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Ranger et al NOTA CREEK C-17
65° 06' 01' / 126° 02' 56"

File No. 97x-1001

Geological Report

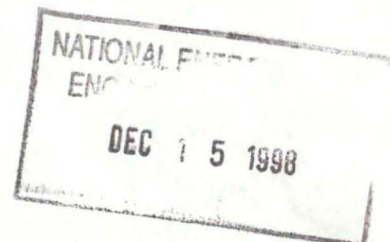


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**MICROFILMED
SUR MICROFILM:**



RANGER OIL et al Nota Creek C-17

RANGER OIL

65 deg. 06' 01" / 126 deg. 02' 56"

File No.: 97x-1001

Prepared by:

H. Wennekers
Geological Wellsite Consultant

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SYNOPSIS

OPERATOR: Ranger Oil Limited

WELL NAME: ROL et al Nota Creek C-17

LOCATION: 65 deg. 06' 01" / 126 deg. 02' 56"
Tulita area (Fort Norman)

FIELD: Undefined

PROVINCE: N.W.T.

ELEVATION: G.L.: 168.22 m K.B.: 172.22 m

SPUD DATE: December 24, 1997 11:30 hrs

T.D. DATE: February 9, 1998 08:22 hrs

CONTRACTOR: Shehtah Drilling Rig: #1

HOLE SIZE: Surface: 444.5 mm Pilot: 311mm To F.T.D.: 222mm

COLLARS: 171mm

MUD COMPANY: Midas Drilling Fluids

MUD TYPE: Gel chem to first intermediate casing. Invert to F.T.D.

LOG RECORD: 13-01-1998 Run #1

- 1) Borehole Compensated Sonic Delta-T (DT) - Long Arm
Caliper (LA) - Gamma Ray (GR) 574.60 m - 25 m
- 2) Phasor Induction SFL - Gamma Ray (GR) -
Spontaneous Potential (SP) 585.05 m -163 m
- 3) Compensated Neutron Litho Density - Gamma Ray (GR) -
Caliper 587.90 m -163 m

LOG RECORD: 10-02-1998 Run #1

- 1) Borehole Compensated Sonic Delta-T (DT) - Long Arm
Caliper (LA) - Gamma Ray (GR)1934.40 m - 589 m
- 2) Phasor Induction SFL - Gamma Ray (GR) -
Spontaneous Potential (SP)1945.80 m - 589 m
- 3) Compensated Neutron Litho Density - Gamma Ray (GR) -
Caliper 587.90 m - 163 m

SYNOPSIS (cont.)

TESTING COMPANY: Baker Tools
DRILLING SUPERVISION : Jack Brazel and Lee Brazel
GEOLOGICAL SUPERVISION: Henri Wennekers
TOTAL DEPTH: 1953 meters

FORMATION TOPS (m)

PERIOD	GROUP	PROGNOSIS		SAMPLES		LOGS	
FORMATION		(LOCAL UNITS)	(subsea)	(KB)	(driller)	(KB)	(subsea)
		(177m)	(172.22m)			(KB)	(Subsea)
Imperial		spud	Surface	Surface	Surface	Surface	Surface
Canol/Hare Indian		102	75	70.22	54	118.22	.. - ..
Hume		2	175	170.22	147	25.22	147 - ..
Headless	-	83	260	255.22	208	35.78	.. - ..
Landry	-	148	325	320.22	NR on samples	..	- ..
Arnica	-	173	350	345.22	290	117.78	.. - ..
Bear Rock	-	208	385	380.22	315	142.78	315 - 142.78
Franklin Mountain	-	473	650	645.22	525	452.78	565 - 492.78
Saline River	-	733	910	905.22	915	742.78	849 - 676.78
		Evaporite Member *		915	- 742.78	849	- 676.78
		Shale cycle or					
		Lower Clastic Member		1418	-1244.78	1435	-1262.78
Mount Cap	-	1573	1750	1745.22	1759	-1586.78	1759 -1586.78
Mount Clark **	-	1723	1900	1895.22	1879	-1706.78	1879 -1706.78
		Unnamed Shale Fm.		1889	-1716.78	1906	-1833.78
Precambrian	-	1753	1930	1925.22	1908 or 1930(?)	1929	-1756.78
Final Total Depth	-	1763	1940	1935.22	1953	-1780.78	1949 -1776.78

*Note: This unit seems to consist of approximately 99% rock salt (halite). From time to time there is an excellent sample recovery of rock salt cuttings, but these cuttings dissolve during water-washing, resulting in no sample for the plastic veils. Reducing the water wash temperature and using carbon based liquid soap occasionally preserved salt cuttings, which after drying were placed in the appropriate veils.

**Note: A fining-up sedimentary cycle covers the 1906m to 1889m interval. A second fining-up sedimentary cycle might be present between 1934m and 1903m.

DEVIATION SURVEY RECORD

Measurements by Halliburton Directional survey instrument. Computations courtesy L. BRAZEL OILFIELD CONSULTING INC.

Measurement	Depth	Inclination	Azimuth	TVD	North East	No.
(m)	Degrees	Degrees	(m)	(m)	(m)	
# 0	0.00	0.00	0.00	0.00	0.00	0.00
# 1	40.50	0.70	339.00	40.50	0.23	-0.09
# 2	68.90	1.20	337.00	68.90	0.67	-0.27
# 3	95.50	2.80	333.00	95.48	1.50	-0.67
# 4	124.40	2.00	341.00	124.35	2.61	-1.16
# 5	152.60	2.10	337.00	152.53	3.55	-1.52
# 6	238.00	1.20	329.00	237.90	5.76	-2.59
# 7	351.00	0.40	347.00	350.89	7.15	-3.29
# 8	455.00	0.50	12.00	454.88	7.95	-3.28
# 9	568.00	0.70	62.00	567.88	8.76	-2.56
Closure is 9.1254 Meters on an azimuth of 343.6879 degrees.						
#10	604.00	0.20	148.00	603.88	8.81	-2.34
#11	662.00	0.60	42.00	661.88	8.95	-2.08
#12	706.00	1.20	12.00	705.87	9.57	-1.83
#13	727.00	0.90	357.00	726.87	9.95	-1.79
#14	773.00	1.00	47.00	772.86	10.58	-1.52
#15	824.00	1.60	49.00	823.85	11.35	-0.65
#16	839.00	1.20	72.00	838.84	11.54	-0.35
#17	868.00	1.50	37.00	867.84	11.94	0.17
#18	891.00	1.80	57.00	890.83	12.37	0.65
#19	912.00	1.80	57.00	911.82	12.73	1.21
#20	940.00	2.00	47.00	939.80	13.31	1.93
#21	959.00	1.80	52.00	958.79	13.72	2.41
#22	993.00	1.20	49.00	992.78	14.28	3.10
#23	1021.00	1.00	12.00	1020.77	14.71	3.37
#24	1081.00	1.00	17.00	1080.76	15.72	3.64
#25	1145.00	1.80	27.00	1144.74	17.15	4.25
#26	1190.00	1.50	7.00	1189.73	18.37	4.65
#27	1209.00	2.00	357.00	1208.72	18.95	4.66
#28	1287.00	2.70	357.00	1286.65	22.14	4.49
#29	1345.00	2.90	17.00	1344.58	24.91	4.85
#30	1525.00	5.40	35.00	1524.10	36.20	11.04
#31	1535.00	5.40	35.00	1534.06	36.97	11.58
#32	1565.00	6.10	40.00	1563.91	39.35	13.41
Closure is 41.5731 meters on an Azimuth of 18.8253 degrees.						
#33	1591.00	6.60	44.00	1589.75	41.48	15.34
#34	1629.00	6.70	45.00	1627.49	44.62	18.43
#35	1667.00	6.80	43.00	1665.49	47.83	21.53
#36	1704.00	7.80	42.00	1701.93	51.30	24.70
#37	1741.00	7.00	47.0	1736.62	54.70	26.03
#39	1864.00	6.90	27.00	--	--	--

BIT RECORD

#	Type	Size (mm)	In	Out	Total (m)	Hrs drilled	FOB (daN)	RPM	Cond. T B G
1ART	13 J	444.5	0	12.14	12.14	8.25	2000	110	2-4-BT
2A	Enterra	457.2	12.14	12.63	0.49	13.5	2300	0/90	Worn 10mm
3ARR	13 J	444.5	12.63	28.00	15.37	11.5	2500	110	4-3 ³ -BT
4A	PG 3	444.5	28	96.00	78	13.25	2-8000	110	2-2-WT
5A	J-2	311	96	162.00	66	33.5	1-8000	110/150	2-2-WT
6ARR4	PG 3	444.5	96	164.00	68	25	1-8000	160	3-3-WT
1RR	J 2	311	164	285.00	121	43.5	9-15000	90/140	6-6-WT
2	GT28	311	285	586.00	301	100	9-20000	30/70	8-8-WT
3	GT28	311	586	589.00	3	3	9000	45	
4	JCT 35C	222	589	916.00	329	61.75	15000	50	5-5-WT E-BT-Hrs
5	ATJ33	222	916	1383.00	467		2-6000	50-55	2-2-WT
6	PDC	222	1383	1903.00	530		2-10000	70	SL W
7	J55	222	1903	1953.00	50		15-20000	50	--

BIT CONDITION

SCALE

Tooth Wear (T) 0 - 8
Bearing Wear (B) 0 - 8
Gauge (G) in or (mm) under
New Bit T=0 B=0 G=in

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
97-12-23	0	0	--	Rigged up Shehtah rig no. 1 to spud. Installed deverter system on conductor pipe, spool and hydril. Installed Tarps on mud tanks. Problems with water truck and hauler truck.
97-12-24	0	0	--	Rigged up Shehtah rig #1 to spud. Run in hole. Bottom portion of conductor pipe buckled. Bit could not pass.
97-12-25	0	0	--	Continued to drill bottom portion of conductor pipe. Searched for milling tool. Located on in Fort Saint John. Flown in to Norman Wells by chartered plane.
97-12-26	12.5	12.5	20	The hole in the conductor pipe, driven into the ground, was 12.14m deep. The base of the conductor pipe buckled inward. This prevented drilling to progress. As a result, a mill was flown in. Milling proceeded, but it made very slow progress. When 12.56m depth was reached, the mill was hoisted and a 444.5mm bit and BHA made up. R.I.H. and drill. Drill bit is still grabbing conductor pipe. at 09:15 hours.
97-12-27	27	15	6:05	Dismantle flow and mill. Install flow nipple. Make up bit and B.H.A. R.I.H. with 444.5mm bit. Tag bottom at 12.56m. Bit still grabbing conductor pipe. Circulate and wait on magnet. Make up magnet. Fish with magnet. Retrieve some large pieces of conductor pipe and many small pieces. Clean conductor pipe pieces out of bit. Rig up magnet again on two singles of pipe. Hole

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
				depth now 14.50m. Fish with magnet. Run magnet several times. Hole depth changed to 15.36m. Rig out magnet. Run in with bit and drill 444.5mm hole from 15.36m-27.76m.
97-12-28	96	69	16	Trip for bit. R.I.H. with bit #4A. Drill 444.5mm hole from 27m-96m.
97-12-29	152	56	20	Drill 311mm pilot hole. Drilling rate slowed when limestone penetrated.
97-12-30	164	12	--	Power out low on fuel. Revise K.B. Limestone 27m high to prognosis. Revise surface casing TD. Revision of ground elevation and K.B. Revise again TD surface casing. Drill to 164m in limestone.
97-12-31	164	--	--	Drill out 311mm hole with 444.5mm bit from 96m-164.26m with surveys. Condition hole. Trip out of hole. Run surface casing and cement. W.O.C.
98-01-01	164	--	--	Nipple up BOP's.
98-01-02	164	--	--	Nipple up BOP's. Pressure test at 1400Kpa at 10 minutes. 14000 Kpa at 10 minutes. Manifold vales, chokes, HCV, deflange leaks. Repairs to remote choke activator and pressure gauge. Repairs to HCV. Repairs to pressure test hose. BOP's very scaled up and corroded. Blind rams changed from top to middle. Pressure test blind rams. Change gate seals. Work rams retest. Change ram rubbers. Insulate and heat trace all mud lines. Repairs to blocks. (The crews were steam heating the block

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
				swivel to turn) Pick up drilling BHA and trip in hole with 311mm bit.
98-01-03	165m	1	1.00	Pick up drilling BHA and trip in hole with 311mm bit. Pressure test at 1400Kpa at 10 minutes, 14000Kpa at 10 minutes. Lower pipe rams, stabbing valve (unthaw kill lines. Pressure test upper pipe rams. Inside BOP (Dismantle and clean), Mud line valves (Remove check Valve and clean). Hydril pressure tested at 1500 Kpa for 10 minutes. Pressure test Hydril, Check valve (Failed test. Parts ordered from Edmonton) Lower kelly cock (Failed test. Replaced with spare one) and pressure tested. Pressure test Hydril, Upper Kelly Valve (Failed test). Replaced with spare and pressure tested. Pick up drill collar and drill mouse hole. Unthaw steam tracing and reinsulate mud lines (Valves were shut off). Drill out rubber, float and shoe. Drill 311mm 164m-165m.
98-01-04	190	26	15.25	Drill 311mm from 165m-171m. Leak off test at 171m. Leak off test was run at 10 litre a minute with no formation leak off at 23 kpa/min. Terminated test. Displace hole and condition mud. DRILL 311mm 171m-181m. Circulate and survey. Drill 181m to 186m. Very rough drilling. Flow checked (light flow). 10 minute flow check produced 550 units of gas readings. Light flow while drilling ahead. with volume increase with low gas readings (Water flow was 2.2m3 per hour). Circulate and weight up drilling mud. Drill 311mm hole 186m-187m.

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
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Repairs to kelly spinner (Kelly spinner fell off swivel while drilling) Drill 311mm hole from 187m-190m.

The drilling report numbering changed. Drilling report # 13 is dated 97-01-06, whereas drilling report # 12 is dated 97-01-04. The AM reports of the wellsite geologist changed on 98-01-10.

98-01-06	258	68	22.75	Drill 191m-203m. Rig service and function test hydril. Drill 203m-209m. Circulate and survey as required. Drill 209m-238m. Rig service and function test pipe rams. Circulate and survey. Drill 238m-258m.
98-01-07	301	43	15.00	Drill 311mm 258m-276m. Circulate and survey as required. Rig and function test Hydril. BOP drill. Accumulator function test. Drill 276m-285m. Trip for bit. Drill 285m-286m. Rig service and function test hydril. Drill 286m-301m. Circulate and survey as required.
98-01-08	364	63	18.50	Drill 311mm 301m-333m. Circulate and condition mud as required to combat anhydrite and flip mud system. Surveyed at 330m. Drill 333m-342m. Rig serviced and function pipe rams. Drill 311mm 342m-364m.
98-01-09	435	71	18.25	Clean out suction lines. Circulate and survey. Drill 311mm 365m-379m. Rig service. Function tested annular. Repairs to mud pump. Drill 311mm 379m-423m. Repairs to mud pump, Rig serviced. Function test pipe rams. Drill 311mm 423m-435m.

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
98-01-10	510	75	22.25	Drill 311mm hole from 435m to 510m with surveys and rig service.
98-01-11	560	50	21.50	Drill 311mm hole from 510m to 560m with rig service and surveys.
98-01-12	586	26	22.00	Drill 311mm hole with rig service and surveys from 560m to 586m.
98-01-13	589	3	3	Drill 311mm hole from 586m to 589m. Directional surveys. Condition hole for wire line logging. Rig in Schlumberger wireline loggers. Commence logging at 06:00hrs. Complete wireline logging operations by 18:00hrs. Tear out loggers. Rig to trip in and trip in to clean hole. Circulate and condition hole. Trip out of hole.
98-01-14	589	-	-	Schlumberger wireline loggers rigged in at 06:00hrs. Complete logging by 18:00hrs. Commenced preparations for landing casing and cementing. Run in casing.
98-01-15	589	-	-	Finish run in casing. Cement casing with Dowell. Wait on cement. Commence to nipple up.
98-01-16	589	-	-	Continue to nipple up. Rig repairs. Mud tank repairs.
98-01-17	589	-	-	Continue nipple up.
98-01-18	589	-	-	Continue nipple up.
98-01-19	589	-	-	Complete nipple up. Prepare mud tanks and mud system for invert. Prepare to trip in hole. Trip in open ended and pressure test stack. Pressure test pipe rams and stabbing valves, inside BOP, kill line valves HCR, check valve, kelly

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
				valves. Pressure testing at 2000 Kpa for 15 minutes, 19000 Kpa at 15 minutes. Annular was high pressure checked at 14500 Kpa. Clean ice out of mud tanks and gel gates. Tripped out of hole to pick up BHA and 222mm Bit # 4. Rig service and safety meeting. Picked up BHA. Tripped in hole. Repairs to kelly spinner (Install proper bolts.) Reseal mud tank gates.
98-01-20	592.50	3.5	3.00	Drill 222mm hole from 589m to 598.5m.
98-01-21	693	101	22.50	Drill 222mm hole with rig service and survey from 592.50m to 693m.
98-01-22	784	91	21.00	Drill 222mm hole with circulation, rig services and surveys from 693m to 784m.
98-01-23	890	106	21.00	Drill 222mm hole with circulation, surveys, and rig service from 784m to 916m.
98-01-24	982	92	10.50	Drill 222mm hole to 916mKB and survey as required. Circulate and condition hole, clean flow line and shaker boxes. Water wet drill cuttings. Tripped out of hole. Changed bit and serviced float. Tripped in hole to 380m. Slipped and cut drill line. Tripped in hole. Broke circulation at 680m and 905m. Washed 11m to bottom. No fill. Circulated sample bottoms up and conditioned mud. Added Chemwet CM and hot lime. Drilled 222mm hole to 982m and survey as required. Fann hole, weight on bit 8000 Dan from 899m to 954mKB, weight on bit 2000 Dan from 954m to 982mKB. Functioned Hydril, pipe

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
				rams and blind rams.
98-01-25	1136	154	21.50	Drill 222mm hole to 988m and survey as required. Rig service and function HCR. Drill 222mm hole to 1029mKB and survey as required. Rig service and function pipe rams. Drill 22mm hole to 1102mKB and survey as required. Rig service and function annular. Drill 222mm hole to 1136mKB. Fan hole, wait on bit 3000 Dan from 982m KB to 1001mKB. Weight on bit 5-6000 Dan from 1001m-1136mKB.
97-01-26	1240	104	17.00	Drill 222mm hole to 1166mKB and survey as required. Rig serviced and function pipe rams. Drill 222mm hole to 1198mKB and survey as required. Rig serviced and function HCR. Drill 222mm hole to 1240mKB and survey as required. Rig service and Hydril. Note: Problems with pressurized medium gray salty shale, depth 1230mKB to 1235mKB. Circulated and mixed invert product to increase yield and viscosity. Fan hole, weight on bit 3-5000 Dan from 1136mKB to 1171mKB. Weight on bit 2-3000 Dan from 1171mKB to 1240 mKB. Note: Gas monitor alarm went off in cellar. Masked Shehtqh personnel and checked for H2S and gas. None fond. Crews followed proper procedure for situation (Monitor was wet)
98-01-27	1249	9	2.00	Condition mud. Drill 222mm hole from 1240m to 1249m. Sloughing shale unloading. Pull bit up into dolomite layer at 1230m. Condition mud, run in, 4.5m bottom fill. Pull up into 1230m dolomite.

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
				Condition mud. Run in 2.5m bottom fill.
98-01-28 1249		0	0:00	Circulated at 1240mKB and increased density to 1080kg/m3, viscosity 45 S/L. Pulled up to 1228m, waited 5 minutes, ran bit into 1238mKB (2m fill) washed to 1240KB. Circulated at 1240mKB and increased density to 1105kg/m3, viscosity 47S/L. Pulled up to 1228mKB, waited 5 minutes, ran bit into 1238mKB (2m fill) washed to 1240mKB. Changed shaker screens to 84x84. Had safety and well control meeting with Shehtah crew. Circulated at 1240mKB and increased density to 1118kg/m3, viscosity 45 S/L. Problems with water-wet barite, shaker screens were plugging up. Bypass shakers, positioned bit at 1229mKB (a dolomite bed). Electric stability dropped 200. Rigged pump #2 and circulated through bleed off line to shear invert. Circulated ad sheared mud, added 8m3 of water, increased oil/water ratio to 80/20. (Should be diesel/water ratio.) Electric stability increased to 720. Density dropped to 1100kg/m3. Circulated and mixed one circulation of 32 sacks hot lime. Ran bit into depth of 1238mKB, 1.5m fill, cleaned to 1240mKB> Circulated at 1240mKB and mixed 70 sks Barite, 20 Liters each of Chem (1), (11) and Chemwet CM. Density increased to 1109kg/m3. Electric stability dropped to 420. Problems with water-wet barite plugging shaker screens. Circulated at 1240mKB and mixed OMV-100 and hot lime 5 minutes a sack. Rig

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
				inspection by Ed Reyvan N.E.B.
98-01-29	1249	0	0:00	<p>Circulated at 1240mKB and mixed 16sks hot lime and 16 sks OMV-100, 5 minutes a sack. Problem with shaker screens plugging with barite and gel. (Immature unsheared Invert.) Circulated at 1229mKB, bypassed shakers, mixed 16 sks hot lime. Note: Electric stability dropped to 200. Circulated at 1229mKB and mixed 100 L chem (1), 100 L chem (11) and 100 L chemwet CM over to circulations. 15 hours later electric stability was 300. Had safety meeting with Dowell and Shehtah personnel. Rigged in Dowell C&A Pumper to shear invert, hopper pressure 10500 kPa, rate 0.84m3/min. Circulated at 1240mKB and shear mud. Worked pipe above 1230mKB and back to 1240mKB. (1.5m bottom fill) After two circulations electric stability was 460. Circulated at 1240mKB, sheared and mixed 205L Chem (1), 205 L Chem (11), 205 L Chem wet CM, 15 sks OMV-100. After two circulations electric stability was 1020. Circulated at 1240mKB, sheared and mixed 15 sks OMV-100, electric stability 1200.</p>
98-01-30	1282	33	0:00	<p>Circulated and cleaned to bottom 1249mKB. Ran in and checked for fill (6 m). Circulated and worked hole from 1229mKB to 1240mKB, mixed barite at 2 minutes a sack for one circulation. Chem (1) and chem (11). Dowell pump was shearing the drilling fluid. Density increased to 1118kg/m3. Continued to work hole and mix barite, OMV-100, Chem (1), Chem (11) until hole stabilized. Density of 1185kg/m3,</p>

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
				viscosity 60 S/L. Plastic 22, Yield 14, electric stability 1180. Fill on bottom decreased as mud density increased. Rig serviced and functioned HCR and Hydril. Drilled 222mm hole to 1259mKB. Rig serviced and Functioned Pipe Rams. Drilled 222mm hole to 1282mKB. Rigged in Wadeco Hopper and rigged into pump # 2 to shear mud. Pump rate 1m3/min. 6500kPa. Released Dowell at 18:45 kg/m3.
98-01-31	1344	63	21.00	Rig serviced and functioned Hydril. Drill 222mm hole to 1296mKB. Circulated hole , rig service, functioned pipe rams and ran survey at 1287mKB. Drilled 222mm hole to 1315mKB. Rig serviced and functioned pipe rams. Drilled hole to 1344mKB. Fann hole from 1282mKB to 1344mKB. Tight hole prior to connection at 1296mKB.
98-02-01	1382	38	20.00	Drilled 222mm hole to 1365mKB. Circulated hole and ran survey at 1345mKB. Drilled 222mm hole to 1363mKB. Rig service and function pipe rams. Drill 222mm hole to 1384mKB. Circulated bottom sample. Set up brakes, rig service and function hydril and pumped survey. Hoisted out of hole to 1219mKB. Pumped pill. Hoisted out of hole. Handled bottom B.H.A., picked up and made up teledrift. Dropped survey on trip, misrun. Fan hole from 1344mKB to 1384mKB. Tight hole prior to making connection.

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
98-02-03	1546	61	21.25	Drilled 222mm hole to 1495mKB. Survey as required. Rig service and function Hydril and HCR. Drill 222mm hole to 1505mKB. Survey. Drill 222mm hole to 1533mKB and survey. Rig service and function test Hydril. Drill 22mm hole to 1546mKB and survey as required. Fann hole at 25 minutes per meter 1480mKB to 1505mKB and 15 minutes from 1505mKB to 1546mKB.
98-02-04	1634	88	18.25	Repairs and drill 222mm hole to 1558mKB. Circulate up samples. Drill 222mm hole with surveys and rig service from 1558mKB to 1634mKB. Gas 380 units over background of 20 units at 1552m. 50 units at 1559m, gas 97 units at 1571m, and 209 units at 1578m. Losses 6m3 to formation. Control drill at 6 to 7 m per hour using at least 1 dan to max 6 dan.
98-02-05	1758	124	20.00	Circulate and survey. Drill 222mm hole from 1646mKB to 1758mKB with survey, rig service and function Hydril, pipe rams, and BOP drill, well secure in 1.5 minutes.
98-02-06	1890	132	21.75	Drilled 222mm hole from 1758mKB to 1890mKB with survey, rig service and function pipe rams and hydril. Background gas 11 to 22 units with peak of 27 units.
98-02-07	1906	16	9.00	Repairs to rotary chain and clean pump suction. Drilled 222mm hole from 1890mKB to 1900mKB with rig service, survey, and function tested pipe rams. Pump pill and trip out drill collars. Slipped and cut drilling line. Tripped out and laid down bit. Layed down

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
				teledrift assembly. Rig to pressure test and tested BOP's and valves, manifold valves and chokes. Hydril and chokes at 1500 kpa at 10 minutes and all other valves. All other tests at 1500 kpa at 10 minutes, 18000kpa at 10 minutes. Pressure tested with test plug. Picked up B.H.A. and tripped in to hole.
98-02-08	1926	10	18.50	Tripped in hole. Broke circulation 1300mKB. Washed to bottom 3m fill. Rig serviced. Function tested hydril. Drilled 222mm hole with rig service and change oil in swivel from 1906mKB to 1926mKB.
98-02-09	1950	24	20.00	Rig serviced. Function tested pipe rams. Cleaned suction screens. Drill 222mm hole from 1926mKB to 1950mKB with rig service, function tests hydril and pipe rams and flow check. Losses to formation of 1m3 per hour. Mixed LCM pill and spot at 1944 to 1860mKB. Losses while drilling ahead aprox. 3m3 per hour.
98-02-10	1953	3	2.50	Drill 222mm hole from 1950mKB to 1953mKB. Flow check. Losses 4m3 per hour in static condition. Mix a LCM pill of prima seal, Cellophane. Circulation Plus and Bore. Spotted at 1953 to 1900mKB. Pulled up to 1930mKB and condition mud with LCM. On the circulation of bottoms up mud came around with the LCM and at an 1190 mud weight. with gas peaks of 600 units over background of 10 units. Circulated and conditioned mud. Rig

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
				service. Function tested Hydril, HCR. Circulated and conditioned mud to 1235kg/m3 and 80 viscosity.
98-02-11	1953	TD		Circulated and conditioned mud to 1235kg/m3 and 80 viscosity at 1931mKB. Flow check and rig service. Function test pipe rams. Tripped out to log. Strapped out. Rig service. Function test blind rams. Rigged up to log and log with Schlumberger. Drillers Depth 1953mKb. Loggers Depth 1948.9mKB. Log run #1 DISFL BHCS. Log run #2 CNL-LDT-XY Cal.

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

Imperial (Surface)

10 - 25 **SHALE** - black, hard, blocky, platy in part, common pyrite disseminated and streaks, slightly silty;

25 - 35 **SHALE** - black, platy, trace pyrite, common bitumen;

35 - 54 **SHALE** - black, hard, blocky, platy in part, common pyrite disseminated and streaks, slightly silty;
SILTSTONE - light tan, blocky, splintery, frag, No show, trace micromicaceous, common pyrite disseminated and streak, fair intergranular porosity;

Canol/Hare Indian (54m from samples)

54 - 75 **SHALE** - black, platy, trace pyrite, common bitumen;

75 - 96 **SHALE** - black, platy, trace pyrite, common bitumen;

96 - 126 **SHALE** - black, platy, trace pyrite, common bitumen;

126 - 147 **SHALE** - black, platy, trace pyrite, common bitumen;

Hume (147m from samples and electric logs)

147 - 150 **LIMESTONE** - light tan - white, blocky, platy in part, microcrystalline, fair intercrystalline porosity, light blue fluorescence and specks bright yellow cut, trace pyrite;

150 - 155 **LIMESTONE** - light tan - white, marbled in part, blocky, platy in part, hard, microcrystalline, fair intercrystalline porosity, No show, white calcite crystals fill fossil molds, trace pyrite;

155 - 164 **LIMESTONE** - light tan - white, marbled in part, blocky, platy in part, hard, microcrystalline, fair intercrystalline porosity, No show, white calcite crystals fill fossil molds, trace pyrite; **DOLOMITE** - light brown - green, hard, blocky, microcrystalline, fair intercrystalline porosity, No show; stylolitic.

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

164 - 170	LIMESTONE - light tan - white, marbled in part, blocky, platy in part, hard, microcrystalline, <u>fair intercrystalline porosity</u> , <u>No show</u> , white calcite crystals fill fossil molds, trace pyrite; DOLOMITE - light brown - green, hard, blocky, microcrystalline, <u>fair intercrystalline porosity</u> , <u>No show</u> ;
170 - 180	LIMESTONE - light tan - white, marbled in part, blocky, platy in part, hard, stylolitic, microcrystalline, <u>fair intercrystalline porosity</u> , <u>trace yellow cut</u> , <u>trace blue fluorescence</u> , clear and white calcite crystals fill fossil molds, trace pyrite, common calcite clear crystal micro fracture fill; DOLOMITE - light brown - green, hard, stylolitic, blocky, dense, microcrystalline, <u>No show</u> , <u>trace porosity</u> ;
180 - 181	DOLOMITE - light brown - green, hard, blocky, dense, stylolitic, microcrystalline, <u>No show</u> , <u>trace porosity</u> ;
181 - 190	LIMESTONE - light tan - white - dark brown, marbled in part, blocky, platy in part, very hard, <u>dense</u> , stylolitic, microcrystalline, <u>No show</u> , clear and white calcite crystals fill micro fractures and fossil molds, trace pyrite, some calcite micro fracture fill, clear and white;
190 - 205	LIMESTONE - light tan - white - dark brown, marbled in part, blocky, platy in part, very hard, stylolitic, microcrystalline, <u>No show</u> , clear and white calcite crystals fill micro fractures and fossil molds, trace pyrite, some calcite micro fracture fill, clear and white;
205 - 208	LIMESTONE - light tan - white - dark brown, marbled in part, blocky, platy in part, very hard, stylolitic, microcrystalline, <u>No show</u> , clear and white calcite crystals fill micro fractures and fossil molds, trace pyrite, some calcite micro fracture fill, clear and white;
Headless	(208m from samples)
208 - 225	LIMESTONE - medium gray, platy, microcrystalline, abundant argillaceous 35-40%, scattered calcite crystals, clear and white, in micro fracture fill and fossil mold; SHALE - medium gray, platy, abundant calcareous;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

225 - 230	LIMESTONE - medium gray, platy, soft to hard, microcrystalline, abundant argillaceous 35-40%, scattered clear and white opaque calcite crystals in micro fracture fill and fossil molds, trace pyrite;
230 - 240	LIMESTONE - tan - white - dark brown, marbled in part, blocky, platy in part, very hard, stylolitic, trace pyrite. <u>No show.</u> Clear and white calcite crystals fill micro fossil molds.
240 - 258	LIMESTONE - medium grey, soft - hard, platy. <u>No show.</u>
258 - 270	DOLOMITE - light brown - green, hard, blocky, dense, microcrystalline, <u>No show, trace porosity;</u> LIMESTONE - medium gray, platy, microcrystalline, abundant argillaceous 35-40%, scattered calcite crystals, clear and white, in micro fracture fill and fossil mold;
270 - 280	DOLOMITE - light brown - green, hard, blocky, dense, microcrystalline, <u>No show, trace porosity;</u> LIMESTONE - medium gray, platy, microcrystalline, abundant argillaceous 35-40%, scattered calcite crystals, clear and white, in micro fracture fill and fossil mold;
280 - 290	LIMESTONE - medium gray, platy, microcrystalline, abundant argillaceous 35-40%, scattered calcite crystals, clear and white, in micro fracture fill and fossil mold; SHALE - medium gray, platy, abundant calcareous; SILTSTONE - black, platy - blocky, soft, abundant quartz clear rounded grains, trace pyrite, common calcareous, some bitumen dead;

Arnica (290m from samples)

290 - 305	DOLOMITE - light brown - tan, hard, blocky, microcrystalline, dense, <u>No show, white calcite crystals fill fossil molds.</u>
305 - 310	DOLOMITE - light brown - grayish, hard, blocky, dense, microcrystalline, <u>fair intercrystalline porosity, LIVE OIL in cuttings, strong yellow cut and fluorescence,</u> common stylolites;

LITHOLOGY

Formation tops Sample interval (in meters)	SAMPLE DESCRIPTION
310 - 315	DOLOMITE - light brown - tan, hard, blocky, dense, microcrystalline, <u>No show</u> , white calcite crystals fill fossil molds, slightly calcareous, trace pyrite;
<u>Bear Rock</u>	<u>(315m from samples and electric logs)</u>
315 - 345	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
345 - 365	ANHYDRITE -white -light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
365 - 380	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
380 - 400	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
400 - 415	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
415 - 430	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
430 - 435	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline;
435 - 445	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

445 - 455	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
455 - 465	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
465 - 475	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
475 - 495	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
495 - 510	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite;
510 - 520	ANHYDRITE - white - light tan, blocky, microcrystalline to fine crystalline; DOLOMITE - light gray, platy, hard, opaque - translucent, microcrystalline to medium crystalline, trace pyrite, trace calcareous in part;
<u>Franklin Mountain (520m from samples)</u>	
520 - 525	ANHYDRITE - white - light tan, blocky - platy, clear - translucent, soft, microcrystalline; DOLOMITE - dark brown - light brown - light tan, hard, brittle, microcrystalline, <u>poor vuggy porosity</u> , clear euhedral crystals in micro vugs;
525 - 540	DOLOMITE - dark brown - light brown - light tan, platy - blocky, hard, microcrystalline, <u>poor vuggy porosity</u> , clear euhedral dolomite crystals in micro vugs;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

540 - 555	DOLOMITE - dark brown - light brown - light tan, platy - blocky, hard, microcrystalline, <u>poor vuggy porosity</u> , clear euhedral dolomite crystals in micro vugs;
555 - 565	DOLOMITE - dark brown - light brown - light tan, platy - blocky, hard, microcrystalline, <u>poor vuggy porosity</u> , clear euhedral dolomite crystals in micro vugs;
Franklin Mountain (565m from electric logs)	
560 - 575	DOLOMITE - dark brown - light brown - light tan, platy - blocky, hard, microcrystalline to fine crystalline, trace clear euhedral dolomite crystals in rare micro vugs, trace pyrite, slightly calcareous;
575 - 580	DOLOMITE - dark brown - light brown - light tan, platy - blocky, hard, microcrystalline to fine crystalline, trace clear euhedral dolomite crystals in rare micro vugs, trace pyrite, slightly calcareous;
580 - 585	DOLOMITE - light tan, platy, brittle, microcrystalline to very fine crystalline, <u>fair intercrystalline porosity</u> , <u>No show</u> , clear crystal grains throughout;
585 - 589	DOLOMITE - light brown - light tan, platy - blocky, hard, microcrystalline to very fine crystalline, <u>No show</u> ;
589 - 610	DOLOMITE - light brown - light tan, platy - blocky, hard, microcrystalline to very fine crystalline, <u>No show</u> ; DOLOMITE - light tan, platy, brittle, microcrystalline to very fine crystalline, <u>fair intercrystalline porosity</u> , <u>No show</u> , clear crystal grains throughout;
610 - 635	DOLOMITE - light brown - light tan, platy - blocky, hard, microcrystalline to very fine crystalline, <u>No show</u> ; DOLOMITE - light tan, platy, brittle, microcrystalline to very fine crystalline, <u>fair intercrystalline porosity</u> , <u>No show</u> , clear crystal grains throughout;
635 - 650	DOLOMITE - It brown - light tan, platy - blocky, hard, microcrystalline to very fine crystalline, <u>No show</u> ; DOLOMITE - light gray, platy, microcrystalline, <u>trace intercrystalline porosity</u> ;

LITHOLOGY

Formation tops Sample interval (in meters)	SAMPLE DESCRIPTION
650 - 655	DOLOMITE - light gray, platy, microcrystalline, <u>trace</u> <u>intercrystalline porosity</u> ;
655 - 675	DOLOMITE - light gray, platy, microcrystalline, <u>trace</u> <u>intercrystalline porosity</u> ; DOLOMITE - white, platy, microcrystalline, thin bedded;
675 - 695	DOLOMITE - light brown - light tan, platy - blocky, hard, microcrystalline to very fine crystalline, <u>No show</u> ; DOLOMITE - light gray, platy, microcrystalline, <u>trace</u> <u>intercrystalline porosity</u> ;
695 - 710	DOLOMITE - light gray, platy, microcrystalline, <u>trace</u> <u>intercrystalline porosity</u> ; DOLOMITE - white, platy, microcrystalline, thin bedded;
710 - 725	DOLOMITE - light gray, platy, microcrystalline, <u>trace</u> <u>intercrystalline porosity</u> ; DOLOMITE - white, platy, microcrystalline, thin bedded;
725 - 730	DOLOMITE - white, platy, microcrystalline, thin bedded;
730 - 736	DOLOMITE - light gray, platy, microcrystalline, <u>trace</u> <u>intercrystalline porosity</u> ;
736 - 755	DOLOMITE - white, platy, microcrystalline, thin bedded;
755 - 775	DOLOMITE - light gray, platy, microcrystalline, <u>trace</u> <u>intercrystalline porosity</u> ; DOLOMITE - white, platy, microcrystalline, thin bedded;
775 - 784	DOLOMITE - white, platy, microcrystalline, thin bedded;
784 - 790	DOLOMITE - white, platy, microcrystalline, thin bedded;
790 - 796	DOLOMITE - light gray, platy, microcrystalline, <u>trace</u> <u>intercrystalline porosity</u> ;
796 - 805	DOLOMITE - light gray, platy, microcrystalline, <u>trace</u> <u>intercrystalline porosity</u> , trace pyrite thin streaks; DOLOMITE - white, platy, microcrystalline, thin bedded;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

805 - 815	DOLOMITE - white, platy, dense, microcrystalline, thin bedded, trace pyrite thin streaks, trace calcareous;
815 - 825	DOLOMITE - light gray, platy, brittle, dense in part, microcrystalline, <u>trace intercrystalline porosity</u> , rare stylolites, trace pyrite thin streaks, trace calcareous; DOLOMITE - white, platy, dense, microcrystalline, thin bedded, trace pyrite thin streaks, trace calcareous;
825 - 835	DOLOMITE - medium gray - dark gray, light brown - dark brown in part, platy, hard to dense in part, microcrystalline, trace pyrite thin streaks, trace calcareous;
835 - 845	DOLOMITE - medium gray - dark gray, light brown - dark brown in part, platy, hard to dense in part, microcrystalline, trace pyrite thin streaks, trace calcareous, moderately argillaceous;
845 - 849	DOLOMITE - medium gray - dark gray, light brown - dark brown in part, platy, hard to dense in part, microcrystalline, trace pyrite thin streaks, trace calcareous, moderately argillaceous;
<u>Saline River Evaporite Member (849m from samples and electric logs)</u>	
849 - 880	DOLOMITE - medium gray - dark gray, light brown - dark brown in part, platy, hard to dense in part, microcrystalline, trace pyrite thin streaks, trace calcareous, moderately argillaceous; SALT - soft, pink;
880 - 900	DOLOMITE - medium gray - dark gray, light brown - dark brown in part, platy, hard to dense in part, microcrystalline, trace pyrite thin streaks, trace calcareous, moderately argillaceous; SALT - soft, pink;
900 - 915	DOLOMITE - medium gray - dark gray, light brown - dark brown in part, platy, hard to dense in part, microcrystalline, trace pyrite thin streaks, trace calcareous, moderately argillaceous; SALT - soft, pink; SHALE - green and red, platy, slightly dolomite;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

915 - 920	DOLOMITE - light gray, platy, brittle, dense in part, microcrystalline, <u>trace intercrystalline porosity</u> , rare stylolites, trace pyrite thin streaks, trace calcareous; DOLOMITE - white, platy, dense, microcrystalline, thin bedded, trace pyrite thin streaks, trace calcareous; DOLOMITE - medium gray - dark gray, light brown - dark brown in part, platy, hard to dense in part, microcrystalline, trace pyrite thin streaks, trace calcareous, moderately argillaceous; SALT - soft, pink; SHALE - green and red, platy, slightly dolomite;
920 - 945	DOLOMITE - medium gray - dark gray, light brown - dark brown in part, platy, hard to dense in part, microcrystalline, trace pyrite thin streaks, trace calcareous, moderately argillaceous; SALT - soft, pink;
945 - 950	SALT - soft, pink, clear, cryptocrystalline; SHALE - green and red, platy, slightly dolomite;
950 - 955	SALT - soft, pink, clear, cryptocrystalline;
955 - 975	SALT - soft, pink, clear, cryptocrystalline; SHALE - green and red, platy, slightly dolomite;
975 - 995	DOLOMITE - medium gray - dark gray, light brown - dark brown in part, platy, hard to dense in part, microcrystalline, trace pyrite thin streaks, trace calcareous, moderately argillaceous; SALT - soft, pink, clear, cryptocrystalline; SHALE - green and red, platy, slightly dolomite;
995 - 1025	SALT - soft, pink, clear, cryptocrystalline;
1025 - 1055	SALT - soft, pink, clear, cryptocrystalline; SHALE - light green, soft, platy, slightly dolomitic; DOLOMITE - light green, platy, hard, dense in part, microcrystalline;
1055 - 1085	SALT - soft, pink, clear, cryptocrystalline; SHALE - light green, soft, platy, slightly dolomitic; DOLOMITE - light green, platy, hard, dense in part, microcrystalline;

LITHOLOGY

Formation tops Sample interval (in meters)	SAMPLE DESCRIPTION
1085 - 1105	SALT - soft, pink, clear, cryptocrystalline; SHALE - light green, soft, platy, slightly dolomitic; DOLOMITE - light green, platy, hard, dense in part, microcrystalline;
1105 - 1135	SALT - soft, pink, clear, cryptocrystalline;
1135 - 1165	SALT - soft, pink, clear, cryptocrystalline;
1165 - 1170	SALT - soft, pink, clear, cryptocrystalline;
1170 - 1195	SALT - soft, pink, clear, cryptocrystalline; DOLOMITE - light tan, brittle, honeycombed, microcrystalline and some coarse crystalline, <u>excellent vuggy porosity</u> ;
1195 - 1200	SALT - soft, pink, clear, cryptocrystalline; SHALE - light green, soft, platy, slightly dolomitic; DOLOMITE - light green, platy, hard, dense in part, microcrystalline; DOLOMITE - light tan, brittle, honeycombed, microcrystalline and some coarse crystalline, <u>excellent vuggy porosity</u> ;
1200 - 1215	SALT - soft, pink, clear, cryptocrystalline; SHALE - light green, soft, platy, slightly dolomitic; DOLOMITE - light green, platy, hard, dense in part, microcrystalline; SHALE - light - medium gray brown, platy, soft, slightly calcareous;
1215 - 1240	SALT - soft, pink, clear, cryptocrystalline; DOLOMITE - light green, platy, hard, dense in part, microcrystalline; DOLOMITE - light tan, brittle, microcrystalline and some coarse crystalline; SHALE - light - medium gray brown, platy, soft, contains water as it explodes when heated, slightly calcareous;
1240 - 1249	SALT - soft, pink, clear, cryptocrystalline; SHALE - light - medium gray brown, platy, soft, contains water as it explodes when heated, slightly calcareous;
1249 - 1265	SALT - soft, pink, clear, cryptocrystalline; SHALE - light green, soft, platy, slightly dolomitic; SHALE - medium gray - brown, blocky, slightly calcareous;

LITHOLOGY

Formation tops Sample interval (in meters)	SAMPLE DESCRIPTION
1265 - 1270	SALT - soft, pink, clear, cryptocrystalline;
1270 - 1275	SALT - soft, pink, clear, cryptocrystalline; SHALE - light -m gray brown, platy, soft, contains water as it explodes when heated, slightly calcareous;
1275 - 1280	SALT - soft, pink, clear, cryptocrystalline; SHALE - medium gray - brown, blocky, slightly calcareous;
1280 - 1285	SALT - soft, pink, clear, cryptocrystalline; SHALE - light green, soft, platy, slightly dolomitic;
1285 - 1295	SALT - soft, pink, clear, cryptocrystalline; SHALE - medium gray - brown, blocky, slightly calcareous;
1295 - 1315	SALT - soft, pink, clear, cryptocrystalline; SHALE - light green, soft, platy, slightly dolomitic;
1315 - 1325	SALT - soft, pink, clear, some brown, cryptocrystalline, some large crystals; SHALE - medium gray - brown, blocky, slightly calcareous; DOLOMITE - white, rare thin beds in shale, microcrystalline, trace ironstone concretion, trace pyrite thin streaks;
1325 - 1335	SALT - soft, pink, clear, abundant brown, crypto - crystalline, some large crystals; SHALE - medium gray, light gray in part, soft, platy, waxy in part, slightly calcareous;
1335 - 1345	SALT - soft, pink, clear, abundant brown, crypto - crystalline, some large crystals; SHALE - medium gray - brown, blocky, slightly calcareous; DOLOMITE - white, rare thin beds in shale, microcrystalline, trace ironstone concretion, trace pyrite thin streaks; SHALE - medium gray, light gray in part, soft, platy, waxy in part, slightly calcareous;
1345 - 1355	SALT - soft, pink, clear, cryptocrystalline; SHALE - light green, soft, platy, slightly dolomitic; DOLOMITE - white, rare thin beds in shale, microcrystalline, trace ironstone concretion, trace pyrite thin streaks; SHALE - medium gray, light gray in part, soft, platy, waxy in part, slightly calcareous;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

1355 - 1365	SALT - soft, pink, clear, cryptocrystalline; SHALE - medium gray, light gray in part, soft, platy, waxy in part, slightly calcareous;
1365 - 1370	SALT - soft, pink, clear, cryptocrystalline;
1370 - 1380	SALT - brown, soft, clear, cryptocrystalline; SHALE - medium gray - brown, blocky, slightly calcareous;
1380 - 1384	SALT - brown, soft, clear, cryptocrystalline;
1384 - 1405	SALT - brown, soft, clear, cryptocrystalline, some mega crystals; SHALE - medium gray, platy, blocky in part, hard, trace pyrite, trace calcareous; SHALE - dark gray, platy - blocky, soft - hard, trace pyrite; DOLOMITE - dark brown, blocky, microcrystalline, trace calcareous; SHALE - light green, platy, soft, trace calcareous; SHALE - red, platy, trace calcareous, trace dolomite; CHERT - dark brown, shards, sharp, very hard, thin beds and irregular lenses, trace pyrite tiny crystals;
1405 - 1406	CHERT - dark brown, shards, sharp, very hard, thin beds and irregular lenses, trace pyrite tiny crystals;
1406 - 1418	SALT - brown, soft, clear, cryptocrystalline, some mega crystals; SHALE - medium gray, platy, blocky in part, hard, trace pyrite, trace calcareous; SHALE - dark gray, platy - blocky, soft - hard, trace pyrite; DOLOMITE - dark brown, blocky, microcrystalline, trace calcareous; SHALE - light green, platy, soft, trace calcareous; SHALE - red, platy, trace calcareous, trace dolomite; CHERT - dark brown, shards, sharp, very hard, thin beds and irregular lenses, trace pyrite tiny crystals;

Saline River Lower Clastic Member (1418m from samples and electric logs)

1418 - 1430	SALT - brown, soft, translucent to clear, some mega crystals, generally cryptocrystalline; SHALE - medium gray, platy, blocky in part, hard, trace pyrite, trace calcareous; SHALE - dark gray, platy - blocky, soft - hard, trace pyrite; DOLOMITE - dark brown, blocky, microcrystalline, trace calcareous;
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LITHOLOGY

Formation tops Sample interval (in meters)	SAMPLE DESCRIPTION
1430 - 1450	SALT - brown, clear, soft; SHALE - dark gray, platy - blocky, soft - hard, trace pyrite;
1450 - 1480	SHALE - light green - medium gray, platy, soft;
1480 - 1485	SHALE - light green - medium gray, platy, soft;
1485 - 1495	SHALE - light green - medium gray, platy, soft;
1495 - 1500	SHALE - light green - medium gray, platy, soft;
1500 - 1510	SHALE - light green - medium gray, platy, soft;
1510 - 1515	SHALE - light green - medium gray, platy, soft;
1515 - 1540	SHALE - light green - medium gray, platy, soft;
1540 - 1545	SHALE - light green - medium gray, platy, soft;
1545 - 1560	SHALE - light green - medium gray, platy, soft; DOLOMITE - light brown, possible oil stained, blocky, microcrystalline, <u>fair intercrystalline porosity, gas, bluish to purple, minor yellow mineral fluorescence, trace dark yellow cut</u> , abundant silty, some quartz clear subrounded grains, slightly dolomitic, slightly calcareous, some pyrite spheroids of small crystals; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite; SANDSTONE - light brown - tan, blocky, brittle, medium hard, very fine grained to fine grained, subrounded, moderately sorted, <u>fair intergranular porosity, gas, oil stained?, blue - purple fluorescence, trace dark yellow cut</u> , trace pyrite, slightly calcareous, abundant dolomitic;
1560 - 1570	SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

1570 - 1580	DOLOMITE - light brown, possible oil stained, blocky, microcrystalline, <u>fair intercrystalline porosity, gas, bluish to purple, minor yellow mineral fluorescence, trace dark yellow cut</u> , abundant silty, some quartz clear subrounded grains, slightly dolomitic, slightly calcareous, some pyrite spheroids of small crystals; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite; SANDSTONE - light brown - tan, blocky, brittle, medium hard, very fine grained to fine grained, subrounded, moderately sorted, <u>fair intergranular porosity, gas, oil stained?, blue - purple fluorescence, trace dark yellow cut</u> , trace pyrite, slightly calcareous, abundant dolomitic;
1580 - 1581	LIMESTONE - light tan - light gray, blocky, medium hard, microcrystalline, slightly dolomitic;
1581 - 1595	SHALE - light green - medium gray, platy, soft; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;
1595 - 1600	SHALE - light green - medium gray, platy, soft; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;
1600 - 1620	SHALE - light green - medium gray, platy, soft; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;
1620 - 1630	SHALE - light green - medium gray, platy, soft; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;
1630 - 1635	SHALE - light green - medium gray, platy, soft; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;
1635 - 1650	SHALE - light green - medium gray, platy, soft; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

1650 - 1675	SHALE - light green - medium gray, platy, soft; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite; ,
1675 - 1700	SHALE - light green - medium gray, platy, soft; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;
1700 - 1710	SHALE - light green - medium gray, platy, soft; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;
1710 - 1720	SHALE - light green - medium gray, platy, soft; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;
1730 - 1740	SHALE - light green - medium gray, platy, soft, trace calcareous; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;
1740 - 1750	SHALE - light green - medium gray, platy, soft, trace calcareous; SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite;
1750 - 1755	SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty;
1755 - 1759	SHALE - medium gray, platy, splintery, hard, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty;
<u>Mount Cap</u>	<u>(1759m from electric logs and samples)</u>
1759 - 1775	SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous;
1775 - 1780	SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous;

LITHOLOGY

Formation tops Sample interval (in meters)	SAMPLE DESCRIPTION
1780 - 1810	SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous;
1810 - 1820	SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous; SILTSTONE - tan - light brown, very hard, blocky, slightly calcareous, slightly argillaceous;
1820 - 1830	SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous; SILTSTONE - tan - light brown, very hard, blocky, slightly calcareous, slightly argillaceous;
1830 - 1840	SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous; SILTSTONE - tan - light brown, very hard, blocky, slightly calcareous, slightly argillaceous;
1840 - 1850	SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous; SILTSTONE - tan - light brown, very hard, blocky, slightly calcareous, slightly argillaceous;
1850 - 1855	SILTSTONE - tan - light brown, very hard, blocky, slightly calcareous, slightly argillaceous; SHALE - light gray - medium gray in part, medium hard, platy, flaky, splintery, abundant micromicaceous, trace pyrite, rare calcareous;
1855 - 1860	SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous; SILTSTONE - tan - light brown, very hard, blocky, slightly calcareous, slightly argillaceous;
1860 - 1865	SILTSTONE - tan - light brown, very hard, blocky, slightly calcareous, slightly argillaceous; SHALE - light gray - medium gray in part, medium hard, platy, flaky, splintery, abundant micromicaceous, trace pyrite, rare calcareous;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

1865 - 1870	SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous;
1870 - 1879	SHALE - light green - medium gray, platy, soft, trace calcareous; SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous;
Mount Clark	(1879m from samples and electric logs)
1879 - 1885	SHALE - light green - medium gray, platy, soft, trace calcareous; SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous; SILTSTONE - tan - light brown, very hard, blocky, slightly calcareous, slightly argillaceous; SHALE - light gray - medium gray in part, medium hard, platy, flaky, splintery, abundant micromicaceous, trace pyrite, rare calcareous;
1885 - 1890	SHALE - light green - medium gray, platy, soft, trace calcareous; SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous; SHALE - light gray - medium gray in part, medium hard, platy, flaky, splintery, abundant micromicaceous, trace pyrite, rare calcareous; SANDSTONE - bright red - orange, hard, blocky, fine grained to medium grained and some coarse grained, rounded, moderately sorted, <u>rare intergranular porosity</u> , trace pyrite, trace calcareous, some siliceous;
1890 - 1900	SHALE - light green - medium gray, platy, soft, trace calcareous; SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous; SHALE - light gray - medium gray in part, medium hard, platy, flaky, splintery, abundant micromicaceous, trace pyrite, rare calcareous; SANDSTONE - white, hard, brittle, siliceous cement, very fine grained to fine grained and some medium grained, rounded, well sorted, silty to very fine matrix with rounded frosted clear quartz grains, trace pyrite, trace calcareous, trace dolomite, <u>trace intergranular porosity</u> ;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

1900 - 1905	<p>SHALE - light green - medium gray, platy, soft, trace calcareous; SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous; SHALE - light gray - medium gray in part, medium hard, platy, flaky, splintery, abundant micromicaceous, trace pyrite, rare calcareous; SANDSTONE - white, hard, brittle, siliceous cement, very fine grained to fine grained and some medium grained, rounded, well sorted, silty to very fine matrix with rounded frosted clear quartz grains, trace pyrite, trace calcareous, trace dolomite;</p>
1905 - 1906	<p>SANDSTONE - white, hard, brittle, siliceous cement, very fine grained to fine grained and some medium grained, rounded, well sorted, silty to very fine matrix with rounded frosted clear quartz grains, trace pyrite, trace calcareous, trace dolomite;</p>
Unnamed Shale	<p>(1906m from electric logs. Some indication from samples.)</p>
1906 - 1910	<p>SHALE - medium gray, platy, splintery, hard, brittle, slightly calcareous, slightly dolomitic, trace pyrite, slightly silty, some micromicaceous; SHALE - light gray - medium gray in part, medium hard, platy, flaky, splintery, abundant micromicaceous, trace pyrite, rare calcareous; SANDSTONE - white, hard, brittle, siliceous cement, very fine grained to fine grained and some medium grained, rounded, well sorted, silty to very fine matrix with rounded frosted clear quartz grains, trace pyrite, trace calcareous, trace dolomite; SANDSTONE - whitish grey, blocky, friable, clear quartz grains, very fine grained to fine grained and some medium grained, subangular to rounded, poorly to moderately sorted, <u>fair intergranular porosity</u>, <u>brownish bitumen stain</u>;</p>
1910 - 1920	<p>SHALE - dark gray, hard, platy, blocky in part, some pyrite disseminated; SANDSTONE - gray - brown, very hard, friable, very fine grained to fine grained, subangular to rounded, poorly sorted, abundant pyrite crystals;</p>

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

1920 - 1929 **SHALE** - dark gray, hard, platy, blocky in part, some pyrite disseminated; **SANDSTONE** - gray - brown, very hard, friable, very fine grained to fine grained, subangular to rounded, poorly sorted, abundant pyrite crystals; **SANDSTONE** - tan, hard, blocky, coarse grained to very coarse grained and some medium grained, rounded, poorly sorted, rock is ground to sand, abundant pyrite euhedral crystals;

Precambrian/Proterozoic sedimentary strata (1929m from electric logs)

1929 - 1935 **SANDSTONE** - tan, hard, blocky, coarse grained to very coarse grained and some medium grained, rounded, poorly sorted, rock is ground to sand, abundant pyrite euhedral crystals; **DOLOMITE** - dark brown, blocky, hard, microcrystalline to fine crystalline, some intercrystalline porosity, fractures;

1935 - 1940 **SANDSTONE** - tan, hard, blocky, coarse grained to very coarse grained and some medium grained, rounded, poorly sorted, rock is ground to sand, abundant pyrite euhedral crystals; **DOLOMITE** - dark brown, blocky, hard, microcrystalline to fine crystalline, fair intercrystalline porosity, fractures, abundant calcareous, trace pyrite;

1940 - 1945 **SANDSTONE** - tan, hard, blocky, coarse grained to very coarse grained and some medium grained, rounded, poorly sorted, rock is ground to sand, abundant pyrite euhedral crystals; **DOLOMITE** - dark brown, blocky, hard, microcrystalline to fine crystalline, fair intercrystalline porosity, abundant calcareous, trace pyrite;

1945 - 1950 **SANDSTONE** - tan, hard, blocky, coarse grained to very coarse grained and some medium grained, rounded, poorly sorted, rock is ground to sand, abundant pyrite euhedral crystals; **DOLOMITE** - dark brown, blocky, hard, microcrystalline to fine crystalline, tight, abundant calcareous, trace pyrite;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

1950 - 1953

SANDSTONE - tan, hard, blocky, coarse grained to very coarse grained and some medium grained, rounded, poorly sorted, rock is ground to sand, abundant pyrite euhedral crystals; DOLOMITE - dark brown, blocky, hard, microcrystalline to fine crystalline, no apparent porosity and/or permeability, formation takes drilling fluid suggesting fractures, abundant calcareous, trace pyrite;

Final Total Depth is 1953m @ 08:22hrs February 9, 1998.

GEOLOGICAL SUMMARY AND CONCLUSIONS

The Nota Creek prospect is a well defined four-way closed tilted graben flank structure cored by Proterozoic sedimentary rocks that are unconformably overlain by a series of Cambrian sandstones - the primary objective - of the Mount Clark Formation. Drilling identified an unnamed 20 metre shale section with minor sandstone beds between the Proterozoic rocks and the Mount Clark Sandstones. The Mount Clark is overlain by a thick succession of Cambrian shales of the Mount Cap formation and of the Lower Clastic Member of the Saline River Formation. A thick evaporite section, mainly composed of halite, overlies the shales. The shallower section is composed of Cambrian-Ordovician dolomites unconformably overlain by Lower Devonian dolomites, anhydrites, and limestones, in turn overlain by Middle Devonian limestones, and Upper Devonian shales with minor sandstones.

The prospect was tested with well Ranger et al Nota Creek C-17. The primary target for both oil and gas is placed in sandstones of the Cambrian Mount Clark Formation. A secondary target for oil is placed in dolomites of the Bear Rock Formation. The primary target was identified, but not the secondary target. Instead, an additional four hydrocarbon-bearing zones were discovered. A brief review of the hydrocarbon-bearing intervals in well Nota Creek C-17 follows below.

The first show of hydrocarbon was at 183m KB, in the Middle Devonian Hume Formation, which came in 27 metres high to prognosis. A drilling break was followed by water influx into the well bore and gas readings increased from a background of 10 units to 600 units. Increased mud weight to 1250kg/m³. It stemmed the water flow of the aquifer and cut off the gas production. Gas did not enter the well bore on subsequent connections.

The second indication of hydrocarbons was from a porosity zone at 305m KB in the Lower/Middle Devonian Arnica Formation. Well cuttings from this zone have a strong mineral fluorescence and a small fast bright yellow cut.

No hydrocarbons were detected in the secondary target - the Bear Rock Formation. The top of this formation came in 70m high to prognosis.

The third indication of hydrocarbons came from the 1550m KB to 1557m KB interval in the Lower Clastic Member of the Cambrian Saline River Formation. The top of this formation came in very close to prognosis and it was marked by a change in drilling penetration rate from 4m/hour to over 20m/hour. The hydrocarbon zone contains porous and permeable dolomites and possibly some sandstone beds as well.