

GEOLOGICAL, DRILLING AND COMPLETION REPORT

ON

CANADA SOUTHERN CARNWATH RIVER #1

Located in the Northwest Territories

Co-ordinates:  $67^{\circ} 44' 40''$  North,  $128^{\circ} 47' 53''$  West.

PERMIT #2267 - Northwest Territories


FROM

11 March 1961 to 8 April, 1961

Wellsite Geologist: P. Antonenko  
Drilling Supervisor: A. Moi.

Report Compiled By: P. Antonenko

Certified by:

  
M. A. Reasoner  
Vice President & General Manager.

This report is submitted in compliance with  
the Department of Northern Affairs regulations.

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- F. Detailed Drill Stem Test Reports & Pressure Charts
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ENGINEERING AND DRILLING REPORT

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Plat of Well Location (see attached pocket)

LOGS ACCOMPANYING THIS REPORT (See attached pocket)

- 1. Sample Log.

GEOLOGICAL REPORTA. PERTINENT DATA

Operator: Canada Southern Petroleum Ltd.

Well: Canada Southern Carnwath River #1

Location: Co-ordinates: 67° 44' 40" North Latitude  
128° 47' 53" West Longitude

Elevation: Ground (estimated) 600'  
K. B. (estimated) 608'

Permit No. 2267 Northwest Territories

Contractor: Tri-City Drilling

Spudded: 2:45 p.m. March 11, 1961

Completed Drilling: April 7, 1961

Total Depth: 2308'

Surface Casing: 175.20' of 9-5/8", 36# Range 2 casing  
with 108 sacks of Halliburton cement,  
plus 4% CaCl<sub>2</sub>

Abandonment Plugs:

Plug #1	2000-2308'	with 60 sacks cement
Plug #2	1000-1200'	with 40 sacks cement
Plug #3	930- 830'	with 20 sacks cement
Plug #4	400- 125'	with 55 sacks cement

Rig Released: 1 p.m. April 8, 1961

Status: Dry and Abandoned

B. SUB-SURFACE DATA

<u>Formation</u>	<u>Sample Depth</u>	<u>E-Log Depth</u>	<u>Sub-Sea</u>
Glacial Drift	Surface		
Mid Ramparts Shale	28'		
Lower Ramparts	126'		
Bear Rock	335'		
Siluro-Ordovician	1154'		

TOTAL DEPTH: 2308'

ELEVATION: Ground (est.) 600'  
K. B. (est.) 608'

C. LOGGING DATA

Electrical Logs were not run.

D. SUMMARY OF DRILLSTEM TESTS (Open Hole)

<u>No.</u>	<u>Interval</u>	<u>Formation</u>	<u>Results</u>
1	865 - 890'	Bear Rock	V.O. 45 minutes. Good initial puff, Strong air blow, decreasing slowly becoming weak in 1/2 hour, dead in 40 minutes. Shut In 30 minutes and 30 minutes. Recovered 610' muddy sulphurous fresh water. HP 410 - 400; FP 110 - 260; SIP 270 - 270.
2	1168 - 1193	Siluro-Ordovician	V. O. 60 minutes, Fair initial puff, weak to moderate air blow, decreasing slightly to end of test. Shut In 30 minutes and 30 minutes. Recovered 550'; 520' sulphurous fresh water 30' mud HP 555 - 555; FP 45 - 235; SIP 390 - 390.
3	2045 - 2070	Siluro-Ordovician	V. O. 60 minutes. Weak initial puff, weak air blow throughout test. Recovered 200' fresh sulphurous water cut mud. HP 1025 - 1025; FP 35 - 120; SIP 780-780.

E. SAMPLE DESCRIPTIONS - by P. Antonenko

<u>From</u>	<u>To</u>	<u>Description</u>
0	10'	<u>Glacial drift</u> ; sand, fine medium grained quartzose, varicolored, rounded quartz and shale grains, some greenish grey waxy shale, calcareous and dark grey argillaceous limestone grains - intermixed with clay.
10'	20'	As above
20'	30'	As above - some greenish grey waxy calcareous shale and argillaceous limestone grains.
<u>TOP MIDDLE RAMPARTS SHALE (HARE INDIAN SHALE) 28'</u>		
30'	40'	<u>Shale</u> ; Grey to olive green, occasionally maroon, calcareous in part, silty, interbedded lenses of buff to grey limestone, in part micaceous, occasional black spores, some round quartz grains (from above)
40'	50'	<u>Shale</u> ; grey to green grey, occasionally maroon, silty, calcareous, in part micaceous, interbedded with limestone, grey to dark green to buff, in part argillaceous, in part finely crystalline - some black spores, occasionally brown weathered.
50'	60'	<u>Shale and Limestone</u> ; as above, black spores in fair abundance.
60'	70'	As above; trace pyrite, some white mottling
70'	80'	<u>Shale</u> ; grey to greenish grey to slightly maroon, calcareous in part, slightly silty, trace pyrite, some black spores, in part micaceous, some lenses of grey to brown, fine crystalline, argillaceous limestone.
80'	90'	As above; also some dark grey to dark brown shale, some pyrite, black spores in fair abundance.
90'	100'	As above; pyritic, trace fossils in shale becoming slightly darker.
100'	110'	<u>Shale</u> ; As above, some cavings (poor sample) trace fossils.
110'	120'	As above; darker brownish shales increasing.
120'	130'	<u>Limestone</u> ; grey, in part light brown, fine-micro-crystalline, dense, argillaceous fossils in parts, some micro fossils, brackish and coral fragments.
<u>TOP LOWER RAMPARTS LIMESTONE: 126'</u>		
130'	140'	As above, trace pyrite, calcite crystals, trace spores, some grey micaceous, slightly calcareous shale.
140'	150'	As above, some fossil fragments trace spores, interbedded with grey very slightly calcareous shale.

E. Sample Descriptions by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
150'	160'	<u>Limestone</u> ; as above, interbedded with 50% grey silty very slightly calcareous shale, some fossil fragments (brachiopods) some pyrite.
160'	170'	As above
170'	180'	As above
180'	190'	<u>Shale</u> ; grey, slightly calcareous, hackly, micro-micaceous, some interbedded limestone, argillaceous, grey, trace fossils, dense, micro-crystalline.
190'	200'	<u>Shale</u> ; as above, interbedded with light brown fine crystalline limestone, trace fossils, dense, argillaceous, 70% shale, 30% limestone.
200'	210'	<u>Limestone</u> and <u>Shale</u> ; as above 50-50
210'	220'	<u>Limestone</u> ; light brown, fine micro-crystalline, argillaceous in part, dense, occasional fossil fragments; occasional calcite crystals, interbedded with grey, slightly silty, micro-micaceous shale, occasional quartz crystals (some contamination from shoe)
220'	230'	<u>Limestone</u> ; as above, trace fossil fragments, trace pyrite, 15% shale as above.
230'	240'	<u>Limestone</u> ; as above, up to 25% shale as above
240'	250'	As above
250'	260'	<u>Limestone</u> ; light brown to buff, fine to micro-crystalline, in part argillaceous, dense, occasional fossil fragments, dense, interbedded with grey to greenish grey micro-micaceous, slightly calcareous shale, trace pyrite, Shale 20-30%.
260'	270'	As above - Shale 30-40%
270'	280'	As above.
280'	290'	<u>Limestone</u> ; light brown to buff, fine micro-crystalline, argillaceous in part, trace fossils, occasional calcite crystals no visible porosity, interbedded with grey to slightly greenish grey in part, micro-micaceous, slightly calcareous shale - 20%.
290'	300'	As above, in part pyritic.
300'	310'	As above, Shale about 50%
310'	320'	As above, Shale 30-40% slightly pyritic, trace fossil fragments.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
320'	330'	As above
330'	340'	<u>Limestone</u> ; brown to light brown, fine, crypto-crystalline, in part argillaceous, flaky cleavage, dense, minor amounts of shale as above.
340'	350'	As above; 10% grey shale
		<u>TOP BEAR ROCK: 335'</u>
350'	360'	<u>Limestone</u> ; brown to light brown, very fine crystalline, slightly argillaceous, no visible porosity, part dolomitic; minor grey shale, rare trace fossil fragments, occasional calcite crystals, trace pyrite.
360'	370'	As above
370'	380'	<u>Limestone</u> ; light brown to brown to some dark brown, fine crystalline, argillaceous in part, no visible porosity, some grey shale as above, also some dark brown to black slightly calcareous shale, trace pyrite, rare trace fossil fragments, occasional calcite crystals.
380'	390'	As above
390'	400'	<u>Limestone</u> ; as above, very minor amounts grey shale.
400'	410'	As above; occasional calcite crystals, no visible porosity.
410'	420'	As above.
420'	430'	As above.
430'	440'	<u>Limestone</u> ; light brown to buff, fine to micro-crystalline, dense, in part argillaceous, in part dolomitic, trace pyrite, minor grey shale.
440'	450'	<u>Limestone</u> ; as above, light brown to brown, trace stylolite.
450'	460'	As above - trace grey shale.
460'	470'	As above, some grey to dark grey waxy shale partings.
470'	480'	<u>Limestone</u> ; light brown to brown, fine to micro-crystalline, argillaceous in part, dense, appears to be non fossiliferous as above, in part dolomitic, some minor grey shale partings.
480'	490'	As above.

E. Sample Descriptions - By P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
490'	500'	As above, mainly light brown to buff.
500	510'	As above
510'	520'	As above
520'	530'	As above, trace greenish grey shale.
530'	540'	As above
540'	550'	As above, trace pellets.
550'	560'	<u>Limestone</u> : as above, in part crypto-crystalline, in part dolomitic, trace of grey shale.
560'	570'	As above, some greenish grey shale partings
570'	580'	As above
580'	590'	As above
590'	600'	As above, trace pyrite.
600'	610'	As above, minor grey-green to dark grey, slightly calcareous shale.
610'	620'	As above
620'	630'	As above
630'	640'	As above (Lost circulation at 635' for 12 hours).
640'	650'	<u>Limestone</u> : brown to grey brown, fine micro-crystalline, in part dolomitic, argillaceous, dense, some dark grey argillaceous partings, non fossiliferous trace grey shale (poor sample - lost circulation material).
650'	660'	As above, in part crypto-crystalline.
660'	670'	As above, some fluorescence, but assume contamination from surface.
670'	680'	<u>Limestone</u> ; as above, dense argillaceous (some rough drilling indicating broken formation)
680'	690'	As above, occasional stylolite.
690'	700'	<u>Limestone</u> ; as above, dense, trace grey green waxy shale.
700'	710'	As above
710'	720'	As above, trace pyritic grey green shale.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
720'	730'	<u>Limestone</u> : as above, trace calcite crystals (calcite lined fracture)
730'	740'	<u>Limestone</u> : as above, some green grey shale partings, also traces of dark grey to grey micaceous shale.
740'	750'	<u>Limestone</u> : brown to grey, fine micro crypto-crystalline argillaceous in parts, dense, in part dolomitic, trace pyrite and occasional dark grey to black shale partings (stylolite?)
750'	760'	As above
760'	770'	As above, trace grey green shale.
770'	780'	As above, trace brown granular dolomite, some calcareous black shale (stylolites?) partings, also some greenish grey shale.
780'	790'	<u>Limestone</u> : as above
790'	800'	<u>Limestone</u> : light brown to grey, fine micro-crystalline, in part argillaceous, dense, in part dolomitic, some argillaceous partings.
800'	810'	<u>Limestone</u> : as above, more argillaceous, some green grey shale partings
810'	820'	As above
820'	830'	As above
830'	840'	As above, in part crypto-crystalline.
840'	850'	As above, some light brown granular dolomite.
850'	860'	As above.
860'	870'	<u>Limestone</u> : as above, dense.
870'	880'	<u>Dolomite</u> : grey to light brown, fine crystalline in part, dense, also light brown, granular dolomite with poor to fair inter granular porosity in parts. (Drilling break at 880-885 from 12-14 minutes per foot.
885'	(Circ. Sample)	<u>Dolomite</u> : light brown fine crystalline, some fair to poor, inter-crystalline and micro vuggy porosity, some dense.
885'	890'	<u>Dolomite</u> : as above, some pyrobitumen, occasional vugular and some poor porosity, inter-crystalline and micro vugular.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
890'	900'	<u>Limestone</u> : light brown, fine micro-crystalline, dense, trace grey granular shale partings, in part dolomitic, interbedded with some dolomite as above.
900'	910'	As above, pyritic in part.
910'	920'	As above.
920'	930'	<u>Mainly Limestone</u> : as above.
930'	940'	<u>Limestone</u> : light brown to buff, fine micro-crystalline, dense, occasional trace of pin-point porosity, some pyrobitumen, some green grey shale partings, some grace granular dolomite.
940'	950'	<u>Limestone</u> : light brown to buff, very fine crystalline, rare trace porosity and pyrobitumen, trace shale, grey green, slightly calcareous.
950'	960'	<u>Limestone</u> : light brown to grey, fine micro-crystalline, dense, argillaceous in part, trace pyrite, trace greenish calcareous shale partings.
960'	970'	<u>Limestone</u> : as above, also abundant calcareous pellets or pebbly material imbedded in greenish grey calcareous shale matrix.
970'	980'	<u>Limestone</u> : as above, trace pellets as above.
980'	990'	<u>Limestone</u> : as above, somewhat chalky, some greenish grey calcareous shale, with calcareous pebbly material imbedded.
990'	1000'	<u>Limestone</u> : light brown to buff, fine micro-crystalline, appears chalky in part, dense, trace stylolite, trace grey green calcareous shale.
1000'	1010'	As above.
1010'	1020'	As above.
1020'	1030'	<u>Limestone</u> : light brown to light grey, fine crystalline, dense, trace pyrobitumen.
1030'	1040'	As above, in part chalky, trace calcite crystals, minor grey green calcite shale partings.
1040'	1050'	As above, Limestone.
1050'	1060'	<u>Dolomite</u> : grey brown, fine to medium crystalline, some scattered poor pin point porosity, some pyrobitumen, some limestone as above.
1060'	1070'	<u>Limestone</u> : grey brown, dolomitic, fine medium crystalline, dense, trace poor pin point porosity.

## E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1070'	1080'	<u>Dolomite and Limestone</u> : light brown fine micro-crystalline, dense, rare trace pin point porosity, trace calcareous grey green shale, trace calcite filled fractures.
1080'	1090'	<u>Limestone</u> : light brown and dolomitic as above, rare traces of poor pin point porosity, traces of grey green calcareous shale, some light granular dolomite.
1090'	1100'	<u>Limestone</u> : grey brown, fine micro-crystalline, argillaceous, dense, trace bituminous material.
1100'	1110'	As above.
1110'	1120'	<u>Limestone</u> : grey brown, fine crystalline, in part dolomitic, argillaceous in part dense.
1120'	1130'	As above.
1130'	1140'	As above, in part micro-crystalline.
1140'	1150'	<u>Limestone</u> : as above, trace coarsely crystalline dolomite, light brown, some fractures.
		<u>SILURO-ORDOVICIAN</u> : 1154'
1150'	1160'	<u>Dolomite</u> : grey to dark grey in part, finely crystalline, rare trace pin point poor porosity, some idiomorphic dolomite crystals infilled vugs or fractures, argillaceous.
1160'	1170'	<u>Dolomite</u> : grey brown, in part light brown, fine crystalline, in part micro-granular, slightly argillaceous, scattered poor pin point inter-crystalline and micro vugular porosity, traces fair porosity, some dolomite crystals as above.
1170'	1180'	<u>Dolomite</u> : light grey to buff, fine crystalline to micro granular, scattered poor pin point porosity, trace fair inter-crystalline porosity.
1180'	1190'	<u>Dolomite</u> : grey brown, argillaceous, slightly silty, micro-granular, some calcite lines fractures, occasional scattered poor pin point porosity.
1190'	1200'	<u>Dolomite</u> : light grey to off white, finely crystalline to micro granular, occasional calcite crystals, scattered inter-crystalline and micro vugular porosity, poor, traces fair.
1200'	1210'	<u>Dolomite</u> : medium grey to grey brown, fine crystalline to micro granular, argillaceous trace poor pin point porosity, trace white dolomite as above.
1210'	1220'	<u>Dolomite</u> : light brown to grey - otherwise as above.

E. Sample Descriptions - by P. Antonenko (Cont'd)

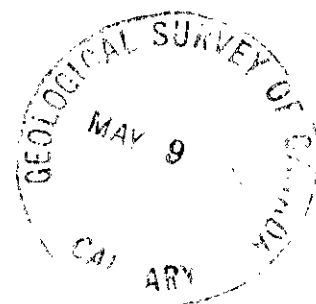
<u>From</u>	<u>To</u>	<u>Description</u>
1220'	1230'	<u>Dolomite</u> : light brown to buff, fine crystalline, trace poor micro-vuggy porosity, some calcite lining, trace disseminated pyrite.
1230'	1240'	<u>Dolomite</u> : grey to dark grey, fine crystalline to micro-granular, argillaceous, some calcite lined fractures, trace calcite veining, slightly limey in part, dense.
1240'	1250'	<u>Dolomite</u> : grey to brown, fine to medium crystalline, some scattered poor micro-vugular porosity, some calcite inclusions, slightly argillaceous, some micro-granular dolomite.
1250'	1260'	<u>Dolomite</u> : grey brown, mottled, coarsely crystalline, calcitic in part, scattered poor inter crystalline porosity, trace fair porosity, also limestone as above.
1260'	1270'	As above, fine to coarsely crystalline, traces of fair inter-crystalline porosity.
1270'	1280'	<u>Dolomite</u> : grey brown to medium grey, finely crystalline to medium crystalline, scattered poor to fair inter-crystalline porosity, some calcite crystals (Red stain due to overheating sample), slightly silty, very slightly argillaceous.
1280'	1290'	<u>Dolomite</u> : as above, occasional poor inter-crystalline porosity
1290'	1300'	As above.
1300'	1310'	<u>Dolomite</u> : grey to grey brown, fine to medium crystalline, slightly argillaceous, some calcite lined fractures, occasional calcite crystals, rare trace poor inter-crystalline porosity.
1310'	1320'	As above.
1320'	1330'	As above, scattered poor porosity.
1330'	1340'	<u>Dolomite</u> : as above, finely crystalline, mainly dense.
1340'	1350'	As above, trace calcite vugs.
1350'	1360'	<u>Dolomite</u> : light brown to grey, finely crystalline, in part micro granular, traces of inter-crystalline porosity, some calcite lined vugs.
1360'	1370'	As above, poor to fair inter-crystalline porosity, mostly medium grey.
1370'	1380'	As above - mainly dense.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1380'	1390'	As above, in part sucrose, abundant calcite crystals, occasional poor inter-crystalline porosity, argillaceous in part.
1390'	1400'	As above, calcite filled vugs and fractures.
1400'	1410'	As above, mainly dense.
1410'	1420'	<u>Dolomite</u> : light brown to buff, fine to micro-crystalline, traces poor inter-crystalline porosity, occasional micro vugular scattered calcite crystals.
1420'	1430'	As above: in part medium grey, fine to medium crystalline, scattered poor porosity.
1430'	1440'	As above, trace poor porosity.
1440'	1450'	<u>Dolomite</u> : light grey to buff, finely crystalline, trace poor inter-crystalline porosity, minor medium grey, slightly argillaceous, medium crystalline dolomite.
1450'	1460'	As above, becoming darker.
1460'	1470'	<u>Dolomite</u> : medium grey, in part dark grey, medium crystalline, slightly argillaceous, trace poor inter-crystalline porosity, occasionally micro-vugular, trace calcite crystals.
1470'	1480'	As above.
1480'	1490'	<u>Dolomite</u> : grey-brown, finely crystalline, calcite veining and calcite infilled vugs, trace porosity.
1490'	1500'	<u>Dolomite</u> : grey to light brown, finely crystalline, trace calcite, trace micro-vugs.
1500'	1510'	<u>Dolomite</u> : grey brown, slightly argillaceous, fine to medium crystalline, occasional trace poor micro-vugular porosity.
1510'	1520'	As above.
1520'	1530'	<u>Dolomite</u> : grey, fine to medium crystalline, abundant calcite crystals, some poor inter-crystalline porosity.
1530'	1540'	<u>Dolomite</u> : light brown to grey, finely crystalline, dense, occasional calcite crystals, rare trace poor pin point porosity.
1540'	1550'	As above.
1550'	1560'	<u>Dolomite</u> : brown grey, fine to coarsely crystalline, slightly argillaceous, scattered poor inter-crystalline porosity, numerous calcite crystals.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1560'	1570'	<u>Dolomite</u> : brown-grey to dark grey - as above.
1570'	1580'	<u>Dolomite</u> : light brown to buff, fine to micro-crystalline, rare trace poor inter-crystalline porosity.
1580'	1590'	<u>Dolomite</u> : light grey to dark grey, fine crystalline, hard dense, slightly argillaceous, occasionally micro-wugular.
1590'	1600'	As above, (This sample is contaminated with pipe dope).
1600'	1610'	<u>Dolomite</u> : light grey, finely crystalline, dense, in part micro-granular.
1610'	1620'	As above.
1620'	1630'	As above; trace calcite lined fractures.
1630'	1640'	As above; dense.
1640'	1650'	As above.
1650'	1660'	As above, trace disseminated pyrite.
1660'	1670'	<u>Dolomite</u> : as above
1670'	1680'	<u>Dolomite</u> : as above, in part micro granular, slightly pyritic, slightly argillaceous, dense.
1690'	1690'	As above.
1690'	1700'	As above.
1700'	1710'	As above, trace calcite crystals, in part limey.
1710'	1720'	<u>Dolomite</u> : light grey to grey fine crystalline, in part limey, some calcite veining, dense.
1720'	1730'	As above.
1730'	1740'	As above, slightly argillaceous, trace pyrite.
1740'	1750'	As above, in part pyritic.
1750'	1760'	<u>Dolomite</u> : light grey micro-granular, in part fine crystalline, dense, some disseminated pyrite.
1760'	1770'	<u>Dolomite</u> : light grey, fine crystalline to micro-granular, dense, trace calcite.
1770'	1780'	As above, trace pyrite.



E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1780'	1790'	As above, in part light brown.
1790'	1800'	As above.
1800'	1810'	<u>Dolomite</u> : light grey, finely crystalline, dense, in part limy, trace calcite.
1810'	1820'	As above.
1820'	1830'	As above, trace pyrite, slightly silty.
1830'	1840'	As above.
1840'	1850'	<u>Dolomite</u> : light grey to medium grey, fine to micro-crystalline, dense, trace calcite.
1850'	1860'	As above.
1860'	1870'	<u>Dolomite</u> : grey to brown grey, finely crystalline to micro-crystalline, dense slightly silty, slightly argillaceous.
1870'	1880'	As above.
1880'	1890'	Grey and brown, dolomite, as above, in part micro-granular, dense, some disseminated pyrite.
1890'	1900'	<u>Dolomite</u> : grey to brown, fine crystalline, dense, some calcite veining, slightly argillaceous, trace pyrite.
1900'	1910'	As above.
1910'	1920'	<u>Dolomite</u> : as above, fine crystalline to micro-crystalline, slightly silty in part argillaceous.
1920'	1930'	<u>Dolomite</u> : as above, also some dark brown dolomitic shale, slightly silty, trace of green calcareous shale, waxy, occasional pyrite, some calcite veins and calcite lined fractures.
1930'	1940'	<u>Dolomite</u> : grey-brown, finely crystalline, dense, some calcite veining, trace green shale, occasional calcite crystals.
1940'	1950'	<u>Dolomite</u> : as above, slightly argillaceous.
1950'	1960'	As above, in part micro-granular.
1960'	1970'	<u>Dolomite</u> : brown, finely crystalline, trace micro-granular, dense, trace micro-vugular, calcite veining common, some grey dolomite as above.
1970'	1980'	As above, some grey green calcite waxy shale partings.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1980'	1990'	<u>Dolomite</u> : grey-brown, fine to micro-crystalline, slightly argillaceous, slightly silty, dense, trace pyrite, minor dark brown, dolomitic shale.
1990'	2000'	<u>Dolomite</u> : brown, finely crystalline, dense, some pyrite, traces of grey green dolomitic shale.
2000'	2010'	As above (this sample badly contaminated with pipe dope after trip).
2010'	2020'	<u>Dolomite</u> : grey to grey brown, fine-medium crystalline, dense, some calcite veining, trace pyrite, traces of grey green shale as above.
2020'	2030'	<u>Dolomite</u> : grey-brown, finely crystalline, dense, slightly argillaceous.
2030'	2040'	As above: some light brown dolomite, occasional calcite crystals, some calcite veining.
2040'	2050'	As above, some pyrite.
2050'	2060'	<u>Dolomite</u> : light brown, coarsely crystalline, calcite crystals common, some scattered poor inter-crystalline porosity.
2060'	2070'	<u>Dolomite</u> : as above, trace pyrite, scattered trace poor inter-crystalline porosity.
2070'	2080'	<u>Dolomite</u> : coarsely crystalline, light brown, as above - rare trace of poor inter-crystalline porosity, some calcite.
2080'	2090'	<u>Dolomite</u> : grey to light brown, medium coarsely crystalline, in part slightly argillaceous, some calcite veining and calcite infilled fractures, occasional dolomite crystal, rare trace poor inter-crystalline porosity.
2090'	2100'	As above, some scattered clear quartz crystals, trace green dolomitic shale.
2100'	2110'	<u>Dolomite</u> : light brown to brown, coarsely crystalline, trace poor inter-crystalline porosity, abundant coarse grained clear quartz crystals and white dolomite crystals, in part dolomitic quartz sandstone, trace pyrite.
2110'	2120'	<u>Dolomite</u> : as above, in part silicious, scattered quartz crystals, also clusters of quartz with inter-crystalline porosity, poor; traces of white chert nodules and fragments, scattered poor inter-crystalline porosity, some disseminated pyrite, numerous white dolomite crystals, some calcite.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
2120'	2130'	<u>Dolomite</u> : light grey to light brown, coarsely crystalline, silicious, some calcite and abundant white dolomite crystals, trace chert and pyrite, scattered poor inter-crystalline porosity.
2130'	2140'	<u>Dolomite</u> : light brown, medium to coarse crystalline, silicious in part, scattered poor inter-crystalline porosity, well formed white dolomite crystals abundant, some clear quartz crystals, trace pyrite.
2140'	2150'	As above.
2150'	2160'	<u>Dolomite</u> : grey to light brown to white crystals, silicious, numerous intermixed well developed quartz crystals, some acicular quartz; scattered poor inter-crystalline porosity, some pieces fair porosity.
2160'	2170'	<u>Dolomite</u> : light grey to buff, fine crystalline, in small part coarsely crystalline as above, dense, trace calcite and calcite lined fractures.
2170'	2180'	<u>Dolomite</u> : light grey to light brown, fine to medium crystalline, silicious in part, abundant rhombic dolomite crystals intermixed with some clear quartz crystals, some scattered traces of poor porosity. Large crystals appear to be part of infilled vugulars or fractures.
2180'	2190'	As above.
2190'	2200'	<u>Dolomite</u> : light grey to grey to dark grey, fine to medium crystalline, slightly silicious, hard, in part argillaceous, some light brown coarse crystalline, dense, some quartz crystals and white dolomite crystals, trace calcite.
2200'	2210'	As above: trace soft green dolomite shale.
2210'	2220'	<u>Dolomite</u> : grey to dark grey, fine crystalline, slightly silicious, hard, argillaceous in part, dense, some white dolomite crystals, trace pyrite.
2220'	2230'	As above: some calcite veining, in part brown, medium to coarse crystalline.
2230'	2240'	As above: trace green shale partings.
2240'	2250'	<u>Dolomite</u> : light grey to buff, medium to coarsely crystalline, dense, occasional isolated vugular scattered white dolomite crystals, occasional quartz crystals, trace pyrite.
2250'	2260'	As above.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
2260'	2270'	As above, in part white dolomite, micro-granular occasional isolated vugular.
2270'	2280'	As above.
2280'	2290'	As above, dense, also some grey to dark grey dolomite, fine to medium crystalline, slightly argillaceous, silicious in parts, some intermixed quartz crystals.
2290'	2300'	<u>Dolomite</u> : light grey to brown to dark grey, fine to medium crystalline, slightly silicious, some calcite veining and infilling, some isolated vugulars infilled with dolomite crystals, some intermixed quartz crystals.
2300'	2308'	As above.


TOTAL DEPTH: 2308'





**Your.....**

***Formation Testing Service Report***

Initial Closed In Time 30 Minutes			Date March 21, 1961	
Tool Open 1st 4 / 2nd 45 Minutes			Ticket No. T4418	
Final Closed In Time 30 Minutes			HOWCO DISTRICT Edmonton	
Depth Top Gauge 847 Ft. Blanked Off No			Kind of Job Dual bottom hole	
BT. P.R.D. No 738 12 Hr. Clock		CONTRACTOR Tri City Drilling		
Pressure Readings Field Office Corrected		HOLE & TOOL DATA		
Initial Hydro Mud Pressure 375 379		Elevation 600' (EST.) Top Packer Depth 850'		
Initial Closed in Pres. 270 252		Total Depth 890' Bottom Packer Depth 865'		
Initial Flow Pres. 95 77		Casing or Hole Size 6 1/2" Size & Type Wall Packer 5 1/2" SEWP		
Final Flow Pres. 250 247		Liner or Rathole Size - Size Bottom Choke 5/8"		
Final Closed in Pres. 270 252		Casing Perforations Top Bottom Size Surface Choke nil		
Final Hydro Mud Pressure 375 376		Interval Tested 865' - 870' ID & Length Air Chamber -		
Depth Center Gauge Ft. Blanked Off		Formation Tested Bear Rock ID & Length Drill Collars 2" x 455'		
BT. P.R.D. No Hr. Clock		Est. Gauge Depth Temp. F° Size Drill Pipe 3 1/2" I.F.		
Pressure Readings Field Office Corrected		MUD DATA Weight 9.0 Viscosity 55		
Initial Hydro Mud Pressure		All depths measured from Kelly Bushing No. Folders Reproduced 5		
Initial Closed in Pres.		REMARKS: Open tool on bottom at 12:28 with		
Initial Flow Pres.		good initial blow. Close tool for initial		
Final Flow Pres.		CIP at 12:32. Open for test at 1:02 with good		
Final Closed in Pres.		air blow, dying off in 40 minutes. Shut in		
Final Hydro Mud Pressure		for final CIP at 1:47. Pull loose at 2:17		
Depth Bottom Gauge 387 Ft. Blanked Off Yes		with 5000 pounds.		
BT. P.R.D. No 367 12 Hr. Clock				
Pressure Readings Field Office Corrected				
Initial Hydro Mud Pressure 410 397				
Initial Closed in Pres. 270 260		Recovered 610 Feet of Muddy sulphurous		
Initial Flow Pres. 110 92		Recovered Feet of water		
Final Flow Pres. 260 255		Recovered Feet of		
Final Closed in Pres. 270 260		Recovered Feet of		
Final Hydro Mud Pressure 400 334		Witnessed By A Moi		
Amount-Type of Cushion nil		Tester L. Jewitt		

LOCATION 126-47-52 N

FIELD

CONVEX N.O.T.

Country  
STATEX Canada

CANADA SOUTHERN CANADIAN RIVER #1  
LEASE NAME 17-44-40 N  
WELL NO. #1  
TEST NO. #1  
OWNERS DISTRICT CALGARY

	Time	PSI							
Initial Hydro Mud Pressure	-	379	Ticket No. 4418						
1st	Initial Flow	-	11	Canada Southern					
	Final Flow	4 minutes	66	Lease Carnwath River					
Initial Closed In Pressure	30 minutes	252	Well No. 1 Test No. 1						
2nd	Initial Flow	-	77	BT No. 738 Depth 847'					
	Final Flow	45 minutes	247	12 Hr. Clock No. 3322					
Final Closed In Pressure	30 minutes	252	Temperature Corrected to 100 ° F						
Final Hydro Mud Pressure		376							
1st Flow Pressure		Initial CIP		2nd Flow Pressure		Final CIP			
	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	
P0	.000	11	.0000	66	.000	77	.0000	247	
P1	.006	11	.0215	252	.102	210	.0215	252	
P2	.012	25	.0430	252	.204	238	.0430	252	
P3	.018	44	.0645	252	.306	247	.0645	252	
P4	.024	66	.0860	252			.0860	252	
P5			.1075	252			.1075	252	
P6			.1290	252			.1290	252	
P7			.1505	252			.1505	252	
P8			.1720	252			.1720	252	
P9			.1935	252			.1935	252	
P10			.2150	252			.2150	252	
	1	Minute Intervals	3	Minute Intervals	15	Minute Intervals	3	Minute Intervals	

Remarks:

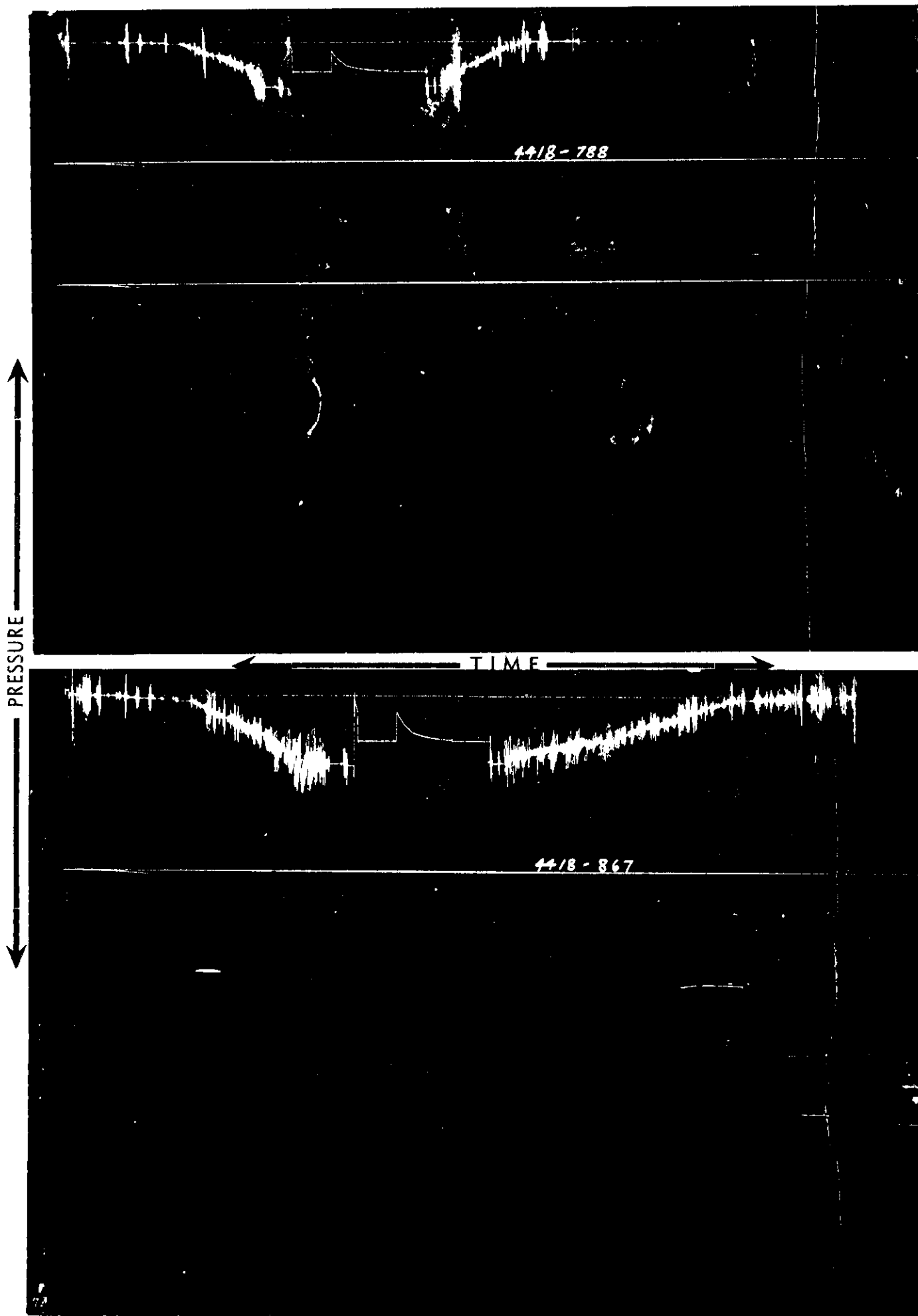
Company CANADA SOUTHERN PETROLEUM LIMITED Date March 21, 1961

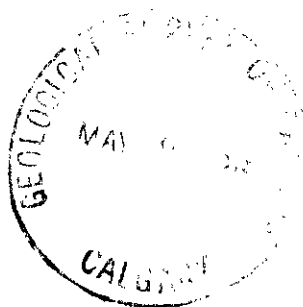
		<b>Time</b>	<b>PSI</b>	Ticket No. <u>4418</u> Canada Southern Carwath River Lease Well No. <u>1</u> Test No. <u>1</u> BT No. <u>867</u> Depth <u>387'</u> <u>12</u> Hr. Clock No. <u>2997</u> Temperature Corrected to <u>100</u> ° F				
Initial Hydro Mud Pressure		-	387					
1st	Initial Flow	-	30					
	Final Flow	4 minutes	80					
Initial Closed In Pressure		30 minutes	260					
2nd	Initial Flow	-	92					
	Final Flow	45 minutes	255					
Final Closed In Pressure		30 minutes	260					
Final Hydro Mud Pressure			384					

	1st Flow Pressure		Initial CIP		2nd Flow Pressure		Final CIP	
	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.
PO	.000	30	.000	80	.000	92	.000	255
P1	.004	46	.020	260	.101	218	.021	260
P2	.008	59	.040	260	.202	245	.042	260
P3	.012	69	.060	260	.303	255	.063	260
P4	.016	80	.080	260			.084	260
P5			.100	260			.105	260
P6			.120	260			.126	260
P7			.140	260			.147	260
P8			.160	260			.168	260
P9			.180	260			.189	260
P10			.200	260			.210	260
	1	Minute Intervals	3	Minute Intervals	15	Minute Intervals	3	Minute Intervals

Remarks:

HOWCO 1297 RI--BANDEFER





**Your.....**

***Formation Testing Service Report***

CANADA SOUTHERN  
CANADIAN RIVER #1

LEASE NAME

#1  
WELL NO.#2  
TEST NO.CANADA SOUTHERN PETROLEUM LIMITED  
LEASE OWNERCANADIAN  
OWNERS DISTRICT

LOCATION 128-47-53 N

67-44-40 N

FIELD

WILCOAT

COUNTY

Country  
STATE  
Canada

Date March 23, 1961  
Ticket No. T4419  
HOWCO DISTRICT Edmonton  
Kind of Job Dual bottom hole

CONTRACTOR Tri City

## HOLE &amp; TOOL DATA

Elevation 600' Est. Top Packer Depth 1160'  
Total Depth 1193' Bottom Packer Depth 1168'  
Casing or Hole Size 6 1/4" Size & Type Wall Packer 5 1/2" SEWP  
Liner or Rathole Size - Size Bottom Choke 5/8"  
Casing Perforations Top Bottom Size Surface Choke nil  
Interval Tested 1168' - 1193' ID & Length Air Chamber -  
Formation Tested Silurian (?) ID & Length Drill Collars 2" x 45'  
Est. Gauge Depth Temp. - F° Size Drill Pipe 3 1/2" I.F.

MUD DATA  
Weight 9.2 Viscosity 45  
All depths measured from Kelly Bushing No. Folders Reproduced 5

REMARKS: Open tool at 11:51 with fair  
initial blow. Closed for initial shut in at  
11:54. Open tool for test at 12:24 with  
moderate air blow decreasing towards end of  
test. Close in at 1:24. Pull loose with 5000  
pounds at 1:54.

Recovered 30 Feet of Mud  
Recovered 520 Feet of Sulphurous water  
Recovered Feet of  
Recovered Feet of

Witnessed By A. Moi  
Tester D. Jewitt

Initial Closed In Time 30 Minutes  
Tool Open 1st 2nd  
Flow Period 3 60 Minutes  
Final Closed In Time 30 Minutes

Depth Top Gauge 1150 Ft. Blanked Off No

BT. P.R.D. No 867 12 Hr. Clock

Pressure Readings Field Office Corrected

Initial Hydro Mud Pressure 555 545

Initial Closed in Pres. 390 372

Initial Flow Pres. 45 35

Final Flow Pres. 235 236

Final Closed in Pres. 390 372

Final Hydro Mud Pressure 555 542

Depth Center Gauge Ft. Blanked Off

BT. P.R.D. No Hr. Clock

Pressure Readings Field Office Corrected

Initial Hydro Mud Pressure

Initial Closed in Pres.

Initial Flow Pres.

Final Flow Pres.

Final Closed in Pres.

Final Hydro Mud Pressure

Depth Bottom Gauge 1190 Ft. Blanked Off Yes

BT. P.R.D. No 788 12 Hr. Clock

Pressure Readings Field Office Corrected

Initial Hydro Mud Pressure 590 574

Initial Closed in Pres. 410 399

Initial Flow Pres. 65 57

Final Flow Pres. 270 261

Final Closed in Pres. 410 399

Final Hydro Mud Pressure 590 571

Amount-Type of Cushion nil

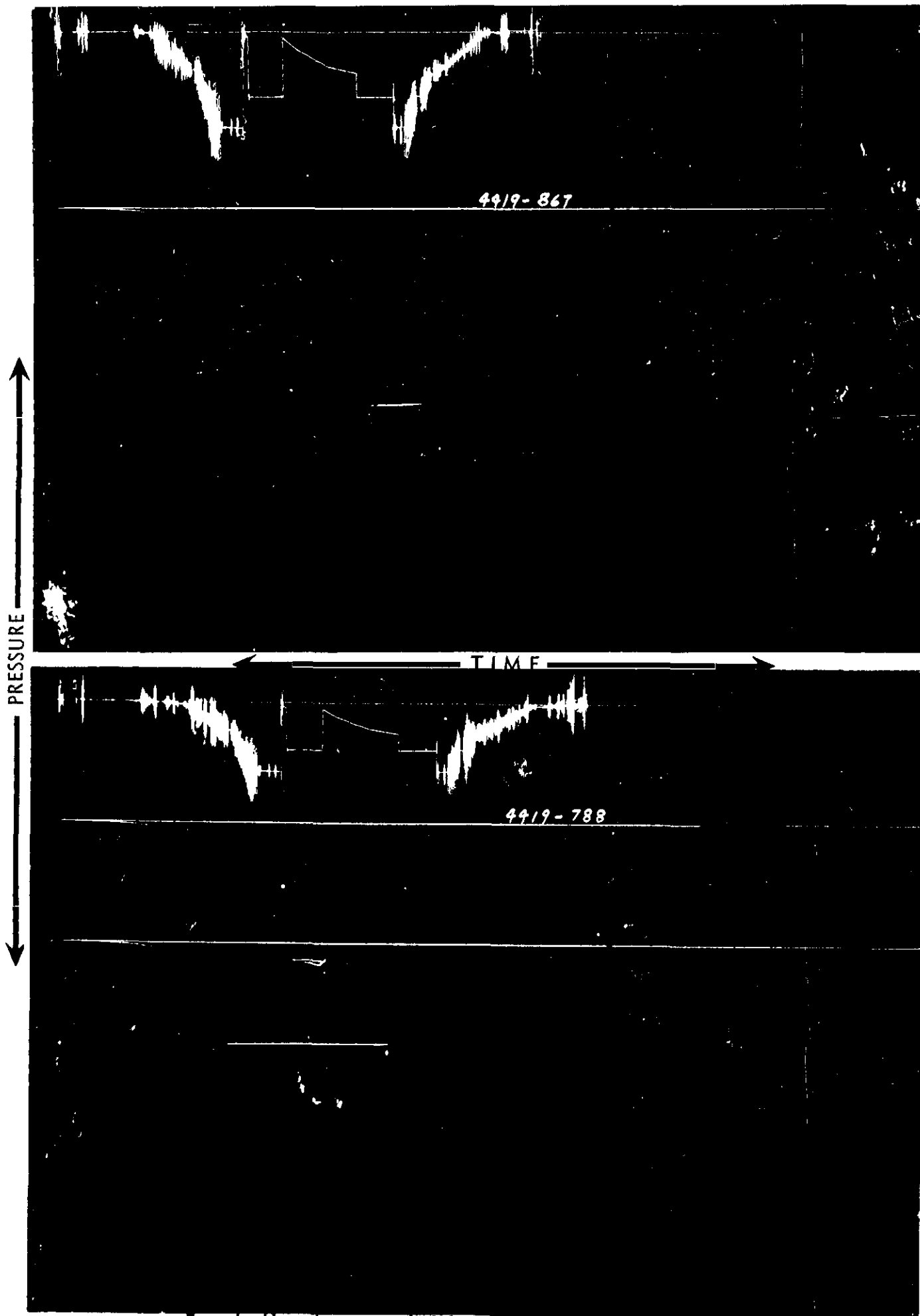
Initial Hydro Mud Pressure		Time	PSI	Ticket No. 4419				
		-	545					
1st	Initial Flow	-	18	Canada Southern Lease Carnwath River				
	Final Flow	3 minutes	34					
Initial Closed In Pressure		30 minutes	372	Well No. 1 Test No. 2				
2nd	Initial Flow	-	35	BT No. 867 Depth 1150'				
	Final Flow	60 minutes	236	12 Hr. Clock No. 2998				
Final Closed In Pressure		30 minutes	372	Temperature Corrected to 100 ° F				
Final Hydro Mud Pressure			542					
1st Flow Pressure			Initial CIP		2nd Flow Pressure		Final CIP	
	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.
P0	.000	18	.000	34	.000	35	.0000	236
P1	.006	21	.019	372	.101	113	.0205	372
P2	.012	27	.038	372	.202	169	.0410	372
P3	.018	34	.057	372	.303	210	.0615	372
P4			.076	372	.404	236	.0820	372
P5			.095	372			.1025	372
P6			.114	372			.1230	372
P7			.133	372			.1435	372
P8			.152	372			.1640	372
P9			.171	372			.1845	372
P10			.190	372			.2050	372
	1 Minute Intervals		3 Minute Intervals		15 Minute Intervals		3 Minute Intervals	

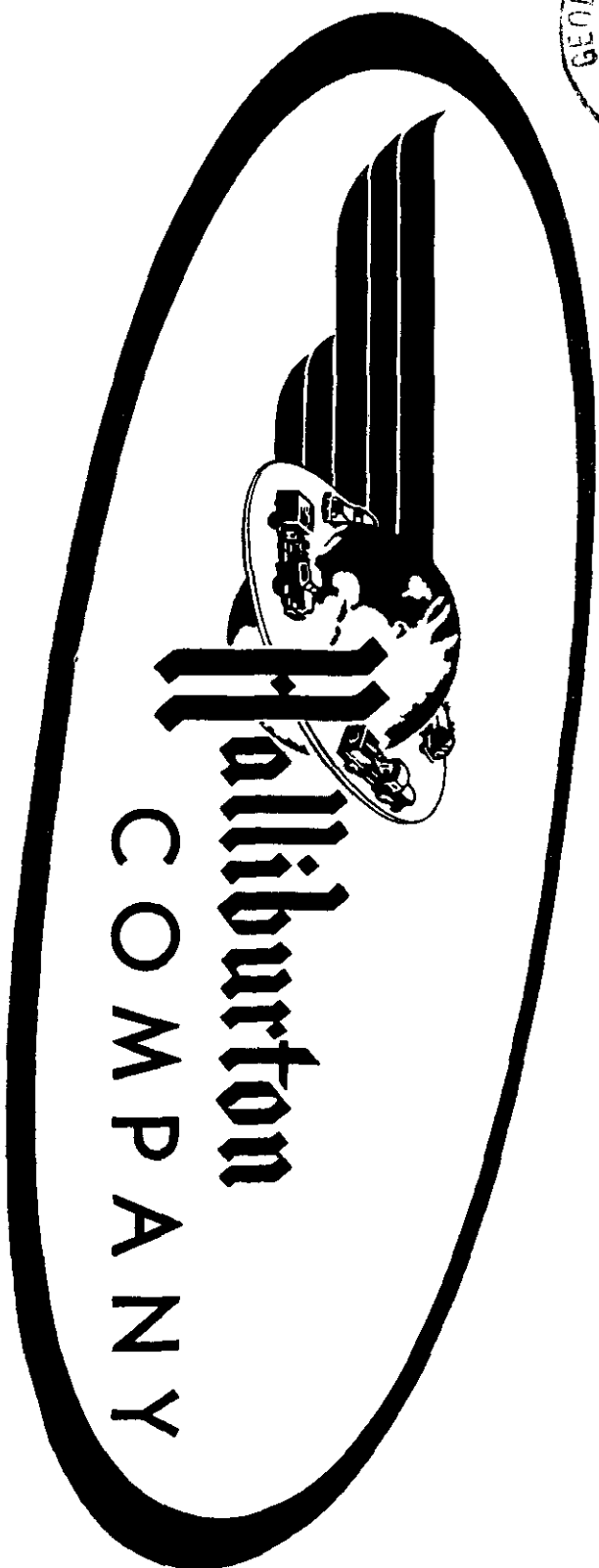
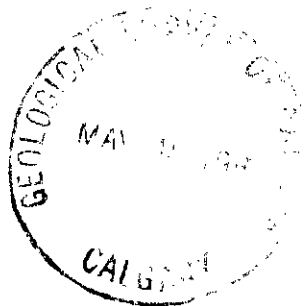
Remarks:

	Time	PSI	Ticket No. 4419  Canada Southern Lease Carnwath River  Well No. 1 Test No. 2  BT No. 788 Depth 1190'  12 Hr. Clock No. 3322  Temperature Corrected to 100 ° F
Initial Hydre Mud Pressure	-	574	
1st	Initial Flow	-	
	Final Flow	3 minutes	
Initial Closed In Pressure	30 minutes	399	
2nd	Initial Flow	-	
	Final Flow	60 minutes	
Final Closed In Pressure	30 minutes	399	
Final Hydre Mud Pressure		571	

	1st Flow Pressure		Initial CIP		2nd Flow Pressure		Final CIP	
	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.
P0	.000	26	.000	49	.000	57	.000	261
P1	.008	34	.019	399	.104	136	.021	399
P2	.016	41	.038	399	.208	193	.042	399
P3	.024	49	.057	399	.312	236	.063	399
P4			.076	399	.416	261	.084	399
P5			.095	399			.105	399
P6			.114	399			.126	399
P7			.133	399			.147	399
P8			.152	399			.168	399
P9			.171	399			.189	399
P10			.190	399			.210	399
	1 Minute Intervals		3 Minute Intervals		15 Minute Intervals		3 Minute Intervals	

Remarks:





**Your.....**

***Formation Testing Service Report***


LEASE NAME

WELL NO.

TEST NO.

LEASE OWNER

OWNERS DISTRICT

Initial Closed In Time 30 Minutes			Date April 3, 1961		LOCATION Carmath River #1
Tool Open 1st 4 / 2nd 60 Minutes			Ticket No. T4420		
Final Closed In Time 30 Minutes			HOWCO DISTRICT Edmonton		
Depth Top Gauge 2025 Ft.		Kind of Job Dual bottom hole			
BT. P.R.D. No 788		12 Hr. Clock		CONTRACTOR Tri City Drilling	
Pressure Readings Field		Office Corrected		HOLE & TOOL DATA	
Initial Hydro Mud Pressure 995		997		Elevation 600' Approx Top Packer Depth 2035'	
Initial Closed in Pres. 755		759		Total Depth 2070' Bottom Packer Depth 2045'	
Initial Flow Pres. 17		12		Casing or Hole Size 6 1/4" Size & Type Wall Packer 5 1/2" SEWP	
Final Flow Pres. 110		104		Liner or Rathole Size - Size Bottom Choke 5/8"	
Final Closed in Pres. 755		761		Casing Perforations Top Bottom Size Surface Choke nil	
Final Hydro Mud Pressure 995		994		Interval Tested 2045' - 2070' ID & Length Air Chamber nil	
Depth Center Gauge Ft.		Blanked Off		Formation Tested Silurian ID & Length Drill Collars 2" x 508'	
BT. P.R.D. No		Hr. Clock		Est. Gauge Depth Temp. 100 F° Size Drill Pipe 3 1/2" I.F.	
Pressure Readings Field		Office Corrected		MUD DATA Weight 9.5 Viscosity 55	
Initial Hydro Mud Pressure				All depths measured from Kelly Pushing No. Folders Reproduced 5	
Initial Closed in Pres.				REMARKS: Open tool with weak air blow.	
Initial Flow Pres.				Close valve for initial CIP. Open for flow	
Final Flow Pres.				with weak air blow throughout test. Close	
Final Closed in Pres.				valve for final CIP. Pull loose at 12:58 with	
Final Hydro Mud Pressure				5000 pounds.	
Depth Bottom Gauge 2066 Ft.		Blanked Off Yes			
BT. P.R.D. No 867		12 Hr. Clock			
Pressure Readings Field		Office Corrected			
Initial Hydro Mud Pressure 1025		1017			
Initial Closed in Pres. 730		773		Recovered 200 Feet of Mud water mixture	
Initial Flow Pres. 35		35		Recovered Feet of	
Final Flow Pres. 120		121		Recovered Feet of	
Final Closed in Pres. 780		773		Recovered Feet of	
Final Hydro Mud Pressure 1015		1010		Witnessed By A. Moi	
Amount-Type of Cushion nil				Tester L. Jewitt	

CANADA  
Company SOUTHERN PETROLEUMS LIMITED

Date April 3, 1961

		Time	PSI					
Initial Hydro Mud Pressure		-	997	Ticket No. 4420				
1st	Initial Flow	-	5	Canada Southern Lease Carnvath River				
	Final Flow	4 minutes	11					
Initial Closed In Pressure		30 minutes	759	Well No. 1 Test No. 3				
2nd	Initial Flow	-	12	BT No. 788 Depth 2028'				
	Final Flow	60 minutes	104	12 Hr. Clock No. 3322				
Final Closed In Pressure		30 minutes	761	Temperature Corrected to 100 ° F				
Final Hydro Mud Pressure			994					
1st Flow Pressure		Initial CIP		2nd Flow Pressure		Final CIP		
	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.
PO	.000	5	.0000	11	.000	12	.000	104
P1	.006	8	.0205	759	.104	37	.021	761
P2	.012	8	.0410	759	.208	60	.042	761
P3	.018	9	.0615	759	.312	83	.063	761
P4	.024	11	.0820	759	.416	104	.084	761
P5			.1025	759			.105	761
P6			.1230	759			.126	761
P7			.1435	759			.147	761
P8			.1640	759			.168	761
P9			.1845	759			.189	761
P10			.2050	759			.210	761
1 Minute Intervals		3	15 Minute Intervals		3 Minute Intervals		Minute Intervals	

Remarks:

HOWARD 1237 RT. SANDEFER

	Time	PSI						
Initial Hydro Mud Pressure	-	1017	Ticket No. 4420					
1st	Initial Flow	-	Canada Southern					
	Final Flow	4 minutes	Lease Carnwath River					
Initial Closed In Pressure		30 minutes	773		Well No. 1 Test No. 3			
2nd	Initial Flow	-	35		BT No. 867 Depth 2066			
	Final Flow	60 minutes	121		12 Hr. Clock No. 2993			
Final Closed In Pressure		30 minutes	773		Temperature Corrected to 100 ° F			
Final Hydro Mud Pressure			1010					
	1st Flow Pressure		Initial CIP		2nd Flow Pressure		Final CIP	
	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.	Time Defl. .000"	PSI Temp. Corr.
P0	.000	29	.000	31	.000	35	.000	121
P1	.005	30	.020	773	.100	57	.020	773
P2	.010	30	.040	773	.200	78	.040	773
P3	.015	31	.060	773	.300	99	.060	773
P4	.020	31	.080	773	.400	121	.080	773
P5			.100	773			.100	773
P6			.120	773			.120	773
P7			.140	773			.140	773
P8			.160	773			.160	773
P9			.180	773			.180	773
P10			.200	773			.200	773
1	Minute Intervals		3	Minute Intervals		15	Minute Intervals	

Remarks:

HOWELL 1237 R1 SANDLEEF

↑  
PRESSURE  
↓

← TIME →

4420 - 768

4420 - 867

Each Horizontal Line Equal to 1000 p.s.i.

## CHEMICAL &amp; GEOLOGICAL LABORATORIES LTD.

Edmonton

Fort St. John

Calgary

## WATER ANALYSIS REPORT

Field **N.W.T.** Well No. **Canada Southern Carnwath River #1**  
 Operator **Canada Southern Petroleum Limited** Date Received **March 24, 1961**  
 Formation \_\_\_\_\_ Depths **865' - 890'**  
 Other pertinent data **Location: 67° 44' 40" N., 128° 47' 53" W., D.S.T. #1**  
**Recovered 610 feet salt water.**

Date **April 11, 1961** Lab. No. **C3714**

## PARTS PER MILLION (MILLIGRAMS PER LITER)

Na + K	Ca	Mg	Fe	SO <sub>4</sub>	Cl	CO <sub>3</sub>	HCO <sub>3</sub>	OH	H <sub>2</sub> S
1,289	82	59	Present	174	1,615		965		

## MILLIGRAM EQUIVALENTS

56.05	4.09	4.85		3.62	45.54		15.83		
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## MILLIGRAM EQUIVALENTS IN PERCENT

43.12	3.15	3.73		2.78	35.04		12.18		
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## Total Solids in Parts per Million

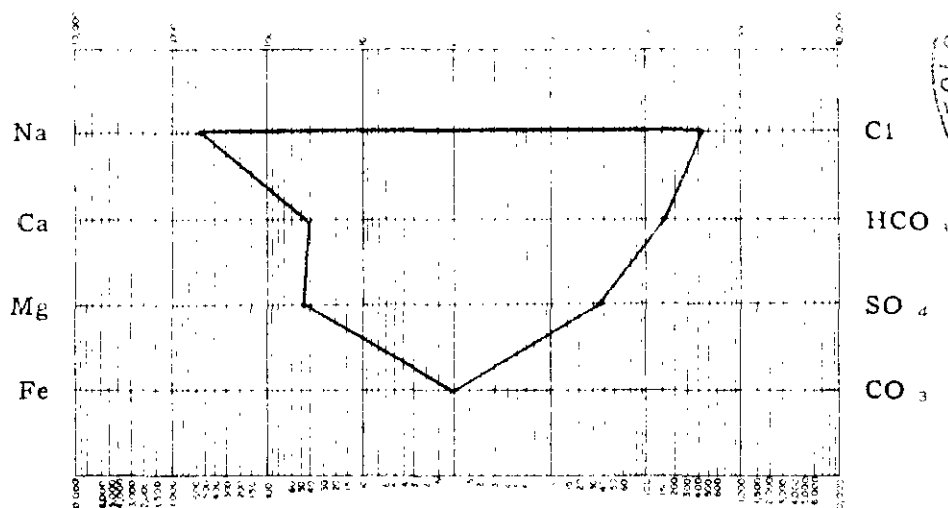
By evaporation **4,600**  
 After ignition **2,070**  
 Calculated **3,694**  
 Specific Gravity **1.006**  
 Observed pH **7.4**  
 Resistivity **1.67** ohm meters @ 68° F.

## Properties of Reaction in Percent

Primary salinity **75.64**  
 Secondary salinity **---**  
 Primary alkalinity **10.60**  
 Secondary alkalinity **13.76**  
 Chloride salinity **92.65**  
 Sulfate salinity **7.35**

Remarks and conclusions **We have no reports on file with which to compare this sample.**

Milligram Equivalents Multiplied by 10 on the graph.

LOGARITHMIC PATTERN  
MEQ per unit

## CHEMICAL &amp; GEOLOGICAL LABORATORIES LTD.

Edmonton

Fort St. John

Calgary

## WATER ANALYSIS REPORT

Field **N.W.T.** Well No. **Canada Southern Carnwath River #1**  
 Operator **Canada Southern Petroleum Limited** Date Received **April 12, 1961**  
 Formation \_\_\_\_\_ Depths **1168' - 1193'**  
 Other pertinent data **Location: 67° 44' 40" N., 128° 47' 53" W., D.S.T. #2, Recovered**  
**550 feet, 520 feet sulp., fresh water and 30 feet mud.**

Date **April 14, 1961**Lab. No. **C3746**

## PARTS PER MILLION (MILLIGRAMS PER LITER)

Na + K	Ca	Mg	Fe	SO <sub>4</sub>	Cl	CO <sub>3</sub>	HCO <sub>3</sub>	OH	H <sub>2</sub> S
1,621	109	83		431	2,245		640		

## MILLIGRAM EQUIVALENTS

70.51	5.44	6.82		8.96	63.31		10.50		
-------	------	------	--	------	-------	--	-------	--	--

## MILLIGRAM EQUIVALENTS IN PERCENT

42.59	3.29	4.12		5.41	38.25		6.34		
-------	------	------	--	------	-------	--	------	--	--

## Total Solids in Parts per Million

By evaporation **5,530**  
 After ignition **3,740**  
 Calculated **4,804**  
 Specific Gravity **1.006**  
 Observed pH **7.5**  
 Resistivity **1.30** ohm meters @ 68° F.

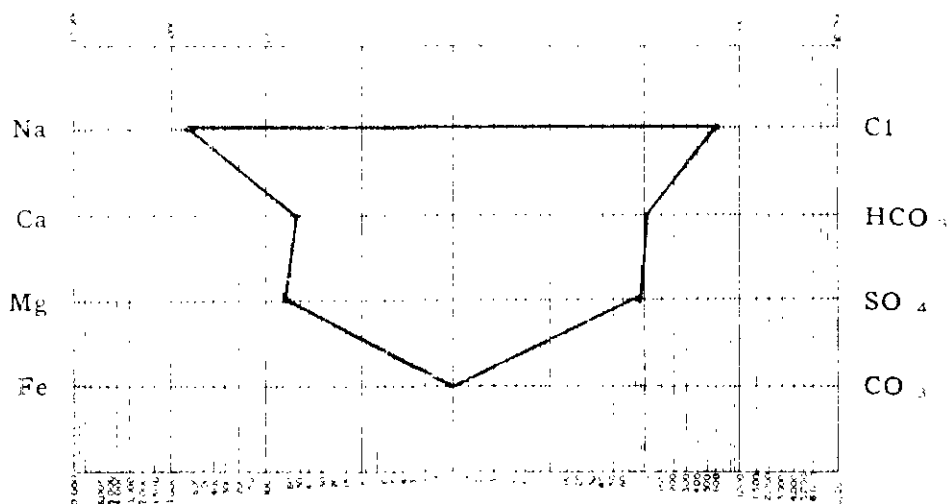
## Properties of Reaction in Percent

Primary salinity **85.18**  
 Secondary salinity **2.14**  
 Primary alkalinity **---**  
 Secondary alkalinity **12.68**  
 Chloride salinity **87.61**  
 Sulfate salinity **12.39**

Remarks and conclusions **We have no analysis in our records from this area with which to compare this sample.**

**Milligram Equivalents Multiplied by 10 on the pattern.**

LOGARITHMIC PATTERN  
 MEQ per unit



## CHEMICAL &amp; GEOLOGICAL LABORATORIES LTD.

Edmonton

Fort St. John

Calgary

## WATER ANALYSIS REPORT

Field **Wildcat Area, N.W.T.** Well No. **Canada Southern Carmath River #1**  
 Operator **Canada Southern Petroleum Limited** Date Received **April 17, 1961**  
 Formation \_\_\_\_\_ Depths **2045' - 2070'**  
 Other pertinent data **D.S.T. #3. Recovered 200 feet fresh water cut mud.**

Date **April 20, 1961**Lab. No. **C3756**

## PARTS PER MILLION (MILLIGRAMS PER LITER)

Na + K	Ca	Mg	Fe	SO <sub>4</sub>	Cl	CO <sub>3</sub>	HCO <sub>3</sub>	OH	H <sub>2</sub> S
1,438	21	38		461	1,590	37	675		

## MILLIGRAM EQUIVALENTS

62.56	1.05	3.12		9.59	44.84	1.23	11.07		
-------	------	------	--	------	-------	------	-------	--	--

## MILLIGRAM EQUIVALENTS IN PERCENT

46.87	0.79	2.34		7.19	33.60	0.92	8.29		
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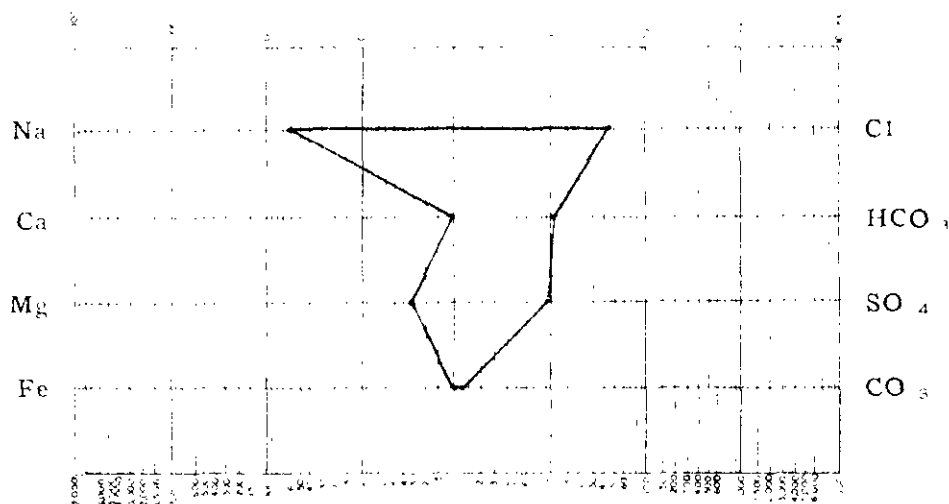
## Total Solids in Parts per Million

By evaporation **4,090**  
 After ignition **3,040**  
 Calculated **3,917**  
 Specific Gravity **1.007**  
 Observed pH **8.4**  
 Resistivity **1.62** ohm meters @ 68° F.

## Properties of Reaction in Percent

Primary salinity **81.58**  
 Secondary salinity **---**  
 Primary alkalinity **12.16**  
 Secondary alkalinity **6.26**  
 Chloride salinity **82.37**  
 Sulfate salinity **17.63**

Remarks and conclusions **No water analysis to compare with on file.**

LOGARITHMIC PATTERN  
MEQ per unit

ENGINEERING & DRILLING REPORTA. SURFACE CASING REPORT

March 11, 1961 to March 14, 1961 - Drilled to 188' with 13 3/4" HT OSC Bit.

March 14, 1961 - Ran 175.20' of 9-5/8" 36# Range 2 casing. Cemented with 108 sacks of Halliburton cement with 4% calcium chloride.

PLUG DOWN - 10 a.m.

Description of Casing String - 9-5/8", 36# Range 2

Halliburton guide shoe	1.20
9-5/8" nipple	3.37
1st Joint	27.30
2nd Joint	30.00
3rd Joint	27.35
4th Joint	27.08
5th Joint	27.42
6th Joint	<u>31.48</u>

175.20'

Landing Joint in 8.50'

Pipe Landed at 183.70' K.B.



B. BIT RECORD

<u>Bit #</u>	<u>Size</u>	<u>Make</u>	<u>Type</u>	<u>Serial</u>	<u>Depth</u> <u>Out</u>	<u>Feet</u>	<u>Hours</u>	<u>Weight</u> <u>1000</u> <u>Pounds</u>	<u>R.P.M.</u>	<u>Pump</u> <u>Pressure</u>	<u>Weight</u> <u>Mad</u>	<u>Viscosity</u>	<u>Remarks</u> <u>Used Eit</u>
1	13-3/4"	H.T.	OSC-3		188	188	148	2 - 6	80	100		45	
2	6-1/4"	H.T.	OSCIG	60397	1442	250	24	6 - 12	80	150	9.1	34	
3	6-1/4"	H.T.	IG	60394	660	218	26-3/4	18	100	200			
4	6-1/4"	H.T.	OSC	69146	815	155	26-1/4	18	100	200			
5	6-1/4"	H.T.	OSC	72657	890	75	9-1/4	18	100	200		55	
6	6-1/4"	H.T.	OWV	23620	1073	183	24	18	100	225			
7	6-1/4"	H.T.	OWV	37219	1193	120	22-1/4	17	100	225			
8	6-1/4"	H.T.	OWV	23612	1273	80	17-1/4	17	100	250			
9	6-1/4"	H.T.	OWS	72181	1357	84	20	17	90	250		50	
10	6-1/4"	H.T.	OWS	72189	1448	91	24	18	80	250		50	
11	6-1/4"	H.T.	OWS	72177	1533	85	22-1/4	18	60	275		55	
12	6-1/4"	H.T.	OWS	72180	1599	66	22-1/4	18	60	200	9.3	70	
13	6-1/4"	H.T.	OWV	75104	1672	73	24	18	60	150	9.2	70	
14	6-1/4"	H.T.	OWV	37235	1749	77	24-1/2	18	60	100			
15	6-1/4"	H.T.	OWV	37195	1824	75	21-1/4	18	60	150	9.3	55	
16	6-1/4"	H.T.	OWS	72166	1921	97	21-3/4	18	80	150	9.3	68	
17	6-1/4"	H.T.	OWS	72157	2009	88	19-1/2	18	80	150	9.4	66	
18	6-1/4"	H.T.	OWS	51348	2070	61	11-1/4	18	80	150	9.5	55	
19	6-1/4"	H.T.	OWV	37272	2146	76	22-3/4	12	70	200			
20	6-1/4"	H.T.	OWS	33610	2198	52	16	12	70	200			
21	6-1/4"	H.T.	OWS	72159	2236	38	17	8	70	200	9.5	53	
22	6-1/4"	H.T.	OWS	72175	2308	72	16	8	70	200			

C. DEVIATION RECORD

<u>Depth</u>	<u>Degrees</u>
130'	1/2
400'	0
890'	1/4
1070'	1/2
1600'	1-3/4
2240'	1-1/2



D. MUD RECORD

<u>Date</u>	<u>Depth</u>	<u>Mud Properties</u>			<u>Filter Cake</u>	<u>Ph</u>	<u>Mud and Chemicals Used</u>
		<u>Wt.</u>	<u>Vis</u>	<u>W.L.</u>			
Mar. 11/61	38'						950# Aquagel
Mar. 12/61	141'	10.5	48				-
Mar. 13/61	186'	10.8	42				-
Mar. 14/61	188'		42				-
Mar. 15/61	272'	8.7	31				1000# Aquagel 100# Bicarb 50# Caustic
Mar. 16/61	401'	9.1	36				1000# Aquagel 25# Caustic
Mar. 17/61	568'	9.4	38				200# Magcogel 250# Poly Gel
Mar. 18/61	638'	) (Lost Circulation)					2700# Aquagel 16 bags Fibreseal 9 bags Bran
Mar. 18/61	660'						8 bags Mil Fibre 7 bags Bran 1 bag Poly Gel 50# Caustic
Mar. 19/61	-						-
Mar. 20/61	890'	9.1					2300# Magcogel 50# Caustic
Mar. 21/61	976'	8.9	48				900# Aquagel 25# Caustic
Mar. 22/61	1125'	9	46				400# Aquagel
Mar. 23/61	1228'	9.2	46				-
Mar. 24/61	1282'	9.4	42				400# Aquagel 50# Quebracho
Mar. 25/61	1401'	9.3	47				900# Aquagel
Mar. 26/61	1450'	9.5	60				600# Aquagel 15# Caustic 50# Quebracho 600# Aquagel 10# Caustic
Mar. 27/61	1554'	9.3	55				-

D. MUD RECORD (Cont'd)

<u>Date</u>	<u>Depth</u>	<u>Mud Properties</u>			<u>Filter Cake</u>	<u>Ph</u>	<u>Mud and Chemicals Used</u>
		<u>Wt.</u>	<u>Via</u>	<u>W.L.</u>			
Mar. 28/61	1581'	9.4	75				400# Gel 10# Caustic 50# Quebracho 15# Caustic 50# Quebracho 1000# Gel
Mar. 29/61	1675'	9.2	57				500# Gel
Mar. 30/61	1748'	9.2	64				600# Gel
Mar. 31/61	1882'	9.3	55				-
April 1/61	1848'	9.4	57				200# Gel
April 2/61	2000'	9.4	60				1000# Gel 100# Quebracho 50# Caustic 500# Gel
April 3/61	2070'	9.5	55				-
April 4/61	2105'	9.5	53	10	2/32	8	300# Gel
April 5/61	2174'	9.5	55				400# Gel
April 6/61	2228'	9.5	47				300# Gel
April 7/61	2308'	9.6	60				300# Gel

April 8/61

Rig Released: 1 p.m. April 8, 1961

E. CHRONOLOGICAL DAILY DRILLING REPORT

<u>Date</u>	<u>Days</u>	<u>Depth</u>	<u>Footage</u>	<u>Hours on Bottom</u>	<u>Remarks</u>
11 Mar. 61	1	38'	38'	1 3/4	Spudded 2:45 p.m. Mixing mud and drilling rate hole. Bit #1 13-3/4" OSC
12 Mar. 61	2	141'	103'	22	Drilling and running survey bit #1.
13 Mar. 61	3	186'	83'	22 3/4	Drilling, Bit #1
14 Mar. 61	4	188'	2'	1 3/4	Ran 175.20' of 9-5/8" 36# Range 2 Casing. Shoe at 183.70'. Cemented with 108 bags of Halliburton cement. Plug down 10 a.m. with 4% CaCl <sub>2</sub> . Waiting on cement and nipples up.
15 Mar. 61	5	272'	84'	14 3/4	Waiting on cement and nipples up. Pressured up, drilled out cement, welded casing bowl, pressured up to 500#, drilled out shoe with bit #2, 6 1/4" OSC IG; Drilling
16 Mar. 61	6	441'	169'	20 1/4	Drilling, Ran survey, Check B.O.P. Tripping for Bit #3
17 Mar. 61	7	632'	463'	22 1/2	Ran in with Bit #3 OSC-IG Drilling, Check B.O.P.s
18 Mar. 61	8	687'	55'	8 1/2	Drilling, lost circulation at 635'. Mixed mud and fibreseal and bran. Waiting on water. Tripped for Bit #4 @ 660'.
19 Mar. 61	9	815'	128'	22	Drilling with Bit #4 OSC 6 1/4". Checked B.O.P.s. Tripped for new bit.
20 Mar. 61	10	890'	75'	9 1/4	Drilling with Bit #5 OSC, dumped mud tanks to clean lost circulation material and mixed mud; ran survey and ran in to drillstem test.
21 Mar. 61	11	1034'	144'	13 3/4	DST #1 from 865 - 890'. Recovered 610# fresh sulphurous water. Drilled with Bit No. 6 H.T. CWV.
22 Mar. 61	12	1163'	129'	21 1/4	Drilling, survey, Ran in with Bit #7 H.T. CWV, Drilling.

E. CHRONOLOGICAL DAILY DRILLING REPORT (Cont'd)

<u>Date</u>	<u>Days</u>	<u>Depth</u>	<u>Footage</u>	<u>Hours on Bottom</u>	<u>Remarks</u>
23 Mar. 61	13	1228'	65'	13 3/4	Drilling, pulled out to run DST #2 from 1168-1193'. Recovered 520' sulphurous fresh water and 30' mud. Ran in with Bit #8 H.T. CWV, Drilling.
24 Mar. 61	14	1317'	99'	21 1/2	Drilling, Tripped for Bit #9, H.T. CWS, Drilling.
25 Mar. 61	15	1401'	84'	21 1/4	Drilling, Tripped for Bit #10 H.T. CWS, Checked B.O.P.s. Drilling.
26 Mar. 61	16	1482'	81'	20 1/2	Drilling, Checked B.O.P.s. Tripped for Bit #11 H.T. CWS, Drilling.
27 Mar. 61	17	1554'	72'	17 3/4	Drilling, pulled out of hole to change transmission. Ran in with Bit #12 H.T. CWS, Drilling.
28 Mar. 61	18	1609'	55'	20 1/2	Drilling, Check B.O.P.s. Tripped for Bit #13 H.T. CWV, Survey, Drilling.
29 Mar. 61	19	1675'	66'	20 1/2	Drilling, Tripped for Bit #14 H.T. CWV, Drilling.
30 Mar. 61	20	1748'	73'	23 1/2	Drilling.
31 Mar. 61	21	1822'	74'	20 1/3	Drilling; Tripped for Bit #15 H.T. CWV, Drilling.
1 April 61	22	1903'	81'	18 3/4	Drilling, Tripped for Bit #16, H.T. CWS, Drilling. Work on pump, Drilling.
2 April 61	23	1966'	63'	19 1/2	Drilling, Tripped for Bit #17 H.T. CWS, Drilling.
3 April 61	24	2070'	104'	14 3/4	Drilling, Tripped for Bit #18, H.T. CWS, Drilling, Tripped for DST #3 @ 2070'. Testing
4 April 61	25	2130'	60'	17 3/4	DST #3 2045 - 2070. Recovered 200' fresh water cut mud, drilling with Bit #19 H.T. CWV.
5 April 61	26	2198'	68'	21	Drilling, Tripped for Bit #20 H.T. CWS, Checked B.O.P.s, Drilling.

E. CHRONOLOGICAL DAILY DRILLING REPORT

<u>Date</u>	<u>Days</u>	<u>Depth</u>	<u>Footage</u>	<u>Hours on Bottom</u>	<u>Remarks</u>
6 April 61	27	2239'	41'	17 3/4	Drilling, Tripped for Bit #21 H.T. OWS, and laid down 3 drill collars. Drilling, Tripped for Bit #22 H.T. OWS.
7 April 61	28	2308'	69	15 1/4	Drilling, survey, Tripping. Laid down Drill collars. Ran in to cement plugs. <u>Ran plug #1</u> from 2000-2308 - 60 sacks cement, displaced 13 bbls. water, plug down 7:30 p.m. <u>Ran plug #2</u> from 1000 - 1200' with 40 sacks cement. Displaced with 7 bbls. water. Plug down 8:45 p.m. Waiting on cement.
8 April 61	29	2308'	Total Depth		Waiting on Cement. Felt plug #2 at 1015'. <u>Ran plug #3</u> from 930'-830' with 20 sacks cement. Plug down 3:30 a.m. <u>Ran plug #4</u> from 400' - 125' with 55 sacks. Displaced with 1 bbl. water. Plug down 4:30 a.m. Waiting on cement. Felt plug #4 at 132'. Put 10 sacks cement in casing near surface. Welded top on casing with 4 feet 2" stand pipe as marker.  Rig Released 1 p.m. 4:00 - 12:00 p.m. Rigging Down.

DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES  
NORTHERN ADMINISTRATION BRANCH  
RESOURCES DIVISION



For the period from . March 1, 1961  
to . April 15, 1961

REPORT of ~~COMPLETION--~~  
~~REWORK~~  
~~RECOMPLETION~~ of a Well  
~~SUSPENSION~~  
ABANDONMENT

Permit No. . 2267 .  
Name of well . CANADA SOUTHERN CARNWATH RIVER #1 . . . . . Lease No. . . . .  
Registered owner . . . . . Drilling Company . TRI-CITY DRILLING  
Location . 67° 44' 40" . . . . . N. Lat. 128° 47' 53" W. Long.  
Survey description, if available . . . . .  
Elevation: Ground . 600' (est) . Last previous depth . . . . .  
Kelly bushing . 608' (est) . Present depth . . 2308' T.D. . . . .  
Spudded . March 11th, 1961 . . . . . Finished drilling . Apr. 7/61 . Rig Released  
April 8, 1961. . . . .  
Deviations from vertical . 130' - 1/2°; . 400' - 0°; . 890' - 1/4°; . 1070' - 1/2°;  
1600' - 1 3/4°; . 2240' - 1 1/2°; . . . . .

CASING RECORD

Date	Size O.D.	Weight lbs/ft	Grade	Set at feet	Sacks Cement	Top of Cement
1 . Mar. 14/61 .	9-5/8"	36# J55	Range 2	183.70' KB	108	Surface
2 . . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
3 . . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
4 . . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .

TUBING RECORD

Size	Wt. Lbs/foot	Grade	Amount	Landed Depth	Remarks
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Wellhead	. . . . .	(Manufacturer)	. . . . .	(Size)	(Series)

Status of well on completion of drilling . . . . . **DRY & ABANDONED** . . . . .

Producing Zone . . . . . **None** . . . . . and formation . . . . .

Injection Zone . . . . . **Nil** . . . . .

Cord intervals . . . . .

. . . . .

. . . . .



. . . . . **Electrical Logs were not run** . . . . .

Interval logged: E-log . . . . . Other logs . . . . .

R-log . . . . .

M-log . . . . .

Velocity log . . . . .

The above logs (are)  
(will be) submitted in accordance with Section 65 of the  
Regulations.

DRILL STEM TESTS

<u>Test No.</u>	<u>Date</u>	<u>Interval Tested</u>	<u>Duration</u>	<u>Results</u>
1	Mar. 21/61	865 - 890	.45"	Rec. 410' muddy sulphurous fresh water; . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
2	Mar. 23/61	1168 - 1193	.60"	Rec. 30' mud, 520' sulphurous fresh water; . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
3	Apr. 3/61	2045 - 2070	.60"	Rec. 200' fresh water cut mud.
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .	. . . . .

(If space insufficient, attach further sheet)

(Strike out the non-applicable)    (Completion)    (Rework)    (Recompletion)

Perforations Bullet . . . . .

Shootings . . . . .

Hydraulic fracturing . . . . .

Chemical treatment . . . . .

Date initial production tests . . . . .

Initial production data . . . . .

Pumping or flowing .....  
Plug back .....  
Other .....  
.....  
.....  
.....  
.....



CEMENT PLUGS SET

<u>Date</u>	<u>Plug set at</u>	<u>Sacks cement</u>	<u>Method</u>	<u>Top found at</u>
Apr. 7/61	2008-2308	60 sacks	Halliburton Cementing	.....
Apr. 7/61	1002-1200	40 sacks	"	1015'
Apr. 8/61	930-830'	20 sacks	"	.....
Apr. 8/61	100-125'	55 sacks	"	132'
Apr. 8/61	.....	10 sacks	set at surface	.....

Washed well samples have been sent to Geological Survey of Canada, Calgary  
~~will be~~

Cores will be stored at .....

Core analysis (was made) of the Intervals .....  
(to be made)

Oil analysis (was made) of the Intervals .....  
(to be made)

Gas analysis (was made) of the Intervals .....  
(to be made)

Water analysis (was made) of the Intervals. DST #1, 2, 3, .....  
(to be made)

The above analyses (are)  
(will be) submitted in accordance with Section 70(2) of  
the Regulations.

ADDITIONAL DETAILS AND COMMENTS

.....  
.....  
.....  
.....  
.....

Signed. .... Address ....  
Date .....

(To be submitted in triplicate in accordance with Sections  
68, 69, 70 and 71, of the Territorial Oil and Gas Regulations  
to the Oil Conservation Engineer at Calgary, Alberta.)

SAMPLES-CORE: \_\_\_\_\_ DRILL: \_\_\_\_\_ LOGS \_\_\_\_\_

[illegible]

CONFIDENTIAL

GEOLOGICAL REPORTA. PERTINENT DATA

Operator: Canada Southern Petroleum Ltd.

Well: Canada Southern Carrawath River #1

Location: Co-ordinates: 67° 44' 40" North Latitude  
128° 47' 53" West Longitude

Elevation: Ground (estimated) 600'  
K. B. (estimated) 608'

Permit No. 2267 Northwest Territories

Contractor: Tri-City Drilling

Spudded: 2:45 p.m. March 11, 1961

Completed Drilling: April 7, 1961

Total Depth: 2308'

Surface Casings: 175.20' of 9-5/8", 36# Range 2 casing  
with 108 sacks of Halliburton cement,  
plus 4% CaCl<sub>2</sub>

Abandonment Plugs:

Plug #1	2000-2308'	with 60 sacks cement
Plug #2	1000-1200'	with 40 sacks cement
Plug #3	930- 830'	with 20 sacks cement
Plug #4	400- 125'	with 55 sacks cement

Rig Released: 1 p.m. April 8, 1961

Status: Dry and Abandoned

B. SUB-SURFACE DATA

<u>Formation</u>	<u>Sample Depth</u>	<u>E-Log Depth</u>	<u>Sub-Sea</u>
Glacial Drift	Surface		
Mid Ramparts Shale	28'		
Lower Ramparts	126'		
Bear Rock	335'		
Siluro-Ordovician	1154'		

TOTAL DEPTH: 2308'

ELEVATION: Ground (est.) 600'  
K. B. (est.) 608'

C. LOGGING DATA

Electrical Logs were not run.

D. SUMMARY OF DRILLSTEM TESTS (Open Hole)

<u>No.</u>	<u>Interval</u>	<u>Formation</u>	<u>Results</u>
1	865 - 890'	Bear Rock	V.O. 45 minutes. Good initial puff, Strong air blow, decreasing slowly becoming weak in 1/2 hour, dead in 40 minutes. Shut In 30 minutes and 30 minutes. Recovered 610' muddy sulphurous fresh water. HP 410 - 400; FP 110 - 260; SIP 270 - 270.
2	1168 - 1193	Siluro-Ordovician	V. O. 60 minutes, Fair initial puff, weak to moderate air blow, decreasing slightly to end of test. Shut In 30 minutes and 30 minutes. Recovered 550'; 520' sulphurous fresh water 30' mud HP 555 - 555; FP 45 - 235; SIP 390 - 390.
3	2045 - 2070	Siluro-Ordovician	V. O. 60 minutes. Weak initial puff, weak air blow throughout test. Recovered 200' fresh sulphurous water cut mud. HP 1025 - 1025; FP 35 - 120; SIP 780-780.



E. SAMPLE DESCRIPTIONS - by P. Antonenko

<u>From</u>	<u>To</u>	<u>Description</u>
0	10'	<u>Glacial drift</u> ; sand, fine medium grained quartzose, varicolored, rounded quartz and shale grains, some greenish grey waxy shale, calcareous and dark grey argillaceous limestone grains - intermixed with clay.
10'	20'	As above
20'	30'	As above - some greenish grey waxy calcareous shale and argillaceous limestone grains.
<u>TOP MIDDLE RAMPARTS SHALE (HARE INDIAN SHALE) 28'</u>		
30'	40'	<u>Shale</u> ; Grey to olive green, occasionally maroon, calcareous in part, silty, interbedded lenses of buff to grey limestone, in part micaceous, occasional black spores, some round quartz grains (from above)
40'	50'	<u>Shale</u> ; grey to green grey, occasionally maroon, silty, calcareous, in part micaceous, interbedded with limestone, grey to dark green to buff, in part argillaceous, in part finely crystalline - some black spores, occasionally brown weathered.
50'	60'	<u>Shale and Limestone</u> ; as above, black spores in fair abundance.
60'	70'	As above; trace pyrite, some white mottling
70'	80'	<u>Shale</u> ; grey to greenish grey to slightly maroon, calcareous in part, slightly silty, trace pyrite, some black spores, in part micaceous, some lenses of grey to brown, fine crystalline, argillaceous limestone.
80'	90'	As above; also some dark grey to dark brown shale, some pyrite, black spores in fair abundance.
90'	100'	As above; pyritic, trace fossils in shale becoming slightly darker.
100'	110'	<u>Shale</u> ; As above, some cavings (poor sample) trace fossils.
110'	120'	As above; darker brownish shales increasing.
120'	130'	<u>Limestone</u> ; grey, in part light brown, fine-micro-crystalline, dense, argillaceous fossils in parts, some micro fossils, brackish and coral fragments.
<u>TOP LOWER RAMPARTS LIMESTONE: 126'</u>		
130'	140'	As above, trace pyrite, calcite crystals, trace spores, some grey micaceous, slightly calcareous shale.
140'	150'	As above, some fossil fragments trace spores, <u>interbedded</u> with grey very slightly calcareous <u>shale</u> .

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
150'	160'	<u>Limestone</u> ; as above, <u>interbedded</u> with <u>50% grey silty very slightly calcareous shale</u> , some fossil fragments (brachiopods) some pyrite.
160'	170'	As above
170'	180'	As above
180'	190'	<u>Shale</u> ; grey, slightly calcareous, hackly, micro-micaceous, some interbedded limestone, argillaceous, grey, trace fossils, dense, micro-crystalline.
190'	200'	<u>Shale</u> ; as above, interbedded with light brown fine crystalline limestone, trace fossils, dense, argillaceous, 70% shale, 30% limestone.
200'	210'	<u>Limestone and Shale</u> ; as above <u>50-50</u>
210'	220'	<u>Limestone</u> ; light brown, fine micro-crystalline, argillaceous in part, dense, occasional fossil fragments; occasional calcite crystals, interbedded with grey, slightly silty, micro-micaceous shale, occasional quartz crystals (some contamination from shoe)
220'	230'	<u>Limestone</u> ; as above, trace fossil fragments, trace pyrite, <u>15% shale</u> as above.
230'	240'	<u>Limestone</u> ; as above, up to <u>25% shale</u> as above
240'	250'	As above
250'	260'	<u>Limestone</u> ; light brown to buff, fine to micro-crystalline, in part argillaceous, dense, occasional fossil fragments, dense, interbedded with grey to <u>greenish grey micro-micaceous, slightly calcareous shale</u> , trace pyrite, <u>Shale 20-30%</u> .
260'	270'	As above - <u>Shale 30-40%</u>
270'	280'	As above.
280'	290'	<u>Limestone</u> ; light brown to buff, fine micro-crystalline, argillaceous in part, trace fossils, occasional calcite crystals no visible porosity, interbedded with grey to slightly greenish grey in part, micro-micaceous, slightly calcareous shale - <u>20%</u> .
290'	300'	As above, in part pyritic.
300'	310'	As above, <u>Shale</u> about <u>50%</u>
310'	320'	As above, <u>Shale 30-40%</u> slightly pyritic, trace fossil fragments.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
320'	330'	As above
330'	340'	<u>Limestone</u> ; brown to light brown, fine, crypto-crystalline. In part argillaceous, flaky cleavage, dense, minor amounts of shale as above.
340'	350'	As above; 10% grey shale
		<u>TOP BEAR ROCK: 335'</u>
350'	360'	<u>Limestone</u> ; brown to light brown, very fine crystalline, slightly argillaceous, no visible porosity, <u>part dolomitic</u> , minor grey shale, rare trace fossil fragments, occasional calcite crystals, trace pyrite.
360'	370'	As above
370'	380'	<u>Limestone</u> ; light brown to brown to some dark brown, fine crystalline, argillaceous in part, no visible porosity, some grey shale as above, also some dark brown to black slightly calcareous shale, trace pyrite, rare trace fossil fragments, occasional calcite crystals.
380'	390'	As above
390'	400'	<u>Limestone</u> ; as above, very minor amounts grey shale.
400'	410'	As above; occasional calcite crystals, no visible porosity.
410'	420'	As above.
420'	430'	As above.
430'	440'	<u>Limestone</u> ; light brown to buff, fine to micro-crystalline, dense, in part argillaceous, in part dolomitic, trace pyrite, minor grey shale.
440'	450'	<u>Limestone</u> ; as above, light brown to brown, trace stylolite.
450'	460'	As above - trace grey shale.
460'	470'	As above, some grey to dark grey waxy shale partings.
470'	480'	<u>Limestone</u> ; light brown to brown, fine to micro-crystalline, argillaceous in part, dense, appears to be non fossiliferous as above, in part dolomitic, some minor grey shale partings.
480'	490'	As above.

E. Sample Descriptions - By P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
490'	500'	As above, mainly light brown to buff.
500	510'	As above
510'	520'	As above
520'	530'	As above, trace greenish grey shale.
530'	540'	As above
540'	550'	As above, <u>trace pellets</u> .
550'	560'	<u>Limestone</u> : as above, in part crypto-crystalline, <u>in part dolomitic</u> , trace of grey shale.
560'	570'	As above, some greenish grey shale partings
570'	580'	As above
580'	590'	As above
590'	600'	As above, trace pyrite.
600'	610'	As above, minor grey-green to dark grey, slightly calcareous shale.
610'	620'	As above
620'	630'	As above
630'	640'	As above (Lost circulation at 635' for 12 hours).
640'	650'	<u>Limestone</u> : brown to grey brown, fine micro-crystalline, <u>in part dolomitic</u> , argillaceous, dense, some dark grey argillaceous partings, non fossiliferous trace grey shale (poor sample - lost circulation material).
650'	660'	As above, in part crypto-crystalline.
660'	670'	As above, some fluorescence, but assume contamination from surface.
670'	680'	<u>Limestone</u> ; as above, dense argillaceous (some rough drilling indicating broken formation)
680'	690'	As above, occasional stylolite.
690'	700'	<u>Limestone</u> ; as above, dense, trace grey green waxy shale.
700'	710'	As above
710'	720'	As above, trace pyritic grey green shale.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
720'	730'	<u>Limestone</u> : as above, trace calcite crystals (calcite lined fracture)
730'	740'	<u>Limestone</u> : as above, some green grey shale partings, also traces of dark grey to grey micaceous shale.
740'	750'	<u>Limestone</u> : brown to grey, fine micro crypto-crystalline argillaceous in parts, dense, in part dolomitic, trace pyrite and occasional dark grey to black shale partings (stylolite?)
750'	760'	As above
760'	770'	As above, trace grey green shale.
770'	780'	As above, trace brown granular dolomite, some calcareous black shale (stylolites?) partings, also some greenish grey shale.
780'	790'	<u>Limestone</u> : as above
790'	800'	<u>Limestone</u> : light brown to grey, fine micro-crystalline, in part argillaceous, dense, in part dolomitic, some argillaceous partings.
800'	810'	<u>Limestone</u> : as above, more argillaceous, some green grey shale partings
810'	820'	As above
820'	830'	As above
830'	840'	As above, in part crypto-crystalline.
840'	850'	As above, some light brown granular dolomite.
850'	860'	As above.
860'	870'	<u>Limestone</u> : as above, dense.
870'	880'	<u>Dolomite</u> : grey to light brown, fine crystalline in part, dense, also light brown, granular dolomite with poor to fair inter granular porosity in parts. (Drilling break at 880-885 from 12-4 minutes per foot.
885'	(Circ. Sample)	<u>Dolomite</u> : light brown fine crystalline, some fair to poor, inter-crystalline and micro vuggy porosity, some dense.
885'	890'	<u>Dolomite</u> : as above, some pyrobitumen, occasional vugular and some poor porosity, inter-crystalline and micro vugular.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
890'	900'	<u>Limestone</u> : light brown, fine micro-crystalline, dense, trace grey granular shale partings, in part dolomitic, interbedded with some dolomite as above.
900'	910'	As above, pyritic in part.
910'	920'	As above.
920'	930'	<u>Mainly Limestone</u> : as above.
930'	940'	<u>Limestone</u> : light brown to buff, fine micro-crystalline, dense, occasional trace of pin-point porosity, some pyrobitumen, some green grey shale partings, some grace granular dolomite.
940'	950'	<u>Limestone</u> : light brown to buff, very fine crystalline, rare trace porosity and pyrobitumen, trace shale, grey green, slightly calcareous.
950'	960'	<u>Limestone</u> : light brown to grey, fine micro-crystalline, dense, argillaceous in part, trace pyrite, trace greenish calcareous shale partings.
960'	970'	<u>Limestone</u> : as above, also abundant calcareous pellets or pebbly material imbedded in greenish grey calcareous shale matrix.
970'	980'	<u>Limestone</u> : as above, trace pellets as above.
980'	990'	<u>Limestone</u> : as above, somewhat chalky, some greenish grey calcareous shale, with calcareous pebbly material imbedded.
990'	1000'	<u>Limestone</u> : light brown to buff, fine micro-crystalline, appears chalky in part, dense, trace stylolite, trace grey green calcareous shale.
1000'	1010'	As above.
1010'	1020'	As above.
1020'	1030'	<u>Limestone</u> : light brown to light grey, fine crystalline, dense, trace pyrobitumen.
1030'	1040'	As above, in part chalky, trace calcite crystals, minor grey green calcite shale partings.
1040'	1050'	As above, Limestone.
1050'	1060'	<u>Dolomite</u> : grey brown, fine to medium crystalline, some scattered poor pin point porosity, some pyrobitumen, some limestone as above.
1060'	1070'	<u>Limestone</u> : grey brown, dolomitic, fine medium crystalline, dense, trace poor pin point porosity.

## E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1070'	1080'	<u>Dolomite and Limestone</u> : light brown fine micro-crystalline, dense, rare trace pin point porosity, trace calcareous grey green shale, trace calcite filled fractures.
1080'	1090'	<u>Limestone</u> : light brown and dolomitic as above, rare traces of poor pin point porosity, traces of grey green calcareous shale, some light granular dolomite.
1090'	1100'	<u>Limestone</u> : grey brown, fine micro-crystalline, argillaceous, dense, trace bituminous material.
1100'	1110'	As above.
1110'	1120'	<u>Limestone</u> : grey brown, fine crystalline, in part dolomitic, argillaceous in part dense.
1120'	1130'	As above.
1130'	1140'	As above, in part micro-crystalline.
1140'	1150'	<u>Limestone</u> : as above, trace coarsely crystalline dolomite, light brown, some fractures.
		<u>SILURO-ORDOVICIAN</u> : 1154'
1150'	1160'	<u>Dolomite</u> : grey to dark grey in part, finely crystalline, rare trace pin point poor porosity, some idiomorphic dolomite crystals infilled vugs or fractures, argillaceous.
1160'	1170'	<u>Dolomite</u> : grey brown, in part light brown, fine crystalline, in part micro-granular, slightly argillaceous, scattered poor pin point inter-crystalline and micro vugular porosity, traces fair porosity, some dolomite crystals as above.
1170'	1180'	<u>Dolomite</u> : light grey to buff, fine crystalline to micro granular, scattered poor pin point porosity, trace fair inter-crystalline porosity.
1180'	1190'	<u>Dolomite</u> : grey brown, argillaceous, slightly silty, micro-granular, some calcite lines fractures, occasional scattered poor pin point porosity.
1190'	1200'	<u>Dolomite</u> : light grey to off white, finely crystalline to micro granular, occasional calcite crystals, scattered inter-crystalline and micro vugular porosity, poor, traces fair.
1200'	1210'	<u>Dolomite</u> : medium grey to grey brown, fine crystalline to micro granular, argillaceous trace poor pin point porosity, trace white dolomite as above.
1210'	1220'	<u>Dolomite</u> : light brown to grey - otherwise as above.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1220'	1230'	<u>Dolomite</u> : light brown to buff, fine crystalline, trace poor micro-vuggy porosity, some calcite lining, trace disseminated pyrite.
1230'	1240'	<u>Dolomite</u> : grey to dark grey, fine crystalline to micro-granular, argillaceous, some calcite lined fractures, trace calcite veining, slightly limey in part, dense.
1240'	1250'	<u>Dolomite</u> : grey to brown, fine to medium crystalline, some scattered poor micro-vugular porosity, some calcite inclusions, slightly argillaceous, some micro-granular dolomite.
1250'	1260'	<u>Dolomite</u> : grey brown, mottled, coarsely crystalline, calcitic in part, scattered poor inter crystalline porosity, trace fair porosity, also limestone as above.
1260'	1270'	As above, fine to coarsely crystalline, traces of fair inter-crystalline porosity.
1270'	1280'	<u>Dolomite</u> : grey brown to medium grey, finely crystalline to medium crystalline, scattered poor to fair inter-crystalline porosity, some calcite crystals (Red stain due to overheating sample), slightly silty, very slightly argillaceous.
1280'	1290'	<u>Dolomite</u> : as above, occasional poor inter-crystalline porosity
1290'	1300'	As above.
1300'	1310'	<u>Dolomite</u> : grey to grey brown, fine to medium crystalline, slightly argillaceous, some calcite lined fractures, occasional calcite crystals, rare trace poor inter-crystalline porosity.
1310'	1320'	As above.
1320'	1330'	As above, scattered poor porosity.
1330'	1340'	<u>Dolomite</u> : as above, finely crystalline, mainly dense.
1340'	1350'	As above, trace calcite vugs.
1350'	1360'	<u>Dolomite</u> : light brown to grey, finely crystalline, in part micro granular, traces of inter-crystalline porosity, some calcite lined vugs.
1360'	1370'	As above, poor to fair inter-crystalline porosity, mostly medium grey.

As above - mainly dense.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1380'	1390'	As above, in part sucrose, abundant calcite crystals, occasional poor inter-crystalline porosity, argillaceous in part.
1390'	1400'	As above, calcite filled vugs and fractures.
1400'	1410'	As above, mainly dense.
1410'	1420'	<u>Dolomite</u> : light brown to buff, fine to micro-crystalline, traces poor inter-crystalline porosity, occasional micro vugular scattered calcite crystals.
1420'	1430'	As above: in part medium grey, fine to medium crystalline, scattered poor porosity.
1430'	1440'	As above, trace poor porosity.
1440'	1450'	<u>Dolomite</u> : light grey to buff, finely crystalline, trace poor inter-crystalline porosity, minor medium grey, slightly argillaceous, medium crystalline dolomite.
1450'	1460'	As above, becoming darker.
1460'	1470'	<u>Dolomite</u> : medium grey, in part dark grey, medium crystalline, slightly argillaceous, trace poor inter-crystalline porosity, occasionally micro-vugular, trace calcite crystals.
1470'	1480'	As above.
1480'	1490'	<u>Dolomite</u> : grey-brown, finely crystalline, calcite veining and calcite infilled vugs, trace porosity.
1490'	1500'	<u>Dolomite</u> : grey to light brown, finely crystalline, trace calcite, trace micro-vugs.
1500'	1510'	<u>Dolomite</u> : grey brown, slightly argillaceous, fine to medium crystalline, occasional trace poor micro-vugular porosity.
1510'	1520'	As above.
1520'	1530'	<u>Dolomite</u> : grey, fine to medium crystalline, abundant calcite crystals, some poor inter-crystalline porosity.
1530'	1540'	<u>Dolomite</u> : light brown to grey, finely crystalline, dense, occasional calcite crystals, rare trace poor pin point porosity.
1540'	1550'	As above.
1550'	1560'	<u>Dolomite</u> : brown grey, fine to coarsely crystalline, slightly argillaceous, scattered poor inter-crystalline porosity, numerous calcite crystals.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1560'	1570'	<u>Dolomite</u> : brown-grey to dark grey - as above.
1570'	1580'	<u>Dolomite</u> : light brown to buff, fine to micro-crystalline, rare trace poor inter-crystalline porosity.
1580'	1590'	<u>Dolomite</u> : light grey to dark grey, fine crystalline, hard dense, slightly argillaceous, occasionally micro-wugular.
1590'	1600'	As above, (This sample is contaminated with pipe dope).
1600'	1610'	<u>Dolomite</u> : light grey, finely crystalline, dense, in part micro-granular.
1610'	1620'	As above.
1620'	1630'	As above; trace calcite lined fractures.
1630'	1640'	As above; dense.
1640'	1650'	As above.
1650'	1660'	As above, trace disseminated pyrite.
1660'	1670'	<u>Dolomite</u> : as above
1670'	1680'	<u>Dolomite</u> : as above, in part micro granular, slightly pyritic, slightly argillaceous, dense.
1690'	1690'	As above.
1690'	1700'	As above.
1700'	1710'	As above, trace calcite crystals, in part limey.
1710'	1720'	<u>Dolomite</u> : light grey to grey fine crystalline, in part limey, some calcite veining, dense.
1720'	1730'	As above.
1730'	1740'	As above, slightly argillaceous, trace pyrite.
1740'	1750'	As above, in part pyritic.
1750'	1760'	<u>Dolomite</u> : light grey micro-granular, in part fine crystalline, dense, some disseminated pyrite.
1760'	1770'	<u>Dolomite</u> : light grey, fine crystalline to micro-granular, dense, trace calcite.
1770'	1780'	As above, trace pyrite.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1780'	1790'	As above, in part light brown.
1790'	1800'	As above.
1800'	1810'	<u>Dolomite</u> : light grey, finely crystalline, dense, in part limy, trace calcite.
1810'	1820'	As above.
1820'	1830'	As above, trace pyrite, slightly silty.
1830'	1840'	As above.
1840'	1850'	<u>Dolomite</u> : light grey to medium grey, fine to micro-crystalline, dense, trace calcite.
1850'	1860'	As above.
1860'	1870'	<u>Dolomite</u> : grey to brown grey, finely crystalline to micro-crystalline, dense slightly silty, slightly argillaceous.
1870'	1880'	As above.
1880'	1890'	Grey and brown, dolomite, as above, in part micro-granular, dense, some disseminated pyrite.
1890'	1900'	<u>Dolomite</u> : grey to brown, fine crystalline, dense, some calcite veining, slightly argillaceous, trace pyrite.
1900'	1910'	As above.
1910'	1920'	<u>Dolomite</u> : as above, fine crystalline to micro-crystalline, slightly silty in part argillaceous.
1920'	1930'	<u>Dolomite</u> : as above, also some dark brown dolomitic shale, slightly silty, trace of green calcareous shale, waxy, occasional pyrite, some calcite veins and calcite lined fractures.
1930'	1940'	<u>Dolomite</u> : grey-brown, finely crystalline, dense, some calcite veining, trace green shale occasional calcite crystals.
1940'	1950'	<u>Dolomite</u> : as above, slightly argillaceous.
1950'	1960'	As above, in part micro-granular.
1960'	1970'	<u>Dolomite</u> : brown, finely crystalline, trace micro-granular, dense, trace micro-vugular, calcite veining common, some grey dolomite as above.
1970'	1980'	As above, some grey green calcite waxy shale partings.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
1980'	1990'	<u>Dolomite</u> : grey-brown, fine to micro-crystalline, slightly argillaceous, slightly silty, dense, trace pyrite, minor dark brown, dolomitic shale.
1990'	2000'	<u>Dolomite</u> : brown, finely crystalline, dense, some pyrite, traces of grey green dolomitic shale.
2000'	2010'	As above (this sample badly contaminated with pipe dope after trip).
2010'	2020'	<u>Dolomite</u> : grey to grey brown, fine-medium crystalline, dense, some calcite veining, trace pyrite, traces of grey green shale as above.
2020'	2030'	<u>Dolomite</u> : grey-brown, finely crystalline, dense, slightly argillaceous.
2030'	2040'	As above: some light brown dolomite, occasional calcite crystals, some calcite veining.
2040'	2050'	As above, some pyrite.
2050'	2060'	<u>Dolomite</u> : light brown, coarsely crystalline, calcite crystals common, some scattered poor inter-crystalline porosity.
2060'	2070'	<u>Dolomite</u> : as above, trace pyrite, scattered trace poor inter-crystalline porosity.
2070'	2080'	<u>Dolomite</u> : coarsely crystalline, light brown, as above - rare trace of poor inter-crystalline porosity, some calcite.
2080'	2090'	<u>Dolomite</u> : grey to light brown, medium coarsely crystalline, in part slightly argillaceous, some calcite veining and calcite infilled fractures, occasional dolomite crystal, rare trace poor inter-crystalline porosity.
2090'	2100'	As above, some scattered clear quartz crystals, trace green dolomitic shale.
2100'	2110'	<u>Dolomite</u> : light brown to brown, coarsely crystalline, trace poor inter-crystalline porosity, abundant coarse grained clear quartz crystals and white dolomite crystals, in part dolomitic quartz sandstone, trace pyrite.
2110'	2120'	<u>Dolomite</u> : as above, in part silicious, scattered quartz crystals, also clusters of quartz with inter-crystalline porosity, poor; traces of white chert nodules and fragments, scattered poor inter-crystalline porosity, some disseminated pyrite, numerous white dolomite crystals, some calcite.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
2120'	2130'	<u>Dolomite</u> : light grey to light brown, coarsely crystalline, silicious, some calcite and abundant white dolomite crystals, trace chert and pyrite, scattered poor inter-crystalline porosity.
2130'	2140'	<u>Dolomite</u> : light brown, medium to coarse crystalline, silicious in part, scattered poor inter-crystalline porosity, well formed white dolomite crystals abundant, some clear quartz crystals, trace pyrite.
2140'	2150'	As above.
2150'	2160'	<u>Dolomite</u> : grey to light brown to white crystals, silicious, numerous intermixed well developed quartz crystals, some acicular quartz; scattered poor inter-crystalline porosity, some pieces fair porosity.
2160'	2170'	<u>Dolomite</u> : light grey to buff, fine crystalline, in small part coarsely crystalline as above, dense, trace calcite and calcite lined fractures.
2170'	2180'	<u>Dolomite</u> : light grey to light brown, fine to medium crystalline, silicious in part, abundant rhombic dolomite crystals intermixed with some clear quartz crystals, some scattered traces of poor porosity. Large crystals appear to be part of infilled vugulars or fractures.
2180'	2190'	As above.
2190'	2200'	<u>Dolomite</u> : light grey to grey to dark grey, fine to medium crystalline, slightly silicious, hard, in part argillaceous, some light brown coarse crystalline, dense, some quartz crystals and white dolomite crystals, trace calcite.
2200'	2210'	As above: trace soft green dolomite shale.
2210'	2220'	<u>Dolomite</u> : grey to dark grey, fine crystalline, slightly silicious, hard, argillaceous in part, dense, some white dolomite crystals, trace pyrite.
2220'	2230'	As above: some calcite veining, in part brown, medium to coarse crystalline.
2230'	2240'	As above: trace green shale partings.
2240'	2250'	<u>Dolomite</u> : light grey to buff, medium to coarsely crystalline, dense, occasional isolated vugular scattered white dolomite crystals, occasional quartz crystals, trace pyrite.
2250'	2260'	As above.

E. Sample Descriptions - by P. Antonenko (Cont'd)

<u>From</u>	<u>To</u>	<u>Description</u>
2260'	2270'	As above, in part white dolomite, micro-granular occasional isolated vugular.
2270'	2280'	As above.
2280'	2290'	As above, dense, also some grey to dark grey dolomite, fine to medium crystalline, slightly argillaceous, silicious in parts, some intermixed quartz crystals.
2290'	2300'	<u>Dolomite</u> : light grey to brown to dark grey, fine to medium crystalline, slightly silicious, some calcite veining and infilling, some isolated vugulars infilled with dolomite crystals, some intermixed quartz crystals.
2300'	2308'	As above.

TOTAL DEPTH: 2308'