

AUTHORITY TO
DRILL A WELL



Exploratory
Development

☒
☐

Delineation
Service

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AUTHORITY TO DRILL A WELL

APPLICATION

This application is submitted with Section 82 of the Canada Oil and Gas Drilling Regulations. When approved under Section 83 of the Regulations, it is the requisite authority for the commencement of drilling operations.

Well Name in Full: RANGER BEAR ROCK O-20
Operator: RANGER OIL LIMITED Drilling Program No.: --
Contractor: Shehtah Drilling Limited Permit or Lease No.: EL 377
Drilling Rig or Unit: Rig #1 Estimated Well Cost: \$1,600,000
Location-Unit: 0 Section: 20 Grid Area: 65° 00', 125° 45'
Coordinates: Lat.: 64° 59' 47" Long.: 125° 47' 25"
Area: Tulita (Fort Norman) Field/Pool: New Exploration
Elevation-RTKB: 165 m Sealloor: -- (BRT)
Approx. Spud Date: January 15, 1998 Estimated Days on Location: 14
Anticipated Total Depth: 700 m Target Horizon(s): Bear Rock

EVALUATION PROGRAM

Ten-metre sample intervals: None
Five-metre sample intervals: 25 mKB to total depth, 2 vials and 1 bagged
Canned sample intervals: None
Conventional cores at: Possible 18 m slimhole core in Bear Rock
Logs and Tests: Log and tests as per program

CASING AND CEMENTING PROGRAM

O.D.	Weight:	Grade:	Setting Depth	Cementing Program (Volumes):
339.7 mm	81.1 kg/m	K-55	Below 20 m	Artic set cement to surface if drilled
244.4 mm	53.6 kg/m	J-55	200 m	Artic set cement to surface
139.7 mm	23.0 kg/m	K-55	700 m	RFC cement 700 m to surface

B.O.P. Equipment: 540 mm, 14 MPa diverter system on conductor pipe
346 mm, 21 MPa, 2 pipe rams, 1 blind ram, annular preventor.

Other Information: Gel chem mud system on surface and main holes.

Signed: [Signature] Title: Drilling & Completions Superintendent
Date: November 7, 1997 Company: Ranger Oil Limited

APPROVAL

An approved copy of this notice is to be posted at each wellsite.

Signed: [Signature] Chief Conservation Officer

Date: Dec 4/97

File: 9211-R36-2-2, WID. 1836
UWI 3000206500125450

Canada

WELL
TERMINATION
RECORD



CANADA

WELL TERMINATION RECORD

This record is submitted in triplicate in compliance with Section 184 of the Canada Oil and Gas Drilling Regulations.

WELL DATA

Well Name: RANGER BEAR ROCK O-20 Area: Tulita
Grid Area: 65° 00' 125° 45' Field/Pool: New Exploration
Permit or Lease No.: EL 377 Final Coordinates: Lat: 64° 59' 47" Long: 125° 47' 25"
Drilling Unit: Tri-City Rig #16 Elevations: KB: 170.4m SWGL: 166m
Spud Date: 16:30 hrs 98-02-25 Rig Released: 12:00 hrs 98-03-07 Total Depth: 249 m

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
339.7 mm	81.1 kg/m	K-55	254 m	11 T Artic set + 7.4% D71 + 0.5% D65 + 0.5% B71
219.1 mm	35.7 kg/m	J-55	200 m	22.0 T Artic set + 0.5% D65 + 0.5% B71

PLUGGING PROGRAM

Approval of the following program was obtained by (person) Ralph Lane, Ranger Oil Limited from
(person) Andy Graw, N.E.B. by means of
telephone on March 6 19 98

Type of Plug:	Interval:	Fell:	Cement and Additives:
Cement	249 - 87 m	87 m	26 m RFC + 1% CaCl + 0.4% D46 + Flobloc + antifoam
Cement	73.1 - 67 m	Dump bail onto BP,	RFC cement
Cement	3 m - surface		RFC cement

Cut & Weld steel cap on 219.1 mm casing, 1 m below ground level. Well sign installed

Lost Circulation/Overpressure Zones: Water flows 95 m, 108 m, 228 mKB/lost circulation @ 249 mKB.

Equipment left on Seafloor (Describe): N/A

Provision for Re-entry (Describe and attach sketch): N/A

Cores: Type: No cores Intervals:

No logs

Other Downhole Completion/Suspension Equipment: Schlumberger bridge plug @ 73.1 mKB

Pressure tested to 2500 kPa

CERTIFICATION

I certify on the basis of personal knowledge of operations undertaken at the above named well that the above information is accurate.

Signed: Don Sorkilmo
Name: Don Sorkilmo

Title: Drilling & Completions Superintendent
Date: March 31, 1998

Acknowledged by: Jerry Baker
Engineering Branch

Date: Apr 29/98

File: 9211-R36-2-2..UID.1836

UWI 3000206500126450

Well Status
Suspended ☐
Completed ☐
Abandoned ☒

Canada

RANGER OIL LIMITED

EXISTING DOWNHOLE WELL PROFILE

Location: RANGER BEAR ROCK O-20

Date: 98-03-31

KB (m) 165.40 GL (m) 161.00 KB to SCF _____ KB to THF _____

Original PBT

Current PBTD

No.

Jts.

Size OD

mm

Grade

Thread

Landed

mKB

Top

mKB

Surface Casing:

13

219.10

J55

STC

200.00

Cement:

22t Articset + .5% D65 + .5% B71

Production Casing:

None

Cement:

Filler:

	Tall:
--	--------------

Tail:

Tubing

Perforated Interval (mKB):

to

to

FINAL TUBING STRING (Bottom Up)

[illegible]

Tubing Weight		Wt. on Anchor		Wt. on Hanger	
0	daN	daN		0	daN

Wellhead	Make:	NA	W.P.	Type:	
Master Valve	Make:		W.P.	Type:	
	Size:		Trlm		
Casing Valves	Make:		W.P.	Type:	
	Size:		Trim		
Choke	Make:				

Surf. Casing Status: Cut off 1m below GL. Steel plate welded onto casing stub.

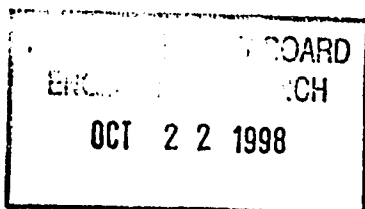
Remarks:	Wellhead sign installed
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FINAL WELL REPORT

N.E.B. COPY

FINAL WELL REPORT
RANGER BEAR ROCK 0-20
Tulita Area, NT

Prepared by Ken Kindjerski
October, 1998



INTRODUCTION

1. Program Summary

Ranger Oil Limited programmed to drill a 700 m deep exploration well to evaluate hydrocarbon production potential from the Bear Rock formation.

Tri-City Drilling Rig #16 was contracted to drill the well. Drilling equipment was mobilized and demobilized using the "Winter Road".

Drilling operations encountered a high pressure water aquifer at 228 mKB in the top of the Hume formation. Mud density was increased to 1435 kg/m^3 to stop the water influx and allow drilling to proceed.

Lost circulation was encountered at 249 mKB in the Hume. The well kicked water during a trip out to remove the bit for open end cementing. The well was shut in using the blind rams and with all the drill string out of the wellbore.

A decision was made to abandon this wellbore. Cement was bullheaded from surface to fill the wellbore to T.D. at 249 mKB. The cement was displaced to 87 mKB with water.

A wireline set bridge plug was placed at 73.1 mKB, pressure tested to 2500 kPa, and capped with 6 m of cement.

The primary target formation was not evaluated.

2. Location Map

Attached is a topographic map (1:50,000) showing the 0-20 well location and its relationship to geographic features, the winter road and the IPL pipeline.

GENERAL DATA

Well Name: Ranger Bear Rock 0-20

Exploration Licence: EL 377

Location: Unit 0, Section 20
Grid Area: 65° 00', 125° 45'

Well Location: See attached well plan.

Unique Well Identifier: 3000206500125450

Operator: Ranger Oil Limited
1600, 321 – 6th Avenue S.W.
Calgary, Alberta T2P 3H3

Drilling Contractor: Tri-City Drilling Inc.
Division of Ensign Drilling Inc.
900, 400 – 5th Avenue S.W.
Calgary, Alberta T2P 0L6

Drilling Rig: Tri-City Rig #16
Superior 300 (double)

Position Keeping/Support Craft: N/A.

Difficulties & Delays: The short season of winter road opening (February 16 – March 17, 1998) limits the operating time window in which a rig can be supplied via road.

Total Well Costs: \$1,540,000

SUMMARY OF DRILLING OPERATIONS

Elevations: GL 161.00 m
KB 165.40 m

Total Depth: 249 mKB
67 mKB PBTD

Spud Date: 1998-02-25 @ 16:30 Hrs.

Rig Release Date: 1998-03-08 @ 12:00 Hrs.

Well Status: Abandoned

Hole Sizes: 444 mm to 25.5 mKB
311 mm to 200 mKB
200 mm to 249 mKB

Casing Strings: Conductor - 2 jts, 339.7 mm, 81.1 kg/m, K55, ST&C landed at 25.4 mKB.

Cemented with 11.1 tonnes Arctic Set + 7.4% D71 + 0.5% D65 + 0.5% B71. Cement to surface.

Surface - 15 jts, 219.1 mm, 35.7 kg/m, J55, ST&C landed at 200 mKB.

Cemented with 22.0 tonnes Arctic Set + 0.5% D65 + 0.5% B71. Cement to surface.

Casing Bowl: Crown Type H, 219.1 mm S0 x 228 mm, 21 MPa, LPSO

Drilling Fluid: Fresh water gel chemical – see attached fluid summary for details.

Sidetacks/Fishing: None

Well Kicks: Water influx was noted on connections at 95 m and 108 mKB. Increased mud density to 1390 kg/m³ before drilling ahead. Flow slowed to only a minor influx and required mud density of 1550 kg/m³ to remain static.

Encountered a strong water flow at 228 m KB, requiring a shut in with the BOP. Fluid density required to balance formation pressure was 1325 kg/m³.

Weighted mud to 1435 kg/m³. Well was static before drilling ahead.

Lost complete circulation at 249 m KB. Pumped 30 m³ LCM mud down annulus and drill pipe before seeing fluid to surface. Hole would not maintain static fluid level with 1400 kg/m³ LCM mud.

Hole started to get tight, worked pipe up into the casing. One bit nozzle was plugged. Pumped additional 15 m³ LCM mud, no returns.

Tripped out to remove bit. Filled hole with two times wet pipe volume. Well kicked with one stand of drill collars left in hole. Pulled stand out while well flowed water to surface, then shut in using blind rams. Maximum shut in pressure 1400 kPa.

Monitored pressures, SICP dropped to 800 kPa. Wellbore fluids were bullheaded back into lost circulation zone with abandonment cement.

Formation Fluids/Gas: Water influx at 95 m was gasified and had a strong sulphurous odor.

Water kick at 249 m was gasified with slight sulphurous odor. Unable to get H₂S reading with Dreger.

Water flow 2660 mg/L chloride.

Formation Leak-off Test: Leak off test was run at 210 mKB. Formation gradient 16.81 KPa/m.

Deviation Surveys: TOTCO surveys were taken, deviations as follows:

32 m - 3/4°
50 m - 3/4°
67 m - 1/4°
85 m - 1/4°
121 m - 1/4°
150 m - 1°
169 m - 1°
200 m - 1 1/4°
210 m - 1/4°

Time Distribution:	Drilling	45.75 hours
	Tripping	6.75 hours
	Rig Service	2.50 hours
	Surveys	2.75 hours
	Condition Mud	67.50 hours
	Handle Tools	5.25 hours
	Reaming	4.00 hours
	Running Casing	4.25 hours
	Cementing	29.25 hours
	W.O.C.	24.00 hours
	Nipple Up/Pressure Test	31.75 hours
	Repairing	6.50 hours
	Logging (Wireline Work)	5.00 hours
	Rig out	<u>24.25 hours</u>
	TOTAL	259.50 hours

Abandonment Plugs:

Plug #1 – 249 m to 87 mKB, 26 m³ RFC cement + 1.0% CaC₂ + 0.4% D46.

Bridge plug at 73.1 mKB with 6 m RFC cement dumped on top of BP.

Casing filled with fresh water between plugs and surface.

One meter cement cap placed in top of casing and steel plate welded on to casing, 1 m below GL.

Well identification sign installed.

GEOLOGY

Drill Cuttings:

Five metre drill samples were taken from 25 m to 245 mKB. No sample was obtained from 249 m T.D. due to lost circulation.

Vial samples from the above were sent to Ranger Oil Limited's Calgary office.

Bagged samples were sent to the Institute of Sedimentary and Petroleum Geology, Core & Sample Lab in Calgary, Alberta.

Formation Tops:

See the attached summary.

Lithology:

See the attached lithology report for sample description.

Cores:

No cores were taken.

Open Hole Logs:

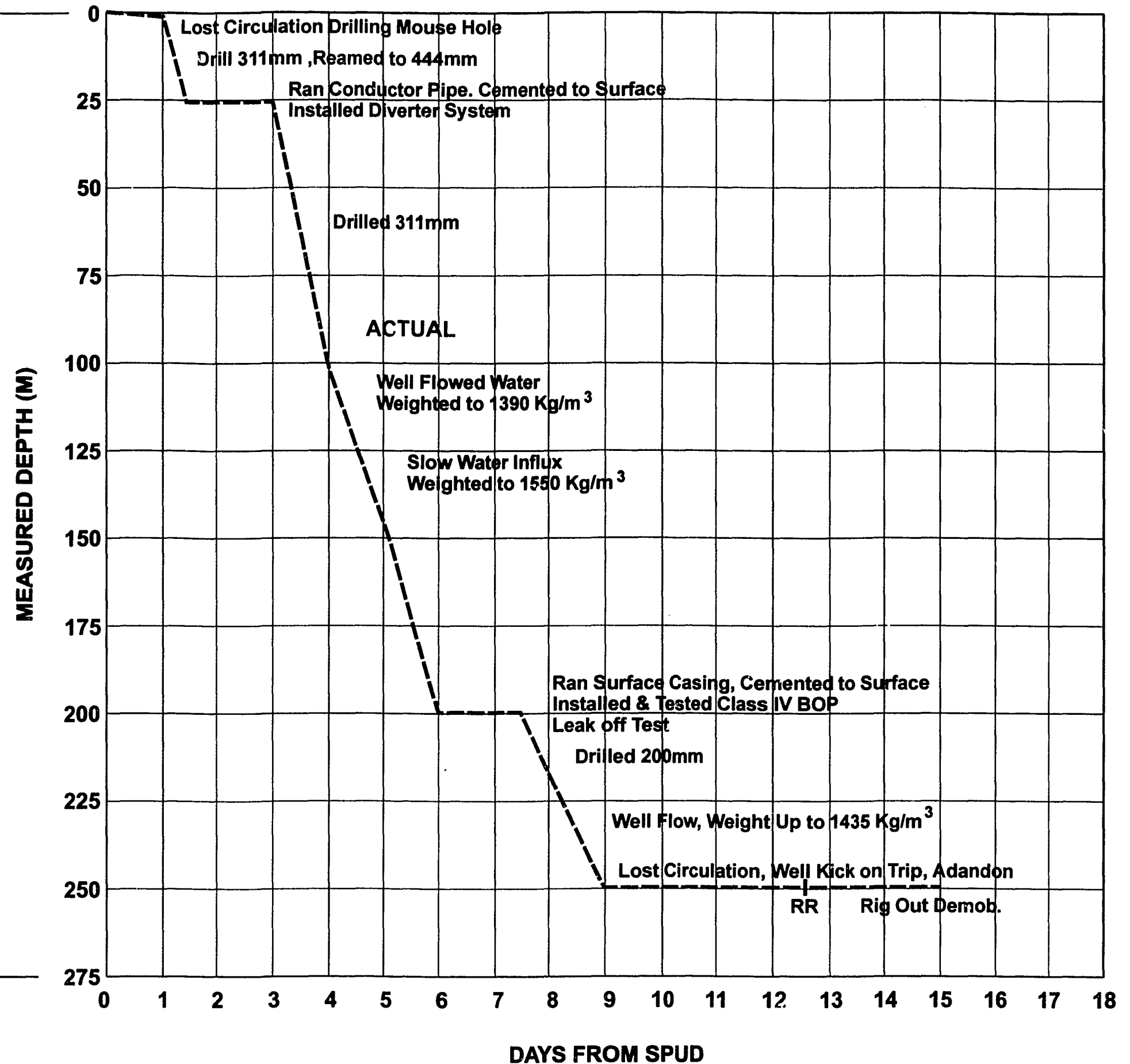
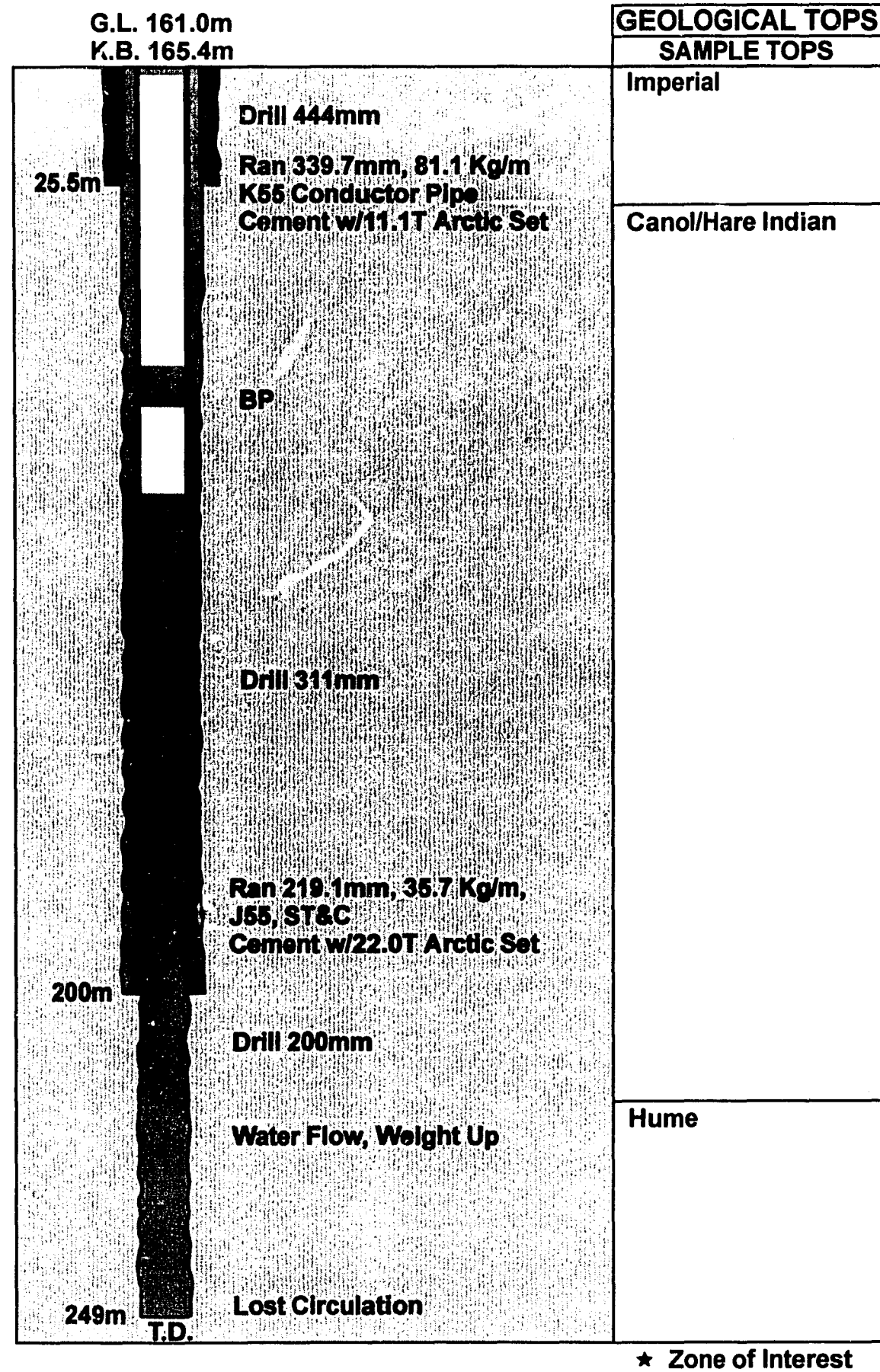
No open hole logs were run due to the difficulties experienced on the main hole interval.

Formation Tests:

No drill stem tests were run. A sample of the formation water from the Hume was recovered from the sump and the analysis is attached.

APPENDICIES TO WELL HISTORY REPORT

1. Area Topographic Map
2. Well Survey Plan
3. Serval Drilling Fluid Summary
4. Formation Tops
5. Lithology Report
6. Geological Sample Log
7. Composite Well Record





SERVAL DRILLING FLUIDS INC.

SERVAL DRILLING FLUID SUMMARY

RANGER OIL LIMITED.
1600, 321-6th Avenue S.W.
Calgary, Alberta

RANGER BEAR ROCK 0-20
65' 00', 125' 45'

WELL INFORMATION SYNOPSIS

OPERATOR: RANGER OIL LIMITED.

WELL NAME: RANGER BEAR ROCK 0-20

LOCATION: 65' 00', 125' 45'

CONTRACTOR AND RIG NO: TRICITY 16

SPUD DATE / TIME: 02-25-98 / 16:30 hrs

RIG RELEASE DATE / TIME: 03-08-98/12:00

TOTAL DEPTH (meters): 249

OPERATOR'S REPRESENTATIVE: Percy Chapman

CONTRACTOR'S REPRESENTATIVE: Rob Ayers

FIELD REPRESENTATIVE: Fred Huetten

HOLE SIZE (mm)	CASING SIZE (mm)	DEPTH (m)	FLUID TYPE	TIME	COST
311	219	200	Gel/ Chem	5	\$15,337. ³⁴
200		249	Gel/Chem	2	\$7,506. ²⁵
				TOTAL:	\$22,843.⁵⁹

SURFACE HOLE SUMMARY

SPUD DATE:	02-25-98	SPUD TIME:	16:30 hrs
SPUD MUD TYPE:	Gel/ Chem		
SURFACE CASING DEPTH (meters):	200	DATE / TIME CEMENTED:	03-02-98 13:30 hrs
CASING OD (mm):	219	WEIGHT (kg/m3):	35.7
PROBLEMS RUNNING CASING:			

COMMENTS, OBSERVATIONS, RECOMMENDATIONS

Drilled 445mm hole for conductor to 25m/
Spudded with Gel at 80 s/L viscosity.
No major problems drilling conductor hole.
Cemented conductor 02-26-98 @ 08:00 hrs.
Drilled out on 02-27-98 @ 03:00 hrs.
It took a long time to drill the mouse hole and kelly sock (10 hrs.)
Lost circulation while drilling the mouse hole .
At 95m, well began to flow, requiring Barite to kill it.
Flow was mainly skunky water with some gas.
It took a kill fluid of 1550 kg/m3 to stop the wells flow, the well flow peaked at about 400 LPM.

INTERMEDIATE/ MAIN HOLE SECTION

MUD UP DEPTH:	201m	MUD UP DATE / TIME:	03-03-98 03:00 hrs
FLUID TYPE:	Gel/Chem system		
TOTAL DEPTH:	249m	MUD UP DATE TIME:	

COMMENTS, OBSERVATIONS, RECOMMENDATIONS

Drilled out with water at 02:15 hrs. on 03-04-98.

Immediately displaced to a premix mud, drilled to 228m and well began to flow.

Shut in well 700 kPa on stack, ran a kill fluid and drilled ahead maintaining kill fluid at 1440.

At 249m, lost circulation, tried LCM pill pumped through kill line.

Got back returns, but any pumping caused losses.

Complete losses occurred again at 12:00 hrs.

Decided to pull out of hole for plugged jet and run in open ended for heavy LCM or cement at 1445hrs (well seemed stable).

On the way out, well kicked hard on last stand.

Shut in at 1200 kPa, cement job was performed and a packer and a plug were run.

If well is drilled in future:

- A large supply of mud for LCM and weighting up should be on hand.
- Rig should have large good quality tanks and top of the line mixing equipment.
- Premix tank should also be available.
- Barite should be supplied in bulk.
- Cementers should be on standby throughout the well and they should be able plumb into rigs mixing to provide high speed mixing when necessary.
- Mud system should be similar to this mud system. Various LCM materials should be stocked on location like Primaseal, cellophane, Mica, and Walnut shells etc.

SURFACE HOLE

PRODUCT & COST SUMMARY

INTERVAL FROM (m):	0-200
DAYS TO DRILL:	5
TOTAL INTERVAL COST:	\$15,337. ¹⁴
COST PER METER:	\$76. ⁶⁰

PRODUCT	AMOUNT	UNIT COST	TOTAL COST
Bentonite	260	\$15. ⁰⁰	\$3,900. ⁰⁰
Primaseal	6	\$47. ⁰⁰	\$282. ⁰⁰
Caustic soda	10	\$77. ⁰⁰	\$770. ⁰⁰
Lime	1	\$17. ⁰⁰	\$17. ⁰⁰
Sawdust	30	\$7. ²⁵	\$217. ⁵⁰
Lignite	1	\$15. ²⁵	\$15. ²⁵
Barite	937	\$18. ⁰⁰	\$16,866. ⁰⁰
Kelzan	2	\$845. ⁰⁰	\$1,690. ⁰⁰
Calcium carbonate	46	\$10. ⁰⁰	\$460. ⁰⁰
Celloflake	7	\$46. ⁰⁰	\$322. ⁰⁰

TOTAL PRICE:	\$24,539. ⁷⁶
(LESS 37.5% DISCOUNT):	\$9,202. ⁴¹
TOTAL BID PRICE:	\$15,337. ³⁴

INTERMEDIATE/MAIN HOLE SECTION

PRODUCT & COST SUMMARY

INTERVAL FROM (m):	200-249
DAYS TO DRILL:	4
TOTAL INTERVAL COST:	\$7,506. ²⁵
COST PER METER:	\$153. ¹⁹

PRODUCT	AMOUNT	UNIT COST	TOTAL COST
Bentonite	164	\$15. ⁰⁰	\$2,460. ⁰⁰
Caustic soda	3	\$77. ⁰⁰	\$231. ⁰⁰
Kelzan	6	\$845. ⁰⁰	\$5,070. ⁰⁰
Aquapac	1	\$390. ⁰⁰	\$390. ⁰⁰
Sawdust	68	\$7. ²⁵	\$493. ⁰⁰
Barite	177	\$18. ⁰⁰	\$3,186. ⁰⁰
Calcium carbonate	2	\$10. ⁰⁰	\$20. ⁰⁰
Soda ash	4	\$40. ⁰⁰	\$160. ⁰⁰
TOTAL PRICE:			\$12,010. ⁰⁰
(LESS 37.5% DISCOUNT):			\$4,503. ⁷⁵
TOTAL BID PRICE:			\$7,506. ²⁵
BULK BARITE 38 METRIC TONNE @ \$450.00/TONNE LESS 37.5%			\$10687.50

FIELD REPORTS

4/27/98



Midas Drilling Fluids

Telephone - 24 Hr. 1-800-929-3570

Fax - (403) 531-0464

DRILLING MUD SERVICE REPORT

SPUD DATE

DATE

7/26/23

WELL NAME and LOCATION Ranger et-2/ Bear Rock 84°59' 125° 47'

REPORT NO. 1

OPEFATOR Ranger Oil Ltd. CONTRACTOR Tri City

REPORT FOR Percey Chapman REPORT FOR

BIT RECORD		NOZZLE DATA		ANNULAR GEOMETRY and VELOCITY				PUMP DATA			
NO		SIZE (mm)		ANNULUS	OD / ID	LENGTH (m)	VELOCITY (m/s)	MAKE			
TYPE		VELOCITY (m/s)		LAST CASING				MODEL			
SIZE (mm)		JET FORCE (N)		LINER				LINER DIA (mm)			
DEPTH IN (m)		ROP (m/hr)		OPEN HOLE	mmDP			ROD DIA (mm)			
DEPTH OUT (m)		DEVIATION RECORD		OPEN HOLE	mmDC			STROKE (mm)			
HOURS RUN		DEPTH (m)	ANGLE - DIRECTION	OPEN HOLE	mmDC			DISP (L/m³)			
WOB (daN)				CIRCULATION TIMES (min)				SPM			
RPM				MUD TANKS / SUMP		BOTTOMS UP		OUTPUT (m³/hr)			
ROP (m/hr)				DRILL STRING		TOTAL		PRESSURE (kPa)			
DRILLING MUD PRODUCTS				MUD VOLUMES (m³)				SOLIDS CONTROL			
MATERIAL		UNITS	COST	TOTAL COST	TANK / SUMP		EQUIPMENT				
					HOLE		OVERFLOW DENSITY (g/cm³)				
					TOTAL		UNDERFLOW DENSITY (g/cm³)				
					LOST TO HOLE		UNDERFLOW RATE (L/min)				
					LOST TO EQUIP.		SOLIDS REMOVAL RATE (g/hr)				
					DUMPED		LIQUID REMOVAL RATE (L/min)				
					NEW WATER		HOURS RUN				
					NEW MUD / PREMIX		SHAKER 1 MESH		SHAKER 2 MESH		
WELL HISTORY & REMARKS											
COST SINCE LAST CHECK											
PREVIOUS COST											
TOTAL COST											
RHEOLOGY											
600		200		6							
300		100		3							
nK											
RECOMMENDATIONS											
- Fill tanks = 3/4 full w water											
- Mix up a light gel slurry prior to spudding. Mix gel @ 3-4 min/st. Build a vis of 33-40 sFL.											
- Do not control PH unless requested.											
- If further hole cleaning is required raise vis as necessary w gel 4 min/st.											
Potential Problems											
Mud Rings - If encountered add SAP. Trickle in a viscup @ suction. Use 1 viscup per connection until problem solved.											
Lost Circulation - If encountered isolate a suction tank & build a vis of 2-80 sFL w gel & small amounts of Lime (3-5 viscups).											
- Then add Prime Seal Medium, Collophane & Gaudust in a 1:1:10 ratio. Mix until a thick LCM pill forms. Pump pill across thief zone & repeat as necessary.											
Surface Csg:											
- Prior to running surface Csg raise vis to 50-65 sFL. Use gel @ 4 min/st.											
SERVICE REP: <u>Fred Huette</u> PHONE / MOBILE:											
WAREHOUSE: PHONE:											

In consideration of the furnishing of this report and any oral suggestions it is agreed that MIDAS DRILLING FLUIDS shall not be liable for any damages resulting from them, nor shall they be construed as authorizing the infringement of any valid patent.



Midas Drilling Fluids

Telephone - 24 Hr. 1-800-929-3570

Fax - (403) 531-0464

DRILLING MUD SERVICE REPORT

SPUD DATE 98/02/25 DATE 98/02/26

WELL NAME and LOCATION Ranger Bear Rock 0-20

REPORT NO. 2

OPERATOR Ranger Oil Ltd.

CONTRACTOR Tri City 16

REPORT FOR Percey Chapman

REPORT FOR Rob Ayers

BIT RECORD		NOZZLE DATA		ANNULAR GEOMETRY and VELOCITY (for 311m)				PUMP DATA	
NO	10	SIZE (mm)	3+24	ANNULUS	OD / ID	LENGTH (m)	VELOCITY (m/s)	MAKE	EMSCO
TYPE	JSL	VELOCITY (m/s)		LAST CASING	445	25.5		MODEL	PSTO
SIZE (mm)	445	JET FORCE (N)			117		20	LINEAR DIA (mm)	110
DEPTH IN (m)	0	ROP (m/h)		OPEN HOLE	227		25.5	ROD DIA (mm)	
DEPTH OUT (m)	25.5	DEVIATION RECORD		OPEN HOLE	227		25.5	STROKE (mm)	406
HOURS RUN	3.4	DEPTH (m)	ANGLE - DIRECTION	OPEN HOLE				DISP (L/hr)	20.5
WOB (kN)				CIRCULATION TIMES (min)				SPM	65
RPM				MUD TANKS / SLUMP		BOTTOMS UP	9	OUTPUT (m³/hr)	1.33
ROP (m/hour)				DRILL STRING	8	TOTAL	34	PRESSURE (kPa)	1000
DRILLING MUD PRODUCTS				MUD VOLUMES (m³)		SOLIDS CONTROL			
MATERIAL	UNITS	COST	TOTAL COST	TANK / SLUMP	30	EQUIPMENT			
Gel	15.00	134	2010.00	HOLE	1.5	OVERFLOW DENSITY (g/cm³)			
Priming Seal	47.00	7	329.00	TOTAL	31.5	UNDERFLOW DENSITY (g/cm³)			
Caustic	77.00	2	154.00	LOST TO HOLE		UNDERFLOW RATE (L/min)			
Line	17.00	1	17.00	LOST TO EQUIP.		SOLIDS REMOVAL RATE (g/min)			
Sawdust	27.25	30	217.50	DUMPED		LIQUID REMOVAL RATE (L/min)			
				NEW WATER		HOURS RUN			
				NEW MUD / PREMIX		SHAKER 1 <u>M25</u> MESH SHAKER 2 <u></u> MESH			
COST SINCE LAST CHECK				WELL HISTORY & REMARKS					
PREVIOUS COST				98/02/25 - Spud for conductor					
TOTAL COST				98/02/26 - Finished @ 2:45					
RHEOLOGY				Cement @ 7:30					
800	200	8							
300	100	3							
nK									
☐ FLOWLINE ☐ SUCTION TEMP °C				RECOMMENDATIONS					
SAMPLE TIME (m)	5:30			<u>Drillout</u>					
PRESENT DEPTH (m)	25.5			- Isolate syst to suction					
MUD DENSITY (g/cm³)	1100			- Fill suction ~ 3/4 in water					
HYD PRESSURE GRADIENT (kPa/m)				- Drilled in water in suction					
FUNNEL VISCOSITY (mL)	45			(Discard water to sump after Drillout.)					
PLASTIC VISCOSITY (mPa-s) @ °C				- After Drilled out open suction					
YIELD POINT (Pa)				to mud in tanks & one mud					
GEL STRENGTH (Pa) 10 sec / 10 min				comes around close in system.					
API FILTRATE (mL/30min) @ 700 kPa				- If mud becomes cement contaminated					
FILTER CAKE (mm)				sprinkle in 3-4 viscop of SAP					
HTHP FL (mL/30 min) kPa °C				- 2 min/cup or until mud					
HTHP FILTER CAKE (mm)				defloculates.					
pH ☐ STRIP ☐ METER	9.0			<u>Mud Maintenance</u>					
ALKALINITY (ppm)				vis - 45-60 s/L in Gel					
HYDROXYLS (mg/L)				@ 4 min/st. Or Raise vis					
CARBONATES (mg/L)				as necessary to clean hole.					
BICARBONATES (mg/L)				Pit - no control for now					
CALCIUM (mg/L)				Mud Rings & Lost Circulation					
CHLORIDES (mg/L)				See said Report -					
% SAND - VOLUME FRACTION				Weight = Run des. / liter & desander.					
% CL - VOLUME FRACTION				= Build Vol in a steady flow					
% TOTAL SOLIDS - VOLUME FRACTION				of water ~ 20 LPM					
MBT (TOTAL BENTONITIC SOLIDS g/m³)				SERVICE REP: <u>Frederic Huette</u> PHONE / MOBILE:					
DRILLED SOLIDS (g/m³)				WAREHOUSE: <u></u> PHONE:					
TOTAL HIGH GRAVITY SOLIDS (g/m³)									
TOTAL LOW GRAVITY SOLIDS (g/m³)									
POLYMER CONCENTRATION (g/m³)									

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Midas Drilling Fluids

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Fax - (403) 531-0464

DRILLING MUD SERVICE REPORT

SPUD DATE 78/02/25 DATE 98/02/27

WELL NAME and LOCATION Ranger et al Bar Rock 0-20

REPORT NO. 3

OPERATOR Ranger O.L. Ltd.

CONTRACTOR Tri City 36

REPORT FOR Percy Chapman

REPORT FOR Roy Ayers

BIT RECORD		NOZZLE DATA		ANNULAR GEOMETRY and VELOCITY				PUMP DATA	
NO	188 A	SIZE (mm)	34/43	ANNULUS	OD / ID	LENGTH (m)	VELOCITY (m/s)	MAKE	Emul
TYPE	FP6H	VELOCITY (m/s)	46	LAST CASING				MODEL	P-500
SIZE (mm)	311	JET FORCE (N)	1142	LINER				LINER DIA (mm)	170
DEPTH IN (m)	25.5	HHP (N)	27	OPEN HOLE	114 mmDP		20	ROD DIA (mm)	
DEPTH OUT (m)	10	DEVIATION RECORD		OPEN HOLE	193 mmDC	65	23	STROKE (mm)	406
HOURS RUN	2.19	DEPTH (m)	34	OPEN HOLE	227 mmDC	18m	37	DSP (L/hr)	28.5
WOB (kN)	2.19	ANGLE - DEGREE	74	CIRCULATION TIMES (min)				SPM	65
RPM	130			MUD TANK / SUMP		BOTTOMS UP	4.5	OUTPUT (m³/hr)	1.33
ROP (m/hr)				DRILL STRING	1	TOTAL	37	PRESSURE (kPa)	3000
DRILLING MUD PRODUCTS				MUD VOLUMES (m³)		SOLIDS CONTROL			
MATERIAL	UNITS	COST	TOTAL COST	TANK / SUMP	35.4	EQUIPMENT			
Gel	15.00	21	315.00	HOLE	6	OVERFLOW DENSITY (g/cc)			
Lime	12.00	1	12.00	TOTAL	41	UNDERFLOW DENSITY (g/cc)			
Gaushic	77.00	1	77.00	LOST TO HOLE		UNDERFLOW RATE (L/min)			
Lignite	18.00	1	18.00	LOST TO EQUIP		SOLIDS REMOVAL RATE (L/min)			
				DUMPED		HOURS RUN			
				NEW WATER		SHAKER 1 1475 MESH SHAKER 2 MESH			
				NEW MUD / PREMIX		WELL HISTORY & REMARKS			
COST SINCE LAST CHECK				78/02/26 - Cement Conductor @ 8.00					
PREVIOUS COST				78/02/27 Drilout 2.45 to 3.00					
TOTAL COST				Presently Drilling ahead					
RHEOLOGY				2.5m water flow 10 L/min					
800	200	8		no background 50 to 1000					
300	100	3		RECOMMENDATIONS					
FW	-0			Maintain Surface Mud as per report #1 & 2					
□ FLOWLINE □ SUCTION TEMP °C				Weighting Up					
SAMPLE TIME (m)	12.15			- Build in vis of 50 s/L w					
PRESENT DEPTH (m)	85			Gel @ 4 min/st					
MUD DENSITY (g/cc)	1120			- Also begin mixing Barite					
HYD PRESSURE GRADIENT (kPa/m)				@ 2-3 min/st or as Ast as you can Add 125 sts.					
FURNEL VISCOSITY (mL)	44			Drilout					
PLASTIC VISCOSITY (mPa.s)	9			- Isolate to Suction & drill out cement					
YIELD POINT (mPa.s)	4			- & discard contaminated water to sump.					
GEL STRENGTH (Pa) 10 sec / 10 min	2.5, 10			- In rest of tank build a premix of 70 s/L - 1st 3/4 full w water then add 1st Soda Ash & mix Gel: Aquapac 20:1.					
API FILTRATE (mL/30 min) @ 700 kPa	147			After Drilout, Displace to mud					
FILTER CAKE (mm)	2.5			Run in a 2" line of water while displacing to maintain volume.					
HTHP FL (mL/30 min) @ 700 kPa				Properties vis - 38 s/L					
HTHP FILTER CAKE (mm)				Liquids - 13 pr less for now					
pH □ STRIP □ METER	9.0			pH - 8.9					
ALKALINITY (mg/L)	1.25			Density - Low as possible					
HYDROXYL (mg/L)	11			SERVICE REP. PHONE / MOBILE:					
CARBONATES (mg/L)	120			WAREHOUSE: Satellite phone 1600 700 - PHONE: 5166					
BICARBONATES (mg/L)	61								
CALCIUM (mg/L)	80								
CHLORIDES (mg/L)	500								
% SAND - VOLUME FRACTION	1.5								
% OIL - VOLUME FRACTION									
% TOTAL SOLIDS - VOLUME FRACTION	7.5								
MBT (TOTAL BENTONITIC SOLIDS (g/L))	40								
DRILLED SOLIDS (g/L)									
TOTAL HIGH GRAVITY SOLIDS (g/L)									
TOTAL LOW GRAVITY SOLIDS (g/L)									
POLYMER CONCENTRATION (g/L)									
ECP	112.6								

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DRILLING MUD SERVICE REPORT

SPUD DATE 7/20/25 DATE 7/20/28

WELL NAME and LOCATION Ranger et al. 0-20 REPORT NO. _____

OPERATOR Ranger Oil Ltd. CONTRACTOR Tricity 16

REPORT FOR Percy Chapman REPORT FOR Rob Ayers

BIT RECORD		NOZZLE DATA		ANNULAR GEOMETRY and VELOCITY				PUMP DATA	
NO	1RPA	SIZE (mm)	8+4/3	ANNULUS	OD / ID	LENGTH (m)	VELOCITY (m/s)	MAKE	Emco
TYPE	FDG-H	VELOCITY (m/s)	42	LAST CASING				MODEL	D500
SIZE (mm)	311	JET FORCE (N)	912	LINER				LINER DIA (mm)	140
DEPTH (m)	0	HHP (kW)	21	OPEN HOLE	114 mmDP		19	ROD DIA (mm)	
DEPTH OUT (m)	17	DEVIATION RECORD		OPEN HOLE	151 mmDC	80	21	STROKE (mm)	406
HOURS RUN	2/3	DEPTH (m)	121m	OPEN HOLE	228 mmDC	78	35	DSP (L/hr)	20.5
WOB (kN)	2/9	ANGLE - DEGREE	44	CIRCULATION TIMES (min)				SPM	60
RPM	70			MUD TANKS / SUMP		BOTTOMS UP	7	OUTPUT (m/min)	1-23
ROP (m/hr)				DRILL STRING	6	TOTAL	28	PRESSURE (kPa)	

DRILLING MUD PRODUCTS				MUD VOLUMES (m³)		SOLIDS CONTROL	
MATERIAL	UNITS	COST	TOTAL COST	TANK / SUMP	EQUIPMENT	OVERFLOW DENSITY (g/cm³)	
Gel	15.00	76	1140.00	HOLE	Ranger Reading & H.S.		
Barite	18.00	126	2268.00	TOTAL		17.30	25 ppm
Caustic	22.00	1	77.00	LOST TO HOLE		20.00	20 ppm
Kelzan	781.00	2	1562.00	LOST TO EQUIP			
				DUMPED	~10		
				NEW WATER			
				NEW MUD / PREMIX		SHAKER 1 100s	SHAKER 2

COST SINCE LAST CHECK	50530	27th - Drilled to 95m well started to flow ~ 10-20 LPM @ 13:00
PREVIOUS COST		- began to weight up system
TOTAL COST		- Barite initially to 200 kg/m³

RHEOLOGY				WELL HISTORY & REMARKS	
600	97	200	6	- During this time well flow was sporadic 5 to 40 LPM, initially gained ~ 5m³ volume. Volume Gains	
300	74	100	3		
nK					

☐ FLOWLINE ☐ SUCTION TEMP °C				RECOMMENDATIONS	
SAMPLE TIME (m)	6:15	23:00		were also sporadic. Flow appeared to be mostly due to gas. Pulled	
PRESENT DEPTH (m)	108	140		from 95m to 108m to 17:30.	
MUD DENSITY (g/cm³)	1315	1050		Repaired Hopper 19:00 - 20:00 weight	
HYD. PRESSURE GRADIENT (kPa/m)				dropped to 1150 & well flow increased	
FUNNEL VISCOSITY (cP)	85	28		30-40 LPM & became sturdier. Mixed up	
PLASTIC VISCOSITY (cP) @ 100 rpm	23			10m³ pill in section to weight of 1360	
YIELD POINT (cP)	25.5			pumped around @ 24:00. Slowed	
GEL STRENGTH (Pa) 10 sec / 10 min	13.22			flow to start weight that came	
API FILTRATE (ml/30min) @ 700 kPa	9	9.0		around was 130.	
FILTER CAKE (mm)	3			28th - Circulation interference	
HTHP FL (ml/30 min) @ 1000 kPa				Flowed well & mixed up	
HTHP FILTER CAKE (mm)				2nd pill to give ~ 25m³ tank	
pH / STRIP ☐ METER	9.0			Volume of 1360 kg/m³ weight	
ALKALINITY (ppm)	11.35			@ 5:00 resumed circulating	
HYDROLYSIS (mg/L)	11			& continued to mix Barite until	
CARBONATES (mg/L)	120			~ 15:00. Premix tank & more	
BICARBONATES (mg/L)	183			barite arrived @ 16:45. @ This	
CALCIUM (mg/L)	50			time mud had thinned back to water	
CHLORIDES (mg/L)	750			& flow was 80-100 LPM. Riggled	
% SAND - VOLUME FRACTION				up premix & presently building	
% OIL - VOLUME FRACTION				(Weighted mud @ 1520 kg/m³	
% TOTAL SOLIDS - VOLUME FRACTION	19.6			30m³)	
MBT (TOTAL BENTONITIC SOLIDS kg/m³)				28th	
DRILLED SOLIDS (kg)	Ranger Readings			Time wt. Visc. Flow	
TOTAL HIGH GRAVITY SOLIDS (kg/m³)				2:00	1275 60 5-10
TOTAL LOW GRAVITY SOLIDS (kg/m³)				3:30	1340 60 "
POLYMER CONCENTRATION (ppm)				5:15	1310 55 "
Mud Chemistry				6:15	1315 85 5-10
Time 19:30	2400	19:00	20:00	8:00	1300 55 "
pH 9.0	8.5	9.0	24:00	9:00	1310 65 "
Cl ppm 700	800	950		10:00	1280 60 "
API 11.3	11.35	11.4		11:30	1310 60 "
Ca 50	50	60		12:00	1300 60 "
				13:00	1300 60 "
				14:00	1320 65 "
				15:00	1410 65 "
				16:45	1050 28 80-100
				22:00	1050 "

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DRILLING MUD SERVICE REPORT

SPUD DATE 98/02/25 DATE 98/03/04

WELL NAME and LOCATION Ranger Bear Rock O-20

REPORT NO. 84

OPERATOR Ranger Oil Ltd

CONTRACTOR Tricity 16

REPORT FOR Percy Chapman

REPORT FOR Rob Ayers

BIT RECORD		NOZZLE DATA		ANNULAR GEOMETRY and VELOCITY				PUMP DATA	
NO	2A	SIZE (mm)	31/19	ANNULUS	OD / ID	LENGTH (m)	VELOCITY (m/s)	MAKE	2msc
TYPE		VELOCITY (m/s)	24	LAST CASING				MODEL	1550
SIZE (mm)	311	JET FORCE (N)	760	LINER				LINER DIA (mm)	140
DEPTH IN (m)	141	HHP (kW)	10	OPEN HOLE	114 mmDP		19	ROD DIA (mm)	
DEPTH OUT (m)	10	DEVIATION RECORD		OPEN HOLE	151 mmDC	80	21	STROKE (mm)	406
HOURS RUN	~ 8	DEPTH (m)	167	ANGLE - DIRECTION	228 mmDC	18	35	DSP (L/hr)	20.5
WOB (daN)	214			CIRCULATION TIMES (min)				SPM	60
RPM	90/130			MUD TANKS / SUMP		BOTTOMS UP	9	OUTPUT (priming)	1.23
ROP (m/hr)				DRILL STRING	8	TOTAL	20	PRESSURE (kPa)	6000
DRILLING MUD PRODUCTS				MUD VOLUMES (m³)		SOLIDS CONTROL			
MATERIAL	UNITS	COST	TOTAL COST	TANK / SUMP		EQUIPMENT			
Brite	18.00	619	11,142.00	HOLE	13	OVERFLOW DENSITY (kg/m³)			
Gel	15.00	10	150.00	TOTAL	24	UNDERFLOW DENSITY (kg/m³)			
Kelzan	285.00	1	285.00	LOST TO HOLE		UNDERFLOW RATE (L/min)			
Caustic	77.00	4	308.00	LOST TO EQUIP.		SOLIDS REMOVAL RATE (kg/hr)			
Syn. Rust	7.35	2	14.70	DUMPED		LIQUID REMOVAL RATE (L/min)			
Calcium Chloride	10.00	46	460.00	NEW WATER		HOURS RUN			
Celloflap	46.00	3	138.00	NEW MUD / PREMIX		SHAKER 1 1203 MESH SHAKER 2 MESH			
WELL HISTORY & REMARKS									
COST SINCE LAST CHECK 13057.50				98/02/28 - Well flowed skunk water from 11.45 on - flow ranged from 100 to 800 LPM - Built Kill fluid of 1550 in Premix.					
PREVIOUS COST 5286.00				98/03/01 - Pumped around kill fluid 9:30 flow stopped - Mixing Brite to maintain weight					
TOTAL COST 18343.50				RECOMMENDATIONS					
RHEOLOGY									
800	82	200	8						
300	52	100	3						
nK	-23/4.5	Reynolds # 267							
☐ FLOWLINE ☐ SUCTION TEMP °C									
SAMPLE TIME (s)				9:00					
PRESENT DEPTH (m)				180					
MUD DENSITY (kg/m³)				1545					
HYD PRESSURE GRADIENT (kPa/m)									
FUNNEL VISCOSITY (mL)				84					
PLASTIC VISCOSITY (mPa-s) @ °C				30					
YIELD POINT (Pa)				11					
GEL STRENGTHS (Pa) 10 sec / 10 min				7, 18					
API FILTRATE (mL/30min) @ 700 kPa				11					
FILTER CAKE (mm)				2.5					
HTAP FL (mL/30 min) °C									
HTAP FILTER CAKE (mm)									
pH ☒ STRIP ☐ METER				9.5					
ALKALINITY (ppm)				15.35					
HYDROXYLS (mg/L)				Nil					
CARBONATES (mg/L)				180					
BICARBONATES (mg/L)				61					
CALCIUM (mg/L)				40					
CHLORIDES (mg/L)				500					
% SAND - VOLUME FRACTION									
% CL - VOLUME FRACTION									
% TOTAL SOLIDS - VOLUME FRACTION				39					
MBT (TOTAL BENTONITIC SOLIDS kg/m³)									
DRILLED SOLIDS (kg/m³)									
TOTAL HIGH GRAVITY SOLIDS (kg/m³)									
TOTAL LOW GRAVITY SOLIDS (kg/m³)									
POLYMER CONCENTRATION (kg/m³)									
ECP				1581					
Properties									
Vis - 38-40 s/L = Gel 4m/hr									
WH - 8-13 = Appaque 1hr/5hr									
PH - No control									
Density - ~1100 kg/m³									
- Run desilter									
- Run water @ 10 LPM									
Service Rep: Fred Huethe				PHONE / MOBILE:					
Warehouse:				PHONE:					

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DRILLING MUD SERVICE REPORT

SPUD DATE 98/03/25 DATE 98/03/04

WELL NAME and LOCATION Ranger Bear Rock 0-30 REPORT NO. 5

OPERATOR Ranger Oil Ltd CONTRACTOR Tri City 16

REPORT FOR Percy Chapman REPORT FOR Rob Ayers

BIT RECORD		NOZZLE DATA		ANNULAR GEOMETRY and VELOCITY				PUMP DATA	
NO.	1	SIZE (mm)		ANNULUS	OD / ID	LENGTH (m)	VELOCITY (m/s)	MAKE	Emko
TYPE		VELOCITY (m/s)		LAST CASING	21/205	200		MODEL	PS00
SIZE (mm)	200	JET FORCE (N)		LINER				LINER DIA (mm)	140
DEPTH IN (m)		HWP (N/m)		OPEN HOLE	114 mmDP		57	ROD DIA (mm)	
DEPTH OUT (m)		DEVIATION RECORD		OPEN HOLE	151 mmDC	80	91	STROKE (mm)	406
HOURS RUN		DEPTH (m)	ANGLE - DIRECTION	OPEN HOLE	200 mmDC			DSP (L/hr)	20.5
WOB. (dash)		CIRCULATION TIMES (min)						SPM	60
RPM		MUD TANKS / SUMP				BOTTOMS UP	3.2	OUTPUT (bar/min)	1.25
ROP (m/hour)		DRILL STRING				TOTAL	33	PRESSURE (kPa)	
DRILLING MUD PRODUCTS				MUD VOLUMES (m³)				SOLIDS CONTROL	
MATERIAL	UNITS	COST	TOTAL COST	TANK / SUMP	5	EQUIPMENT			
Caustic	72.00	2	154.00	HOLE	5	OVERFLOW DENSITY (g/cm³)			
Bacite	18.00	162	3456.00	TOTAL	40	UNDERFLOW DENSITY (g/cm³)			
Bar. Gnd	15.00	14	285.00	LOST TO HOLE		UNDERFLOW RATE (L/min)			
White bulk kg 1000s	5			LOST TO EQUIP.		SOLIDS REMOVAL RATE (g/min)			
Cellofloc	460	4	184.00	DUMPED		LIQUID REMOVAL RATE (L/min)			
				NEW WATER		HOURS RUN			
				NEW MUD / PREMIX		SHAKER 1	MESH	SHAKER 2	MESH
COST SINCE LAST CHECK 4071.00				WELL HISTORY & REMARKS					
PREVIOUS COST 17393.50				98/03/02 - Drilled T.P. for surface					
TOTAL COST 22372.50				@ 5:00 Well still dead.					
				- Wiper 5:30 - 6:30					
				- Cement job 13:30					
				98/03/03 - Mudding up.					
RHEOLOGY									
600	200	6							
300	100	3							
RVK									
□ FLOWLINE □ SUCTION TEMP °C				RECOMMENDATIONS					
SAMPLE TIME (m)				See Report # 4 for Premix instructions					
PRESENT DEPTH (m)				200					
MUD DENSITY (g/cm³)				Mud Maintenance					
HYD. PRESSURE GRADIENT (kPa/m)				Viscosity - 38 - 42 s/L to Gel					
FUNNEL VISCOSITY (s/L)				@ No faster than 5 min/st.					
PLASTIC VISCOSITY (Pa-s) @ °C				PH - no control for now.					
YIELD POINT (Pa) @ °C				Waterloss - 8-10mls use Aquapac LVIS mix for 65min					
GEL STRENGTH (Pa) 10 sec / 10 min				Density - low as possible					
API FILTRATE (mL/30min) @ 700 kPa				- Run as fine as possible					
FILTER CAKE (mm)				- Run Desilter & Desander					
HTHP FL (mL/30 min) @ °C				- Maintain vol up & steady					
HTHP FILTER CAKE (mm)				- trickle of water 10-25 L/min					
pH □ STRIP □ METER				- Pump Sand trap Regularly.					
ALKALINITY (ppm)				Anhydrite Contamination					
HYDROXYLS (mg/L)				- If encountered vis will rise					
CARBONATES (mg/L)				- If encountered waterloss will go up, PH may drop					
BICARBONATES (mg/L)				- If this occurs mix Desco & Sigrite in a 1:3 ratio (over circulation)					
CALCIUM (mg/L)				until vis comes down to a manageable level					
CHLORIDES (mg/L)				Level 2:50 s/L					
% SAND - VOLUME FRACTION				- Then allow system to Gyp over naturally.					
% OIL - VOLUME FRACTION				SERVICE REP: Fred Huette					
% TOTAL SOLIDS - VOLUME FRACTION				PHONE / MOBILE:					
MBT (TOTAL BENTONITIC SOLIDS g/L)				WAREHOUSE: 600 700 51 66					
DRILLED SOLIDS (g/L)				PHONE:					
TOTAL HIGH GRAVITY SOLIDS (g/L)									
TOTAL LOW GRAVITY SOLIDS (g/L)									
POLYMER CONCENTRATION (g/L)									

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DRILLING MUD SERVICE REPORT

SPUD DATE 98/02/25 DATE 98/03/04

WELL NAME and LOCATION Ranger Bear Rock 0-20

REPORT NO. 6

OPERATOR Ranger OIL Ltd.

CONTRACTOR Tri City 16

REPORT FOR Percey Chapman

REPORT FOR Rob Myers

BIT RECORD		NOZZLE DATA		ANNULAR GEOMETRY and VELOCITY			PUMP DATA		
NO.	1	SIZE (mm)	31.4/3	ANNULUS	OD/ID	LENGTH (m)	VELOCITY (m/s)	MAKE	EMSCO
TYPE	5T 28	VELOCITY (m/s)	42	LAST CASING	219/25	200		MODEL	10-520
SIZE (mm)	200	JET FORCE (N)	1042	LINER				LINER DIA (mm)	140
DEPTH IN (m)	201	HHP (kW)	25	OPEN HOLE	114 mmOP		57	ROD DIA (mm)	
DEPTH OUT (m)	17	DEVIATION RECORD		OPEN HOLE	151 mmOC	150	91	STROKE (mm)	406
HOURS RUN	6	DEPTH (m)	210	ANGLE - DIRECTION				DISP (L/hr)	20.5
W.O.B. (daN)	2/4			CIRCULATION TIMES (min)				SPM	60
RPM	80			MUD TANKS / SUMP		BOTTOMS UP	3.5	OUTPUT (m³/hr)	1.23
ROP (m/hr)				DRILL STRING	9.4	TOTAL	24	PRESSURE (kPa)	
DRILLING MUD PRODUCTS				MUD VOLUMES (m³)		SOLIDS CONTROL			
MATERIAL	UNITS	COST	TOTAL COST	TANK / SUMP	25	EQUIPMENT			
Gel	15.00	40	600.00	HOLE	5	OVERFLOW DENSITY (g/cm³)			
Helzin	845.00	1	845.00	TOTAL	30	UNDERFLOW DENSITY (g/cm³)			
Caustic	77.00	1	77.00	LOST TO HOLE		UNDERFLOW RATE (L/min)			
Sawdust	7.25	10	72.50	LOST TO EQUIP.		SOLIDS REMOVAL RATE (g/hr)			
				DUMPED		LIQUID REMOVAL RATE (L/min)			
				NEW WATER		HOURS RUN			
				NEW MUD / PREMIX		SHAKER 1	MESH	SHAKER 2	MESH
WELL HISTORY & REMARKS									
COST SINCE LAST CHECK				1584.50 98/03/03 - Nipple Cp Renewed by hand.					
PREVIOUS COST				22372.50					
TOTAL COST				23697.00 98/03/04 - Drilled at @ 2:15. @ 9:30 Drilled to 228m well began to flow. Shut in well @ 700 kPa on stick. Pumped 15m³ of kill fluid.					
RHEOLOGY									
600	75	200	6						
300	49	100	3						
nK									
☐ FLOWLINE ☐ SUCTION TEMP °C				RECOMMENDATIONS					
SAMPLE TIME (m)				11:30					
PRESENT DEPTH (m)				229					
MUD DENSITY (g/cm³)				1435					
HYD. PRESSURE GRADIENT (kPa/m)									
FUNNEL VISCOSITY (mL)				62					
PLASTIC VISCOSITY (mPa-s) @ °C				26					
YIELD POINT (Pa)				11.5					
GEL STRENGTHS (Pa) 10 sec / 10 min				5.5 10					
API FILTRATE (mL/30min) @ 700 kPa				10					
FILTER CAKE (mm)				3					
HTHP F.L. (mL/30 min) @ °C									
HTHP FILTER CAKE (mm)									
pH @ 25°C				9.5					
ALKALINITY (ppm)				11.4					
HYDROXYLS (mg/L)				11					
CARBONATES (mg/L)				20					
BICARBONATES (mg/L)				212					
CALCIUM (mg/L)				40					
CHLORIDES (mg/L)				500					
% SAND - VOLUME FRACTION				58					
% OIL - VOLUME FRACTION									
% TOTAL SOLIDS - VOLUME FRACTION				28					
MBT (TOTAL BENTONITIC SOLIDS, g/m³)									
DRILLED SOLIDS (g/m³)									
TOTAL HIGH GRAVITY SOLIDS (g/m³)									
TOTAL LOW GRAVITY SOLIDS (g/m³)				731					
POLYMER CONCENTRATION (g/m³)									
Hach test Sulfide				2 ppm					
Premix Once weighted Premix is pumped over build 30m³ of unweighted Premix in 1st two tanks. Use 1st Caustic 1st Helzin + Gel @ 3min/st build a vis of 55-65 S/L. Thank.									
SERVICE REP: Fred Huette				PHONE / MOBILE:					
WAREHOUSE: 1600 700 5166				PHONE:					

of this report and any oral suggestions it is agreed that MIDAS DRILLING FLUIDS shall not be liable for any damages resulting from them, nor shall they be of any valid patent.



Midas Drilling Fluids

Telephone - 24 Hr. 1-800-929-3570

Fax - (403) 531-0464

DRILLING MUD SERVICE REPORT

SPUD DATE 28/02/05 DATE 28/03/06

WELL NAME and LOCATION Ranger Bear Rake 0-20

REPORT NO. 7

OPERATOR Ranger Oil Ltd.

CONTRACTOR Tri City 16

REPORT FOR Percey Chapman

REPORT FOR Rob Ayers

BIT RECORD		NOZZLE DATA		ANNULAR GEOMETRY and VELOCITY				PUMP DATA	
NO		SIZE (mm)		ANNULUS	OD / ID	LENGTH (m)	VELOCITY (m/s)	MAKE	<u>Em310</u>
TYPE		VELOCITY (m/s)		LAST CASING	<u>219/205</u>	<u>200</u>		MODEL	<u>P-500</u>
SIZE (mm)		JET FORCE (N)		LINER				LINER DIA (mm)	<u>140</u>
DEPTH IN (m)		HMP (N/m)		OPEN HOLE		mmDP		ROD DIA (mm)	
DEPTH OUT (m)		DEVIATION RECORD		OPEN HOLE		mmDC		STROKE (mm)	<u>406</u>
HOURS RUN		DEPTH (m)	ANGLE - DIRECTION	OPEN HOLE		mmDC		DISP (L/hr)	<u>20.5</u>
WOB (kN)				CIRCULATION TIMES (min)				SPM	
RPM				MUD TANKS / SUMP		BOTTOMS UP		OUTPUT (m/min)	
ROP (m/hour)				DRILL STRING	<u>1.0</u>	TOTAL	<u>3.2</u>	PRESSURE (kPa)	
DRILLING MUD PRODUCTS				MUD VOLUMES (m³)		SOLIDS CONTROL			
MATERIAL	UNITS	COST	TOTAL COST	TANK / SUMP	<u>20</u>	EQUIPMENT			
				HOLE	<u>6</u>	OVERFLOW DENSITY (g/cm³)			
				TOTAL	<u>26</u>	UNDERFLOW DENSITY (g/cm³)			
				LOST TO HOLE		UNDERFLOW RATE (L/min)			
				LOST TO EQUIP.		SOLIDS REMOVAL RATE (gpm)			
				DUMPED		LIQUID REMOVAL RATE (L/min)			
				NEW WATER		HOURS RUN			
				NEW MUD / PREMIX		SHAKER 1	MESH	SHAKER 2	MESH
WELL HISTORY & REMARKS									
COST SINCE LAST CHECK				<u>28/03/05 - Drilled from 00:15 to 4:30</u>					
PREVIOUS COST				<u>Lost circulation totally.</u>					
TOTAL COST				<u>7:00 Pumped HCT pill thru</u>					
RHEOLOGY				<u>Kill line ~ 11m³. Got Return.</u>					
600	200	6		<u>However seepages losses occurred</u>					
300	100	3		<u>when ever pumping. Pump pressure</u>					
				<u>up due to plugged jet or</u>					
				RECOMMENDATIONS					
				<u>Packing off.</u>					
				<u>Lost circulation completely @</u>					
				<u>12:00 - well seen as stalled.</u>					
				<u>2:00h 14:15 for plugged jet. Flow</u>					
				<u>check every 50m</u>					
				<u>Well kicked on last stand</u>					
				<u>shut in 12:00h. 16:30</u>					
				<u>Mixed up kill fluid 17:55 kg/m³ 20m³</u>					
				<u>waited on cementers for Top down</u>					
				<u>Cement Job.</u>					
				<u>28/02/06 - wait on Repairs Cementers.</u>					
				Inventory					
				Actual Inv Used Cost Total cost					
				SAPP 3 3 137.00 137.00					
				Lime 5 4 17.00 17.00					
				Gel 840 416 424 15.00 630.00					
				Quartz 10 47 13 77.00 100.00					
				Lignite 56 55 1 15.25 15.25					
				Kafan 40 32 8 845.00 670.00					
				Amphol LV 40 39 1 390.00 390.00					
				Pond Seal M 120 114 6 49.00 282.00					
				Squidust 800 780 100 7.25 725.00					
				Barite (20%) 1219 104 1114 18.00 20052.00					
				Cal Gels 56 8 48 0.20 480.00					
				Cellaphane 240 224 16 46.00 736.00					
				Soda Ash 40 36 4 40.00 160.00					
				Petro 19 19 112.00					
				78 40 38 ? Total 36978.25					
				To 37.5% Diluent = 23111.41					
				SERVICE REP: <u>Fred Huette</u> PHONE / MOBILE:					
				WAREHOUSE: PHONE:					

1000kg Dark Bulk
is from Esso Norman
included in Price.

**PRECEDING
DOCUMENT
IS OF
POOR
QUALITY**

FORMATION TOPS (m)

PERIOD GROUP	PROGNOSIS	SAMPLES	LOGS
FORMATION (LOCAL UNITS)	(subsea) (KB)	(driller) (KB)	(subsea)

DEVONIAN

IMPERIAL	SPUD	SURFACE	
CANOL/HARA INDIAN	120	50	31 m
HUME	-140	310	223 m
HEADLESS	-230	400	
GOSSAGE/LANDRY	-290	460	
BEAR ROCK	-350	520	
FRANKLIN MOUNTAIN	-520	690	
TD	-530	700	

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

25 - 30

SANDSTONE - white, clear, pink, very fine grained to medium grained and some coarse grained, subangular to subrounded, poorly sorted, unconsolidated, occasionally calcareous, occasional feldspar, occasional siliceous cement;

Canol/Hara Indian 31m Sample

30 - 35

SANDSTONE - white, clear, pink, very fine grained to medium grained and some coarse grained, subangular to subrounded, poorly sorted, unconsolidated, occasionally calcareous, occasional feldspar, occasional siliceous cement; SHALE - dark gray, blocky, commonly micromicaceous;

35 - 40

SANDSTONE - white, clear, pink, very fine grained to medium grained and some coarse grained, subangular to subrounded, poorly sorted, unconsolidated, occasionally calcareous, occasional feldspar, occasional siliceous cement; SHALE - dark gray, blocky, commonly micromicaceous;

40 - 45

SHALE - black, blocky, occasionally micromicaceous;

45 - 50

SHALE - black, blocky, occasionally micromicaceous;

50 - 55

SHALE - black, blocky, occasionally micromicaceous; SHALE - gray, occasionally calcareous;

55 - 60

SHALE - gray, occasionally calcareous;

60 - 65

SHALE - gray, occasionally calcareous;

65 - 70

SHALE - gray, occasionally calcareous;

70 - 75

SHALE - gray, soft and fissile;

75 - 80

SHALE - dark gray;

80 - 85

SHALE - gray;

85 - 90

SHALE - dark gray, occasionally micromicaceous;

90 - 95

SHALE - dark gray, occasionally micromicaceous;

95 - 100

SHALE - dark gray, black, some finely disseminated pyrite, commonly micromicaceous;

LITHOLOGY

Formation tops Sample interval (in meters)	SAMPLE DESCRIPTION
100 - 105	SHALE - dark gray, black, some finely disseminated pyrite, commonly micromicaceous;
105 - 110	SHALE - dark gray, black, some finely disseminated pyrite, commonly micromicaceous; LIMESTONE - gray, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous;
110 - 115	SHALE - dark gray, black, some finely disseminated pyrite, commonly micromicaceous; LIMESTONE - gray, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous;
115 - 120	SHALE - dark gray, black, some finely disseminated pyrite, commonly micromicaceous;
120 - 125	SHALE - dark gray, black, with finely disseminated pyrite, and pyrite nods, commonly micromicaceous;
125 - 130	SHALE - dark gray, black, with finely disseminated pyrite, and pyrite nods, commonly micromicaceous;
130 - 135	SHALE - dark gray, black, with finely disseminated pyrite, and pyrite nods, commonly micromicaceous;
135 - 140	SHALE - dark gray, black, with finely disseminated pyrite, and pyrite nods, commonly micromicaceous;
140 - 145	SHALE - dark gray, black, with finely disseminated pyrite, and pyrite nods, commonly micromicaceous;
145 - 150	SHALE - dark gray, black, with trace of limestone, and pyrite nodes, commonly micromicaceous;
150 - 155	SHALE - dark gray, black, with trace of limestone, and pyrite nodes, commonly micromicaceous;
155 - 160	SHALE - dark gray, black, very minor calcite veinlets, trace of pyrite nods, commonly micromicaceous, commonly carbonaceous;

LITHOLOGY

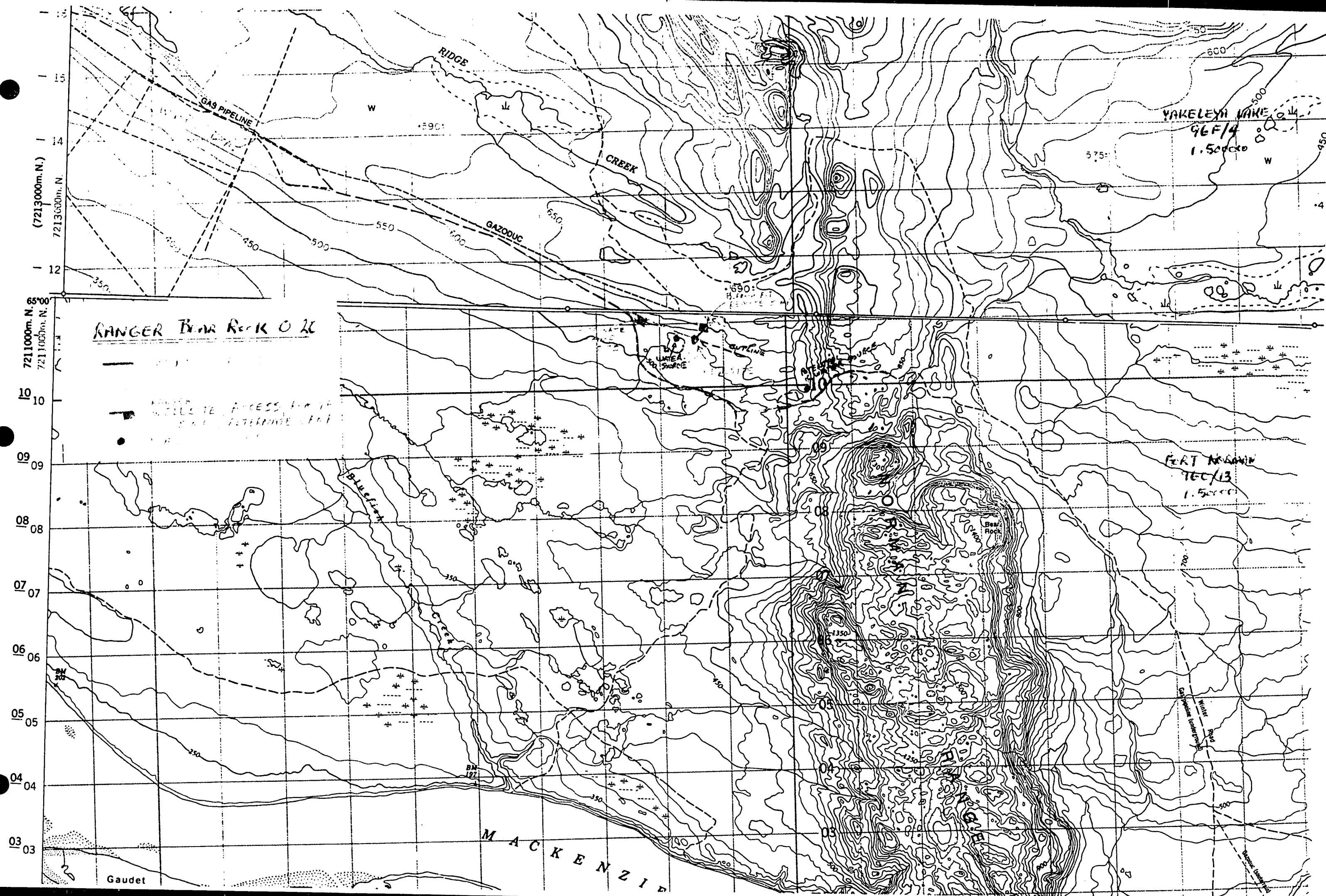
Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

160 - 165	SHALE - dark gray, black, very minor calcite vainlets, trace of pyrite nods, commonly micromicaceous, commonly carbonaceous;
165 - 170	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
170 - 175	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
175 - 180	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
180 - 185	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
185 - 190	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
190 - 195	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
195 - 200	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
200 - 205	SHALE - dark gray, thin laminae;
205 - 210	SHALE - dark gray, black, thin laminae, occasionally micromicaceous, occasional pyrite;
210 - 215	SHALE - dark gray, black, with traces of brown and white limestone from fractures, occasional pyrite;
215 - 220	SHALE - black, blocky, occasionally micromicaceous, occasional pyrite nods;
Hume	223m Sample
220 - 225	SHALE - black, fossiliferous, occasionally micromicaceous, trace pyrite nods; LIMESTONE - white, brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous, mainly from small fractures;

LITHOLOGY

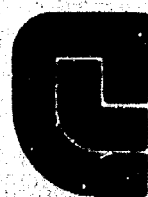
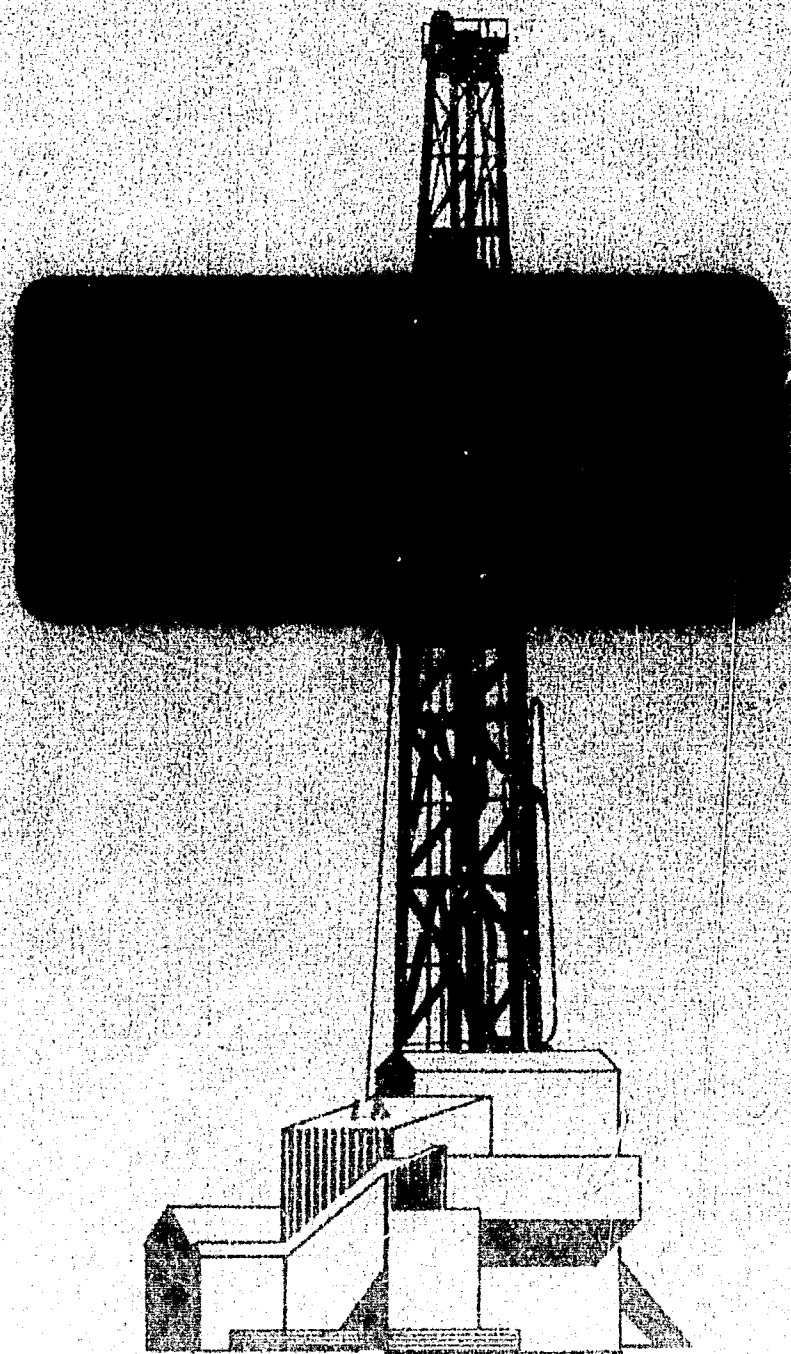
Formation tops Sample interval (in meters)	<u>SAMPLE DESCRIPTION</u>
225 - 230	SHALE - black, fossiliferous, occasionally micromicaceous, trace pyrite nodds; LIMESTONE - white, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous in part;
230 - 235	LIMESTONE - white, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous in part;
235 - 240	LIMESTONE - white, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous in part;
240 - 245	LIMESTONE - white, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous in part;
245 - 249	No sample;
249 - 253	No sample;



GEOLOGICAL REPORT

N.E.B. 0011

Geological Report



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ROL et al BEAR ROCK 0-20

64 59'47" 125 47'25"

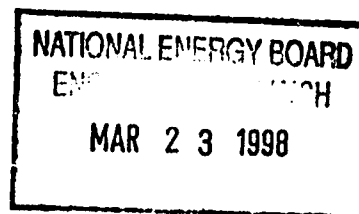
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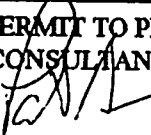
FRED RICHARDSON
Geological Wellsite Consultant
CL Consultants Limited

Prepared for:

Peter Goetz
RANGER OIL LIMITED



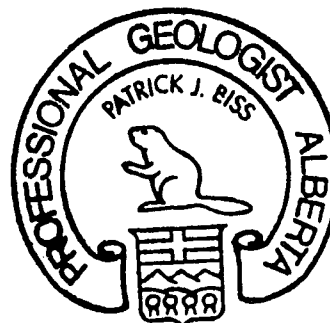
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Date: March 16, 1998

PERMIT NUMBER: P2911

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta



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ROL et al Bear Rock 0-20
64 59'47"N 125 47'25"W

SYNOPSIS

OPERATOR:	RANGER OIL	
WELL NAME:	ROL et al Bear Rock 0-20	
LOCATION:	64 59'47" 125 47'25"	
FIELD:	Wildcat	
PROVINCE:	N.W.T.	
ELEVATIONS:	G.L. - 166 m	K.B. - 170.4 m
SPUD DATE:	February 25/98	16:30 hrs
T.D. DATE:	March 5/98	04:45 hrs
CONTRACTOR:	TRI CITY	Rig: 16
HOLE SIZE:	200 mm	
COLLARS:	150 mm	
MUD COMPANY:	MIDUS	
MUD TYPE:	GEL-CHEM	
WIRELINE LOGGING CO.:	N/A	
LOG RECORD:	NO LOGS RUN	
DRILLING SUPERVISION:	PERCY CHAPMAN	
GEOLOGICAL SUPERVISION:	FRED RICHARDSON	
TOTAL DEPTH:	249 meters	

ROL et al Bear Rock 0-20
64 59'47"N 125 47'25"W

FORMATION TOPS (m)

PERIOD GROUP FORMATION (LOCAL UNITS)	PROGNOSIS (subsea) (KB)		SAMPLES (driller) (KB)		LOGS (subsea)
<u>DEVONIAN</u>					
IMPERIAL	SPUD	SURFACE			
CANOL/HARA INDIAN	120	50	36 m		
HUME	-140	310	228 m		
HEADLESS	-230	400			
GOSSAGE/LANDRY	-290	460			
BEAR ROCK	-350	520			
FRANKLIN MOUNTAIN	-520	690			
TD	-530	700			

ROL et al Bear Rock 0-20
64 59'47"N 125 47'25"W

DEVIATION SURVEY RECORD

Depth (m)	Deviation	Azimuth	Depth (m)	Deviation	Azimuth
15 M	1/2 DEG				
25 M	1/8 DEG				
32 M	3/4 DEG				
50 M	3/4 DEG				
67 M	1/4 DEG				
85 M	1/4 DEG				
121 M	1/4 DEG				
150 M	1 DEG				
169 M	1 DEG				
200 M	1 1/4 DEG				



ROL et al Bear Rock 0-20
64 59'47"N 125 47'25"W

BIT RECORD

#	Type	Size (mm)	In	Out	Total (m)	Hrs drilled	FOB (daN)	RPM	Cond. T B G
1a	J51	444.5	0	25.5	25.5			180	
1RR	SMITH	311	0	25.5	25.5	1		180	
1RRA	SMITH	331	25.5	142	116.5	17	4/4	60/80	
2RRA	SMITH	311	142	200	58	16.75	2/3	140/160	
1	HUGES	200	200	249	49	28	2/4	80	

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
Feb 25	0	25.5	2	0000-0230 pre mix, rig up pre fabs 0230-0530 drill mouse hole, loss circ. 0530-0800 drill rat hole, loss circ. 0800-0815 rig service 0815-1530 drill rat hole, loss circ. 1530-1600 repair hydrolic leak 1600-1615 rig service 1615-1630 pre spud safety meeting 1630-1845 spud drill 311mm hole 1845-2115 drill and survey 2115-2215 lay down collars, make up bit 2215-2315 drill 444.5 mm hole 2315-2345 pick up 9 " 2345-2400 survey
Feb 26	25.5	0	0	0000-0015 rig service 0015-0230 ream 444 mm hole 0230-0245 circ. and work hole 0245-0300 survey 0300-0330 lay down bha 0330-0545 rig to run csg. run csg. 0545-0730 circ. and cond mud 0730-0930 cement with dowell 0930-1330 woc 1330-1500 cut csg. weld flange 1500-2245 nipple up 2245-2400 pick up 9" dc, make up bit
Feb 27	108	82.5	11 1/4	0000-0015 rig service 0015-0145 pressure test 0145-0245 take plug out of kelly 0245-0300 drill out cement 0300-0330 repair flow ripple 0330-0630 drill 311 mm hole 0630-0645 survey 0645-1730 drill & survey 1730-2400 mix barite

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
Feb 28	140	32	4 3/4	0000-0015 rig service 0015-0215 mix barite 0215-0230 rig service 0230-0500 mix barite 0500-0530 pump pill of 1355 d 0530-1500 mix barite circ at 1420 d 1500-1645 drill 1645-1730 rig up pre mix tank 1730-2030 pre mix barite 2030-2200 drill 311 mm hole 2200-2215 rig service 2215-2230 survey 2230-2400 drill 311 mm hole
MAR 1	187	47	13 hrs	0000-0015 rig service 0015-0115 drill 311 mm hole 0115-0800 circ. and mix premix 0800-1000 mix premix & pump same 1000-1100 well dead, trip for bit 1100-2400 drill & survey
Mar 2	200	13	4 3/4	0000-0530 drill, survey, circ. 0530-0630 wiper trip 0630-0715 circ. 0715-0830 pooh lay down 228 dc's 0830-0845 rig service 0845-0900 safety meeting with tong hand 0900-1100 rig to run csg. 1100-1145 circ. 1145-1330 safety meeting re. cement 1300-2130 woc 2130-2230 nipple down devertor 2230-2330 cut conductor & csg. 2330-2400 nipple up bop's
Mar 3	200	0	0	0000-0030 retry to weld bowl 0030-0645 wait on welder 0645-0800 weld on bowl (test failed) 0800-1200 wait on new welder 1200-1530 weld bowl (cut off old) 1530-1730 nipple up 1730-2000 pressure test 2000-2300 make up bha 2300-2400 take ice plug out of kelly

DAILY DRILLING CHRONOLOGY

Date	Depth 24:00	Progress (24 hrs)	Drilling (hrs)	Rig activity 00:00 - 24:00
Mar 4	229	29	3/4	0000-0130 pressure test & function test 0130-0145 safety meeting 0145-0215 drill out 0215-0245 repair swivel 0245-0530 drill out & drill ahead 0530-0715 circ wait on pressure tester 0715-0800 leak off test 0800-0815 rig service 0815-0900 drill (well flow shut in) 0900-1600 mix and pump pill 1600-1900 mix pill pump same 1900-2000 blow line winterize manifold 2000-2400 circ. and cond. mud
Mar 5	249	20	4 1/2	0000-0030 circ. and cond mud 0030-0445 drill 200 mm hole & lost circ 0445-0645 mix loss circ. material 0645-0700 pump loss circ & got returns 0700-0800 mix barite and lcm 0800-1300 mix lcm & barite & pump 1300-1330 hoist 4 dp to 200 meters 1330-1445 mix lcm & barite, pump same 1445-1600 pooh 1600-1630 pooh, well kicked 1630-1800 make up 11 stds dp rack 1800-2100 mix barite 2100-2400 wait on cementors

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

25 - 30	SANDSTONE - white, clear, pink, very fine grained to medium grained and some coarse grained, subangular to subrounded, poorly sorted, unconsolidated, occasionally calcareous, occasional feldspar, occasional siliceous cement;
30 - 35	SANDSTONE - white, clear, pink, very fine grained to medium grained and some coarse grained, subangular to subrounded, poorly sorted, unconsolidated, occasionally calcareous, occasional feldspar, occasional siliceous cement; SHALE - dark gray, blocky, commonly micromicaceous;
35 - 40	SANDSTONE - white, clear, pink, very fine grained to medium grained and some coarse grained, subangular to subrounded, poorly sorted, unconsolidated, occasionally calcareous, occasional feldspar, occasional siliceous cement; SHALE - dark gray, blocky, commonly micromicaceous;
40 - 45	SHALE - black, blocky, occasionally micromicaceous;
45 - 50	SHALE - black, blocky, occasionally micromicaceous;
50 - 55	SHALE - black, blocky, occasionally micromicaceous; SHALE - gray, occasionally calcareous;
55 - 60	SHALE - gray, occasionally calcareous;
60 - 65	SHALE - gray, occasionally calcareous;
65 - 70	SHALE - gray, occasionally calcareous;
70 - 75	SHALE - gray, soft and fissile;
75 - 80	SHALE - dark gray;
80 - 85	SHALE - gray;
85 - 90	SHALE - dark gray, occasionally micromicaceous;
90 - 95	SHALE - dark gray, occasionally micromicaceous;
95 - 100	SHALE - dark gray, black, some finely disseminated pyrite, commonly micromicaceous;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

100 - 105	SHALE - dark gray, black, some finely disseminated pyrite, commonly micromicaceous;
105 - 110	SHALE - dark gray, black, some finely disseminated pyrite, commonly micromicaceous; LIMESTONE - gray, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous;
110 - 115	SHALE - dark gray, black, some finely disseminated pyrite, commonly micromicaceous; LIMESTONE - gray, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous;
115 - 120	SHALE - dark gray, black, some finely disseminated pyrite, commonly micromicaceous;
120 - 125	SHALE - dark gray, black, with finely disseminated pyrite, and pyrite nods, commonly micromicaceous;
125 - 130	SHALE - dark gray, black, with finely disseminated pyrite, and pyrite nods, commonly micromicaceous;
130 - 135	SHALE - dark gray, black, with finely disseminated pyrite, and pyrite nods, commonly micromicaceous;
135 - 140	SHALE - dark gray, black, with finely disseminated pyrite, and pyrite nods, commonly micromicaceous;
140 - 145	SHALE - dark gray, black, with finely disseminated pyrite, and pyrite nods, commonly micromicaceous;
145 - 150	SHALE - dark gray, black, with trace of limestone, and pyrite nodes, commonly micromicaceous;
150 - 155	SHALE - dark gray, black, with trace of limestone, and pyrite nodes, commonly micromicaceous;
155 - 160	SHALE - dark gray, black, very minor calcite vainlets, trace of pyrite nods, commonly micromicaceous, commonly carbonaceous;

LITHOLOGY

Formation tops Sample interval (in meters)	SAMPLE DESCRIPTION
160 - 165	SHALE - dark gray, black, very minor calcite vainlets, trace of pyrite nods, commonly micromicaceous, commonly carbonaceous;
165 - 170	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
170 - 175	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
175 - 180	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
180 - 185	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
185 - 190	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
190 - 195	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
195 - 200	SHALE - dark gray, black, siliceous, very minor calcareous vainlets, commonly micromicaceous, trace pyrite nods;
200 - 205	SHALE - dark gray, thin laminae;
205 - 210	SHALE - dark gray, black, thin laminae, occasionally micromicaceous, occasional pyrite;
210 - 215	SHALE - dark gray, black, with traces of brown and white limestone from fractures, occasional pyrite;
215 - 220	SHALE - black, blocky, occasionally micromicaceous, occasional pyrite nods;
220 - 225	SHALE - black, fossiliferous, occasionally micromicaceous, trace pyrite nods; LIMESTONE - white, brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous, mainly from small fractures;

LITHOLOGY

Formation tops
Sample interval
(in meters)

SAMPLE DESCRIPTION

225 - 230	SHALE - black, fossiliferous, occasionally micromicaceous, trace pyrite nodds; LIMESTONE - white, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous in part;
230 - 235	LIMESTONE - white, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous in part;
235 - 240	LIMESTONE - white, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous in part;
240 - 245	LIMESTONE - white, light brown, cryptocrystalline to microcrystalline and some fine crystalline, fossiliferous in part;
245 - 249	No sample;
249 - 253	No sample;

GEOLOGICAL SUMMARY AND CONCLUSIONS

This wildcat well ROL et al Bear Rock 0-20 64 59'47" N 125 47'25" W N.W.T. was drilled with the intention to penetrate and evaluate the Bear Rock Fm. (Mid Dev.) which would have been encountered at a measured depth of approximately 520 meters. The Bear Rock Formation is a breccia and has been known to have lost circulation problems, and on occasion resulted in extremely large volumes of flowing water.

Unfortunately we encountered all of the above problems in the Canol/Hare Indian and Hume formations

The Canol/Hare Indian top came in at 36 meters, 14 meters high to prognosis. At 108 meters we had a gas and water kick (with a small amount of H₂S) that we had difficulty controlling. We mixed and pumped 1460 kg/m³ and got back 1420 kg/m³. We had to order more weight material and we used all we had on hand "then" to mix 1550 kg/m³ mud which killed the well. While this mud was being mixed we drilled ahead with formation water. At that time we only had 25.5 meters of conductor pipe cemented in place and the BOP's were not yet installed. We drilled to 200 meters and set 219 mm casing and installed the BOP's.

At a depth of 228 meters (the Hume top) the well again kicked water and gas (with a small amount of H₂S) and this time we were able to maintain control by closing the BOP's and then mixing weight material to 1440 kg/m³ to control the kick.

At a measured depth of 249 meters we lost circulation and mixed lost circulation material to get it back. Then at 04:45 on March 5 the well blew formation water, some gas and rocks out of the hole. And for a short time water was shooting a meter above the floor. This kick was subsequently controlled with heavy weight mud and the decision was made to abandon the well. Cement was pumped to the formation on March 6/98. The final TD was 249 meters.

SURVEY PLAN

OVERSIZED

DOCUMENT

FILMED

ON

35mm

COMPLETION

