

NWT

**APPROVAL
TO DRILL A
WELL**

Exploratory
Development

x

Delineation
Service

APPROVAL TO DRILL A WELL

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

Well Name: Devian et al Thunder River N-73.....
Operator: Devian Exploration Inc. Drilling Program No.:
Contractor: Akita Drilling Interest Identifier: EL 373
Drilling Rig or Unit: 14 Estimated Well Cost: \$1,700,000
Location-Unit: D Section: 66 Grid Area 67 30 - 131 15
Coordinates: Lat.: N $67^{\circ}22'51.615''$ (Surface Co-Ordinates same as bottom hole) Long.: W $131^{\circ}29'15.918''$
Area: Grandview Hills Field/Pool: Thunder River
Elevation-KB/RT: 89m (ASL) GL/Seafloor: 85m
Approx. Spud Date: January 30, 2001 Est. Days on Location: 15
Anticipated Total Depth: 1200m Target Horizons: Hume, Bear Rock, Ordovician

EVALUATION PROGRAM

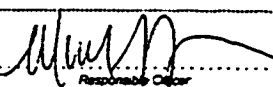
Ten-metre sample intervals N/A
Five-metre sample intervals From Surface Casing to TD
Canned sample intervals from casing shoe to TD every 10 metres
Conventional Tests Possibility of 3 - Hume, Bear Rock, Ordovician
Logs and Tests E-log, Sonic, Neutron - Density, GR-XY Caliper from TD - Surface Casing

CASING AND CEMENTING PROGRAM

O.D. (mm)	Weight (kg/m)	Grade	Setting Depth (m KB)	Cementing Program (m ³)
406mm	96.73	H-40	30m	2.9T Artic Set Cement
219.1mm	35.72	J-55	300m	27.2T Artic Set Cement
139.7mm	23.1	J-55	1200m	30.2T Fill-Lite and Class G

B.O.P. Equipment: Shaffer spherical 229mm x 21MPa annular preventer. 2 - Shaffer LWP 229mm x 21MPa single gate ram preventers.....
Neutron 300 litre x 21MPa 8 station accumulator. National Oilwell Willis 46mm x 65mm x 21MPa choke manifold.....

Other Information:
.....
.....
.....

Signed:  Title: V.P. Engineering
Name: Mark Algar Company: Devian Exploration Inc.
Date: January 10, 2001 Phone: 403-233-7778

APPROVAL

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

Date: January 25/01 Signed: 
File: 9211-D28-1-3 Chief Conservation Officer
WD: 1909
UWI: 300-N736730131150

WELL
TERMINATION
RECORD (with
attachment)



WELL TERMINATION RECORD

This record is submitted in compliance with Section 154 of the Canada Oil and Gas Drilling Regulations.

Well Name: Devlan: et al Thunder River N-73 Area: Grandview Hills, NWT

Grid Area: 67-30 131-15

Field / Pool: N/A

Interest: EL 373

Final

Lat: 67°22'51.6"

Long: 131°29'15.9"

Drilling: Akita 14

Elevations:

kbl 24.2m

(ASL)

GL/Seafloor

120.1m

Spud Date: February 24/01

R.R.: March 15/01

Total Depth: 1146 m

O.D. (mm)	Weight (kg/m)	Grade	Depth Set (m KB)	Cement (m³)
<u>406.4</u>	<u>96.7</u>	<u>H-40</u>	<u>28.0</u>	<u>9.8</u>
<u>219.1</u>	<u>35.7</u>	<u>H-40</u>	<u>310.0</u>	<u>22.1</u>
<u>139.7</u>	<u>20.8</u>	<u>J-55</u>	<u>1146.0</u>	<u>25.5</u>

PLUGGING PROGRAM

Approval of the following program was obtained by (person) _____

from (person) _____

of the _____

by means of _____

on _____

Type of Plug

Interval (m KB)

Felt

Cement (m³)

Lost Circulation/Overpressure Zones: 816.5-817.0; 1019-1019.5 (Lost Circ.)

Equipment left on Seafloor (Describe): N/A

Provision for Re-entry (Describe and attach sketch): Production casing ran and cemented

Cores:

Type:

N/A

Interval

N/A

Other Downhole Completion/Suspension _____

CERTIFICATION

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

Signed: _____

Title:

Vice President, Engineering

Name:

Mark Algar

Date:

April 24, 2001

Company:

Devlan Exploration Inc.

Well Status

Suspended ☒

Completed ☐

Abandoned ☐

Acknowledged by: _____

Chief Conservation Officer

Date:

May 31/01

File: 9211-D28-1-3

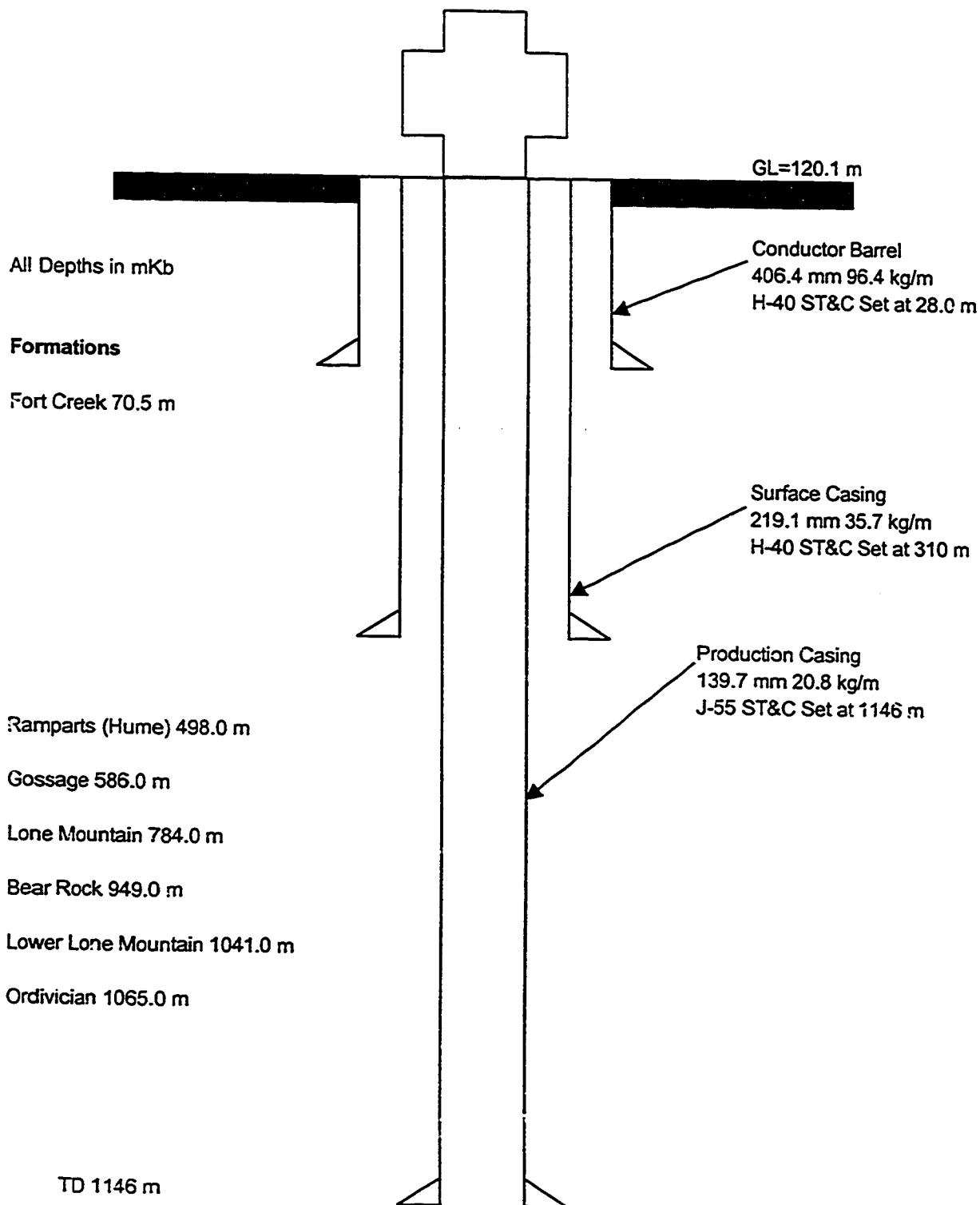
UWI: 300N7367301 150

WID: 1909



Devlan etal Thunder River N-73

Wellbore Schematic



GEOLOGICAL REPORT

DEVLAN EXPLORATION INC.

DEVLAN ET AL THUNDER RIVER N-73

300\N73673013115\00

SECTION 73 N N67 deg. 22' 52" W 131 deg. 29' 16"

TSHIGEHTCHIC. N.W.T.

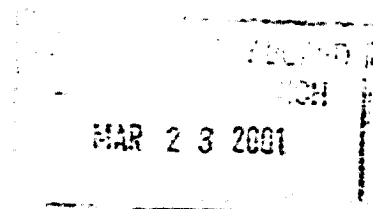
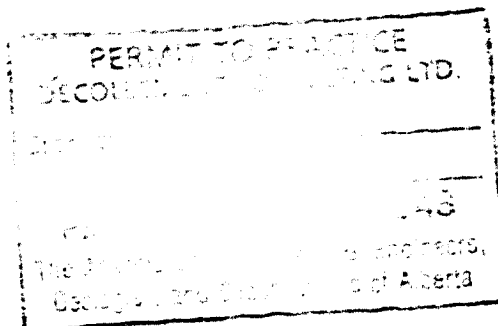
N.E.B. COPY

DEVLAN EXPLORATION INC.

DEVLAN ET AL THUNDER RIVER N-73

300\N73673013115\00

SECTION 73 N N67 deg. 22' 52" W 131 deg. 29' 16"
TSIIGEHTCHIC. N.W.T.



GEOLOGICAL REPORT

ON

**DEVLAN ET AL TREE RIVER
300\B10672013145\00
SECTION 10 N67 19' 14" W 131 45' 30"
TSIHGEHTCHIC, N.W.T**

FOR

DEVLAN EXPLORATION INC.

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February/March, 2001

**Keith Robertson, B. Sc.,
Wellsite Geologist**

DECOLLEMENT CONSULTING LTD.

WELL DATA SUMMARY

WELL NAME	DEVLAN et al THUNDER RIVER N-73
LEGAL LOCATION	SECTION 73 N67° 22' 52" W 131° 29' 16"
UNIQUE WELL I.D.	300\N73673013115\00
SURFACE LOCATION	N67° 22' 52" W 131° 29' 16"
FIELD/REGION	TSIIGEHTCHIC NWT
OPERATOR	DEVLAN EXPLORATION INC.

SITE DATA

BOTTOMHOLE COORDINATES	N67° 22' 52" W 131° 29' 16"
SURFACE COORDINATES	N67° 22' 52" W 131° 29' 16"
SEISMIC LOCATION	N67° 22' 52" W 131° 29' 16"
WELL CLASSIFICATION	WILDCAT
AFE NUMBER	WELL LICENSE # 9211-D28-1-3
DRILLING CONTRACTOR	NONE
	AKITA 14

ELEVATIONS

GROUND LEVEL	120.1 (m)
KELLY BUSHING	124.2 (m)

DRILLING DATES

SPUD DATE	24 Feb, 2001		TIME	0730 HRS
T.D. DATE	March 11, 2001		TIME	1215 HRS

HOLE SIZE & MUD TYPE

SURFACE	311 mm. GEL CHEM
MAIN	200 mm. GEL CHEM

CASING DATA

SURFACE	SET AT 310 m. ran 22 jts of 219.1 mm. 35.7 kg/m. ST&C casing, cement with 30 tonne Polar Set Reg, +.2% R-15; plug down 0500 hrs.
PRODUCTION	ran 83 jts of 139.7 mm 20.8 kg/m production casing

GEOLOGICAL DATA

SAMPLE INTERVAL	0 to 1146 metres
GAS DETECTION INTERVAL	0 to 1146 metres
CORES	NONE
LOGGING SUITE	DIL-SP-CNL-PE-GR-CAL-SONIC
DRILL STEM TESTS	NONE

WELL STATUS

POTENTIAL BEAR ROCK GAS
WELL



FORMATION TOPS

DEVLAN et al THUNDER RIVER N-73
SECTION 73 N67° 22' 52" W 131° 29' 16"

K.B.(m): 124.20 G.L.(m): 120.10

FORMATION	PROGNOSIS		SAMPLE		LOG	
	MD(m)	SS(m)	MD(m)	SS(m)	MD(m)	SS(m)
FLUVIAL	124.0	0.2	3.0	121.2	3.0	121.2
FORT CREEK	74.2	50.0	70.5	53.7	70.0	54.2
RAMPARTS (HUME)	474.2	-350.0	498.0	-373.8	501.0	-376.8
GOSSAGE	554.0	-429.8	586.0	-461.8	585.0	-460.8
LONE MOUNTAIN	714.2	-590.0	784.0	-659.8	788.0	-663.8
BEAR ROCK	789.2	-665.0	949.0	-824.8	952.0	-827.8
LOWER LONE MTN			1041.0	-916.8	1041.0	-916.8
ORDOVICIAN	874.2	-750.0	1065.0	-940.8	1061.0	-936.8
TOTAL DEPTH	1239.2	-1115.0	1146.0	-1021.8	1145.8	-1021.6

DEVIATION SURVEYS

DEVLAN et al THUNDER RIVER N-73
SECTION 73 N67° 22' 52" W 131° 29' 16"

Depth	Refraction
60.0	0.750°
95.0	0.250°
133.0	2.000°
161.0	2.250°
190.0	2.250°
218.0	2.125°
247.0	2.000°
276.0	2.250°
305.0	2.000°
199.0	2.500°
247.0	2.250°
305.0	2.250°
346.0	0.250°
452.0	2.000°
598.0	1.250°
704.0	1.000°
849.0	1.750°
1100.0	2.250°

WELLSITE BIT RECORD #1

DEVLAN et al THUNDER RIVER N-73
SECTION 73 N67° 22' 52" W 131° 29' 16"

SPUD DATE: 24 Feb, 2001
T.D. DATE: March 11, 2001

SURFACE CASING: SET AT 310 m. ran 22 jts of 219.1 mm. 35.7 kg/m. ST&C

SIZE (mm)	311	200	311	311	200	200
MAKE	VAREL	VAREL	VAREL	VAREL	VAREL	VAREL
TYPE	L127	L127	L127	L127	L127	ETD09XG
SERIAL #	140640	158870	140640	137231	158872	164838
JETS	4X12.7	3X12.7	4X12.7	4X12.7	3X11.1	3X11.1
DEPTH IN	0.00	173.00	173.00	240.00	310.00	435.00
DEPTH OUT	173.00	310.00	240.00	310.00	435.00	793.00
METRES	173.00	137.00	67.00	70.00	125.00	358.00
HOURS	13.00	22.00	7.75	8.75	19.25	80.00
ACC. HRS.	13.00	35.00	42.75	51.50	70.75	150.75
ROP (m/hr)	13.31	6.23	8.65	8.00	6.49	4.48
FOB	5\13000	5\6000	5\6000	5\6000	11\12000	11\12000
RPM	90\180	160\180	160\180	160\180	130\150	80\90
PP	3700	4460	4460	4460	5090	7610
DEN	1180	1240	1235	1280	1280	1050
VISCOSITY	55	56	68	101	42	43
MAX DEV.°	2.250°	2.000°	2.500°	2.250°	0.250°	1.000°
Condition:						
	1\IV	3\IV	3\IV	2\IV	4\IV	2\IV
Condition:						
REMARKS	drill surface hole	drill pilot hole	ream pilot hole	ream pilot hole		

WELLSITE BIT RECORD #2

DEVLAN et al THUNDER RIVER N-73
SECTION 73 N67° 22' 52" W 131° 29' 16"

SPUD DATE: 24 Feb, 2001
T.D. DATE: March 11, 2001

SURFACE CASING: SET AT 310 m. ran 22 jts of 219.1 mm. 35.7 kg/m. ST&C

BIT #	1	2	3	10	11	12
SIZE (mm)	200	200				
MAKE	VAREL	VAREL				
TYPE	ETD17XG	ETD17XG				
SERIAL #	163953	164008				
JETS	3X11.1	3X11.1				
DEPTH IN	793.00	944.00				
DEPTH OUT	944.00	1146.00				
METRES	151.00	202.00				
HOURS	44.25	68.00				
ACC. HRS.	195.00	263.00				
ROP (m/hr)	3.41	2.97				
FOB	11\12000	11\12000				
RPM	80\100	80\100				
PP	5500	5500				
DEN	1050	1050				
VISCOSITY	44	42				
MAX DEV.°	1.750°	2.250°				
Condition:	100% 3/2I	100% 2/2I				
Condition:	100% 100% 100% 100%	100% 100% 100% 100%				
REMARKS						

DAILY DRILLING SUMMARY

DEVLAN et al THUNDER RIVER N-73
SECTION 73 N67° 22' 52" W 131° 29' 16"

Date	Depth	Progress	Drilling Hours	R.O.T. (min)	Drilling	SA	FE	PS	Operator's Remarks
21-Feb-01	0	0	0.00	0.00	N/A	N/A	N/A	N/A	MOVING TO LOCATION
22-Feb-01	0	0	0.00	0.00	N/A	N/A	N/A	N/A	SET UP RIG, WOC TO ARRIVE
23-Feb-01	0	0	0.00	0.00	N/A	N/A	N/A	N/A	CEMENT CONDUCTOR BARREL,
24-Feb-01	0	0	0.00	0.00	1035	60	28	12	RIG TO SPUD, SPUD AT 0730; DRILL; TRIP
25-Feb-01	173	173	13.00	13.31	1260	42	16.8	9.0	DRILL PILOT SURFACE HOLE
26-Feb-01	310	137	22.00	6.23	1240	56	12.8	9.0	REAM PILOT HOLE
27-Feb-01	270	97	10.50	9.24	1235	68	N/A	9.0	REAM PILOT HOLE; COND MUD, RUN CASING
28-Feb-01	310	40	6.75	5.93	1280	101	N/A	9.0	CEMENT; WOC; PRESSURE TEST
1-Mar-01	319	9	1.00	9.00	1025	38.0	14.0	9.5	LEAK OFF TEST; DRILL MAIN HOLE; TRIP FOR BIT
2-Mar-01	435	116	18.25	6.36	1080	42	8.0	9.5	DRILL AHEAD
3-Mar-01	568	133	23.00	5.78	1060	43	8.0	9.5	DRILL AHEAD
4-Mar-01	665	97	23.00	4.22	1050	45	7.5	9.5	DRILL AHEAD
5-Mar-01	752	87	23.00	3.78	1050	42	7.0	9.5	DRILL AHEAD; TRIP FOR BIT
6-Mar-01	816	64	16.75	3.82	1050	43	8.0	9.5	DRILL AHEAD
7-Mar-01	900	84	23.00	3.65	1050	52	8.4	9.0	DRILL AHEAD; TRIP FOR BIT
8-Mar-01	951	51	18.00	2.83	1040	44	8.4	9.5	DRILL AHEAD
9-Mar-01	1016	65	22.25	2.92	1040	42	8.4	9.5	MIX LCM, FIGHT LOST CIRCULATE; DRILL;
10-Mar-01	1057	41	13.00	3.15	1045	51	8.8	9.5	DRILL AHEAD
11-Mar-01	1131	74	23.00	3.22	1050	47	8.0	9.5	DRILL AHEAD to TD; POOH TO LOG
12-Mar-01	1146	15	6.25	2.40	1060	72	7.6	9.5	LOG; RUN CASING
13-Mar-01	1146	0	0.00	0.00	N/A	N/A	N/A	N/A	RUN CASING

WELLSITE LOGGING REPORT

DEVLAN et al THUNDER RIVER N-73
SECTION 73 N67° 22' 52" W 131° 29' 16"

HOLE DATA			MUD DATA		LOGGING COMPANY	
Hole Size: 200 TD Driller: 1146 Strap: NA TD Logger: 1145.8 Casing Driller: 310 Casing Logger: 310 Hole Condition: GOOD			Type: GEL CHEM Density: 1060 Viscosity: 72 W.L.: 7.6 pH: 9.5		Logging Co.: TUCKER Engineer: Randy Nitz Truck No.: 117 Start Date: 12 Mar 2001 Start Time: 0100 End Date: 12 Mar 2001 End Time: 0530	
LOGGING SEQUENCE						
Run Number	Logged Interval		Hours	Logs	Remarks	
	From	To				
1	1146	1	4.50	DIL-SP-CNL-LDT-PE-GR.		
				XY-CAL.		
Total Hours:			4.50			
LOGGING OPERATIONS SUMMARY						
Date	From	To	Description of Operation			
11 Mar 01	1145.8	1	Logs ran to and through surface casing but only presented to surface casing. All ran in combo.			
REMARKS & COMMENTS						

WELL SUMMARY

DEVLAN et al THUNDER RIVER N-73 SECTION 73 N67° 22' 52" W 131° 29' 16"

The Devlan et al Thunder River well was spudded on the 24th of February at 0730 hours. Drilling commenced below the conductor barrel. At a depth of 133 m. the survey jumped out to 2 degrees and continued to climb to 2.25 degrees at 166 m. even though measures had been installed to counteract the swing. Consequently a bit trip was made at 173 m. and a pilot hole was drilled to surface casing depth of 310 m. while trying to control the deviation problem. Although the inclination did not increase more it also did not diminish, and casing was set with a deviation of 2 degrees. Main hole was drilled to a Total Depth of 1146 metres. Lost circulation was encountered at 815 and again at 1019 due to open fractures. The shaker was bypassed from 1019 to 1074, therefore sample quality was poor over this section, and no gas readings were recorded. The well was logged successfully.

Samples were caught in 5 metre intervals from surface to Total Depth as per instructions from the NEB. One set of bagged samples and 3 sets of vialled samples were required. The bagged samples and 2 sets of vials were shipped to the NEB, while the operator of the well retained the final set.

This well was drilled to evaluate the potential of the Gossage, Bear Rock and Ordovician formations. The play was constructed around old wells drilled in the 60's and 70's along with new seismic data run over the area. The Devlan et al Thunder River well was drilled on top of the seismic high that appeared to be developed over a fairly large land area.

Since it is somewhat unclear as to the exact composition of the Bear Rock and Lone Mountain, the formation tops in this well may not coincide with other wells. A classic section consisted of pelletal Gossage limestone overlying dolomite and brecciated limestone of the Bear Rock. The Bear Rock breccias are predominantly limestone rather than dolostones, according to papers published in the 60's through the 80's by a large group of geologists studying this formation in the Fort Norman and Mackenzie Mountains area. No mention was made of the Lone Mountain formation. However, in the Grandview Hills area, the Bear Rock has been described as brecciated dolomites by long time experts. In the 2 wells drilled to date (Devlan et al Tree River and Devlan et al Thunder River) no brecciated dolomites were encountered, only homogeneous, well cemented dolomites with minor to large, and sometimes open, fractures. Therefore these dolomites were labeled as Bear Rock in the 2 previously mentioned wells. A possible explanation for the presence of non-brecciated dolomites as such, is no near-surface removal of evaporites by dissolution to cause the brecciation. The limestone section, (at the base of the Lone Mountain in this well) may actually be the Landry Member of the Bear Rock. The **Landry Formation** (Douglas and Norris, 1961) is the bedded limestones overlying the Bear Rock and has been assigned to the **Landry Member** of the Bear Rock. Recognition of a Landry Member as part of the Bear Rock indicates that the Landry Formation continues recognizably in the Bear Rock. These studies from the Fort Norman and Mackenzie Mountain areas show that a pelletal lime mudstone is consistently recognizable in unbrecciated subsurface well sections. There have been no previous reports of this in the Grandview Hills area.

The Gossage formation comprised well-cemented pelletoidal limestone; cryptocrystalline, clean, calcilutites as well as clean packstones with black bituminous infills in pore spaces in the top 20 metres but was rare in the remainder of the section. Only two dolomite lenses were recorded and no shows or gas peaks were noted through out the section. The Lone Mountain included interbedded limestones and dolomites with a middle tight dolomite section. Clean, dolomitic, microcrystalline to very fine crystalline packstones were sandwiched between the limestone beds. The basal Lone Mountain (Landry Member\Bear Rock?) consisted of tight dolomitic limestone with micro fractures and rare fossil fragments. The Bear Rock comprised light to medium brown clean calcilutite and packstone with open fractures between 1019 and 1025 metres. The Lower Lone Mountain consisted of; medium brown clean dolomitic calcilutites; pyritic dolomitic grey green shale laminae; grey green argillaceous dolomitic calcilutites; and pink microcrystalline clean dolomitic packstones. **The Ordovician consisted of clean white dolomitic calcilutite with stringers of fine to medium crystalline dolomites containing varying amounts of porosity.**

No shows or hydrocarbon of reservoir quality were noted in this well. However two zones are of particular interest; the fracture zone between 1019 and 1025 metres along with the dolomites directly underneath, 1025 to 1030 metres, and the top of the Ordovician from 1068 to 1082 metres. Connection gases were noted after the gas detector was re-installed from bypassing the shaker due to lost circulation. Also, when tripping out, the hole was swabbed and finally started to flow slightly, enough that the mud required weighting up for logging. Trip gas was recorded at a peak of 130 units. If possible, more intensive information should be gathered over the fracture zone. From the resistivity logs it appears that the fracture zone at 1019 contained gas over water. The well was cased as a **potential Bear Rock gas well.**

FORMATION EVALUATIONS

DEVLAN et al THUNDER RIVER N-73
SECTION 73 N67° 22' 52" W 131° 29' 16"

GLACIAL GRAVEL surface to 70.5m.

These gravels consisted of clear, vitreous, pink, light brown to ochre; vari-coloured sands ranging in size from very fine grained to coarse grained, with common small pebbles. They were unconsolidated in samples but were cemented with argillaceous clay matrix. Although generally angular and sub angular they also contained well rounded quartz grains. It was obvious that the source rock was the igneous granite shield of the north since samples contained common feldspars often with imbedded micas and quartz crystals.

CONCLUSION: A zone of no interest.

FORT CREEK 70.5 m. to 498 m.

The Fort Creek formation can be divided into 3 sections; an upper shale, a middle sandier section and a lower shale. The upper shale was medium grey, micromicaceous, slightly silty containing occasional carbonaceous fragments, and non-calcareous. The middle section comprised a predominantly micromicaceous shale section but with increased components of silt and sand. Shales were carbonaceous, moderately firm to hard and non calcareous. Sandstones were poorly developed; silty to very fine and fine grained, poorly sorted, well consolidated, siliceous argillaceous, and dirty. The siltstones were predominantly a degraded sandstone, but often contained siderite grains or laminae and disseminated pyrite. All were tight. One exception was found at 314m. where 3 metres of earthy brown, very fine to fine grained sandstone showed light blooming cut fluorescence and a trace of residual oil stain. Gas readings only tripled over this section to a peak of 150 units. The lower shales were purer with little to no sand or silt components. From a depth of 385m. to 498m. these shale were petroliferous and exhibited light blue blooming fluorescence after 1 minute on all samples. A bed of light grey, mottled, banded, kaolinitic claystone was logged at the base of the Fort Creek.

Gas readings ranged between 100 to 200 units over the total formation with 2 exceptions. The petroliferous shales from 325 to 342 metres and from 385 to 498 metres logged between 200 to 400 units decreasing slightly towards the base of the Fort Creek. No shows were noted anyway through out this formation.

CONCLUSION: No hydrocarbon shows or gas increase of endemic proportions indicates a zone of no interest.

HUME 498 m. to 586 m.

The Hume is an interbedded shale-limestone sequence. In this well the shales were predominantly grey green, devoid of sand or silt grains, calcareous with common disseminated pyrite and moderately firm. Limestones were predominantly medium brown to grey brown, mottled with small amounts of white and buff. These argillaceous calcilutites were cryptocrystalline, often contained small amounts of calcite and pyritic infill in minor fractures and pore spaces, and were well indurated and **tight**. No gas peaks were encountered with gas readings ranging from 40 to 50 units.

CONCLUSION: This zone was devoid of hydrocarbons and is of no interest.

GOSSAGE 586 m. to 784 m.

The Gossage formation comprised well-cemented pelloidal limestone in this well. It encompassed cryptocrystalline, clean, calcilutites as well as clean packstones, well cemented with calcareous cement. Black bituminous infills in pore spaces were noted in the top 20 metres but were rare in the remainder of the section. Micro fractures were common through out and usually infilled with calcite crystals, bituminous shale material or pyritic cubes. Only 2 dolomite lenses were recorded; **one at 650 metres with 5% porosity and questionable light blue blooming cut fluorescence, and the second at 750 metres with patchy micro vuggy porosity at 8%.** Below this dolomite lens was another 30 metres of clean pelloidal packstones. Stringers and laminae of black bituminous shales in the upper half and apple green shales in the lower half were also logged. Gas readings were very low ranging from 30 to 70 units over the whole interval with no peaks.

CONCLUSION: No hydrocarbon shows or gas increase indicates a zone of no interest. The only interesting area was the dolomite lens at 650 metres, but no hydrocarbon shows or gas increases were found

LONE MOUNTAIN 784 m. to 952 m.

The Upper Lone Mountain can be divided into an upper and lower section. The upper section encompassed limestone interbedded with stringers and lenses of dolomite. The pelloidal, calcisiltite limestones were well cemented with calcareous cement and rare dolomite rhombs. Clean, dolomitic, microcrystalline to very fine crystalline packstones were sandwiched between the limestone beds. Large open fractures containing abundant calcite crystals were drilled between 814 and 818 metres where lost circulation was encountered. The lower section comprised clean calcilutites and packstones with occasional stringers of grainstones. Another open fracture at 828 metres also contained abundant calcite crystals but no lost circulation. **Common micro vuggy porosity of 3 to 8% in lenses of very fine to fine crystalline grainstones were interbedded with tight cryptocrystalline dolomite beds in the top 30 metres of this section.** The remaining 40 metres were predominantly tight with only minor porosity stringers.

An interesting development was the penetration of dolomitic limestone with abundant micro fractures (that was not logged or mentioned in previous wells). Mixes of light grey and buff cryptocrystalline calcilutites with medium to dark brown organic rich (of non-calcareous origin) calcilutites were logged through out the section. Rare fossil fragments of brachiopod, ostracod, crinoid and possible algae mats were present. It was well cemented with calcareous and dolomitic cement. Gas ranged from 30 to 50 units with no peaks. Gas readings were low over the whole formation, ranging from 20 to 50 units. The exception was recorded at 828 metres with a peak of 88 units. No hydrocarbon shows were seen in any of the porosity streaks and permeability was low.

CONCLUSION: The absence of gas increases and hydrocarbon shows indicates this is non-reservoir quality rock.

BEAR ROCK 952 m. to 1041 m.

The Bear Rock comprised homogeneous dolomite with occasional limestone stringers. Dolomites consisted of light to medium brown, clean, cryptocrystalline, calcilutites interbedded with clean, very fine crystalline packstone stringers, generally well cemented with dolomitic and occasional calcareous cement. **Some of the packstone stringers contained low intercrystalline porosity but at times coupled with micro vuggy porosity reached 12%.** No hydrocarbon or gas shows were noted. At 1019 metres to a depth of 1025 metres a series of open fractures were encountered, with lost circulation of a total 32 cubic metres before the opening was healed. Due to the large amounts of lost circulation material in the system the shaker was bypassed for a length of time. No gas readings were logged from 1019 to 1074 metres and samples over this area were poor. More minor fractures were encountered from 1035 to 1040 metres. Gas readings over the whole section ranged between 30 and 50 units with no peaks.

CONCLUSION: There were no hydrocarbon or gas shows. It appeared that the open fracture was not reservoir quality but contained gas over salt water. **Any stringers with porosity appeared wet.** The fracture continued to give problems through out the remainder of the hole, alternately taking and giving fluids.

LOWER LONE MOUNTAIN 1041 m. to 1065 m.

The Lower Lone Mountain consisted of dolomites; medium brown clean calcilutites; pyritic dolomitic grey green shale laminae; grey green argillaceous dolomitic calcilutites; and pink microcrystalline clean dolomitic packstones. No gas readings were collected over this section.

CONCLUSION: A zone of no interest.

ORDOVICIAN 1065 m. to 1164 m. TD

In this well the Ordovician was a cryptocrystalline to microcrystalline, pyritic, very clean calcilutite interbedded with stringers of fine to medium crystalline dolomite rhombs with calcareous and dolomitic cement. **These well-developed crystalline stringers contained varying amounts of intercrystalline and micro vuggy porosity of 3 to 10%.** Near the top black, dead, bituminous infill was commonly associated with these large crystals and pore spaces. At 1100 a 20-metre, cryptocrystalline, calcilutite limestone bed of was encountered. Under lying this were more argillaceous, pyritic, dolomitic packstones, and calcareous dark grey brown shales. Gas readings ranged from 5 to 10 units with increases to 30 units at times.

CONCLUSION: There were no hydrocarbon shows or gas increases in this zone, however connection gases appeared after the gas detector was replaced from bypassing the shaker due to lost circulation. The top of the Ordovician was wet.

LITHOLOGICAL DESCRIPTIONS

DEVLAN et al THUNDER RIVER N-73
SECTION 73 N67° 22' 52" W 131° 29' 16"

- 0 to 15 **NO SAMPLES**
- 15 to 30 **SANDSTONE: GLACIAL GRAVEL**; white, cream, off white, translucent, pink, medium to very coarse grained to small pebbles, angular to sub angular, poorly sorted, loose and unconsolidated, common pink feldspar, **20% intergranular porosity, no shows**, trace black shale stringers at base, blocky, non calcareous. Possibly interbedded with clay beds or laminae (interpreted?) very poor samples.
- 30 to 40 **SANDSTONE: GLACIAL GRAVEL**; variable colour, transparent, yellow, brown, pink, black, medium to very coarse grained to small pebbles, sub angular to sub rounded, poorly sorted, unconsolidated, loose in samples, occasional pink feldspar, argillaceous and silty matrix and cement, frosted quartz grains, common pyrite blebs, rare shale partings, **20% intergranular porosity, no shows**.
- 40 to 50 **SANDSTONE: GLACIAL GRAVEL**; variable colour, transparent, yellow, brown, pink, black, medium to very coarse grained to small pebbles, sub angular to sub rounded, poorly sorted, unconsolidated, loose in samples, occasional pink feldspar, argillaceous and silty matrix and cement, trace glauconite grains, occasional chert fragments from chert pebbles, frosted quartz grains, common pyrite blebs, rare shale partings, **20% intergranular porosity, no shows**.
- 50 to 60 **SANDSTONE: GLACIAL GRAVEL**; transparent, translucent, yellow, brown, pink, red, variable colour, medium to very coarse grained to small pebbles, angular to sub rounded, poorly sorted, unconsolidated, loose in samples, quartzose, occasional feldspar, occasional chert pebbles, pyrite blebs, **20% intergranular porosity, no shows**, argillaceous and silty matrix inferred.
- 60 to 65 **SANDSTONE: GLACIAL GRAVEL**; transparent, translucent, yellow, brown, pink, red, variable colour, predominantly small pebbles, angular to sub rounded, poorly sorted, unconsolidated, loose in samples, quartzose, occasional feldspar, common chert pebbles, pyrite blebs, **20% intergranular porosity, no shows**, argillaceous and silty matrix inferred.
- 65 to 70.5 **SANDSTONE: GLACIAL GRAVEL**; transparent, translucent, yellow, brown, pink, red, variable colour, predominantly small pebbles, angular to sub rounded, poorly sorted, unconsolidated, loose in samples, quartzose, occasional feldspar, common to abundant chert pebbles, pyrite blebs, **20% intergranular porosity, no shows**, argillaceous and silty matrix inferred.

TOP OF FORT CREEK 70.5 m.

- 70.5 to 80 **SHALE**; medium grey, blocky, silty with scattered sand grains, micromicaceous, very hard, non calcareous.
- 80 to 90 **SHALE**; medium grey, blocky, silty in part, scattered micro carbonaceous fragments and occasional carbonaceous smear grading to minor carbonaceous laminae, micromicaceous, rare siderite grains and micro laminae, hard, non calcareous.
- 90 to 100 **SHALE**; medium grey, blocky, slightly silty in part, common micro carbonaceous fragments and micro laminae, micromicaceous, firm to hard, non calcareous.
- 100 to 110 **SHALE**; medium grey, blocky, sub platy, silty in part, micromicaceous, common carbonaceous fragments and micro laminae, firm to hard, non calcareous.
- 110 to 120 **SHALE**; medium grey, blocky to sub platy, silty with increase in silt components, occasional carbonaceous micro fragments, decreasing from above, micromicaceous, firm, non calcareous.
- 120 to 130 **SHALE**; as above, medium grey, blocky to sub platy, silty with increase in silt components, occasional carbonaceous micro fragments, decreasing from above, micromicaceous, firm, non calcareous.
- 130 to 140 **SHALE**; medium grey, blocky to sub platy, micromicaceous, slightly silty, common micro carbonaceous fragments, occasional pyrite blebs, firm, non calcareous.
- 140 to 150 **SHALE**, as above, medium grey, blocky to sub platy, micromicaceous, slightly silty, common micro carbonaceous fragments, occasional pyrite blebs, firm, non calcareous.
- 150 to 157 **SHALE**; medium grey, blocky, sub platy, micromicaceous, silty and sandy, occasional coal micro fragments, disseminated pyrite, moderately firm to firm, non calcareous.
- 157 to 161 **SANDSTONE**; medium grey, salt and pepper, very fine to fine grained to silty, sub angular, poorly sorted, well consolidated, very argillaceous and dirty matrix, micro coal fragments, occasional clear chert grains, hard, **tight**.
- 161 to 170 **SHALE**; medium grey, blocky, sub platy, silty and sandy, minor coal micro fragments, moderately firm, non calcareous.
- 170 to 175 **SHALE**; medium grey, blocky to sub platy, micromicaceous in part, very sandy laminae in part, silty, occasional coal micro fragments, moderately firm, non calcareous.
- 175 to 185 **SHALE**; as above, medium grey, blocky to sub platy, micromicaceous in part, very sandy laminae in part, silty, occasional coal micro fragments, moderately firm, non calcareous, sandstone stringers, medium grey, salt and pepper, very fine to fine grained, very argillaceous and dirty, hard, dense, **tight**.

- 185 to 195 **SHALE**; medium grey, blocky, sub platy, sandy laminae throughout, occasional coal micro fragments, trace pyrite blebs, moderately firm, non calcareous.
- 195 to 205 **SHALE**; as above, medium grey, blocky, sub platy, sandy laminae throughout, occasional common coal micro fragments and micro laminae, moderately firm, non calcareous.
- 205 to 208 **SANDSTONE**; light grey, salt and pepper, predominantly fine grained, sub angular, moderately sorted, quartzose, clay matrix, siliceous cement, occasional coal partings, dense, **tight**, rare siderite cement and grains.
- 208 to 215 **SHALE**; medium grey, blocky, sub platy, sandy, occasional coal micro fragments, common disseminated pyrite, moderately firm, non calcareous.
- 215 to 221 **SILTSTONE**; light to medium grey, slightly salt and pepper, grading to very fine and fine grained sandstone in part, very argillaceous and dirty, common coal micro laminae and fragments, rare disseminated pyrite and chert grains, moderately indurated, dense, **tight**.
- 221 to 224 **SANDSTONE**; light grey, salt and pepper, very fine grained grading to silt and fine grained sandstone in part, sub angular, poorly sorted, well consolidated, quartzose with abundant (30%) clay and argillaceous matrix and cement, very slightly calcareous in part, common coal laminae and micro fragments, rare siderite grains, dense, **tight**.
- 224 to 230 **SILTSTONE**; light to medium grey, slightly salt and pepper, occasional very fine and fine sand grain inclusions, common coal partings and laminae, very argillaceous and dirty, dense, **tight**, grading to very silty shale in part.
- 230 to 235 **SILTSTONE**; as above, light to medium grey, slightly salt and pepper, occasional very fine and fine sand grain inclusions, rare coal partings and laminae, very argillaceous and dirty, dense, **tight**.
- 235 to 238 **SANDSTONE**; medium to light grey, salt and pepper, very fine to fine grained, silty in part, sub angular, poorly sorted, well consolidated, quartzose, siliceous cement in part, very argillaceous and dirty in part, argillaceous cement and matrix, common coal micro laminae and fragments, dense, **tight**.
- 238 to 245 **INTERBEDDED SILTSTONE AND SHALE**:
- SILTSTONE**; (50%) medium grey to light grey, slightly salt and pepper, occasional sand grains, common coal micro laminae and fragments, trace glauconite, very argillaceous and dirty, dense, occasional pyrite blebs, **tight**;
- SHALE**; (50%) medium grey, blocky, very silty, occasionally sandy, occasional coal micro fragments, moderately firm, non calcareous.

- 245 to 250 **SHALE**; as above, medium grey, blocky, very silty, occasionally sandy, occasional coal micro fragments, moderately firm, non calcareous, with siltstone stringers, as above, medium grey to light grey, slightly salt and pepper, occasional sand grains, common coal micro laminae and fragments, trace glauconite, very argillaceous and dirty, dense, occasional pyrite blebs, **tight**.
- 250 to 252 **SANDSTONE**; light grey, very fine to fine grained to silty, poorly sorted, well consolidated, quartzose, siliceous in part with argillaceous cement and matrix, dirty, coal partings, hard, dense, **tight**.
- 252 to 260 **SHALE**; medium grey, blocky, sub platy in part, silty and sandy, occasional coal partings, moderately firm, non calcareous.
- 260 to 268 **SHALE**; medium grey, blocky, sub platy, silty and sandy in part, occasional coal micro fragments, moderately firm, non calcareous, minor **SANDSTONE**; stringers, very fine grained, very argillaceous and dirty, hard, **tight**.
- 268 to 272 **SILTSTONE**; medium grey, slightly salt and pepper, very argillaceous and dirty, grading to very fine grained sandstone in part, fine grained sand inclusions, argillaceous cement, trace glauconite and siderite grains, hard, dense, trace pyrite, **tight**.
- 272 to 276 **SHALE**; as above, medium grey, blocky, sub platy, silty and sandy in part, occasional coal micro fragments, moderately firm, non calcareous.
- 276 to 278 **SILTSTONE**; as above, medium grey, slightly salt and pepper, very argillaceous and dirty, grading to very fine grained sandstone in part, fine grained sand inclusions, argillaceous cement, trace glauconite and siderite grains, hard, dense, trace pyrite, **tight**.
- 278 to 288 **SHALE**; medium grey, blocky, sub platy in part, slightly silty, rare coal micro fragments, trace disseminated pyrite, moderately firm, non calcareous.
- SANDSTONE**; stringers, light to medium grey, salt and pepper, silty to very fine grained to fine grained, poorly sorted, well consolidated, very argillaceous and dirty, siliceous in part, hard, dense, **tight**.
- 288 to 289 **SILTSTONE**; light to medium grey, sandy with common very fine and fine grained sand inclusions, argillaceous, dirty, siliceous, common micro coal fragments, hard, dense, **tight**.
- 289 to 295 **SHALE**; medium grey with brown cast, blocky, sub platy, slightly silty, rare coal micro fragments, trace disseminated pyrite, moderately firm, non calcareous, with minor siltstone, stringers, as above.
- 295 to 301 **SHALE**; as above, medium grey with brown cast, blocky, sub platy, slightly silty, rare coal micro fragments, trace disseminated pyrite, moderately firm, non calcareous, with minor siltstone, stringers, as above.

- 301 to 303 **SANDSTONE**; light grey, light brown, salt and pepper, silty to very fine grained, poor to moderately sorted, well consolidated, sub angular, quartzose, off white kaolin matrix in part, sideritic matrix in part, slightly siliceous cement, hard, occasional carbonaceous micro fragments, **tight**.
- 303 to 306 **SHALE**; medium grey, blocky, sub platy, common micro fragments of coal, moderately firm, non calcareous, minor brown siderite stringers, trace Inoceramous crystals.
- 306 to 310 **SANDSTONE**; as above, light grey, light brown, salt and pepper, silty to very fine grained, poor to moderately sorted, well consolidated, sub angular, quartzose, off white kaolin matrix in part, sideritic matrix in part, slightly siliceous cement, hard, occasional carbonaceous micro fragments, **tight**, with shale stringers, as above.

SET SURFACE CASING 310m.

- 310 to 314 **SHALE**; medium to dark grey, blocky, slightly silty, moderately firm, non calcareous.
- 314 to 317 **SANDSTONE**; light brown and grey brown, mottled, earthy in part, very fine to fine grained, sub angular, moderately sorted and consolidated, quartzose, common chert grains, argillaceous cement and matrix, trace pyrite, common coal micro fragments, 12% **intergranular porosity, trace of light blue blooming cut fluorescence, no visible dry fluorescence.**
- 317 to 325 **SHALE**; medium to dark grey, blocky to sub platy, silty, micromicaceous, minor coal micro fragments, moderately firm, non calcareous;
- SANDSTONE**; stringers, medium grey brown, very fine grained to silty, well consolidated, poorly sorted, sub angular, very argillaceous and dirty, minor coal micro fragments, dense, hard, **tight**.
- 325 to 339 **SHALE**; dark grey to black, blocky to platy, micromicaceous, very carbonaceous throughout, rarely silty, carbonaceous laminae and micro fragments, moderately firm, trace disseminated pyrite, non calcareous.
- 339 to 343 **SHALE**; medium to dark grey, black in part, blocky, sub platy, micromicaceous, carbonaceous in part, silty, carbonaceous partings grading to micro carbonaceous fragments, moderately firm, non calcareous.
- 343 to 348 **SHALE**; dark grey to medium grey, blocky, micromicaceous, silty and sandy, rare micro coal fragments, common brown siderite grains, firm to hard, non calcareous, siderite stringers, medium brown, secondary, silty and sandy, rare coal micro fragments, hard, **tight**.
- 348 to 354 **SHALE**; medium grey to grey brown, blocky, silty laminae, occasional scattered sand grains, rare coal micro fragments and rare disseminated pyrite, firm to hard, non calcareous.

- 354 to 361 **SILTSTONE**; medium brown and grey brown, scattered very fine sand grains, very argillaceous and dirty, varved texture in part, coal micro laminae and fragments, hard, dense, **tight**, occasional siderite stringers, light brown, silty, sandy.
- 361 to 370 **SHALE**; dark grey, blocky to sub platy, micromicaceous, slightly carbonaceous, hard, non calcareous, occasional siderite stringers associated with calcite crystals (fractures?).
- 370 to 380 **SHALE**; medium to dark grey and grey brown, blocky, sub platy, slightly silty, minor micro coal fragments, firm to hard, non calcareous, trace disseminated pyrite.
- 380 to 387 **SHALE**; as above, medium to dark grey and grey brown, blocky, sub platy, slightly silty, minor micro coal fragments, firm to hard, non calcareous, trace disseminated pyrite, minor fractures with calcite crystal infill, occasional white specks (precipitated secondary chert? or silica?).
- 387 to 400 **SHALE**; dark grey to black, blocky, sub platy, micromicaceous, very carbonaceous throughout, rare silt grains and brown siderite grains, common disseminated pyrite, moderately firm, non calcareous, occasional calcite crystal infill in micro fractures.
- 400 to 407 **SHALE**; dark grey to black, blocky, sub platy, micromicaceous, very carbonaceous, rare silt grains, common disseminated pyrite, moderately firm, non calcareous, trace secondary silica replacement.
- 407 to 411 **SHALE**; as above, dark grey to black, blocky, sub platy, micromicaceous, carbonaceous, rare silt grains, common disseminated pyrite, moderately firm, non calcareous, decrease in car material, occasional sandstone stringers, light brown, mottled, very fine grained to silty, poorly sorted, very argillaceous and dirty, pyrite blebs, siliceous cement, hard, **tight**.
- 411 to 415 **SHALE**; dark grey to black with brown cast, blocky, common disseminated pyrite, common micro fractures, carbonaceous, stringers of very siliceous shale with rounded secondary precipitated silica and chert grains, (radiolarian?) very very hard, non calcareous.
- 415 to 420 **SHALE**; as above, dark grey to black with brown cast, blocky, common disseminated pyrite, no micro fractures, carbonaceous, stringers of very siliceous shale with rounded secondary precipitated silica and chert grains, (radiolarian?) very very hard, non calcareous.
- 420 to 430 **SHALE**; dark grey to black to dark grey brown with earthy texture, blocky, common disseminated pyrite and occasional pyrite laminae, slightly carbonaceous, hard, non calcareous, trace of micro fractures.
- 430 to 435 **SHALE**; dark grey brown with earthy texture, dull lustre, blocky, common disseminated pyrite, slightly carbonaceous, hard, non calcareous.

- 435 to 440 **SHALE**; dark grey to black to dark grey brown, blocky, common to abundant disseminated pyrite, occasional micro fractures with calcite crystal infill, rare siliceous and chert specks (radiolarian? secondary silica replacement of fossil?) very hard, carbonaceous to petroliferous, non calcareous.
- 440 to 445 **SHALE**; dark grey to black, blocky, common disseminated pyrite, occasional siliceous and chert specks, (radiolarian? secondary silica replacement of fossil?) very hard, carbonaceous to petroliferous, non calcareous.
- 445 to 453 **SHALE**; dark grey, black, dark grey brown, earthy and dull texture, common disseminated pyrite, laminated due to pyrite, carbonaceous and petroliferous in part, rare micro fractures with calcite crystal infill, rare pyrite blebs, hard, non calcareous.
- 453 to 454 **SILTSTONE**; light grey, very argillaceous and clayey matrix and cement, sandy, siliceous, minor coal micro fragments, dense, hard, **tight**.
- 454 to 455 **SANDSTONE**; clear, translucent, medium grained, well sorted, moderately consolidated, quartzose, clean, siliceous cement in part to kaolinitic cement in part, 12% porosity, no shows, associated with medium grey brown dolomite laminae, common pyrite blebs.
- 455 to 456 **CLAYSTONE**; off white to light grey, speck, kaolinitic, soft, common shale and sand partings, dense, **tight**.
- 456 to 460 **SHALE**; dark grey to black, blocky, carbonaceous in part, petroliferous, common disseminated pyrite, hard, non calcareous.
- 460 to 465 **SHALE**; dark grey and grey brown, earthy texture, petroliferous, common disseminated pyrite, hard, non calcareous, occasional pyrite nodules and large calcite crystals (fractures).
- 465 to 470 **SHALE**; as above, dark grey and grey brown, earthy texture, petroliferous, common disseminated pyrite, hard, non calcareous, common transparent and white calcite crystals and common pyrite nodules, (fractures).
- 470 to 475 **SHALE**; dark grey and grey brown, earthy texture, petroliferous, occasional disseminated pyrite, hard, non calcareous, decrease in pyrite and calcite.
- 475 to 486 **SHALE**; dark grey to black, blocky, carbonaceous, petroliferous, common disseminated pyrite, occasional horizontal bands of pyrite, hard, non calcareous, trace micro fractures with calcite infill.
- 486 to 494 **CLAYSTONE**; light to medium grey, mottled, argillaceous laminae, banded with light and dark clay, common disseminated pyrite, occasional black coal partings, soft, dense, **tight**, non calcareous, becoming darker with depth and grading to shale.

- 494 to 498 **SHALE**; dark grey to black, blocky, carbonaceous, petroliiferous, moderately firm to hard, non calcareous.

TOP OF HUME 498 m

- 498 to 500 **SHALE**; as above, dark grey to black, blocky, carbonaceous, petroliiferous, moderately firm to hard, non calcareous, with stringers of interbedded limestone; bioclastic in part, Gastropod, brachiopod, crinoid fragments, argillaceous, dirty, also fine crystalline, white and medium brown, crystalline texture, vitreous, clean, well indurated, **tight**.
- 500 to 502 **LIMESTONE**; white, clear, buff, medium brown, medium grey brown, mottled in part, massive texture, crystalline texture in part, vitreous in part, calcilutite, occasional sparry calcite, argillaceous laminae to very clean, common brachiopod fossil fragments, cryptocrystalline, well indurated, **tight**.
- 502 to 506 **SHALE**; medium grey green, platy, clayey, no silt or sand, calcareous, marly, moderately firm, disseminated pyrite.
- 506 to 510 **LIMESTONE**; occasional translucent, buff, medium brown, medium grey brown, chalky texture in part, crystalline in part, earthy to vitreous, cryptocrystalline to microcrystalline, calcilutite, clean to argillaceous, well indurated, dense, **tight**, brachiopod and crinoid fragments, trace slickensides, minor shale stringers, as above.
- 510 to 515 **LIMESTONE**; off white, buff, medium brown, vitreous in part to earthy, crystalline to chalky texture, clean calcilutite, cryptocrystalline to microcrystalline, occasional fossil fragments of brachiopod, minor bioclastic stringers, minor very fine crystalline grainy stringers, well indurated, **tight, no shows**.
- 515 to 520 **SHALE**; medium grey green, sub platy, sub blocky, calcareous, occasional crinoid fragments, disseminated pyrite, moderately firm.
- 520 to 527 **SHALE**; medium grey green with brown cast, sub platy, sub blocky in part, greasy texture, calcareous, disseminated pyrite, moderately firm.
- 527 to 530 **LIMESTONE**; buff, medium brown, crystalline texture, mottled in part, trace of brachiopod fossil fragments, slightly argillaceous calcilutite, cryptocrystalline, well indurated, **tight**.
- 530 to 535 **LIMESTONE**; medium brown, medium grey brown, mottled, massive texture, cryptocrystalline, argillaceous calcilutite, minor micro fossil fragments unidentifiable, well indurated, trace black bitumen in associated with calcite crystals (fractures) and scattered black bituminous spots (porosity infill?), **tight, no shows**.
- 535 to 540 **LIMESTONE**; medium brown and grey brown, mottled in part, massive texture, cryptocrystalline, argillaceous calcilutite, occasional argillaceous and shale partings, minor unidentifiable fossil fragments, well indurated, dense, **tight, no shows**.

- 540 to 548 **LIMESTONE**; medium to dark brown, mottled in part, massive texture, crystalline texture in part, argillaceous calcilutite, well indurated, increase in secondary limestone and calcite infill in minor fractures with bitumen and bituminous shale coating along with disseminated pyrite, **tight, no shows.**
- 548 to 555 **SHALE**; medium grey, medium grey green, sub platy, marly, calcareous, disseminated pyrite and pyrite cubes, moderately firm.
- 555 to 560 **LIMESTONE**; medium brown, dark brown, mottled in part, occasionally vitreous, massive and crystalline texture, cryptocrystalline, clean to argillaceous calcilutite, occasional carbonaceous and bitumen shale stringers, minor fractures with white sparry calcite infill and bituminous shale coatings, rare pyritic fracture infill, well indurated, **tight.**
- 560 to 565 **LIMESTONE**; predominantly as above, medium brown, dark brown, mottled in part, occasionally vitreous, massive and crystalline texture, cryptocrystalline, clean to argillaceous calcilutite, common bitumen shale infill in minor fractures with white sparry calcite, rare Ostracods and brachiopod fossil fragments, well indurated, **tight.**
- 565 to 569 **LIMESTONE**; 60% medium grey brown and medium brown, mottled, cryptocrystalline, massive texture, bioclastic stringers with argillaceous secondary limestone and calcite infill in fractures and porosity spaces, clean in part grading to argillaceous calcilutite, disseminated pyrite, well indurated, **tight, marly;**
- SHALE**; 40% medium grey green, sub platy, calcareous, unidentifiable fossil fragments, disseminated pyrite, grading to marlstone in part, moderately firm.
- 569 to 575 **SHALE WITH LIMESTONE STRINGERS:**
- SHALE**; medium grey green, sub platy, sub blocky in part, disseminated pyrite, rare unidentifiable fossil fragments, calcareous, moderately firm;
- LIMESTONE**; stringers, buff, off white, medium brown, mottled, cryptocrystalline, massive to crystalline texture in part, clean calcilutite, disseminated pyrite and pyrite replacement of fossil fragments, trace crinoid fragments, well indurated, **tight.**
- 575 to 586 **SHALE**; as above, medium grey green, sub platy, sub blocky in part, disseminated pyrite, calcareous, moderately firm;
- LIMESTONE** stringers, off white, medium to light grey and grey brown, crystalline texture, common calcite crystal and pyrite infill in fractures and pore spaces, chalky texture in part and soft, cryptocrystalline, calcilutite, wind, **tight.**

TOP OF GOSSAGE 586 m

- 586 to 590 **LIMESTONE**; medium brown to medium grey brown, dark brown, crystalline texture, cryptocrystalline, calcilutite, dense, well indurated, tight, stringers of off white to buff limestone, pelletal with secondary limestone cement, well indurated, **tight**.
- 590 to 595 **LIMESTONE**; medium brown to grey brown, mottled, pelloidal, texture, secondary calcareous cement, clean grainstone to packstone, microcrystalline to very fine crystalline, occasional black shale coating on pellets, well indurated, dense, **tight**.
- 595 to 600 **LIMESTONE**, off white, medium brown and grey brown, mottled in part, occasional pelletal texture grading to crystalline texture in part, secondary calcareous cement, massive texture in part, clean calcilutite with stringers of packstone, rare ghost fossil fragments, well indurated, **tight**.
- 600 to 605 **LIMESTONE**; off white, medium brown, massive texture, crystalline texture, cryptocrystalline, clean calcilutite, occasional micro fractures infilled with limestone breccia calcite crystals and black dead bitumen, 3% fracture porosity, no permeability, well indurated, very hard, **tight**.
- 605 to 610 **LIMESTONE**; off white, medium brown to dark brown, massive texture, crystalline texture, cryptocrystalline, clean calcilutite, common micro fractures pore spaces and fossil fragments replacement with calcite crystals and black bitumen, 3% porosity, no permeability well indurated, very hard, **tight**.
- 610 to 615 **LIMESTONE**; light to medium brown and grey brown, massive and crystalline texture, cryptocrystalline to microcrystalline in part, clean calcilutite grading to clean calcisiltite, occasional white sparry calcite crystals, very well indurated, very hard, **tight**.
- 615 to 620 **LIMESTONE**; medium brown to grey brown, massive and crystalline texture, cryptocrystalline, clean calcilutite, well indurated, trace of white secondary limestone in minor pore space and rare micro fractures, **tight**, occasional shale stringers, dark grey to black, very carbonaceous, calcareous.
- 620 to 625 **LIMESTONE**; light to medium brown and grey brown, dull, massive and crystalline texture, cryptocrystalline, clean calcilutite, trace stylolite, trace micro fractures infilled with calcite and carbonaceous shale mix, well indurated, stringers of micro sucrosic texture limestone, microcrystalline, slightly argillaceous calcisiltite, calcareous cement, well indurated, **tight**.
- 625 to 630 **LIMESTONE**; off white, light to medium brown and grey brown, dull, massive to crystalline to micro sucrosic texture, cryptocrystalline to microcrystalline, clean calcilutite to clean packstone, occasionally mottled, translucent secondary calcite crystal infill in pore spaces, predominantly well indurated, **tight**, trace shale stringers, grey green, calcareous, disseminated pyrite.

- 630 to 635 **LIMESTONE**; off white, light to medium brown and grey brown, dull, massive and crystalline texture, cryptocrystalline, clean calcilutite, rare stringers of pelloidal limestone, calcareous cement, well indurated, **tight**.
- 635 to 640 **LIMESTONE**; light to medium brown and grey brown, dull, massive and crystalline texture, cryptocrystalline, clean calcilutite, increase in pelloidal limestone, mottled, cryptocrystalline to microcrystalline, clean calcisiltite to clean packstone, well cemented with calcareous cement, dense, **tight**, rare micro fractures infilled with carbonaceous shale, shale, stringers, dark grey to black, carbonaceous, bituminous, calcareous.
- 640 to 645 **LIMESTONE**; off white, light to medium brown, mottled, light grey, massive and crystalline texture, cryptocrystalline, clean calcilutite, stringers of pelloidal limestone as above, but not common, trace disseminated pyrite and minor micro fractures infilled with carbonaceous shale, well indurated, **tight**.
- 645 to 650 **LIMESTONE**; light to medium brown and grey brown, dark brown in part, pelloidal texture, occasionally crystalline and massive texture, clean calcilutite to slightly argillaceous calcisiltite, calcareous cement, increase in micro fractures infilled with carbonaceous shale and carbonaceous shale grain coating, very well indurated, **tight**, trace shale stringers, black, carbonaceous, calcareous.
- 650 to 653 **DOLOMITE**; medium brown, vitreous, micro sucrosic texture, clean grainstone, moderately indurated, 5% intercrystalline porosity, low permeability, trace of light blue blooming cut fluorescence (gas?) no visible dry fluorescence.
- 653 to 660 **LIMESTONE**; light to medium brown and grey brown, mottled, pelloidal texture in part, massive and crystalline texture in part, calcilutite, calcareous cement, increase in micro fractures with translucent sparry calcite infill, well indurated, **tight**.
- 660 to 665 **LIMESTONE**; medium brown to grey brown, mottled, pelloidal texture, cryptocrystalline, clean calcilutite to clean packstone, calcareous cement, slightly argillaceous in part, well indurated, dense, **tight**.
- 665 to 670 **LIMESTONE**; light to medium brown and grey brown, mottled, microcrystalline to cryptocrystalline, clean packstone, calcareous cement, slightly argillaceous in part, trace black carbonaceous shale coating in micro fractures, well indurated, **tight**, rare dolomite stringers, medium grey, micro sucrosic texture, dolomitic cement, clean packstone, **tight**.
- 670 to 675 **LIMESTONE**; medium brown, cryptocrystalline, clean packstone, pelloidal texture, occasional massive and crystalline texture, rare carbonaceous shale infill in minor pore spaces and stylolite, trace calcite crystals and secondary limestone cement in pore space, well indurated, **tight**.

- 675 to 680 **LIMESTONE**; off white, light to medium brown, dark brown in part, mottled, massive and crystalline texture, rare pelloidal texture, clean calcilutite, well indurated, **tight**, trace dolomite; stringers, light brown, micro sucrosic texture, clean calcisiltite, dolomitic cement, rare secondary calcareous cement and infill in minor pores, 3% porosity, no permeability, no shows.
- 680 to 685 **LIMESTONE**; off white, medium brown and grey brown, massive and crystalline texture, occasionally pelletoidal texture with minor pelloidal stringers, clean calcilutite, well indurated, common carbonaceous shale infill in minor fractures, dense, **tight**.
- 685 to 690 **LIMESTONE**; off white, medium to dark brown and grey brown, mottled, pelletoidal texture, rare massive texture, calcareous cement with occasional microcrystalline dolomite rhombs, clean to argillaceous calcisiltite, large white to transparent sparry calcite crystal infill in fractures with carbonaceous shale coating, trace of limestone, very argillaceous, grading to calcareous shale.
- 690 to 696 **LIMESTONE**; off white, medium brown to grey brown, mottled, predominantly pelletoidal texture, calcareous cement, occasional scattered dolomite rhombs and minor dolomite laminae, clean to argillaceous calcisiltite, common carbonaceous shale coating, well indurated, **tight**, shale stringers, dark grey, carbonaceous, calcareous, grading to argillaceous limestone in part.
- 696 to 700 **LIMESTONE**; off white, chalky, cryptocrystalline, soft, also medium brown to grey brown, mottled, pelletoidal in part to massive and crystalline texture, clean calcilutite, occasional dolomite rhombs, becoming argillaceous in part, well indurated, dense, **tight**.
- 700 to 710 **LIMESTONE**; off white, light to medium brown and grey brown, light grey, mottled, predominantly pelletoidal texture, clean calcilutite, occasional dolomite rhombs, very fine pellets with calcareous cement, occasional carbonaceous shale coating, moderately indurated, **tight**.
- 710 to 715 **LIMESTONE**; off white, semi pelloidal texture, chalky and occasionally crystalline texture, medium brown and grey brown, predominantly pelloidal texture, cryptocrystalline, clean calcisiltite, well indurated in part to moderately indurated and soft in part, **predominantly tight**.
- 715 to 720 **LIMESTONE**; off white, cream, very light grey, pelletoidal texture throughout, calcareous cement, very clean calcisiltite, occasional calcite crystal infill in minor fractures, rare carbonaceous shale infill in minor fractures, rare carbonaceous shale infill, moderately indurated to soft, **tight**.
- 720 to 725 **LIMESTONE**; off white, light brown, light grey, pelletoidal texture in part, massive texture in part, cryptocrystalline, clean calcilutite to clean calcisiltite, occasional chalky texture, calcareous cement, moderately indurated and soft to well indurated, dense, **tight**;

SHALE: stringers, light grey to grey green, pyritic, calcareous, grading to light grey argillaceous limestone in part.

- 725 to 740 **LIMESTONE;** light to medium brown and grey brown, indurated, predominantly pelletoidal texture with interbeds of massive texture, cryptocrystalline, clean calcilutite to clean calcisiltite, rare Ostracods, rare calcite crystals and rare bituminous shale infill in minor fractures, moderately to well indurated, **tight**.
- 740 to 745 **LIMESTONE;** medium grey brown to medium grey, massive texture, cryptocrystalline, slightly argillaceous calcilutite, not as clean as above, moderately indurated, rare calcite crystals, **tight**;
- SHALE:** stringers, medium grey to medium grey green, pyritic, calcareous.
- 745 to 750 **LIMESTONE;** off white, light brown to grey brown, pelloidal texture in part, massive texture in part, cryptocrystalline, clean calcilutite to clean calcisiltite, scattered dolomite rhombs throughout, occasional dolomite rhomb crystals in minor fractures, calcite crystal infill and bituminous shale coating in minor fractures, well indurated, **tight**.
- 750 to 755 **DOLOMITE;** white, buff to medium brown, vitreous, cryptocrystalline to fine crystalline in part, sucrosic to grainy texture, clean grainstone, well developed dolomite rhombs in part with black bituminous shale coating rhombs, well cemented with dolomite cement, **patchy micro vuggy porosity 3 to 7%, no shows, low to moderate permeability**.
- 755 to 765 **LIMESTONE;** cream, light grey, light brown to dark brown, predominantly pelloidal texture, cryptocrystalline to microcrystalline, clean calcilutite to clean calcisiltite, well cemented with calcareous cement, no visible dolomite rhombs, moderately to well indurated, **tight**, trace shale stringers, light green, pyritic, calcareous.
- 765 to 770 **LIMESTONE;** cream, light grey and grey brown to medium brown, predominantly pelletoidal texture to sub pelloidal (breccia in part), cryptocrystalline, clean calcilutite to clean calcisiltite, well cemented with calcareous cement, no visible dolomite rhombs, moderately to well indurated, **tight**.
- 770 to 775 **LIMESTONE;** cream to off white, chalky texture, massive, clean calcilutite, soft, also light grey to grey brown, pelletoidal to crystalline texture, cryptocrystalline, clean calcilutite, well cemented with calcareous cement, no visible dolomite rhombs, moderately to well indurated, **tight**, trace shale; stringers, dark green, pyritic, calcareous.
- 775 to 780 **LIMESTONE;** cream, light to medium brown and grey brown, predominantly pelletoidal and sub pelletoidal texture grading to crystalline texture in part, clean calcilutite to clean calcisiltite, trace carbonaceous shale and calcite crystals in minor micro fractures, moderately to well indurated, **tight**, trace shale stringers, apple green, pyritic, calcareous, also black, carbonaceous to bituminous, calcareous.

- 780 to 784 **LIMESTONE**: off white to cream, light buff, predominantly massive and crystalline texture, rare pelletoidal texture, very clean calcilutite, well cemented with calcareous cement, **tight**, dolomite stringers, dark brown and dark grey brown, vitreous, cryptocrystalline, clean calcilutite, predominantly dolomitic cement with rare patchy calcareous cement, well indurated, hard, **tight**.

TOP OF LONE MOUNTAIN 784 m

- 784 to 790 **DOLOMITE**: medium brown to grey brown, vitreous, microcrystalline, clean packstone, well cemented with dolomite cement and rare calcareous cement, well indurated, **tight**, 20% white to translucent calcite crystals, large fracture.
- 790 to 792 **LIMESTONE**: cream to light buff, light to medium brown, massive and crystalline texture, rare pelletoidal texture, clean calcilutite, well cemented with calcareous cement and rare dolomite rhombs, well indurated, **tight**.
- 792 to 793 **DOLOMITE**: as above, medium brown to grey brown, vitreous, microcrystalline, clean packstone, well cemented with dolomite cement and rare calcareous cement, well indurated, **tight**.
- 793 to 798 **LIMESTONE**: cream to light buff, cryptocrystalline, massive and crystalline texture, clean calcilutite, well cemented with calcareous cement, very rare dolomite rhombs, common white to translucent sparry calcite crystals in large fracture, well indurated, **tight**.
- 798 to 799 **DOLOMITE**: white, very light buff, cryptocrystalline to microcrystalline, micro sucrosic, clean packstone, well indurated, **tight**.
- 799 to 807 **LIMESTONE**: cream, light buff, pearly, massive to crystalline texture, occasional pelloid texture, very clean calcilutite to clean calcisiltite, well cemented with calcareous cement, no visible dolomite, well indurated to moderately indurated, **tight**.
- 807 to 808 **DOLOMITE**: light brown to grey brown, vitreous to dull, very fine to fine crystalline, sucrosic to grainy texture, clean packstone, dolomitic and calcareous cement, well cemented, 3 to 5% intercrystalline porosity, **no shows**.
- 808 to 811 **LIMESTONE**: cream, light brown to medium brown, pearly in part, massive to crystalline texture, common pelletoidal texture, well cemented with calcareous cement, very clean, well indurated, **tight**, trace of apple green shale.
- 811 to 818 **DOLOMITE**: medium brown and grey brown, dull to vitreous in part, microcrystalline, occasionally macro crystalline, micro sucrosic texture in part, predominantly crystalline texture, clean packstone, well cemented with dolomitic cement, rare calcareous cement, common to abundant (30%) white and translucent sparry calcite crystals, large fracture, occasional micro vuggy porosity, 10% fracture porosity, **no shows**, trace apple green shale.

- 818 to 826 **LIMESTONE**; cream, light buff to medium brown, cryptocrystalline and massive texture, crystalline texture, clean calcilutite, well cemented with calcareous cement, well indurated, dense, **tight**, dolomite stringers, white to light buff, very fine to fine crystalline with well developed dolomite rhombs, well cemented in part with dolomitic and calcareous cement, **5% intercrystalline porosity, clean packstone, no shows.**
- 826 to 831 **DOLOMITE**; off white, light grey and grey brown, vitreous, sucrosic and grainy texture, clean grainstone and packstone, well cemented in part with dolomitic cement, very rare calcareous cement, trace of micro vuggy porosity but not common, rare bituminous shale infill in some pore space, abundant (20%) white and translucent sparry calcite crystals, **10% fracture porosity, large open fracture.**
- 831 to 835 **DOLOMITE**; medium to dark brown to black, vitreous, cryptocrystalline in dark brown and black with very fine to fine crystalline in medium brown, grainstone to packstone, common (10%) bituminous shale infill in pore space, common white calcite crystals in micro fractures, common secondary white dolomite rhombs in pore space, **stringers of 10% micro vuggy and fracture porosity but also tight, no shows.**
- 835 to 840 **DOLOMITE**; light buff to medium brown, vitreous, cryptocrystalline with stringers of very fine crystalline, crystalline texture to micro sucrosic and grainy, clean packstone to grainstone, well cemented in part with dolomitic cement and rare calcareous cement, well indurated and tight, very fine crystalline stringers with **trace of micro vuggy porosity 5% but low permeability**, also dark brown stringers with very fine crystalline and grainy texture, argillaceous grainstone with common bituminous shale infill and crystal coating, dolomitic cement with rare calcareous cement and pyritic cubes, **5 to 7% intercrystalline and micro vuggy porosity**, common white to translucent calcite crystals in micro fractures.
- 840 to 845 **DOLOMITE**; buff to light to medium brown with stringers of dark brown, predominantly microcrystalline with rare macro crystalline to very fine crystalline, clean packstone to clean calcisiltite, well cemented with dolomitic cement, occasional argillaceous streaky and rare bituminous shale infill, occasional white sparry calcite crystal infill in micro fractures, **scattered 3 to 5% intercrystalline and rare micro vuggy porosity, no shows.**
- 845 to 850 **DOLOMITE**; medium brown, vitreous, predominantly sucrosic and grainy texture with stringers of crystalline texture, very fine to fine crystalline with microcrystalline and macro crystalline stringers, clean grainstone to clean packstone, rare argillaceous streaky, rare sparry calcite crystals, **stringers of 8% micro vuggy and pinpoint porosity with good permeability** interbedded with well cemented tight stringers, **no shows.**
- 850 to 855 **DOLOMITE**; buff to light brown, vitreous, microcrystalline with rare macro crystalline, clean packstone to argillaceous packstone stringers, crystalline texture, common stringers of dark brown dolomite well cemented with dolomitic cement and rare calcareous cement, moderately indurated throughout, **3 to 5% intercrystalline porosity to tight, no shows.**

- 855 to 860 **DOLOMITE**; medium brown and dark brown, vitreous, microcrystalline to macro crystalline, micro sucrosic and crystalline texture, clean packstone, well cemented with dolomitic cement, common argillaceous stringers, common white calcite crystal infill in micro fractures, well indurated, dense, **tight**.
- 860 to 868 **DOLOMITE**; medium brown with dark brown stringers, vitreous, cryptocrystalline to microcrystalline to macro crystalline, clean packstone, well cemented with dolomitic cement, occasional bituminous shale infill in pore spaces, white calcareous and pyritic infill in micro fractures, well indurated, **tight "ghost" pelletoidal texture**.
- 868 to 874 **DOLOMITE**; medium to dark brown, vitreous, mottled in part, cryptocrystalline to microcrystalline, crystalline texture, clean calcilutite, well cemented with dolomitic cement, **scattered micro vuggy and pinpoint porosity of 3%, no permeability**, common white calcite crystals dolomitic in part infill in micro fractures.
- 874 to 880 **DOLOMITE**; medium to dark brown to black, vitreous, mottled in part, cryptocrystalline to microcrystalline, crystalline texture and massive texture, clean calcilutite, well cemented with dolomitic cement, common white calcite crystal dolomitic in part infill in minor fractures and stress fractures, well indurated, dense, **tight**, shale stringers, black, dolomitic, calcareous, very hard, grading to shaly limestone.
- 880 to 885 **LIMESTONE**; dark brown to black, pearly to dull, cryptocrystalline, argillaceous calcilutite, crystalline and massive texture, light brown dolomitic stringers in part, well cemented with calcareous cement, very well indurated, trace crinoid fragments, **tight**.
- 885 to 890 **LIMESTONE**; light brown, predominantly dark brown to black, massive and crystalline texture, rare pelletoidal texture, argillaceous calcilutite, well cemented with calcareous cement, stringers of cryptocrystalline dark brown dolomite, well indurated, dense, **tight**, shale stringers black, bituminous in part, calcareous.
- 890 to 895 **LIMESTONE**; cream and buff to medium and dark brown, dull to pearly, cryptocrystalline, clean calcilutite to wackestone?, nodular and lumpy texture in part, trace lineation of limestone pellets, rare dolomitic stringers grading to limy dolomite, trace unidentifiable fossil fragments, common white calcite crystal infill in micro fractures, well indurated, hard, **tight**.
- 895 to 900 **LIMESTONE**; cream to buff and light brown, dull to pearly, cryptocrystalline, massive and crystalline texture, clean calcilutite, well indurated, occasional white calcite crystal infill, hard, **tight**, dolomite stringers, dark brown to black, vitreous in part, microcrystalline to macro crystalline, micro sucrosic texture and grainy texture in part, well cemented with dolomitic cement and common calcareous cement in part, irregular calcite crystals, hard, **tight**.

- 900 to 905 **LIMESTONE**; cream, medium to dark brown, dull, pearly, cryptocrystalline to microcrystalline, massive texture, rare pelloidal texture, calcilutite to packstone, well cemented with calcareous cement and abundant macro to very fine crystalline dolomite rhombs, well dolomitize, well indurated, crinoid fragments, fossil casts, abundant particulate material, **tight**, dolomite stringers, dark brown to black, vitreous, microcrystalline, micro sucrosic and grainy texture, packstone, well cemented with minor calcareous and dolomitic cement, very well indurated, **tight**.
- 905 to 910 **LIMESTONE**; cream, medium brown to dark brown, dull, pearly, cryptocrystalline, massive texture, calcilutite, well cemented with calcareous cement, rare dolomite rhombs and laminae, trace brachiopod and crinoid fragments, well indurated, common stress fractures, **tight**, dolomite stringers, as above.
- 910 to 915 **LIMESTONE**; light chalky grey brown, predominantly dark brown to black, lithographic in part, cryptocrystalline, crystalline and massive texture, clean calcilutite, trace gastropod and crinoid fragments, rare dolomite rhombs, argillaceous in part, well indurated, **tight**, trace shale stringers, black, carbonaceous, calcareous.
- 915 to 920 **LIMESTONE**; light grey brown to dark brown and black, occasionally lithographic, cryptocrystalline in part, mottled, clean calcilutite with stringers of bioclastic crinoid packstone, common crinoid fragments, well cemented with calcareous cement, rare dolomitic rhombs, occasional dolomite laminae with calcareous cement, well indurated, **tight**, common shale stringers, black, carbonaceous, calcareous.
- 920 to 925 **LIMESTONE**; light buff to medium brown, dull to pearly, cryptocrystalline, nodular and lumpy texture in part cemented with microcrystalline dolomite, mottled, lithographic in part, clean packstone to clean calcilutite, calcareous cement, stringers of dolomitic cement, silicified calcite laminae, well indurated, **tight**.
- 925 to 930 **LIMESTONE**; light buff to cream and light grey, chalky texture, dull, cryptocrystalline, soft calcilutite, also dark brown, crystalline texture, cryptocrystalline, clean calcilutite, well cemented with calcareous cement, minor stringers of macro crystalline dolomite with calcareous cement, common bituminous shale infill in micro fractures, algae?, well indurated, **tight**, minor shale stringers black, calcareous.
- 930 to 935 **LIMESTONE**; light buff and cream, chalky, cryptocrystalline, soft calcilutite grading to medium brown, mottled, crystalline texture, clean calcilutite, well cemented with calcareous cement and occasional scattered dolomite rhombs and laminae, black carbonaceous shale infill with calcite crystals and dolomite rhombs, well indurated, **tight**.
- 935 to 940 **LIMESTONE**; light buff to medium brown, dull to vitreous in part, cryptocrystalline, crystalline texture in part, clean calcilutite, well cemented with calcareous cement, increase in white calcite crystals due to micro fractures, well indurated, **tight**, dolomite stringers (10%) dark brown to black, shaly and carbonaceous, vitreous, macro crystalline to very fine crystalline, calcareous and dolomitic cement, well indurated, **tight**.

- 940 to 945 **LIMESTONE**; light buff to cream chalky, dull, cryptocrystalline clean calcilutite, well cemented with calcareous cement, rare stringers of macro to very fine crystalline dolomite with dolomitic and calcareous cement, moderately indurated, **tight**.
- 945 to 949 **LIMESTONE**; cream to light buff to light to medium brown, pearly, dull in part, chalky to crystalline texture, clean calcilutite, mottled in part, well cemented with calcareous cement and scattered macro to very fine dolomite rhombs, rare stringers of dolomite with bituminous shale matrix and calcareous cement infill in minor fractures, well indurated, trace algae?, **tight**.

TOP OF BEAR ROCK 949 m

- 949 to 959 **DOLOMITE**; medium brown, vitreous, cryptocrystalline to microcrystalline, very rare very fine crystalline, crystalline texture to micro sucrosic in part, well cemented with dolomitic cement and rare calcareous cement, clean calcisiltite to packstone, stringers of argillaceous dolomite grading to shale, well indurated, **tight to 3 to 5% intercrystalline porosity**.
- 959 to 962 **LIMESTONE**; white, cream, mottled brown, dull to pearly, cryptocrystalline, very clean calcilutite, rare pelletoidal texture, massive texture throughout, well cemented with calcareous cement, no visible dolomite rhombs, trace Ostracods, well indurated, **tight**.
- 962 to 964 **DOLOMITE**; buff, off white, vitreous, microcrystalline to very fine crystalline, very clean packstone, dolomitic cement, no visible calcareous cement, sucrosic to crystalline texture, **5 to 7% micro vuggy and intercrystalline porosity, no shows or permeability**.
- 964 to 966 **LIMESTONE**; white, cream, mottled brown, dull to pearly, cryptocrystalline, very clean calcilutite, rare pelletoidal texture, massive texture throughout, well cemented with calcareous cement, no visible dolomite rhombs, **tight**.
- 966 to 971 **DOLOMITE**; predominantly medium brown, vitreous, microcrystalline to macro crystalline, crystalline to micro sucrosic texture, well cemented with dolomitic cement, occasional calcareous cement grading to minor stringers of limestone with dolomitic cement, rare bituminous shale infill in micro fractures, rare calcite crystal infill in fractures, moderately to well indurated, **tight**.
- 971 to 973 **LIMESTONE**; light buff to light to medium brown, mottled, pearly to dull, crystalline texture, rare chalky texture, clean calcilutite, well cemented with calcareous cement and common dolomite rhombs, well indurated, **tight**.
- 973 to 980 **DOLOMITE**; medium to dark brown, vitreous, cryptocrystalline to microcrystalline to rare macro crystalline, crystalline texture to micro sucrosic texture in part, clean packstone, well cemented with dolomitic cement and common calcareous cement blebs, occasional bituminous infill, well indurated, **tight**.

- 980 to 985 **DOLOMITE**; medium to light brown, vitreous, microcrystalline to stringers of very fine and fine crystalline, micro sucrosic to grainy texture, very clean packstone, predominantly well indurated and **tight**, stringers of **micro vuggy porosity** moderately to poorly cemented with dolomitic and calcareous cement, **12% porosity, no shows**.
- 985 to 991 **DOLOMITE**; light to medium brown and grey brown, vitreous, microcrystalline to macro crystalline, micro sucrosic texture to crystalline texture, clean packstone, well cemented with dolomitic cement and occasional calcareous cement grading to rare limestone stringers with dolomitic cement, occasional white calcite crystal infill in micro fractures, well indurated, **tight**.
- 991 to 992 **LIMESTONE**; white to very light grey, dull, chalky, clean calcilutite, massive with rare crystalline texture, moderately indurated, soft, **tight**.
- 992 to 994 **DOLOMITE**; as above, light to medium brown and grey brown, vitreous, microcrystalline to macro crystalline, micro sucrosic texture to crystalline texture, clean packstone, well cemented with dolomitic cement and occasional calcareous cement grading to rare limestone stringers with dolomitic cement, occasional white calcite crystal infill in micro fractures, well indurated, **tight**.
- 994 to 995 **LIMESTONE**; as above, white to very light grey, dull, chalky, clean calcilutite, massive with rare crystalline texture, moderately indurated, soft, **tight**.
- 995 to 1000 **DOLOMITE**; light to medium brown, vitreous, predominantly microcrystalline and cryptocrystalline with rare very fine crystalline, crystalline texture, clean packstone, well cemented with dolomitic cement and common (20%) calcareous cement, rare white calcite crystal infill in minor fractures, well indurated, **tight**.
- 1000 to 1005 **DOLOMITE**; as above light to medium brown, vitreous, predominantly microcrystalline and cryptocrystalline with rare very fine crystalline, crystalline texture, clean packstone, well cemented with dolomitic cement and common (20%) calcareous cement, rare white calcite crystal infill in minor fractures, well indurated, **tight**, limestone stringers light grey brown, mottled, dull to pearly, cryptocrystalline, clean calcilutite, well cemented with calcareous cement but common to abundant dolomite rhombs, well indurated, **tight**.
- 1005 to 1010 **DOLOMITE**; buff to light to medium brown, vitreous, cryptocrystalline to microcrystalline, clean packstone, well cemented with dolomitic cement, occasional to common calcareous cement, occasional stringers becoming slightly argillaceous, stringers of white cryptocrystalline dolomite, well indurated, **tight**, trace shale laminae, grey green, pyritic.
- 1010 to 1016 **DOLOMITE**; light to medium brown, mottled with white, occasional cryptocrystalline, predominantly microcrystalline to very fine crystalline, micro sucrosic texture to grainy texture, well cemented with dolomitic cement, rare calcareous cement, clean packstone to grainstone, common white calcite crystals, **8 to 10% micro vuggy pinpoint and intercrystalline porosity, no shows**.

NOTE; Due to lost circulate the samples from 1015 to 1060 were caught from the mud tanks and are of very poor quality.

- 1016 to 1019 **DOLOMITE**; light to medium brown, mottled with white, vitreous, occasionally cryptocrystalline, predominantly microcrystalline to very fine crystalline, micro sucrosic to grainy texture, well cemented with dolomite cement and occasional calcareous cement, clean packstone, well indurated, **tight**.
- 1019 to 1023 **DOLOMITE**; dark brown, vitreous, very fine to fine crystalline dolomite rhombs, packstone, grainy texture, grain supported with dolomite cement in part, common black dead bituminous infill, abundant white calcite crystal infill, 20% porosity in micro vuggy dolomite, open fracture, **no shows, no gas**.
- 1023 to 1024 **DOLOMITE**; medium brown, vitreous, cryptocrystalline, clean calcilutite, well cemented, crystalline texture, very well indurated, hard, dense, **tight**.
- 1024 to 1025 **DOLOMITE**; as above, with fractures as above.
- 1025 to 1031 **DOLOMITE**; light to medium brown with stringers of dark brown to black, vitreous, cryptocrystalline to microcrystalline with occasional stringers of very fine crystal, clean packstone with stringers of argillaceous packstone, crystalline texture, well cemented with dolomite cement including very fine crystalline dolomite rhombs, well indurated, very hard, **tight**.
- 1031 to 1035 **DOLOMITE**; medium brown to dark brown, vitreous, cryptocrystalline to microcrystalline, crystalline texture, well cemented with dolomite cement, clean calcilutite becoming argillaceous in occasional stringers, wind, very hard, **tight**.
- 1035 to 1041 **DOLOMITE**; medium to dark brown, vitreous, cryptocrystalline to microcrystalline, crystalline texture, **tight**, stringers infill, rhombs growing cryptocrystalline to occasional fracture
 clean packstone, well cemented with dolomitic cement, well indurated, hard, of light brown cryptocrystalline dolomite with large calcite crystal fracture occasional calcite crystals with well developed very fine crystalline dolomite on crystal face, also frost with dolomite rhombs, stringers of white microcrystalline dolomite with argillaceous bituminous matrix, porosity, also occasional micro vuggy and pinpoint porosity 6%.

LOWER LONE MOUNTAIN 1041 m

- 1041 to 1045 **DOLOMITE**; medium brown, rare dark brown, cryptocrystalline to microcrystalline with rare very fine crystal, crystalline texture, clean packstone, well cemented with dolomitic cement, occasional white calcite crystals in fractures decreasing from above, well indurated, **tight**.

- 1045 to 1050 **DOLOMITE**; as above, medium brown, rare dark brown, cryptocrystalline to microcrystalline with rare very fine crystal, crystalline texture, clean packstone, well cemented with dolomitic cement, occasional white calcite crystals in fractures decreasing from above, well indurated, **tight**, shale stringers, medium grey to grey green, pyritic, dolomitic.
- 1050 to 1056 **DOLOMITE**; medium brown, occasional light to dark brown, cryptocrystalline to microcrystalline, vitreous, crystalline texture, clean packstone grading to argillaceous calcilutite, very well indurated, well cemented with dolomitic cement, hard, **tight**, occasional micro fractures with calcite dolomite crystal infill, shale stringers, light grey to light grey green, pyritic, dolomitic, fractures.
- 1056 to 1058 **DOLOMITE**; light grey to grey green, cryptocrystalline to microcrystalline, crystalline texture, well cemented, argillaceous calcilutite, very well indurated, **tight**.
- 1058 to 1062 **DOLOMITE**; pink, microcrystalline to very fine crystalline in part, vitreous, grainy texture to crystalline texture in part, clean packstone, well cemented, occasional pyrite blebs, dense, **tight**.
- 1062 to 1065 **DOLOMITE**; predominantly medium grey, white to medium brown in part, cryptocrystalline, vitreous, crystalline texture, clean packstone to argillaceous calcilutite, well cemented, well indurated, dense, **tight**, abundant LCM, poor sample.

TOP OF ORDOVICIAN 1065 m

- 1065 to 1068 **DOLOMITE**; white, translucent, cream in part, vitreous, cryptocrystalline to microcrystalline, crystalline texture, very clean packstone grading to clean calcilutite, well indurated, **tight**.
- 1068 to 1072 **DOLOMITE**; as above, white, translucent, cream in part, vitreous, cryptocrystalline to microcrystalline, crystalline texture, very clean packstone grading to clean calcilutite, well indurated, **tight** with stringers of dolomite, white, medium crystalline, vitreous, grainstone stringers, well developed dolomite rhombs cemented with dolomitic cement and black dead bitumen matrix, **10% micro vuggy and pinpoint porosity in streaky, no shows**.
- 1072 to 1075 **DOLOMITE**; white, light grey, vitreous, cryptocrystalline to microcrystalline in part, clean calcilutite, well cemented, very clean, common pyrite cubes, well indurated, **tight**.
- 1075 to 1080 **DOLOMITE**; white to cream, vitreous, cryptocrystalline, occasionally microcrystalline, crystalline texture, clean calcilutite, massive, occasional pyrite cubes and blebs, well cemented, **very hard and tight, no shows**, occasional dolomite stringers, light brown, microcrystalline to very fine crystalline, packstone, argillaceous and bituminous infill in pore space, **6% intercrystalline and micro vuggy porosity, no shows**.

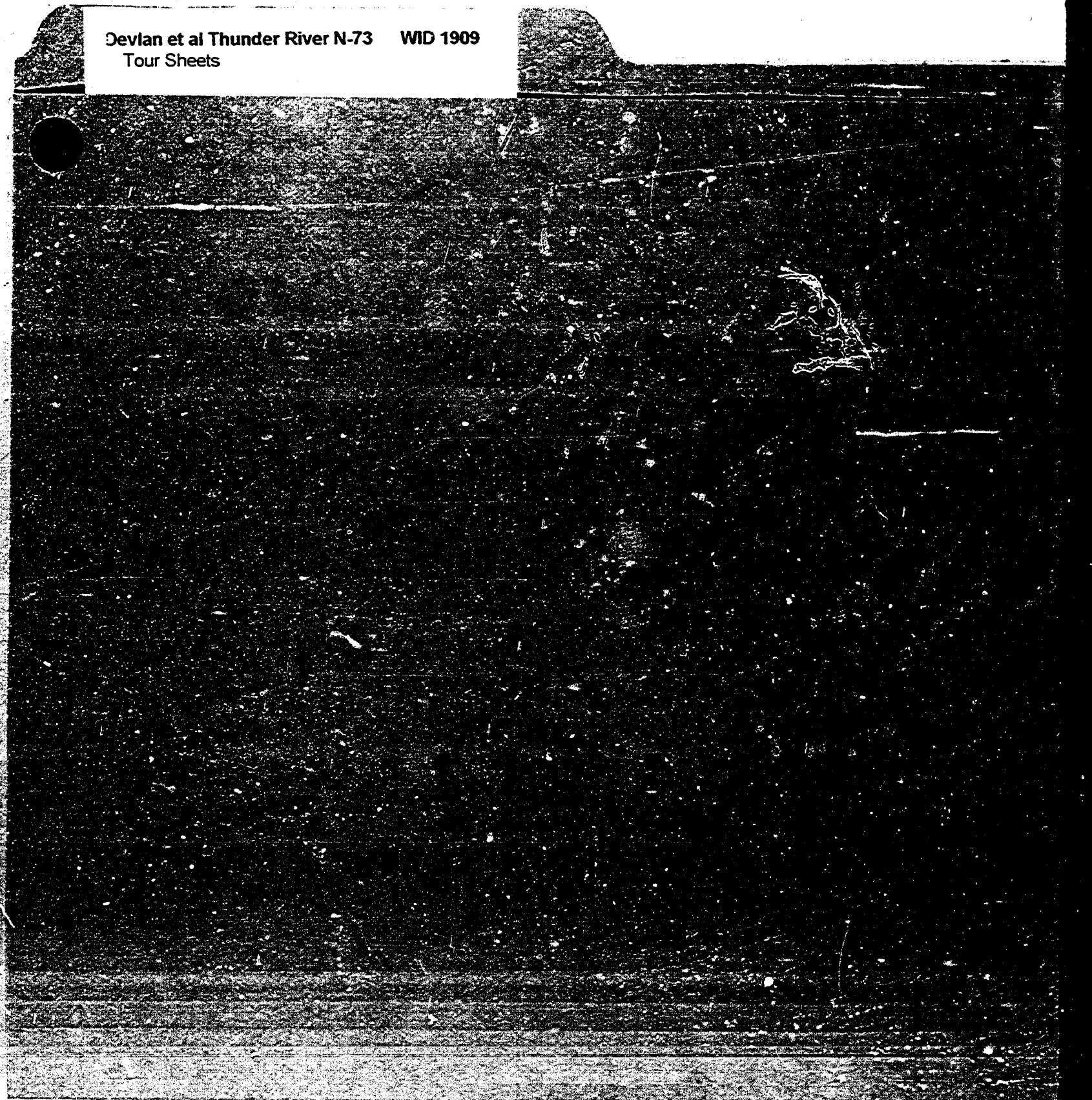
- 1080 to 1082 **DOLOMITE**; buff, light brown, vitreous, very fine crystalline to medium crystalline, well developed dolomite rhombs grading to deformed rhombs in part, clean packstone to grainstone cemented with dolomite cement and occasional calcareous cement and occasional bituminous infill, 8% **micro vuggy porosity but in streaky, low permeability, no shows.**
- 1082 to 1085 **DOLOMITE**; white, light grey, vitreous, cryptocrystalline, crystalline texture to massive, well cemented, clean calcilutite, disseminated pyrite and pyrite blebs, well indurated, **tight**, shale stringers, grey green, pyritic, dolomitic.
- 1085 to 1087 **DOLOMITE**; buff, light brown, vitreous, very fine crystalline to medium crystalline, well developed dolomite rhombs grading to deformed rhombs in part, clean packstone to grainstone cemented with dolomite cement and occasional calcareous cement and occasional bituminous infill, 8% **micro vuggy porosity but in streaky, low permeability, no shows.**
- 1087 to 1090 **DOLOMITE**; white, light grey, vitreous, cryptocrystalline, crystalline texture to massive, well cemented, clean calcilutite, disseminated pyrite and pyrite blebs, well indurated, **tight.**
- 1090 to 1095 **DOLOMITE**; white, vitreous, very fine crystalline to medium crystalline, clean packstone to grainstone, predominantly deformed dolomite rhombs, well cemented with dolomitic cement and rare calcareous cement, stringers of well developed dolomite rhombs with increased calcareous cement and dolomitic cement in part, **scattered micro vuggy and intercrystalline porosity 5%, no permeability**, well indurated, very clean.
- 1095 to 1100 **DOLOMITE**; white, vitreous, predominantly as above with increase in calcareous cement grading to stringers of limestone, buff, pearly, cryptocrystalline, clean calcilutite, common dolomitic cement and dolomite rhombs, **tight.**
- 1100 to 1105 **LIMESTONE**; white, buff, light grey, pearly, cryptocrystalline, crystalline to massive texture, clean calcilutite, well cemented with calcareous cement and common stringers of dolomite rhombs with calcareous cement, microcrystalline to medium crystalline dolomite rhombs scattered throughout, moderately indurated, very clean, **predominantly tight with scattered intercrystalline porosity due to dolomitize**, shale stringers, grey green, pyritic, dolomitic.
- 1105 to 1110 **LIMESTONE**; white, buff, light grey brown, stringers of medium brown, pearly, cryptocrystalline, crystalline texture to massive in part, rare chalky texture, well cemented, calcareous cement, rare dolomitize to nil, moderately well indurated, very clean calcilutite, **tight**, shale stringers, grey green, pyritic, dolomitic.
- 1110 to 1115 **LIMESTONE**; predominantly light grey to light grey green, rare buff and white, cryptocrystalline, crystalline and massive texture, well cemented with calcareous cement, well indurated, argillaceous calcilutite, **tight.**

- 1115 to 1121 **LIMESTONE** white to cream to buff, pearly, cryptocrystalline, massive texture, crystalline in part, well cemented well calcareous cement, scattered microcrystalline to fine crystalline dolomite rhombs, clean calcilutite, stringers of light grey green pyritic argillaceous calcilutite, stringers of dolomite, white to light brown, microcrystalline to fine crystal well cemented with dolomitic cement, **very rare micro vugs but no permeability, 3% porosity in dolomite stringers, otherwise tight.**
- 1121 to 1123 **SHALE**; grey green, pyritic, dolomitic.
- 1123 to 1125 **DOLOMITE**; white grading to light grey green, vitreous, cryptocrystalline to microcrystalline, well cemented with dolomitic cement, argillaceous packstone to argillaceous calcilutite, well indurated, **tight grading to shale.**
- 1125 to 1130 **DOLOMITE**; white, light grey green, light buff, vitreous, cryptocrystalline to microcrystalline, well cemented with dolomitic cement, crystalline to micro sucrosic texture, no calcareous cement, argillaceous packstone to clean calcilutite, well indurated, tight.
- 1130 to 1134 **DOLOMITE**; white to light grey green, vitreous, cryptocrystalline to microcrystalline, massive and crystalline texture, well cemented with dolomitic cement and minor calcareous cement, common disseminated pyrite, minor stringers of microcrystalline to very fine crystalline dolomite with dolomitic cemented indurated, tight.
- 1134 to 1136 **DOLOMITE**; light grey to grey green, vitreous, cryptocrystalline, argillaceous calcilutite, massive texture, dolomitic and occasional calcareous cement, well indurated, hard, **tight.**
- 1136 to 1146 **SHALE**; dark grey brown, blocky, predominantly calcareous, occasionally dolomitic, occasionally pyritic in part, moderately firm grading to very argillaceous limestone in occasional stringers.

TD 1146 m

TOUR SHEETS

Devlan et al Thunder River N-73 WID 1909
Tour Sheets



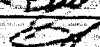
DAILY CHECKS	OPERATIONAL CHECKS
(1) Daily Warm Ambient Inspection	Initial
(2) Extended Inspection-Weekly (using checklist)	Initial
(3) H ₂ S Spores Positive (if required)	Initial
(4) Well Lubricate & Ethos Diagram Pretest	Initial
(5) Flame Lines, Stained	Initial
(6) BOP Drills Performed	Initial
(7) Visually inspect BOP's - Flarelines & Degradator Lines	Initial
(1) Rig Site Health and Safety Meeting (once a month)	Initial
(2) C.A.O.D.C. Rig Safety Inspection Checklist (once a month)	Initial
(3) Inspection Before Flaring or Lifting	Initial
(4) Green Saver Checklist	Initial
(5) Master of the Ship	Initial

OPR.	R.M.	YEAR	01	MO	03
INSTR.	INSTR.	RIG NO.	14		
INSTR.	INSTR.	FUEL : 8.0			
INSTR.	INSTR.	RIG	BOLIER		
INSTR.	INSTR.	TEMPERATURE			
INSTR.	INSTR.	CURRENT			
INSTR.	INSTR.	CONDITIONS			
INSTR.	INSTR.	WIND DIRECTION			
INSTR.	INSTR.	ROAD			

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DRILLING ASSEMBLY						BIT RECORD							MUD RECORD								METRES DRILLED			
REF NO.						TIME							DENSITY								FROM TO			
SIZE (mm)						0:00							kg/m³								TO ROTARY R.P.M.			
WDC CODE																								
MPG						FUNNEL VIS - (SL)																		
TYPE						W.L (cm²)																		
SERIAL NO.						PH																		
JETS																								
DEPTH OUT						GUY L																		
DEPTH IN						PRODUCT AMOUNT X UNIT																		
TOTAL METRES DRILLED													HOURS RUN INTAKE DENSITY OVERFLOW DENSITY UNDERFLOW DENSITY								DEPTH (m) DEVIATION (°) DIRE			
TOTAL HOURS RUN																								
D.P.	STANDS	CUTTING STRUCTURE	B	Gage	ODC	Reason Putted	Total Run m/hr.																	
		Y V MOD LOC																						
D.P.	SINGLES																							
KELLYDOWN																								
TOTAL																								
WT OF DC																								
WT OF STRING																								

DRILLING ASSEMBLY At End of Tour				BIT RECORD				MUD RECORD				METRES DRILLED				
				BIT NO.												
				SIZE (mm)				TIME								
				MDC CODE				DENSITY $\log m^3$								
				MFG.				FUNNEL VIS. (St)								
				TYPE				W.L. (cm)								
				SERIAL NO.				pH								
				JETS												
				DEPTH OUT (m)												
				DEPTH IN (m)												
				TOTAL METRES DRILLED (m)												
				TOTAL HOURS RUN												
				CUTTING STRUCTURE												
				Y	Y ₁	MDC	LOC	B	Gage	ODC	Reason Pushed	Total Run m/hr.				
				D.P.	STANDS											
				D.P.	SINGLES											
				KELLY DOWN												
				TOTAL												
				HOLE DRAG												
				TORQUE AT BOTTOM												
				FILL ON BOTTOM (m)												

DETAILS OF OPERATION IN SEQUENCE AND REMARKS			
4.00	1600	2	22 Monitor well
1800	2100	3	1 Put casing setsets, tear out bit in place
2100	2100	3	1 TEAR OUT RIG & PULVERISE - REMAINING
			
Rig Released @ E3-59 HAS: MAR 15 - PDU 			
NOTES: BOILER #1 8HR. Burn. 2x 20 LITRES BOILER #2 8HR. Burn. 2x 15 LITRES			

DAILY CHECKS	OPR.	R.M.
(1) Daily Walks Around Inspection	Initial _____	Initial _____
(2) Detailed Inspection-Weekly (using checklists)	Initial _____	Initial _____
(3) HSB Signs Posted (if required)	Initial _____	Initial _____
(4) Well License & Stock Diagram Posted	Initial _____	Initial _____
(5) Flame Lines Staked	Initial _____	Initial _____
(6) DCP Drills Performed	Initial _____	Initial _____
(7) Visually inspect BOP's - Pilelines & Degasser Lines	Initial _____	Initial _____
(1) Rig Site Health and Safety Meeting (one/breww/month)		Initial _____
(2) C.A.O.D.C. Rig Safety Inspection Checklist (one/month)		Initial _____
(3) Mast Inspection Before Raising or Lowering		Initial _____
(4) Crown Saver Checked		Initial _____
(5) Motor Kills checked		Initial _____

WEAR	01	MONTH	03	DAY	14
REG NO.	14				
FUEL @ 8:00					
REG	BOLIER				
W E A T H E R	TEMPERATURE				°C
	CURRENT CONDITIONS				
	WIND DIRECTION				
	ROAD				

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DRILLING ASSEMBLY (At End of Tour)										BIT RECORD										MUD RECORD										METRES DRILLED																			
BIT NO.										MUD TYPE										DATE										TIME																			
SIZE (mm)										TIME										1800										20:00										23:00									
MDC CODE										DENSITY kg/m ³										1045										1050										1056									
MFG.										FUNNEL VIS. (SL)										63										66										70									
TYPE										W.L. (cm)										7.5										9										8.5									
SERIAL NO.										PH										10.0										10										10									
JETS										MUD OVERFLOWS										SOLIDS																													
DEPTH OUT (m)										PRODUCT										AMOUNT X UNIT																													
DEPTH IN (m)										Gel										28																													
TOTAL METRES DRILLED (m)										HOURS RUN										INTAKE DENSITY (kg/m ³)										OVERFLOW DENSITY (kg/m ³)										UNDERFLOW DENSITY (kg/m ³)									
TOTAL HOURS RUN										End of Tour										1:K																													
CUTTING STRUCTURE										CONCENTRATION																																							
D.P. STANDS										HOURS RUN										INTAKE DENSITY (kg/m ³)										OVERFLOW DENSITY (kg/m ³)										UNDERFLOW DENSITY (kg/m ³)									
D.P. SINGLES																																																	
KELLYDOWN										HOURS RUN																																							
TOTAL										HOURS RUN																																							
WT.OFDC										HOURS RUN										INTAKE DENSITY (kg/m ³)										OVERFLOW DENSITY (kg/m ³)										UNDERFLOW DENSITY (kg/m ³)									
WT.OF STRING										HOURS RUN																																							

4-1

TOTAL	SHALE SHAKERS		RENTAL SERVICES	
	70773	500		
8	SCREENS CHANGED	YES NO		
8	TOP 120	TOP		
	MIDDLE 80	MIDDLE		
	BOTTOM 45	BOTTOM		

TIME LOG	DETAILS OF OPERATION IN SEQUENCE AND REMARKS
0000	Start of operation
0005	Initial setup and calibration
0010	First data collection point
0015	Adjustment of parameters
0020	Second data collection point
0025	Continuation of data collection
0030	End of operation

0000	0345	345	CIRC
0345	0600	24	12 CEMENT CS6 STAGE ONE (PRE Job SAFETY MTG)
0600	0800	2	5 CIRC STAGE TOOL
		8	HAS

[illegible]

TIME LOG	DETAILS OF OPERATION IN SEQUENCE AND REMARKS
0000	ARRIVED AT THE SCENE OF THE ACCIDENT
0005	INITIAL ASSESSMENT OF THE SITUATION
0010	IDENTIFICATION OF THE VEHICLE INVOLVED
0015	ESTIMATION OF THE TIME OF THE ACCIDENT
0020	INTERVIEW WITH THE DRIVER
0025	COLLECTION OF EVIDENCE
0030	MEASUREMENT OF THE SKID MARKS
0035	ANALYSIS OF THE WRECKAGE
0040	COMPLETION OF THE INVESTIGATION
0045	DEPARTURE FROM THE SCENE

0800	0945	134	5	CIRC STAGE TOOL
0945	1000	1420		Pump Fill
1000	1200	2	23	TOP Fill
1200	1600	4	5	Circ STAGE TOOL
				CHRS.

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DAILY CHECKS		OPR.	P.M.
(1) Empty Waste Accumulator inspection	Initial	Initial	
(2) Gasoline inspection (Verify tubing checked)	Initial	Initial	
(3) HPS Safety (checked if required)	Initial	Initial	
(4) Check Licenses & Safety Diagrams Posted	Initial	Initial	
(5) Flare Lines, Standst	Initial	Initial	
(6) BOPG Units Performed	Initial	Initial	
(7) Visually inspect BOPG's - Flarelines & Digester Lines	Initial	Initial	

YEAR		MONTH		DAY	
81		03		12	

FUEL		8:00	
NG NO		14	

TEMPERATURE		°C	
CURRENT			
CONDITIONS			
WIND DIRECTION			
ROAD			

DRILLING ASSEMBLY (At End of Tour)				BIT RECORD				MUD RECORD				METRES DRILLED			
BIT NO.				MUD TYPE				FROM				TO			
SIZE (mm)				TIME				1146				TO			
MDC CODE				DENSITY				1147				TO			
MFG.				FURNEL				1148				TO			
TYPE				VIS. (cm)				1149				TO			
SERIAL NO.				WLL (cm)				1150				TO			
NETS				PH				1151				TO			
DEPTH OUT				PRODUCT				1152				TO			
DEPTH IN				AMOUNT X UNIT				1153				TO			
TOTAL METRES DRILLED				GAL 10-K				1154				TO			
TOTAL HOURS RUN				15K				1155				TO			
CUTTING STRUCTURE				HOURS RUN				1156				TO			
MDC LOC				INITIAL DENSITY				1157				TO			
B				OVERFLOW DENSITY				1158				TO			
Gage				UNDERFLOW DENSITY				1159				TO			
ODC				HOURS RUN				1160				TO			
Reason				INITIAL DENSITY				1161				TO			
Total Run				OVERFLOW DENSITY				1162				TO			
m/hr				UNDERFLOW DENSITY				1163				TO			
HOLE CONDITION				HOURS RUN				1164				TO			
HOLE DRAG				INITIAL DENSITY				1165				TO			
TORQUE AT BOTTOM				OVERFLOW DENSITY				1166				TO			
FILL ON BOTTOM				UNDERFLOW DENSITY				1167				TO			
WET OFC				HOURS RUN				1168				TO			
WET OF SPRING				INITIAL DENSITY				1169				TO			
				OVERFLOW DENSITY				1170				TO			
				UNDERFLOW DENSITY				1171				TO			
				HOURS RUN				1172				TO			
				INITIAL DENSITY				1173				TO			
				OVERFLOW DENSITY				1174				TO			
				UNDERFLOW DENSITY				1175				TO			
				HOURS RUN				1176				TO			
				INITIAL DENSITY				1177				TO			
				OVERFLOW DENSITY				1178				TO			
				UNDERFLOW DENSITY				1179				TO			
				HOURS RUN				1180				TO			
				INITIAL DENSITY				1181				TO			
				OVERFLOW DENSITY				1182				TO			
				UNDERFLOW DENSITY				1183				TO			
				HOURS RUN				1184				TO			
				INITIAL DENSITY				1185				TO			
				OVERFLOW DENSITY				1186				TO			
				UNDERFLOW DENSITY				1187				TO			
				HOURS RUN				1188				TO			
				INITIAL DENSITY				1189				TO			
				OVERFLOW DENSITY				1190				TO			
				UNDERFLOW DENSITY				1191				TO			
				HOURS RUN				1192				TO			
				INITIAL DENSITY				1193				TO			
				OVERFLOW DENSITY				1194				TO			
				UNDERFLOW DENSITY				1195				TO			
				HOURS RUN				1196				TO			
				INITIAL DENSITY				1197				TO			
				OVERFLOW DENSITY				1198				TO			
				UNDERFLOW DENSITY				1199				TO			
				HOURS RUN				1200				TO			
				INITIAL DENSITY				1201				TO			
				OVERFLOW DENSITY				1202				TO			
				UNDERFLOW DENSITY				1203				TO			
				HOURS RUN				1204				TO			
				INITIAL DENSITY				1205				TO			
				OVERFLOW DENSITY				1206				TO			
				UNDERFLOW DENSITY				1207				TO			
				HOURS RUN				1208				TO			
				INITIAL DENSITY				1209				TO			
				OVERFLOW DENSITY				1210				TO			
				UNDERFLOW DENSITY				1211				TO			
				HOURS RUN				1212				TO			
				INITIAL DENSITY				1213				TO			
				OVERFLOW DENSITY				1214				TO			
				UNDERFLOW DENSITY				1215				TO			
				HOURS RUN				1216				TO			
				INITIAL DENSITY				1217				TO			
				OVERFLOW DENSITY				1218				TO			
				UNDERFLOW DENSITY				1219				TO			
				HOURS RUN				1220				TO			
				INITIAL DENSITY				1221				TO			

DAILY CHECKS		OPR.	R.M.	YEAR	MONTH	DAY
(1) Empty Water Alarm Inspection:	Initial	Initial		1	3	11
(2) Corrosion Inspection (Annually) (Cathodic, Tank, etc.)	Initial	Initial		RIG NO. 14		
(3) HPS Signs Provided (if requested)	Initial	Initial		FUEL 8:00		
(4) West Lander & Shale Diagram Posted	Initial	Initial		RIG	BOLIER	
(5) Flame Lovers Cleaned	Initial	Initial		W E A T H E R		
(6) BOP Data Performed	Initial	Initial				
(7) Visually inspect BOP's, Flarelines & Degasser Lines	Initial	Initial		TEMPERATURE °C		
(1) Rig Site Health and Safety Meeting (checkdownmonth)	Initial			CURRENT CONDITIONS		
(2) C A Q Q C Rig Safety Inspection Checklist (checkdownmonth)	Initial			WIND DIRECTION		
(3) Meet Inspection Before Hoisting or Lifting	Initial			ROAD		
(4) Corrosion Survey Checked	Initial					
(5) Master Valve checked	Initial					

[illegible]

DRILLING ASSEMBLY (At End of Tour)				BIT RECORD			
1	15 Hock Sub	2.25	BT NO	#4 NEW			
12	D.C. 159	2.75	SIZE (mm)	300			
1	X/O	110.80	WADC CODE				
		.91	WFG	VAREL			
			TYPE	ETD 171G			
	BHA 114.71		SERIAL NO.	114008			
			JETS (mm)	3111.1			
			DEPTH OUT (mm)	RNG			
			DEPTH IN (mm)	944			
			TOTAL METRES DRILLED (mm)	191			
			TOTAL HOURS RUN	63 3/4			
D.P.	STANDS		CUTTING STRUCTURE		B	Gage	ODC
			Y	Z	MOD	LOC	Reason Pulled
105	D.P.	SINGLES					Total Run m/hr.
	KELLYDOWN						
		5.01					
	TOTAL	1135.00	HOLE DRAG				
WT.OFDC		12,000	TORQUE AT BOTTOM				
WT.OF STRING		42,000	FILL ON BOTTOM (mm)				

MUD RECORD					
MUD TYPE		WATER BASE	Oil Base		
TIME	01:00	04:00	06:00		
DENSITY kg/m ³	1050	1050	1050		
FUNNEL VIS. (S/L)	47	46	47		
W.L. (cm)	8	8	8		
PH	7	9.5	9.5		
MUD MATERIALS ADDED		SOLIDS CONTROL			
PRODUCT	AMOUNT X UNIT	HOURS RUN	INTAKE DENSITY (kg/m ³)	OVERFLOW DENSITY (kg/m ³)	UNDERFLOW DENSITY (kg/m ³)
agapac	1.5K				
capac	1.5K				
gul	20.5K				
subact	15.5K				
Kw Cat	4.5K	8	1050	1040	1200
cellulose	2.5K				
		HOURS RUN	INTAKE DENSITY (kg/m ³)	OVERFLOW DENSITY (kg/m ³)	UNDERFLOW DENSITY (kg/m ³)

[illegible]

DRILLING ASSEMBLY (At End of Tour)						BIT RECORD										
1			25	m		BIT NO.	#4 NEW									
1	S&S Sub	159	275	m		SIZE	(mm) 200									
12	D.C.	159	110.80	m		IADC CODE										
1			.91	m		MFG.	VAREL									
				m		TYPE	ETO: 7x6									
		344	114.71	m		SERIAL NO.	164008									
				m		JETS	(mm) 3/11.1									
				m		DEPTH OUT	(m) 1146									
				m		DEPTH IN	(m) 944									
				m		TOTAL METRES DRILLED	(m) 202									
				m		TOTAL HOURS RUN	68									
	O.P.	STANDS		m		CUTTING STRUCTURE										
06	D.P.	SINGLES	102499	m		T	T	MDC	LGC	B	Gage	ODC	Reason Pulled	Total Run m/hr		
			2630	m		2	2	2	A	2	IN	2	TD	68		
	KELLYDOWN			m		0.000 ETO										
	TOTAL		1146	m		HOLE DRAG										
	WT.OF DC		12.000	1000 gms		TORQUE AT BOTTOM										
	WT.OF STRING		43.000	1000 gms		FILL ON BOTTOM (m)										

MUD RECORD			
TIME	0800	1200	1600
DENSITY kg/m ³	1080	1055	1060
FUNNEL VIS. - (SL)	53	75	72
W.L. (cm)	75	1.5	7.2
PH	1.2	1.5	9.5
MUD PROPERTIES		SOLIDS CONTENT	
PRODUCT	AMOUNT X UNIT		
Gel	21	HOURS/RUN	INTAKE DENSITY (g/cm ³)
			OVERFLOW DENSITY (g/cm ³)
			UNDERFLOW DENSITY (g/cm ³)
		GEL TIME	
		HOURS/RUN	INTAKE DENSITY (g/cm ³)
			OVERFLOW DENSITY (g/cm ³)
			UNDERFLOW DENSITY (g/cm ³)
		HOURS/RUN	INTAKE DENSITY (g/cm ³)
			OVERFLOW DENSITY (g/cm ³)
			UNDERFLOW DENSITY (g/cm ³)

[illegible]

DRILLING ASSEMBLY (At End of Hour)						BIT RECORD									
						M	BIT NO.								
						M	SIZE	(mm)							
						M	SACC CODE								
						M	MPG								
						M	TYPE								
						M	SERIAL NO.								
						M	JETS								
						M	DEPTH OUT	(m)							
						M	DEPTH IN	(m)							
						M	TOTAL METRES DRILLED	(m)							
						M	TOTAL HOURS RUN								
D.P.	STANDS					M	CUTTING STRUCTURE								
						M	Y	Y ₀	MOG	LOC	B	Gage	ODC	Reason Pulled	Total Run in/hr
D.P.	SINGLES					M									
KELLYDOWN						M	HOLE CONDITION								
TOTAL						M	HOLE DRAG								
WT.OFDC						M	TORQUE AT BOTTOM								
WT.OF STRING						M	PULL ON BOTTOM (mg)								

MUD RECORD			
WELL TYPE	WELL BASED	3" BASED	
TIME	1800	1945	
DENSITY lgm/l	W	1070	
FUNNEL VIS. (SU)		69	
W.L. (cm)		75	
pH		7.5	
MATERIALS ADDED		SOLIDS CONTROL	
PRODUCT	AMOUNT X UNIT	SOLIDS CONTROL	
Bentonite	3!	HOURS RUN	WAKE DENSITY (lgm/l)
			OVERFLOW DENSITY (lgm/l)
			UNDERFLOW DENSITY (lgm/l)
		CENTRIFUGE	
		HOURS RUN	WAKE DENSITY (lgm/l)
			OVERFLOW DENSITY (lgm/l)
			UNDERFLOW DENSITY (lgm/l)
		HOURS RUN	WAKE DENSITY (lgm/l)
			OVERFLOW DENSITY (lgm/l)
			UNDERFLOW DENSITY (lgm/l)

[illegible]

73

[illegible][illegible]

00	04.00	06.00
50	1050	1050
7	46	47
	8	8
	9.5	9.5

[illegible]

UNIT X UNIT	HOURS RUN	INTAKE DENSITY (gpm.)	OVERFLOW DENSITY (gpm.)	UNDERFLOW DENSITY (gpm.)
sk				
sk				
sk				
sk				
sk	8	1050	1040	1210
sk				
	HOURS RUN	INTAKE DENSITY (gpm.)	OVERFLOW DENSITY (gpm.)	UNDERFLOW DENSITY (gpm.)

100	1200	1600
1050	1055	1060
	94	72
	7.5	7.5
	9.5	9.5

[illegible]

UNIT X UNIT				
HOURS/RUN	INTAKE DENSITY (PPM)	OVERFLOW DENSITY (PPM)	UNDERFLOW DENSITY (PPM)	
HOURS/RUN	INTAKE DENSITY (PPM)	OVERFLOW DENSITY (PPM)	UNDERFLOW DENSITY (PPM)	
HOURS/RUN	INTAKE DENSITY (PPM)	OVERFLOW DENSITY (PPM)	UNDERFLOW DENSITY (PPM)	

DO	1945	
NO	1080	
	69	
	7.5	
	7.3	

METRES DRIELED					TIME LOG		DETAILS OF OPERATION IN SEQUENCE AND REMARKS	
FROM	TO	DND PLAN CORRE	ROTARY R.P.M.	WT. ON BIT (LBS)				
1146					1600	1615	14 6 P.O.H TO LDG.	
TD					1615	1630	14 5 CIRC (Circumference) Flow ✓ 100 (Flow)	
					1630	1700	12 6 RTH	
					1700	1945	24 5 CIRC (Circumference) (Max Weight) M	
					1945	2400	44 6 P.O.H to Lot Flow to 1139, 1088, 944, 846, 749, 652, 112, O.O.H.	
							8 HRS	
							meas 9.04	
							Calc 4.53	
							DIFF 4.51m ³	
							Shovel 2nd bucket of	
							✓ CROWN SAVER	
							FUNCTION HYDROL 6 SEC	
OPERATOR SIGNATURE								
Name - G.S. Pl.					8			

[illegible]

DAILY CHECKS		OPR.	R.M.
(1) Daily Walk Around Inspection	Initial	Initial	
(2) Detailed Inspection-Weekly (using checklist)	Initial	Initial	
(3) H2S Signs Posted (if required)	Initial	Initial	
(4) Well License & Stick Diagram Posted	Initial	Initial	
(5) Flame Lines Stained	Initial	Initial	
(6) BOP Drills Performed	Initial	Initial	
(7) Visually inspect BOP's - Firelines & Degasser Lines	Initial	Initial	
(1) Rig Site Health and Safety Meeting (once/month)		Initial	
(2) C.A.O.D.C. Rig Safety Inspection Checklist (once/month)		Initial	
(3) Mast Inspection Before Raising or Lowering		Initial	
(4) Crown Saver Checked		Initial	
(5) Motor Kalls checked		Initial	

YEAR	MONTH	DAY
81	02	10
RIG NO. 14		
FUEL @ 8:00		
RIG	BOILER	
WEATHER	TEMPERATURE °C	
	CURRENT CONDITIONS	
	WIND DIRECTION	
	ROAD	

[illegible]

METRES DRILLED					
FROM	TO	DRD SHA CORR-C	ROTARY R.P.M.	WT. ON BIT (1000-mts)	
1041	1061	D	^{80%} /100	11-12	
		LINER SIZE (mm)	S.P.M.	LINER SIZE (mm)	S.P.M.
7,900	152	100			
3,300	60				
DEPTH (m)	DEVIATION (°)		DIRECTION		
<i>Karen Baker</i>					

[illegible]

METRES DRILLED				
FROM	TO	DND DAYS CODEC	ROTARY RPM	WLOG. IN MET (1000ft/m)
1087	1110	D	80/100	H-10
		LITHO SIZE (mm)	S.P.H.	LITHO SIZE (mm)
7200	153	100		
2,700	SS			
DEPTH (m)	DEVIATION (°)	DIRECTION		
1100m	2 1/4			
DRILLER'S SIGNATURE				
Vance Taylor				

15

[illegible]

TOTAL		2. SHALE SINKER(S)		DENTAL SERVICES	
	NO TYPE	110FTS 150D			
8	SCREENS CHANGED	☐ YES	☐ NO		
8	TOP	120	TOP		
8	MIDDLE	80	MIDDLE		
	BOTTOM	45	BOTTOM		

OPERATION IN SEQUENCE AND REMARKS

OPERATION IN SEQUENCE AND REMARKS

SERVICE

200 RIM Hole F 1041m - 1061m

LITRES V CROWN SAVER

LITRES FUNCTION PIPE RANS 3 SEC.

F OPERATION IN SEQUENCE AND REMARKS

Service
Room No. F 1061m - 1087m

Boxes ✓ Crown Saver
Liters Functioning 1 Ssec.

[illegible]

service

200mm Hole F 1089m - 1102m
@ 1100m
100mm Hole F 1102m - 1110m

FUNCTION PIPE KAMS 350C
✓ CROWN SAUER

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139791

LICENCE NO.: **NEB 9211-026-1-3** WELL NAME AND NO.: **DEVLAN ET AL THUNDER RIVER N-73**

OPERATOR: **DEVLAN EXPLORATION LTD** CONTRACTOR: **AKITA DRILLING**

SURFACE LOCATION: **AKITA DRILLING** UNIQUE ID: **AKITA DRILLING**

SIGNATURE OF OPERATOR'S REPRESENTATIVE: *[Signature]* SIGNATURE OF CONTRACTOR'S RIG MANAGER: *[Signature]*

DAILY CHECKS

(1) Daily Walk Around Inspection
(2) Detailed Inspection Weekly (using checklist)
(3) HPS Signs Posted (if required)
(4) Well License & Stuck Diagram Posted
(5) Fire Lines Stained
(6) BOP Drills Performed
(7) Visually inspect BOP's - Flarearms & Degasser Lines

(1) Rig Site Health and Safety Meeting (once a month)
(2) CADC Rig Safety Inspection Checklist (once a month)
(3) Mast Inspection Before Raising or Lowering
(4) Crown Seals Checked
(5) Motor Kats checked

OPR. **Initial** R.M. **Initial**

Initial **Initial**
Initial **Initial**
Initial **Initial**
Initial **Initial**
Initial **Initial**
Initial **Initial**
Initial **Initial**

YEAR **2014** MONTH **05** DAY **08**

RIG NO. **14**

FUEL @ 8:00 **14**

RIG **14** BOLER **14**

WEATHER

TEMPERATURE **14** °C

CURRENT CONDITIONS **14**

WIND DIRECTION **14**

ROAD **14**

TIME - HRS	CODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	NO																								
	OPER	RIG UP & TEAR DOWN	DRILL ACTUAL	REAMING CORING	COND. MUD & DISC	TRIPS	RIG SERVICE	REPAIR RIG	CUT OFF DRILL LINE	DEV SURVEY	WIRE LINE LOGS	RAN CASE & CEMENT	WAIT ON CEMENT	UPPLE UP B.O.P	TEST B.O.P	DRILL STEM TEST	PLUG BACK	SQUEEZE CEMENT	FISHING	DIR. WORK	SAFETY MTG				
	MORN		4 3/4			3	4 1/4																		
	DAY		7 1/4				4 1/4			4 1/4															
	EVE		7 3/4				4 1/4																		
TOTAL																									

DRILLING ASSEMBLY (At End of Tour)

BIT RECORD

1 **SHOCK SUB** **2.75** **BIT NO. #4 NEW** **SIZE (mm) 200** **TIME 02:30 06:00**

12 **D.C.** **159 110.80** **WDC CODE** **DENSITY 1050 1050**

1 **X/O** **91** **MFG. VAREL** **FUNNEL VIS. (SL) 45 44**

TYPE ETD 17XG **W.L. (cm) 7.5 7.5**

SERIAL NO. 164008 **PH 7.5**

JETS 3/11.1

DEPTH OUT (m) 2NG

DEPTH IN (m) 944

TOTAL METRES DRILLED (m) 14

TOTAL HOURS RUN 4 3/4

CUTTING STRUCTURE **MOCT LOC** **B Gage OOC Reason Pulled Total Run m/hr.**

D.P. STANDS 831.93

D.P. SINGLES 11.38

KELLYDOWN 11.38

TOTAL 958.00

WT.OFDC 12,000

WT.OFSTRING 38,500

HOLE DRAG

TORQUE AT BOTTOM

FILL ON BOTTOM (m)

MUD RECORD

PRODUCT AMOUNT X UNIT

INTAKE DENSITY (kg/m³) **OVERFLOW DENSITY (kg/m³)** **UNDERFLOW DENSITY (kg/m³)**

HOURS RUN **INTAKE DENSITY (kg/m³)** **OVERFLOW DENSITY (kg/m³)** **UNDERFLOW DENSITY (kg/m³)**

8 1050 1040 1220

METRES DRILLED

FROM TO DRD RAN CORREC ROTARY R.P.M. WT ON BIT (1000 lbs)

944 958 0 8/10011-12

DEPTH (m) DEVIATION (m) DIRECTION

5400 152 110

2010 60

DAVID BARBER

DRILLING ASSEMBLY (At End of Tour)

BIT RECORD

1 **SHOCK SUB** **2.75** **BIT NO. #4 NEW** **SIZE (mm) 200** **TIME 0800 1200 1600**

12 **D.C.** **159 110.80** **WDC CODE** **DENSITY 1040 1040 1040**

1 **X/O** **91** **MFG. VAREL** **FUNNEL VIS. (SL) 44 45 44**

TYPE ETD 17XG **W.L. (cm) 7.5 8.0 7.5**

SERIAL NO. 164008 **PH 10.0 9.5 9.5**

JETS 3/11.1

DEPTH OUT (m) 2NG

DEPTH IN (m) 944

TOTAL METRES DRILLED (m) 31

TOTAL HOURS RUN 12 1/4

CUTTING STRUCTURE **MOCT LOC** **B Gage OOC Reason Pulled Total Run m/hr.**

D.P. STANDS 851.27

D.P. SINGLES 9.77

KELLYDOWN 9.77

TOTAL 975.75

WT.OFDC 12,000

WT.OFSTRING 38,500

HOLE DRAG

TORQUE AT BOTTOM

FILL ON BOTTOM (m)

MUD RECORD

PRODUCT AMOUNT X UNIT

INTAKE DENSITY (kg/m³) **OVERFLOW DENSITY (kg/m³)** **UNDERFLOW DENSITY (kg/m³)**

HOURS RUN **INTAKE DENSITY (kg/m³)** **OVERFLOW DENSITY (kg/m³)** **UNDERFLOW DENSITY (kg/m³)**

8 1040 1035 1215

METRES DRILLED

FROM TO DRD RAN CORREC ROTARY R.P.M. WT ON BIT (1000 lbs)

958 975 0 8/10011-12

DEPTH (m) DEVIATION (m) DIRECTION

5440 152 110

2020 60

DAVID BARBER

DRILLING ASSEMBLY (At End of Tour)

BIT RECORD

1 **SHOCK SUB** **2.75** **BIT NO. #4 NEW** **SIZE (mm) 200** **TIME 1800 2100 2400**

12 **D.C.** **159 110.80** **WDC CODE** **DENSITY 1040 1040 1040**

1 **X/O** **91** **MFG. VAREL** **FUNNEL VIS. (SL) 44 45 45**

TYPE ETD 17XG **W.L. (cm) 7.5 7.5 7.5**

SERIAL NO. 164008 **PH 7.5 9.5 9.5**

JETS 3/11.1

DEPTH OUT (m) 2NG

DEPTH IN (m) 944

TOTAL METRES DRILLED (m) 55

TOTAL HOURS RUN 20

CUTTING STRUCTURE **MOCT LOC** **B Gage OOC Reason Pulled Total Run m/hr.**

D.P. STANDS 880.27

D.P. SINGLES 3.92

KELLYDOWN 3.92

TOTAL 999.00

WT.OFDC 12,000

WT.OFSTRING 39,000

HOLE DRAG

TORQUE AT BOTTOM

FILL ON BOTTOM (m)

MUD RECORD

PRODUCT AMOUNT X UNIT

INTAKE DENSITY (kg/m³) **OVERFLOW DENSITY (kg/m³)** **UNDERFLOW DENSITY (kg/m³)**

HOURS RUN **INTAKE DENSITY (kg/m³)** **OVERFLOW DENSITY (kg/m³)** **UNDERFLOW DENSITY (kg/m³)**

8 1040 1035 1220

METRES DRILLED

FROM TO DRD RAN CORREC ROTARY R.P.M. WT ON BIT (1000 lbs)

975 999 0 8/10011-12

DEPTH (m) DEVIATION (m) DIRECTION

5560 152 110

2080 60

DAVID BARBER

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139790

LICENCE NO.: **NEB 9211-006-13** WELL NAME AND NO.: **DEULIN ET AL THUNDER RIVER 11-73**

OPERATOR: **DEULIN EXPLORATION LTD** CONTRACTOR: **THUNDER RIVER**

SURFACE LOCATION: **THUNDER RIVER** UNIQUE ID: **THUNDER RIVER**

SIGNATURE OF OPERATOR'S REPRESENTATIVE: **[Signature]** SIGNATURE OF CONTRACTOR'S BIG MANAGER: **[Signature]**

DAILY CHECKS

(1) Daily Walk Around Inspection
(2) Detailed Inspection - Weekly (using checklist)
(3) HSB Signs Posted (if required)
(4) Well Location & Stock Diagram Posted
(5) Fire Lines Staked
(6) BOP Drills Performed
(7) Visually inspect BOP's - Parallels & Degasser Lines

OPR. R.M.

YEAR: **01** MONTH: **03** DAY: **14**

RIG NO.: **14**

FUEL @ 8:00

TEMPERATURE

CURRENT CONDITIONS

WIND DIRECTION

ROAD

TIME - HRS	CODE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	OPER.	ING UP A TEAR DOWN	DRILL ACTUAL	REAMING	CORING	CONQ. MUD & CIRC.	TRIPS	NO SERVICE	REPAIR NO	CUT OFF DRILL LINE	DEV SURVEY	WIRE LINE LOGS	RUN CASE & CEMENT	WAIT ON CEMENT	SHUDDLE UP B.O.P.	TEST B.O.P.	DRILL STEM TEST	PLUG BACK	SQUEEZE CEMENT	FISHING	DR. WORK	SAFETY MTG.			
	MORN.		7 1/2					1/4																	
	DAY		7 3/4						1/4																
	EVE		5 1/2				1/2	1 1/4	1/4	1/4															

DRILLING ASSEMBLY (At End of Tour)

BIT RECORD

1 **SHOCK SUB** 9.75 m **BIT NO. #3 NEW**

12 **DC** 159 **110.86** **SIZE (mm) 95**

1 **X/O** 9.1 m **ADC CODE 517**

MFG. UAREL

TYPE ETD 17.6

SERIAL NO. 163953

JETS 3/11.7

DEPTH OUT (m) 793

DEPTH IN (m) 793

TOTAL METRES DRILLED (m) 115

TOTAL HOURS RUN 31

CUTTING STRUCTURE

D.P. STANDS

81 D.P. SINGLES 783.54

KELLYDOWN 9.71

TOTAL 908.03

WT.OFDC 19000

WT.OFSTRING 37000

MUD RECORD

TIME 0100 0300 0530

DENSITY kg/m³ 1040 1040 1040

FUNNEL VIS. (SL) 48 47 45

W.L. (cm) 7.5 7.5 8

PH 9.5 9 9

PRODUCT AMOUNT X UNIT

Signatures 1 SK.

DEPT. 1910

60

DEPTH (m) DEVIATION (°) DIRECTION

DRILLING ASSEMBLY (At End of Tour)

BIT RECORD

1 **SHOCK SUB** 2.75 m **BIT NO. #3 NEW**

12 **DC** 159 **110.86** **SIZE (mm) 200**

1 **X/O** 9.1 m **ADC CODE 517**

MFG. UAREL

TYPE ETD 17.6

SERIAL NO. 163953

JETS 3/11.1

DEPTH OUT (m) 793

DEPTH IN (m) 793

TOTAL METRES DRILLED (m) 137

TOTAL HOURS RUN 383/4

CUTTING STRUCTURE

D.P. STANDS

84 D.P. SINGLES 812.61

KELLYDOWN 2.68

TOTAL 430.00

WT.OFDC 12000

WT.OFSTRING 38000

MUD RECORD

TIME 0800 1200 1600

DENSITY kg/m³ 1040 1040 1040

FUNNEL VIS. (SL) 45 45 44

W.L. (cm) 7.5 7.5 7.5

PH 9 9 9.5

PRODUCT AMOUNT X UNIT

Can. 8 LSK

Gel 9.0

DEPT. 1970

60

DEPTH (m) DEVIATION (°) DIRECTION

DRILLING ASSEMBLY (At End of Tour)

BIT RECORD

1 **SHOCK SUB** 2.75 m **BIT NO. #3 NEW**

12 **DC** 159 **110.86** **SIZE (mm) 200**

1 **X/O** 9.1 m **ADC CODE 517**

MFG. UAREL

TYPE ETD 17.6

SERIAL NO. 163953

JETS 3/11.1

DEPTH OUT (m) 793

DEPTH IN (m) 793

TOTAL METRES DRILLED (m) 151

TOTAL HOURS RUN 443/4

CUTTING STRUCTURE

D.P. STANDS

25 D.P. SINGLES 822.37

KELLYDOWN 1.2

TOTAL 944.18

WT.OFDC 12000

WT.OFSTRING 32000

MUD RECORD

TIME 1800 2100

DENSITY kg/m³ 1040

FUNNEL VIS. (SL) 7.6

W.L. (cm) 8.5

PH 9.5

PRODUCT AMOUNT X UNIT

DEPT. 5500

152

110

DEPTH (m) DEVIATION (°) DIRECTION

39790

[illegible]

				20	21	22	23	24	25	26	TOTAL	SHALE SHAKER S	RENTAL SERVICES
SCREEN ELEMENT	FISHING	DRL WORK	SAFETY MTG.									NO TYPE	
												SCREENS CHANGED	YES NO
												TOP	TOP
												MIDDLE	MIDDLE
												BOTTOM	BOTTOM

MUD RECORD		
IN	OUT	TIME
100	0300	0330
040	1040	1040
48	47	45
7.5	7.5	8
9.5	9	9

[illegible]

MUD RECORD		
12:00	12:00	1600
40	1040	1040
5	45	44
5	7.5	7.5
	9	9.5

UNIT X UNIT			
HOURS/IN	INTAKE DENSITY (Page 7)	OVERFLOW DENSITY (Page 7)	UNDERFLOW DENSITY (Page 7)
8	104	1035	1200
HOURS/IN	INTAKE DENSITY (Page 7)	OVERFLOW DENSITY (Page 7)	UNDERFLOW DENSITY (Page 7)

MUD RECORD		
00	21.00	
40		
2		
3		
5		

UNIT X UNIT		SOLIDS COLLECTION		
HOURS RUN	INTAKE DENSITY (page 1)	OVERFLOW DENSITY (page 1)	UNDERFLOW DENSITY (page 1)	
SOLIDS COLLECTION				
HOURS RUN	INTAKE DENSITY (page 1)	OVERFLOW DENSITY (page 1)	UNDERFLOW DENSITY (page 1)	
HOURS RUN	INTAKE DENSITY (page 1)	OVERFLOW DENSITY (page 1)	UNDERFLOW DENSITY (page 1)	

[illegible][illegible]

METRES DRILLED					TIME LOG		DETAILS OF OPERATION IN SEQUENCE AND REMARKS	
FROM	TO	DND CODE	ROTARY R.P.M.	WE ORE BIT (TODAY)				
930	944	0	%	11-12	1600	1615	M	7 RIG SERVICE
					1615	2145	S	2 DRILL 200 mm Hole F 930m - 944m
					2145	2215	V	5 Circ & Blow Kelly
					2215	2400	X	6 Bit + Trip - Floor 93m, 913m 4% 120
5500	152	110						
REDUCE ROT SPEED								
DEVIATION SURVEY								
DEPTH (m)	DEVIATION (%)	DIRECTION						
DRIVER SIGNATURE					NOTES			
					Vilawan Saver			
					Fugation HCR 7cc			
DRIVER SIGNATURE					DRIVER SIGNATURE			

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139789

LICENCE NO. **NEB 9211-056-13** WELL NAME AND NO. **DEWIL ET AL THUNDER H. 66 N-73**

OPERATOR **DEWIL ET AL** CONTRACTOR **THUNDER H. 66**

SURFACE LOCATION **THUNDER H. 66** JOBSITE ID **THUNDER H. 66**

SIGNATURE OF OPERATOR'S REPRESENTATIVE: **[Signature]** SIGNATURE OF CONTRACTOR'S RIG MANAGER: **[Signature]**

DAILY CHECKS

ITEM	DATE	TIME	INITIALS
1. Rig Safety Inspection			
2. Wellhead Inspection			
3. Mud System Inspection			
4. Rig Floor Inspection			
5. Rigging Inspection			
6. Rigging Inspection			
7. Rigging Inspection			
8. Rigging Inspection			
9. Rigging Inspection			
10. Rigging Inspection			

TEMPERATURE °C

CURRENT CONDITIONS

WIND DIRECTION

ROAD

DATE **01-08-06**

TIME **14:00**

FUEL **8.00**

BOLTER

TEMPERATURE °C

CURRENT CONDITIONS

WIND DIRECTION

ROAD

ITEM	DATE	TIME	INITIALS	ITEM	DATE	TIME	INITIALS
1. Rig Safety Inspection				1. Rig Safety Inspection			
2. Wellhead Inspection				2. Wellhead Inspection			
3. Mud System Inspection				3. Mud System Inspection			
4. Rig Floor Inspection				4. Rig Floor Inspection			
5. Rigging Inspection				5. Rigging Inspection			
6. Rigging Inspection				6. Rigging Inspection			
7. Rigging Inspection				7. Rigging Inspection			
8. Rigging Inspection				8. Rigging Inspection			
9. Rigging Inspection				9. Rigging Inspection			
10. Rigging Inspection				10. Rigging Inspection			

ITEM	DATE	TIME	INITIALS	ITEM	DATE	TIME	INITIALS
1. Rig Safety Inspection				1. Rig Safety Inspection			
2. Wellhead Inspection				2. Wellhead Inspection			
3. Mud System Inspection				3. Mud System Inspection			
4. Rig Floor Inspection				4. Rig Floor Inspection			
5. Rigging Inspection				5. Rigging Inspection			
6. Rigging Inspection				6. Rigging Inspection			
7. Rigging Inspection				7. Rigging Inspection			
8. Rigging Inspection				8. Rigging Inspection			
9. Rigging Inspection				9. Rigging Inspection			
10. Rigging Inspection				10. Rigging Inspection			

ITEM	DATE	TIME	INITIALS	ITEM	DATE	TIME	INITIALS
1. Rig Safety Inspection				1. Rig Safety Inspection			
2. Wellhead Inspection				2. Wellhead Inspection			
3. Mud System Inspection				3. Mud System Inspection			
4. Rig Floor Inspection				4. Rig Floor Inspection			
5. Rigging Inspection				5. Rigging Inspection			
6. Rigging Inspection				6. Rigging Inspection			
7. Rigging Inspection				7. Rigging Inspection			
8. Rigging Inspection				8. Rigging Inspection			
9. Rigging Inspection				9. Rigging Inspection			
10. Rigging Inspection				10. Rigging Inspection			

ITEM	DATE	TIME	INITIALS	ITEM	DATE	TIME	INITIALS
1. Rig Safety Inspection				1. Rig Safety Inspection			
2. Wellhead Inspection				2. Wellhead Inspection			
3. Mud System Inspection				3. Mud System Inspection			
4. Rig Floor Inspection				4. Rig Floor Inspection			
5. Rigging Inspection				5. Rigging Inspection			
6. Rigging Inspection				6. Rigging Inspection			
7. Rigging Inspection				7. Rigging Inspection			
8. Rigging Inspection				8. Rigging Inspection			
9. Rigging Inspection				9. Rigging Inspection			
10. Rigging Inspection				10. Rigging Inspection			

ITEM	DATE	TIME	INITIALS	ITEM	DATE	TIME	INITIALS
1. Rig Safety Inspection				1. Rig Safety Inspection			
2. Wellhead Inspection				2. Wellhead Inspection			
3. Mud System Inspection				3. Mud System Inspection			
4. Rig Floor Inspection				4. Rig Floor Inspection			
5. Rigging Inspection				5. Rigging Inspection			
6. Rigging Inspection				6. Rigging Inspection			
7. Rigging Inspection				7. Rigging Inspection			
8. Rigging Inspection				8. Rigging Inspection			
9. Rigging Inspection				9. Rigging Inspection			
10. Rigging Inspection				10. Rigging Inspection			

ITEM	DATE	TIME	INITIALS	ITEM	DATE	TIME	INITIALS
1. Rig Safety Inspection				1. Rig Safety Inspection			
2. Wellhead Inspection				2. Wellhead Inspection			
3. Mud System Inspection				3. Mud System Inspection			
4. Rig Floor Inspection				4. Rig Floor Inspection			
5. Rigging Inspection				5. Rigging Inspection			
6. Rigging Inspection				6. Rigging Inspection			
7. Rigging Inspection				7. Rigging Inspection			
8. Rigging Inspection				8. Rigging Inspection			
9. Rigging Inspection				9. Rigging Inspection			
10. Rigging Inspection				10. Rigging Inspection			

ITEM	DATE	TIME	INITIALS	ITEM	DATE	TIME	INITIALS
1. Rig Safety Inspection				1. Rig Safety Inspection			
2. Wellhead Inspection				2. Wellhead Inspection			
3. Mud System Inspection				3. Mud System Inspection			
4. Rig Floor Inspection				4. Rig Floor Inspection			
5. Rigging Inspection				5. Rigging Inspection			
6. Rigging Inspection				6. Rigging Inspection			
7. Rigging Inspection				7. Rigging Inspection			
8. Rigging Inspection				8. Rigging Inspection			
9. Rigging Inspection				9. Rigging Inspection			
10. Rigging Inspection				10. Rigging Inspection			

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LICENCE NO. **NEB 9211-026-1-3** WELL NAME AND NO. **DEULA ETAL THUNDER RIVER N-72**

OPERATOR: **Deula Etal** CONTRACTOR: **Deula Etal**

SURFACE LOCATION: **Deula Etal** UNIQUE ID: **Deula Etal**

SIGNATURE OF OPERATOR'S REPRESENTATIVE: **Deula Etal** SIGNATURE OF CONTRACTOR'S RIG MANAGER: **Deula Etal**

DAILY CHECKS

(1) Daily Waste Around Inspection Initial ☒ R.M. **my**

(2) Disturbed Inspection Weekly (using checklist) Initial ☒

(3) HPS Engine Posited (if required) Initial ☒

(4) Well License & Status (Diagram Posited) Initial ☒

(5) Flare Lines Stained Initial ☒

(6) BOP Drive Performed Initial ☒

(7) Visually inspect BOP's Flarelines & Degasser Lines Initial ☒

(1) Rig Site Health and Safety Meeting (once/monthly) Initial ☒

(2) C.A.O.D.C. Rig Safety Inspection Checklist (once/monthly) Initial ☒

(3) Well Inspection Before Raising or Lowering Initial ☒

(4) Crown Seal Checked Initial ☒

(5) Motor Kats checked Initial ☒

YEAR **81** MONTH **03** DAY **05**

RIG NO **14**

FUEL @ 8:00

RIG **BOILER**

TEMPERATURE °C

CURRENT CONDITIONS

WIND DIRECTION

ROAD

TIME	CODE	NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
OPER	RIG UP & TEST DOWN	DRILL ACTUAL	MEASURING	CORING	CORING	TRIPS	RIG SERVICE	REPAIR RIG	CUT OFF	DEV SURVEY	WIRE LINE LOGS	RUN CASE & CEMENT	WALL ON CEMENT	MUD PUMP	TEST BOP	DRILL STEM TEST	PLUG BACK	SQUEEZE CEMENT	FISHING	DR WORK	SAFETY	WTG					
MORN		7:45																									
DAY		7:45																									
EVE		3																									
TOTAL																											

DRILLING ASSEMBLY (At End of Tour)

BIT NO. **25**

SIZE (mm) **200**

IADC CODE **159**

MPG **110.80**

TYPE **1 x 10**

SERIAL NO. **164838**

JETS **3/11.1**

DEPTH OUT (m) **114.71**

DEPTH IN (m) **431**

TOTAL METRES DRILLED (m) **327**

TOTAL HOURS RUN **71**

CUTTING STRUCTURE **MOD LOC**

D.P. STANDS **638.87**

KELLYDOWN **502**

TOTAL **758.00**

WT.OFDC **12000**

WT.OFSTRING **341.506**

HOLE CRAG

TORQUE AT BOTTOM

FILL ON BOTTOM (m)

BIT RECORD

TIME **0130** **0300** **0345**

DENSITY **1050** **1050** **1050**

FUNNEL VIS. (SL) **45** **44** **43**

W.L. (cm) **1.5** **7.5** **7.5**

pH **9.5** **9.5** **9.5**

MUD MATERIALS ADDED

PRODUCT **Gel** AMOUNT X UNIT **7 SKS**

HOURS RUN **8** INTAKE DENSITY (kg/m³) **1050** OVERFLOW DENSITY (kg/m³) **1040** UNDERFLOW DENSITY (kg/m³) **1030**

METRES DRILLED

FROM **730** TO **758** D **80** W **11-12**

LINEAR SIZE (mm) **152** S.P.M. **134**

DEPTH (m) **7700** DEVIATION (°) **60** DIRECTION

DRILLING ASSEMBLY (At End of Tour)

BIT NO. **25**

SIZE (mm) **200**

IADC CODE **159**

MPG **110.80**

TYPE **1 x 10**

SERIAL NO. **164838**

JETS **3/11.1**

DEPTH OUT (m) **114.71**

DEPTH IN (m) **431**

TOTAL METRES DRILLED (m) **358**

TOTAL HOURS RUN **78 3/4**

CUTTING STRUCTURE **MOD LOC**

D.P. STANDS **667.33**

KELLYDOWN **6.96**

TOTAL **789.00**

WT.OFDC **12000**

WT.OFSTRING **35.000**

HOLE DRAG

TORQUE AT BOTTOM

FILL ON BOTTOM (m)

BIT RECORD

TIME **0800** **1200** **1600**

DENSITY **1050** **1050** **1050**

FUNNEL VIS. (SL) **44** **46** **44**

W.L. (cm) **7.5** **7** **7.5**

pH **9.5** **7.5** **9.5**

MUD MATERIALS ADDED

PRODUCT **Gel** AMOUNT X UNIT **12 SKS**

HOURS RUN **8** INTAKE DENSITY (kg/m³) **1050** OVERFLOW DENSITY (kg/m³) **1040** UNDERFLOW DENSITY (kg/m³) **1030**

METRES DRILLED

FROM **758** TO **789** D **80** W **11-12**

LINEAR SIZE (mm) **152** S.P.M. **180**

DEPTH (m) **6100** DEVIATION (°) **60** DIRECTION

DRILLING ASSEMBLY (At End of Tour)

BIT NO. **25**

SIZE (mm) **200**

IADC CODE **159**

MPG **110.80**

TYPE **1 x 10**

SERIAL NO. **164838**

JETS **3/11.1**

DEPTH OUT (m) **114.71**

DEPTH IN (m) **431**

TOTAL METRES DRILLED (m) **362**

TOTAL HOURS RUN **80**

CUTTING STRUCTURE **MOD LOC**

D.P. STANDS **703.12**

KELLYDOWN **7.25**

TOTAL **794.00**

WT.OFDC **12000**

WT.OFSTRING **7.25**

HOLE DRAG

TORQUE AT BOTTOM

FILL ON BOTTOM (m)

BIT RECORD

TIME **17:30** **00:50** **10:50**

DENSITY **1050** **1050** **43**

FUNNEL VIS. (SL) **44** **43** **8**

W.L. (cm) **7.5** **8** **9.5**

pH **9.5** **9**

MUD MATERIALS ADDED

PRODUCT **Gel** AMOUNT X UNIT **1 SK**

HOURS RUN **8** INTAKE DENSITY (kg/m³) **1050** OVERFLOW DENSITY (kg/m³) **1040** UNDERFLOW DENSITY (kg/m³) **1030**

METRES DRILLED

FROM **789** TO **793** D **80** W **11-12**

LINEAR SIZE (mm) **152** S.P.M. **180**

DEPTH (m) **6070** DEVIATION (°) **60** DIRECTION

DAILY CHECKS		OPR.	R.M.	YEAR	MONTH	DATE
(1) Daily Walk Around Inspection	Initial	Initial		01	03	07
(2) Detailed Inspection Weekly (using checklist)	Initial	Initial		HIG NO. 14		
(3) H/S Sign Posted (if required)	Initial	Initial		FUEL @ 8:00		
(4) Wet License & Shock Diagram Posted	Initial	Initial		RIG		
(5) Flare Lines Stained	Initial	Initial		BOILER		
(6) BOP Drills Performed	Initial	Initial		W		
(7) Visually inspect BOP's - Flarelines & Degasser Lines	Initial	Initial		TEMPERATURE °C		
(1) Rig Site Health and Safety Meeting (Inc./Crew/month)	Initial	Initial		CURRENT CONDITIONS		
(2) C.A.O.D.C. Rig Safety Inspection Checklist (Inc./month)	Initial	Initial		WIND DIRECTION		
(3) Mast Inspection Before Raising or Lowering	Initial	Initial		ROAD		
(4) Crown Saver Checked	Initial	Initial				
(5) Motor K&S checked	Initial	Initial				

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DRILLING ASSEMBLY (At End of Tour)						MUD RECORD								METRES DRILLED							
						☐ MUD TYPE ☒ WATER BASED ☐ OIL BASED															
1 Shock Sub						BIT NO.	#2 NEW	TIME		08.00	12.00	16.00	FROM		TO		D.D. CORR.	ROTARY R.P.M.	WT. ON BIT (1000 LBS.)		
1 D.C						SIZE (mm)	200	DENSITY kg/m ³		1050	1050	1050	672		698		D	80	1142		
1 X/O						MDC CODE		FUNNEL VIS. (S/L)		44	43	43									
BHA						MFG.	VAREL	W.L. (cm)		7.5	7.5	7.5									
1147.1m						TYPE	ETD 09RG	PH		7.5	9	9.5									
						SERIAL NO.	164838														
						JETS (mm)	3/11-1														
						DEPTH OUT (m)	RNG	MUD MATERIALS ADDED		SOLIDS CORRECT											
						DEPTH IN (m)	531	PRODUCT		AMOUNT X UNIT											
						TOTAL METRES DRILLED (m)	367	CAUSTIC		1 K		HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)						
						TOTAL HOURS RUN	55 3/4	SAND		2 K											
D.P.						CUTTING STRUCTURE	B	Gage	OOC	Reason Pulled	Total Run m/hr.										
STANDS						Y	L	MDC	LOC												
D.P.						SINGLES	580.16m														
KELLYDOWN						3.13m	HOLE CONDITION														
TOTAL						698.00m	HOLE DRAG														
WT.OFDC						12,000	TORQUE AT BOTTOM														
WT.OFSTRING						33,000	FILL ON BOTTOM (m)														

DRILLING ASSEMBLY (At End of Tour)				BIT RECORD				MUD RECORD				METRES DRILLED			
1 Stack Sub 2.75m				BIT NO. #2 NEW				MUD TYPE ☐ WATER BASED ☐ OIL BASED				FROM TO DRO-PMAN CORREC. ROTARY R.P.M. WT. ON BIT (1000000)			
12 D.C 110.80m				SIZE (mm) 200				TIME 18:30 20:30 23:00				698 730 0 80 11-12			
1 X6 91m				MFG. UAREL				DENSITY kg/m ³ 1050 1050 1050							
RHA 114.71m				TYPE ETD09KG				FUNNEL VIS. (S/L) 43 43 42							
				SERIAL NO. 164838				W.L. (cm) 2.5 7.5 7							
				JETS (mm) 3/11-1				PH 9.5 9.5 9.5							
				DEPTH OUT (m) RNC				MUD MATERIALS ADDED				SOLIDS CONTROL			
				DEPTH IN (m) 431				PRODUCT				AMOUNT X UNIT			
				TOTAL METRES DRILLED (m) 299				HOURS RUN				INTAKE DENSITY (kg/m ³) OVERFLOW DENSITY (kg/m ³) UNDERFLOW DENSITY (kg/m ³)			
				TOTAL HOURS RUN 63 1/4											
D.P. STANDS				CUTTING STRUCTURE				CENTRIFUGAL				HOURS RUN			
63 D.P. SINGLES 609.21m				T _c T _n MDC LOC B Gauge OOC Reason Pulled Total Run m/hr.				INTAKE DENSITY (kg/m ³) OVERFLOW DENSITY (kg/m ³) UNDERFLOW DENSITY (kg/m ³)				8 1050 1040 1220			
KELLYDOWN 608m				HOLE CONDITION				HOURS RUN				INTAKE DENSITY (kg/m ³) OVERFLOW DENSITY (kg/m ³) UNDERFLOW DENSITY (kg/m ³)			
TOTAL 730.50m				HOLE DRAG				HOURS RUN				INTAKE DENSITY (kg/m ³) OVERFLOW DENSITY (kg/m ³) UNDERFLOW DENSITY (kg/m ³)			
WT. OF DC 12.50 1000 gms				TORQUE AT BOTTOM				HOURS RUN				INTAKE DENSITY (kg/m ³) OVERFLOW DENSITY (kg/m ³) UNDERFLOW DENSITY (kg/m ³)			
WT. OF STRING 33.5m 1000 gms				FILL ON BOTTOM (m)				HOURS RUN				INTAKE DENSITY (kg/m ³) OVERFLOW DENSITY (kg/m ³) UNDERFLOW DENSITY (kg/m ³)			

DAILY CHECKS

- (1) Daily Walk Around Inspection
- (2) Detailed Inspection-Weekly (using checklist)
- (3) HPS Signs Posted (if required)
- (4) Wall Licensure & Stock Diagram Posted
- (5) Flame Lines Stained
- (6) BOP Drills Performed
- (7) Visually inspect BOP's - Flarelines & Degreaser Lines

- (1) Rig Site Health and Safety Meeting (once a week/month)
- (2) C.A.O.D.C. Rig Safety Inspection Checklist (once a week)
- (3) Meet Inspection Before Raising or Lowering
- (4) Crown Saver Checked
- (5) Motor Kalls checked

OPR.	R.M.
Initial _____	Initial <u>277</u>
Initial _____	Initial _____
Initial _____	Initial _____
Initial _____	Initial <u>277</u>
Initial _____	Initial <u>277</u>
Initial _____	Initial <u>277</u>
Initial _____	Initial <u>277</u>
Initial _____	Initial _____
Initial _____	Initial _____
Initial _____	Initial <u>277</u>
Initial _____	Initial _____
Initial _____	Initial _____
Initial _____	Initial _____

YEAR	01	MONTH	03	DAY	07
RIG NO.	14				
FUEL @ 8:00					
RIG	BOLSER				
W E A T H E R	TEMPERATURE				
	CURRENT CONDITIONS				
	WIND DIRECTION				
	ROAD				

TIME
HOURS

CODE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	ROAD	
OPER.	RIG UP & TEAR DOWN	DRL ACTUAL	REAMING	CORING	COND. MUD & CIRC.	TRIPS	RIG SERVICE	REPAIR RIG	CUT OFF DRL LINE	DEV SURVEY	WIRE LINE LOGS	HEAL CASE & CEMENT	WAIT ON CEMENT	MUDDLE UP B.O.P.	TEST B.O.P.	DRL STEM TEST	PLUG BACK	SQUEEZE CEMENT	FISHING	DIR WORK	SAFETY MTG.						
MORN.		5 1/4			1-2 1/4	1/4																					
DAY		7 1/2				1/4			1/4																		
EVE		7 3/4				1/4																					
TOTAL																											
DRILLING ASSEMBLY																											

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DRILLING ASSEMBLY (At End of Tour)										BIT RECORD					MUD RECORD						
1		2		3		4		5		BIT NO.		#2 NEW									
1		2		3		4		5		SIZE (mm)		200						TIME		08:00 12:00 16:00	
1		2		3		4		5		IADC CODE								DENSITY kg/m³		1020 1020 1020	
1		2		3		4		5		MPG.		UNREL						FUNNEL VIS. (S/L)		45 42 42	
1		2		3		4		5		TYPE		ETD09-XG						W.L. (cm)		7.5 7.5 7.5	
1		2		3		4		5		SERIAL NO.		164838						PH		9.5 9.5 9.5	
1		2		3		4		5		JETS (mm)		3/11.1									
1		2		3		4		5		DEPTH OUT (m)		RNG						MUD/WATER RATIO (ADDED)		SOLIDS CONTROL	
1		2		3		4		5		DEPTH IN (m)		431						PRODUCT		AMOUNT X UNIT	
1		2		3		4		5		TOTAL METRES DRILLED (m)		73						Gel		6.5	
1		2		3		4		5		TOTAL HOURS RUN		9.5						HOURS RUN		INTAKE DENSITY (kg/m³)	
1		2		3		4		5		CUTTING STRUCTURE		T ₁ T ₂ MOC LOC B Gage ODC Reason Pulled m/hr.						HOURS RUN		OVERFLOW DENSITY (kg/m³)	
1		2		3		4		5		D.P.		STANDS		40				HOURS RUN		UNDERFLOW DENSITY (kg/m³)	
1		2		3		4		5		D.P.		SINGLES		386.74				HOURS RUN		INTAKE DENSITY (kg/m³)	
1		2		3		4		5		KELLYDOWN		2.55						HOURS RUN		OVERFLOW DENSITY (kg/m³)	
1		2		3		4		5		TOTAL		504.00						HOURS RUN		UNDERFLOW DENSITY (kg/m³)	
1		2		3		4		5		HOLE DRAG								HOURS RUN		INTAKE DENSITY (kg/m³)	
1		2		3		4		5		TORQUE AT BOTTOM								HOURS RUN		OVERFLOW DENSITY (kg/m³)	
1		2		3		4		5		FILL ON BOTTOM (m)								HOURS RUN		UNDERFLOW DENSITY (kg/m³)	
1		2		3		4		5		SOLE CONDITION								HOURS RUN		INTAKE DENSITY (kg/m³)	
1		2		3		4		5		HOLE DRAG								HOURS RUN		OVERFLOW DENSITY (kg/m³)	
1		2		3		4		5		TORQUE AT BOTTOM								HOURS RUN		UNDERFLOW DENSITY (kg/m³)	
1		2		3		4		5		FILL ON BOTTOM (m)								HOURS RUN		INTAKE DENSITY (kg/m³)	
1		2		3		4		5		HOLE DRAG								HOURS RUN		OVERFLOW DENSITY (kg/m³)	
1		2		3		4		5		TORQUE AT BOTTOM								HOURS RUN		UNDERFLOW DENSITY (kg/m³)	
1		2		3		4		5		FILL ON BOTTOM (m)								HOURS RUN		INTAKE DENSITY (kg/m³)	
1		2		3		4		5		HOLE DRAG								HOURS RUN		OVERFLOW DENSITY (kg/m³)	
1		2		3		4		5		TORQUE AT BOTTOM								HOURS RUN		UNDERFLOW DENSITY (kg/m³)	
1		2		3		4		5		FILL ON BOTTOM (m)								HOURS RUN		INTAKE DENSITY (kg/m³)	
1		2		3		4		5		HOLE DRAG								HOURS RUN		OVERFLOW DENSITY (kg/m³)	
1		2		3		4		5		TORQUE AT BOTTOM								HOURS RUN		UNDERFLOW DENSITY (kg/m³)	
1		2		3		4		5		FILL ON BOTTOM (m)								HOURS RUN		INTAKE DENSITY (kg/m³)	

METRES DRILLED				
FROM	TO	DRILL SIZE CORRECTION	ROTARY R.P.M.	W.C. ON BIT (1000 MET)
445	504	D	6780	9-10

DAY	TOUR	LINER SIZE (mm)	S.P.M.	LINER SIZE (mm)	S.P.M.
		5,100	152	120	
		1,800	60		

DEPTH (m)	DEVIATION (°)	DIRECTION
452	2°	

W. H. H. H. H.

DRILLING ASSEMBLY (At End of Tour)										BIT RECORD										MUD RECORD									
1 SHACK SUB 2.75										22 NEW										1800 0030 2300									
12 D.C 159 110.80										200										1070 1070 1060									
1 X/O -91										VAREL										42 45 43									
BHA 114.71										ETD 09.00										7.5 7.5 8									
										114838										9.5 9 9.5									
										3/11.1																			
										RNG										PRODUCT AMOUNT X UNIT									
										431										6.4									
										112										HOURS RUN INTAKE DENSITY (kg/m³) OVERFLOW DENSITY (kg/m³) UNDERFLOW DENSITY (kg/m³)									
										1744										CENTRIFUGE									
D.P. STANDS										CLIPPING STRUCTURE										HOURS RUN INTAKE DENSITY (kg/m³) OVERFLOW DENSITY (kg/m³) UNDERFLOW DENSITY (kg/m³)									
44 D.P. SINGLES 425.5										T ₁ T ₂ MDC LOC B Gage OCC Reason Pulled Total Run m/hr.										HOURS RUN INTAKE DENSITY (kg/m³) OVERFLOW DENSITY (kg/m³) UNDERFLOW DENSITY (kg/m³)									
KELLYDOWN 5512.2										HOLE CONDITION										8 1070 1050 1720									
TOTAL 543.00										MOLE DRAG																			
T.O.FDC 12.00										TORQUE AT BOTTOM										HOURS RUN INTAKE DENSITY (kg/m³) OVERFLOW DENSITY (kg/m³) UNDERFLOW DENSITY (kg/m³)									
T.O.F STRING 3.00										FILL ON BOTTOM (m)																			

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22

	19	20	21	22	23	24	25	26	TOTAL FISHING	SHALE SHAKER(S)	RENTALS SERVICES	REMARKS
FISHING MTG.	DPR WORK	SAFETY MTG.							8	NO ADJUST 500		
									8	SCREENS CHANGED YES NO		
									8	TOP 1-2 TOP		
									8	MIDDLE 80 MIDDLE		
										BOTTOM 45 BOTTOM		

T X UNIT			
HOURS RUN	INTAKE DENSITY (gpm)	OVERFLOW DENSITY (gpm)	UNDERFLOW DENSITY (gpm)
8	1020	1070	1270
HOURS RUN*	INTAKE DENSITY (gpm)	OVERFLOW DENSITY (gpm)	UNDERFLOW DENSITY (gpm)

0000		30-75		50-75	
T X UNIT					
K	HOURS RUN	INTAKE DENSITY (gpm.)	OVERFLOW DENSITY (gpm.)	UNDERFLOW DENSITY (gpm.)	
K					
C	CUMULATIVE TOTAL GALLONS				
	HOURS RUN	INTAKE DENSITY (gpm.)	OVERFLOW DENSITY (gpm.)	UNDERFLOW DENSITY (gpm.)	
	8	1070	1040	1260	
	HOURS RUN	INTAKE DENSITY (gpm.)	OVERFLOW DENSITY (gpm.)	UNDERFLOW DENSITY (gpm.)	

SOLIDS CONTROL			
EX UNIT			
HOURS:RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)
8	1070	1050	1780
HOURS:RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)

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139784

Form containing multiple sections: License No., Well Name, Operator, Contractor, Surface Location, Signature of Operator's Representative, Signature of Contractor's Rig Manager, Time Log, Drilling Assembly, Bit Record, Mud Record, Metres Drilled, and various data tables for drilling parameters.

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3784

DAILY CHECKS		OPR.	R.M.	YEAR	MONTH	DAY	LAST	O.D. (mm)	MIN. I.D. (mm)	kg/m	MAKE	GRADE	NO. OF JOINTS	TOTAL (m) LENGTH	KB TO CSG HEAD (m)	SET AT (m)		
(1) Daily Well Around Inspection		Initial	Initial				CASING											
(2) Drilling Inspection Weekly (using checklist)		Initial	Initial				TUBING											
(3) H/S Signs Posted (if required)		Initial	Initial				OR											
(4) Well License & Stick Diagram Posted		Initial	Initial				LINER											
(5) Flare Lines Staked		Initial	Initial															
(6) BOP Drills Performed		Initial	Initial															
(7) Visually Inspect BOP's - Flarelines & Degasser Lines		Initial	Initial															
(1) Rig Site Health and Safety Meeting (weekly/monthly)		Initial	Initial				TEMPERATURE	°C	DC/OP SIZE (mm)	LINEAR MASS (kg/m)	GRADE	MIN ID (mm)	TOOL JOINT (mm)	TYPE THREAD	NO OF JOINTS	PUMP TYPE	PUMP MANUFACTURER	STROKE LTR (mm)
(2) C.A.D.C. Rig Safety Inspection Checklist (weekly/monthly)		Initial	Initial				CURRENT CONDITIONS		902	700	2	70	1+1	FM	176	FS 3	EMCO	PM
(3) Mast Inspection Before Raising or Lowering		Initial	Initial				WIND DIRECTION		150	137.2			179	XH	17			
(4) Crown Saver Checked		Initial	Initial				ROAD											
(5) Motor Kicks checked		Initial	Initial															

SHALE SHAKER(S)										RENTALS SERVICES									
NO. TYPE										NO. TYPE									
SCREENS CHANGED										YES NO									
TOP										TOP									
MIDDLE										MIDDLE									
BOTTOM										BOTTOM									

MUD RECORD				METRES DRILLED				TIME LOG				DETAILS OF OPERATION IN SEQUENCE AND REMARKS			
WATER BASE	WATER BASE	WATER BASE	WATER BASE	FROM	TO	D.R. CORR. C	ROTARY R.P.M.	WT. ON BIT (1000 LBS)	FROM	TO	W.C.	W.C.	W.C.	W.C.	
				310	329	0	4/100	7/5	0000	0100	1	15	PRESS. TEST		
									0100	0200	1	6	K.T.H. w/crew		
									0200	0300	1	6	F.P. T. T. PIPE RAM. HYDRIL. HLP 4		
													STAIR VALVES STABBING VALVE, INSIDE		
				4850	159	170			0300	0400	1	15	UPPER KILL DOCK 1-1/4" 10x45mm		
									0400	0500	4	28	TOP DRILL w/crew		
									0500	0600	14	7	DRILL OUT		
									0600	0700	14	9	DRILL 200mm Hole F 310m - 320m		
									0700	0800	14	5	C.R.		
									0800	0900	14	2	DRILL 200mm Hole F 320m - 330m		
									0900	1000	14	2	DRILL 200mm Hole F 330m - 340m		
									1000	1100	14	2	DRILL 200mm Hole F 340m - 350m		
									1100	1200	14	2	DRILL 200mm Hole F 350m - 360m		
									1200	1300	14	2	DRILL 200mm Hole F 360m - 370m		
									1300	1400	14	2	DRILL 200mm Hole F 370m - 380m		
									1400	1500	14	2	DRILL 200mm Hole F 380m - 390m		
									1500	1600	14	2	DRILL 200mm Hole F 390m - 400m		
									1600	1700	14	2	DRILL 200mm Hole F 400m - 410m		
									1700	1800	14	2	DRILL 200mm Hole F 410m - 420m		
									1800	1900	14	2	DRILL 200mm Hole F 420m - 430m		
									1900	2000	14	2	DRILL 200mm Hole F 430m - 440m		
									2000	2100	14	2	DRILL 200mm Hole F 440m - 450m		
									2100	2200	14	2	DRILL 200mm Hole F 450m - 460m		
									2200	2300	14	2	DRILL 200mm Hole F 460m - 470m		
									2300	2400	14	2	DRILL 200mm Hole F 470m - 480m		
									2400	2500	14	2	DRILL 200mm Hole F 480m - 490m		
									2500	2600	14	2	DRILL 200mm Hole F 490m - 500m		
									2600	2700	14	2	DRILL 200mm Hole F 500m - 510m		
									2700	2800	14	2	DRILL 200mm Hole F 510m - 520m		
									2800	2900	14	2	DRILL 200mm Hole F 520m - 530m		
									2900	3000	14	2	DRILL 200mm Hole F 530m - 540m		
									3000	3100	14	2	DRILL 200mm Hole F 540m - 550m		
									3100	3200	14	2	DRILL 200mm Hole F 550m - 560m		
									3200	3300	14	2	DRILL 200mm Hole F 560m - 570m		
									3300	3400	14	2	DRILL 200mm Hole F 570m - 580m		
									3400	3500	14	2	DRILL 200mm Hole F 580m - 590m		
									3500	3600	14	2	DRILL 200mm Hole F 590m - 600m		
									3600	3700	14	2	DRILL 200mm Hole F 600m - 610m		
									3700	3800	14	2	DRILL 200mm Hole F 610m - 620m		
									3800	3900	14	2	DRILL 200mm Hole F 620m - 630m		
									3900	4000	14	2	DRILL 200mm Hole F 630m - 640m		
									4000	4100	14	2	DRILL 200mm Hole F 640m - 650m		
									4100	4200	14	2	DRILL 200mm Hole F 650m - 660m		
									4200	4300	14	2	DRILL 200mm Hole F 660m - 670m		
									4300	4400	14	2	DRILL 200mm Hole F 670m - 680m		
									4400	4500	14	2	DRILL 200mm Hole F 680m - 690m		
									4500	4600	14	2	DRILL 200mm Hole F 690m - 700m		
									4600	4700	14	2	DRILL 200mm Hole F 700m - 710m		
									4700	4800	14	2	DRILL 200mm Hole F 710m - 720m		
									4800	4900	14	2	DRILL 200mm Hole F 720m - 730m		
									4900	5000	14	2	DRILL 200mm Hole F 730m - 740m		
									5000	5100	14	2	DRILL 200mm Hole F 740m - 750m		
									5100	5200	14	2	DRILL 200mm Hole F 750m - 760m		
									5200	5300	14	2	DRILL 200mm Hole F 760m - 770m		
									5300	5400	14	2	DRILL 200mm Hole F 770m - 780m		
									5400	5500	14	2	DRILL 200mm Hole F 780m - 790m		
									5500	5600	14	2	DRILL 200mm Hole F 790m - 800m		
									5600	5700	14	2	DRILL 200mm Hole F 800m - 810m		
									5700	5800	14	2	DRILL 200mm Hole F 810m - 820m		
									5800	5900	14	2	DRILL 200mm Hole F 820m - 830m		
									5900	6000	14	2	DRILL 200mm Hole F 830m - 840m		
									6000	6100	14	2	DRILL 200mm Hole F 840m - 850m		
									6100	6200	14	2	DRILL 200mm Hole F 850m - 860m		
									6200	6300	14	2	DRILL 200mm Hole F 860m - 870m		
									6300	6400	14	2	DRILL 200mm Hole F 870m - 880m		
									6400	6500	14	2	DRILL 200mm Hole F 880m - 890m		
									6500	6600	14	2	DRILL 200mm Hole F 890m - 900m		
									6600	6700	14	2	DRILL 200mm Hole F 900m - 910m		
									6700	6800	14	2	DRILL 200mm Hole F 910m - 920m		
									6800	6900	14	2	DRILL 200mm Hole F 920m - 930m		
									6900	7000	14	2	DRILL 200mm Hole F 930m - 940m		
									7000	7100	14	2	DRILL 200mm Hole F 940m - 950m		
									7100	7200	14	2	DRILL 200mm Hole F 950m - 960m		
									7200	7300	14	2	DRILL 200mm Hole F 960m - 970m		
									7300	7400	14	2	DRILL 200mm Hole F 970m - 980m		
									7400	7500	14	2	DRILL 200mm Hole F 980m - 990m		
									7500	7600	14	2	DRILL 200mm Hole F 990m - 1000m		

MUD RECORD				METRES DRILLED				TIME LOG				DETAILS OF OPERATION IN SEQUENCE AND REMARKS			
WATER BASE	WATER BASE	WATER BASE	WATER BASE	FROM	TO	D.R. CORR. C	ROTARY R.P.M.	WT. ON BIT (1000 LBS)	FROM	TO	W.C.	W.C.	W.C.	W.C.	
				329	387	0	15/100	11-12	0800	0915	14	8	RIG REPAIR (REWIRED SHAKER MOTOR)		
									0915	1230	34	2	DRILL 300mm Hole F 329m - 348m		
									1230	1245	14	10	SURVEY 346m		
									1245	1300	14	22	B.O.P. DRILL		
									1300	1600	3	2	DRILL 300mm Hole F 348m - 387m		
									1400	1500	14	2	8 HRS		
									1500	1600	14	2	8 HRS		
									1600	1700	14	2	8 HRS		
									1700	1800	14	2	8 HRS		
									1800	1900	14	2	8 HRS		
									1900						

DAILY CHECKS	O.P.R.	R.M.
(1) Daily Walk Around Inspection	initial	initial
(2) Detailed Inspection Weekly (using checklist)	initial	initial
(3) HSE Signs Posted (if required)	initial	initial
(4) Wet License & Stick Diagram Posted	initial	initial
(5) Flame Lines Stained	initial	initial
(6) BOP Drills Performed	initial	initial
(7) Visually inspect BOP's - Functioning & Displacement Lines	initial	initial
(1) Rig Site Health and Safety Meeting (once/monthly)		initial
(2) C A O D C Rig Safety Inspection Checklist (once/monthly)		initial
(3) Most Inspection Before Raising or Lowering		initial
(4) Cement Saver Checked		initial
(5) Motor Kicks Checked		initial

YEAR	1	MONTH	2	DAY	2	
FIG NO						
14						
FUEL : 8 00						
FIG			SOLAR			
W E A T H E R	TEMPERATURE					°C
	CURRENT CONDITIONS					
	WIND DIRECTION					
	ROAD					

[illegible]

DRILLING ASSEMBLY (At End of Tour)				BIT RECORD				MUD RECORD				METRES DRILLED			
				ADD TYPE ☐ WATER ☐ SED ☐ G-USED ☐								FROM TO LWD READ CODE-C ROTARY R.P.M. W.T. ON BIT (Tons)			
BIT NO				TIME				Ram 22 Jnts: 219.4 min				MORNING			
SIZE (mm)				DENSITY kg/m ³				35-72 kg/m ³ T-55: STX							
IADC CODE				FUNNEL VIS. (SA)				G/S + F/C -- 311-18 m!							
MFG.				W.L. (cm)				[Signature]							
TYPE				pH											
SERIAL NO.															
JETS															
DEPTH OUT (m)				ADD MATERIALS ADDED				SOLIDS CONTROL							
DEPTH IN (m)				PRODUCT				AMOUNT X UNIT							
TOTAL METRES DRILLED (m)				Cemented 10'				30 tone (75% EXC - SS)							
TOTAL HOURS RUN				30 tone (75% EXC - SS)				30 tone (75% EXC - SS)							
CUTTING STRUCTURE				B Gage OOC Reason Pulled Total Run				30 tone (75% EXC - SS)							
D.P. STANDS				30 tone (75% EXC - SS)				30 tone (75% EXC - SS)							
D.P. SINGLES				30 tone (75% EXC - SS)				30 tone (75% EXC - SS)							
KELLY DOWN				30 tone (75% EXC - SS)				30 tone (75% EXC - SS)							
TOTAL				30 tone (75% EXC - SS)				30 tone (75% EXC - SS)							
HOLE DRAG				30 tone (75% EXC - SS)				30 tone (75% EXC - SS)							
TORQUE AT BOTTOM				30 tone (75% EXC - SS)				30 tone (75% EXC - SS)							
FILL ON BOTTOM (m)				30 tone (75% EXC - SS)				30 tone (75% EXC - SS)							

DRILLING ASSEMBLY (At End of Tour)										BIT RECORD										MUD RECORD										METRES DRILLED									
										BIT NO. _____ SIZE (mm) _____ IADC CODE _____ MFG. _____ TYPE _____ SERIAL NO. _____ JETS (mm) _____ DEPTH OUT (m) _____ DEPTH IN (m) _____ TOTAL METRES DRILLED (m) _____ TOTAL HOURS RUN _____										TIME _____ DENSITY kg/m ³ _____ FUNNEL VIS. - (S/L) _____ W.L. (cm) _____ pH _____ PRODUCT _____ AMOUNT X UNIT _____ LPSO 15x _____										FROM 310 TD TO _____ D.D. MAX CORE-C _____ ROTARY R.P.M. _____ W.T. ON BIT (1000-2000) _____ LINER SIZE (mm) _____ S.P.M. _____ LINER SIZE (mm) _____ S.P.M. _____ DEPTH (m) _____ DEVIATION (°) _____ DIRECTION _____									
D.P. STANDS _____ D.P. SINGLES _____ KELLYDOWN _____ TOTAL _____ WT. OF DC _____ WT. OF STRING _____										CUTTING STRUCTURE Y Y ₁ MDC LOC B Gage ODC Reason Pulled Total Run m/hr _____ HOLE CONDITION _____ HOLE DRAG _____ TORQUE AT BOTTOM _____ FILL ON BOTTOM (m) _____										HOURS RUN _____ INTAKE DENSITY (g/cm ³) _____ OVERFLOW DENSITY (g/cm ³) _____ UNDERFLOW DENSITY (g/cm ³) _____ HOURS RUN _____ INTAKE DENSITY (g/cm ³) _____ OVERFLOW DENSITY (g/cm ³) _____ UNDERFLOW DENSITY (g/cm ³) _____ HOURS RUN _____ INTAKE DENSITY (g/cm ³) _____ OVERFLOW DENSITY (g/cm ³) _____ UNDERFLOW DENSITY (g/cm ³) _____																			

[illegible]

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139782

DAILY CHECKS

- (1) Daily Well Around Inspection
 (2) Detailed Inspection Weekly (using checklist)
 (3) H & S Signs Posted (if required)
 (4) Well Location & Stick Diagram Posted
 (5) Flare Lines Staked
 (6) BOP Drills Performed
 (7) Visually inspect BOP's - Handlines & Degasser Lines
- (1) Rig Site Health and Safety Meeting (once a month)
 (2) C.A.O.D.C. Rig Safety Inspection Checklist (once a month)
 (3) Meet Inspection Before Raising or Lowering
 (4) Crown Saver Checked
 (5) Motor Kicks checked

OPR.

R.M.

Initial

Initial

Initial

Initial

Initial

Initial

Initial

Initial

Initial

YEAR

MONTH

DAY

FUEL @ 8:00

WATER

TEMPERATURE

CURRENT

CONDITIONS

WIND DIRECTION

ROAD

LAST

CASING

TUBING

OR

LINER

O.D. (mm)

MIN. I.D. (mm)

kg/m

MAKE

GRADE

NO. OF JOINTS

TOTAL (m)

KB. TO CSG HEAD (m)

SET AT (m)

DC/DP SIZE (mm)

LINEAR MASS (kg/m)

GRADE

MIN. I.D. (mm)

TOOL JOINT (mm)

TYPE

THREAD

NO. OF JOINTS

PUMP TYPE

PUMP MANUFACTURER

STROKE (mm)

LTH (mm)

SHALE SHAKER(S)

RENTALS SERVICES

NO. TYPE

SCREENS CHANGED

YES

NO

TOP

MIDDLE

BOTTOM

TOP

MIDDLE

BOTTOM

MUD RECORD

TIME	0400	0600
68.1	1.34	67
6.8	67	
7.0	1.0	

METRES DRILLED

TIME LOG

DETAILS OF OPERATION IN SEQUENCE AND REMARKS

FROM	TO	NO. CORR.	ROTARY R.P.M.	WT. ON BIT (1000-000)	FROM	TO	TIME	REMARKS
240	288				2000	2005	1/4	1.00 SERVICE
					2005	2005	1/2	1.00 OH.
					2005	2005	1/4	1.00 WITH 1.5" 3"
					2005	2005	1/4	1.00 FROM 155m - 240m
					2005	2005	1/4	1.00 DRILL 31mm HOLE F 240m - 259m
					2005	2005	1/4	1.00 SURVEY @ 247m
					2005	2005	1/4	1.00 DRILL 31mm HOLE F 259m - 288m

MUD RECORD

TIME	0900	1100
35	1340	
70	80	
9	9	

METRES DRILLED

TIME LOG

DETAILS OF OPERATION IN SEQUENCE AND REMARKS

FROM	TO	NO. CORR.	ROTARY R.P.M.	WT. ON BIT (1000-000)	FROM	TO	TIME	REMARKS
288	310				0800	1200	4/2	DRILL 31mm HOLE 288m - 310m
					1200	1300	1/5	CIR
					1300	1315	1/4	7.00 SERVICE
					1315	1320	1/4	10.00 SURVEY @ 305m
					1320	1600	2/4	6.00 WIPER TIP

MUD RECORD

TIME	045	05
45		
05		

METRES DRILLED

TIME LOG

DETAILS OF OPERATION IN SEQUENCE AND REMARKS

FROM	TO	NO. CORR.	ROTARY R.P.M.	WT. ON BIT (1000-000)	FROM	TO	TIME	REMARKS
310					1600	1830	2/4	WIPER TIP (FROM 306m - 310m)
					1830	1930	1/5	5.00 Pipe & Blow Kelly
					1930	2100	1/3	6.00 P.O.D.H.
					2100	2400	3/12	Run Casing

139781

LICENCE NO.: **NEB 14-02-1-3** WELL NAME AND NO.: **DEVLAN ET AL THUNDER RIVER N-73**

OPERATOR: **DEVLAN EXPLORATION LTD** CONTRACTOR: **ALTA DRILLING**

SURFACE LOCATION: **ALTA DRILLING** UNIQUE ID:

SIGNATURE OF OPERATOR'S REPRESENTATIVE: *[Signature]* SIGNATURE OF CONTRACTOR'S RIG MANAGER: *[Signature]*

DAILY CHECKS

(1) Daily Walk Around Inspection
(2) Detailed Inspection Weekly (using checklist)
(3) H/S Signs Posted (if required)
(4) Well Log and Shot Diagram Posted
(5) Flare Lines Staked
(6) BOP Drills Performed
(7) Visually inspect BOPs - Flarelines & Degasser Lines

(1) Rig Site Health and Safety Meeting (once a month)
(2) C.A.O.D.C. Rig Safety Inspection Checklist (once a month)
(3) Mast Inspection Before Raising or Lowering
(4) Crown Saver Checked
(5) Motor Kils checked

OPR. *[Signature]* R.M. *[Signature]*

YEAR: **1998** MONTH: **02** DAY: **14**

RIG NO: **14** FUEL @ 8:00:

WHEELS: BOILER:

TEMPERATURE: °C
CURRENT CONDITIONS:
WIND DIRECTION:
ROAD:

TIME HOURS	CODE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	OPER.	RIG UP & TEAR DOWN	DRILL ACTUAL	REAMING	CORING	CONG. MUD & CIRC.	TRIPS	RIG SERVICE	REPAIR RIG	CUT OFF PIPE LINE	DEV SURVEY	WELL LOGS	FLARE CASE & CEMENT	WELL ON CEMENT	WELL OFF R.O.P.	TEST B.O.P.	DRILL STEM TEST	PLUG BACK	SQUEEZE CEMENT	FISHING	DIR. WORK	SAFETY MTG.				
	MORN.		04			04			04		04															
	DAY		21	1			2	1	04	2																
	EVE		04				04	1	04	04		04														
	TOTAL																									

DRILLING ASSEMBLY (At End of Tour)

BIT NO. **22 NEW** SIZE (mm) **200** IADC CODE MFG. **VARCEL** TYPE **L122** SERIAL NO. **154870** JETS (mm) **5/12.7** DEPTH OUT (m) **510** DEPTH IN (m) **173** TOTAL METRES DRILLED (m) **137** TOTAL HOURS RUN **22.14**

CUTTING STRUCTURE: MDC LOC B Gage OOC Reason Total Run m/hr.

D.P. STANDS SINGLES **193.69** KELLYDOWN **3.59** TOTAL **310**

WT.OFDC **12,000** TORQUE AT BOTTOM WT.OFSTRING **23,000** FILL ON BOTTOM (m)

MUD RECORD

MUD TYPE: **WATER BASED** TIME **0200** DENSITY **1215** FUNNEL VIS. (SL) **60** W.L. (cm) **1.4** PH **7.5**

PRODUCT **GEL** AMOUNT X UNIT **55X**

METRES DRILLED

FROM **279** TO **310** D.D. CORR. **0** ROTARY R.P.M. **40** W.T. ON BIT (1000 gms) **5.6**

DEPTH (m) **276** DEVIATION (m) **2.4** DIRECTION

DEPTH (m) **305** DEVIATION (m) **2** DIRECTION

DRILLING ASSEMBLY (At End of Tour)

BIT NO. **21 BK** SIZE (mm) **311** IADC CODE MFG. **VARCEL** TYPE **L127** SERIAL NO. **140640** JETS (mm) **4/12.7** DEPTH OUT (m) **173** DEPTH IN (m) **173** TOTAL METRES DRILLED (m) **19** TOTAL HOURS RUN **2**

CUTTING STRUCTURE: MDC LOC B Gage OOC Reason Total Run m/hr.

D.P. STANDS SINGLES **67.79** KELLYDOWN **11.71** TOTAL **191.95**

WT.OFDC **12,000** TORQUE AT BOTTOM WT.OFSTRING **21,000** FILL ON BOTTOM (m)

MUD RECORD

MUD TYPE: **WATER BASED** TIME **1420** DENSITY **1300** FUNNEL VIS. (SL) **57** W.L. (cm) **9** PH **7**

PRODUCT **GEL** AMOUNT X UNIT **55X**

METRES DRILLED

FROM **173** TO **192** D.D. CORR. **0** ROTARY R.P.M. **12** W.T. ON BIT (1000 gms) **5.6**

DEPTH (m) **199** DEVIATION (m) **2.4** DIRECTION

DEPTH (m) **199** DEVIATION (m) **2.4** DIRECTION

DRILLING ASSEMBLY (At End of Tour)

BIT NO. **21 BK** SIZE (mm) **311** IADC CODE MFG. **VARCEL** TYPE **L127** SERIAL NO. **140640** JETS (mm) **4/12.7** DEPTH OUT (m) **240** DEPTH IN (m) **173** TOTAL METRES DRILLED (m) **67** TOTAL HOURS RUN **2.14**

CUTTING STRUCTURE: MDC LOC B Gage OOC Reason Total Run m/hr.

D.P. STANDS SINGLES **116.20** KELLYDOWN **11.38** TOTAL **240.36**

WT.OFDC **12,000** TORQUE AT BOTTOM WT.OFSTRING **21,000** FILL ON BOTTOM (m)

MUD RECORD

MUD TYPE: **WATER BASED** TIME **1800** DENSITY **1230** FUNNEL VIS. (SL) **50** W.L. (cm) **9** PH **7**

PRODUCT **GEL** AMOUNT X UNIT **55X**

METRES DRILLED

FROM **192** TO **240** D.D. CORR. **0** ROTARY R.P.M. **12** W.T. ON BIT (1000 gms) **5.6**

DEPTH (m) **199** DEVIATION (m) **2.4** DIRECTION

DEPTH (m) **199** DEVIATION (m) **2.4** DIRECTION

9781

[illegible]

18	19	20	21	22	23	24	25	26	TOTALS	SHALE SHAKER(S)	
SCREEN	FISHING	DIR. WORK	SAFETY MTO.							NO.	TYPE
									4	SCREENS CHANGED	YES ☐ NO ☐
									3	TOP	40 TOP
									4	MIDDLE	40 MIDDLE
										BOTTOM	45 BOTTOM

[illegible][illegible]

MUD RECORD			METRES DRILLED				TIME LOG		DETAILS OF OPERATION IN SEQUENCE AND REMARKS	
DATE	TIME	DEPTH (m)	FROM	TO	DRD REAR CORRECT	ROTARY R.P.M.	WT ON BIT (1000-lbs)	FROM	TO	REMARKS
1972	1200	2330						1645	1730	1 1/2 2 DRILL 311m - Hole 192m - 2m
1972	1245							1720	1745	1 1/4 7 RIG SERVICE
1972	41							1745	1800	1 1/4 10 SURF 199m
1972	9							1800	2215	1 1/2 2 DRILL 311m - Hole 192m - 2m
1972								2215	2230	1 1/4 5 RIG
1972								2300	2300	1 1/2 6 T.O.O.H. - D.T. - TIGHT HOLE
SOUNDS CONTROL			SOUNDS CONTROL				SOUNDS CONTROL			
MANT X UNIT			MANT X UNIT				MANT X UNIT			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)	OVERFLOW DENSITY (g/cm ³)	UNDERFLOW DENSITY (g/cm ³)							
CERAMIC			CERAMIC				CERAMIC			
HOURS RUN	INTAKE DENSITY (g/cm ³)									

DAILY CHECKS		OPPL	R.M.	YEAR	MONTH	DAY
1. Check Photo Review Inspection	Initial	Initial		1961	11	14
2. Disturbed Inspection/Review, using Checksheet	Initial	Initial		FUEL 45.00		
3. PM's Sign-off / Required	Initial	Initial		ROSEN		
4. Check Location & Move Program Product	Initial	Initial		TEMPERATURE 44°C		
5. Fuel Level Monitored	Initial	Initial		CURRENT CONDITIONS		
6. GTP Data Performance	Initial	Initial		WIND DIRECTION		
7. Verify operator's GTP's - Parameters & Engageable Status	Initial	Initial		ROAD		
8. Log Day/night work history (Time) - see Logbook	Initial	Initial				
9. Review & Log Safety Inspection (Standard Inspection)	Initial	Initial				
10. Read Analyst's Station Reading & Logging	Initial	Initial				
11. Current Temp. Read and	Initial	Initial				
12. Motor Ribs checked	Initial	Initial				

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LICENCE NO.: **NEO 9211-021-3** WELL NAME AND NO.: **DEVIANET-AL THUNDER RIVER N-73**

OPERATOR: **DEVIAN EXPLO-ATION LTD.** CONTRACTOR: **ALITA DRILLING**

SURFACE LOCATION: _____ UNIQUE ID: _____

SIGNATURE OF OPERATOR'S REPRESENTATIVE: _____ SIGNATURE OF CONTRACTOR'S RIG MANAGER: _____

DAILY CHECKS

(1) Daily Walk Around Inspection
(2) Detailed Inspection Weekly (using checklist)
(3) HPS Signs Posted (if required)
(4) Well License & Stock Diagram Posted
(5) Flare Lines Stained
(6) BOP Drills Performed
(7) Visually inspect BOP's - Flarelines & Degasser Lines

(1) Rig Site Health and Safety Meeting (once a month)
(2) C.A.O.D.C. Rig Safety Inspection Checklist (once a month)
(3) Mast Inspection Before Raising or Lowering
(4) Crown Saver Checked
(5) Motor Kite checked

OPR. _____ T.R.M. _____

YEAR: **2001** MONTH: **02** DAY: **14**

RIG NO. **14**

FUEL @ 8:00 _____

TEMPERATURE _____ °C

CURRENT CONDITIONS _____

WIND DIRECTION _____

ROAD _____

TIME	OPER	DRILL ACTUAL	REAMING CORING	CONC MUD & CIRC	TRIPS	RIG SERVICE	REPAIR RIG	CUT OFF DRILL LINE	DEV SURVEY	WIRE LINE LOGS	PLUG CASE & CEMENT	WAIT ON CEMENT	APPLY L.P. RIGGING	TEST B.O.P.	DRILL STEM TEST	PLUG BACK	SQUEEZE CEMENT	FISHING	DIP WORK	SAFETY MTG	DRILL RIG	DRILL LOG
MORN		12																				
DAY		6.74		1/2	1/4	1/4		1/2														
EVE																						
TOTAL																						

DRILLING ASSEMBLY (At End of Tour)

BIT RECORD

1 **0.1 Sub** **.31** m BIT NO. **155**
SIZE (mm) **311**
IADC CODE _____
MFG. **VARCEL**
TYPE **150 3711**
SERIAL NO. **140640**
JETS (mm) **4/12.7**
DEPTH OUT (m) _____
DEPTH IN (m) _____
TOTAL METRES DRILLED (m) _____
TOTAL HOURS RUN **1/4**

CUTTING STRUCTURE
Y Y₀ MOC LOC B Gage OOC Reason Total Run m/hr.

MUD RECORD

TIME **0600**
DENSITY kg/m³ **1500**
FUNNEL VIS. (SL) **600**
W.L. (cm²) _____
pH _____

PRODUCT **GEL** **2.5** **AMOUNT X UNIT**

W.T. OF DC **7.500** **WT. OF STRING** **10.500**

METRES DRILLED

FROM	TO	DRD COR-C	ROTARY R.P.M.	WT. ON BIT (1000 lbs)
13	14	1		

DEPTH (m)	DEVIATION (°)	DIRECTION

DRILLING ASSEMBLY (At End of Tour)

BIT RECORD

1 **1.1 Sub** **.31** m BIT NO. **#1 RR**
SIZE (mm) **311**
IADC CODE _____
MFG. **VARCEL**
TYPE **L127**
SERIAL NO. **140640**
JETS (mm) **4/12.7**
DEPTH OUT (m) **15**
DEPTH IN (m) **15**
TOTAL METRES DRILLED (m) **120**
TOTAL HOURS RUN **7.4**

CUTTING STRUCTURE
Y Y₀ MOC LOC B Gage OOC Reason Total Run m/hr.

MUD RECORD

TIME **0600**
DENSITY kg/m³ _____
FUNNEL VIS. (SL) _____
W.L. (cm²) _____
pH _____

PRODUCT **3 APP** **3 SKS** **AMOUNT X UNIT**
Bicorb **3 SKS**
Gel **2.5 SKS**

W.T. OF DC **18.500** **WT. OF STRING** **26.000**

METRES DRILLED

FROM	TO	DRD COR-C	ROTARY R.P.M.	WT. ON BIT (1000 lbs)
48	135	1		

DEPTH (m)	DEVIATION (°)	DIRECTION
60	4	
95	4-1	

DRILLING ASSEMBLY (At End of Tour)

BIT RECORD

1 **1.1 Sub** **.31** m BIT NO. **#1 RR**
SIZE (mm) **311**
IADC CODE _____
MFG. **VARCEL**
TYPE **L127**
SERIAL NO. **140640**
JETS (mm) **4/12.7**
DEPTH OUT (m) **173**
DEPTH IN (m) **15**
TOTAL METRES DRILLED (m) **153**
TOTAL HOURS RUN **15**

CUTTING STRUCTURE
Y Y₀ MOC LOC B Gage OOC Reason Total Run m/hr.

MUD RECORD

TIME **0600**
DENSITY kg/m³ _____
FUNNEL VIS. (SL) _____
W.L. (cm²) _____
pH _____

PRODUCT **3 APP** **3 SKS** **AMOUNT X UNIT**
Bicorb **3 SKS**
Gel **2.5 SKS**

W.T. OF DC **16.500** **WT. OF STRING** _____

METRES DRILLED

FROM	TO	DRD COR-C	ROTARY R.P.M.	WT. ON BIT (1000 lbs)
135	152	1		

DEPTH (m)	DEVIATION (°)	DIRECTION
133	2	

[illegible]

DRILLING ASSEMBLY (At End of Tour)				BIT RECORD				MUD RECORD				METRES DRILLED			
				BIT NO.				TIME				FROM			
				SIZE (mm)				DENSITY kg/m ³				TO			
				IADC CODE				FUNNEL VIS. (S/L)				D-D READ CORRECT			
				MFG.				W.L. (cm)				ROTARY R.P.M.			
				TYPE				pH				WT. ON BIT (1000 da)			
				SERIAL NO.				MUD MATERIALS ADDED				LINER SIZE (mm)			
				JETS (mm)				SOLIDS CONTROL				S.P.M.			
				DEPTH OUT (m)				PRODUCT				AMOUNT X UNIT			
				DEPTH IN (m)				Gel				15 SXS.			
				TOTAL METRES DRILLED (m)				HOURS RUN				INTAKE DENSITY (gpm)			
				TOTAL METRES RUN								OVERFLOW DENSITY (gpm)			
				CUTTING STRUCTURE								UNDERFLOW DENSITY (gpm)			
				T ₁ T ₂ MDC LOC B Gage OOC Reason Pulled Total Run m/hr.											
D.P. STANDS															
D.P. SINGLES															
KELLYDOWN				HOLE CONDITION											
TOTAL				HOLE DRAG											
WT. OF DC				TORQUE AT BOTTOM											
WT. OF STRING				FILL ON BOTTOM (m)											

DRILLING ASSEMBLY (At End of Tour)						BIT RECORD							MUD RECORD								METRES DRILLED						
						MUD TYPE ☐ WATER BASED ☐ OIL BASED															FROM TO DRO-PEAR CORREC ROTARY R.P.M. WT. OF BIT (1000 gms)						
BIT NO.						TIME																					
SIZE (mm)						DENSITY kg/m ³																					
IADC CODE						FUNNEL VIS. - (S/L)																					
MPG						W.L. (cm ³)																					
TYPE						pH																					
SERIAL NO.																											
JETS (mm)																											
DEPTH OUT (m)						MUD MATERIALS ADDED							SOLIDS CONTROL														
DEPTH IN (m)						PRODUCT AMOUNT X UNIT							Densities								DEPTH (m) DEVIATION (°) DIRECTION						
TOTAL METRES DRILLED (m)													HOURS RUN INTAKE DENSITY (g/cm ³) OVERFLOW DENSITY (g/cm ³) UNDERFLOW DENSITY (g/cm ³)														
TOTAL HOURS RUN																											
CUTTING STRUCTURE						CENTRIFUGE																					
D.P.	STANDS					T ₁	T ₂	MOC	LOC	B	Gage	OOC	Reason Pulled	Total Run m/hr.	HOURS RUN INTAKE DENSITY (g/cm ³) OVERFLOW DENSITY (g/cm ³) UNDERFLOW DENSITY (g/cm ³)												
D.P.	SINGLES																										
KELLYDOWN						SOLE CONDITION																					
TOTAL						HOLE DRAG																					
WT. OF DC						TORQUE AT BOTTOM							HOURS RUN INTAKE DENSITY (g/cm ³) OVERFLOW DENSITY (g/cm ³) UNDERFLOW DENSITY (g/cm ³)								DRIZZERS AVAILABLE						
WT. OF STRING						FCL ON BOTTOM (m)																					

3

BOAT COMMENT	FISHING	DRL WORK	SAFETY MTG.				
				100 SOUTHERN	100 LOST	SIGNS PLANK	DUEL RAIN
				4	2 1/2		
						1 X	
						IV-1	574

TOTALS	SHALE SHAKERS		RENTALS SERVICES	
	NO	TYPE		
8	SCREENS CHANGED	YES NO		
	TOP	TOP		
8	MIDDLE	MIDDLE		
	BOTTOM	BOTTOM		

[illegible][illegible][illegible][illegible][illegible]

METRES DRILLED		TIME LOG		DETAILS OF OPERATION IN SEQUENCE AND REMARKS	
FROM	TO	D&D COR-C	ROTARY R.P.M.	W.C. BIT (NO. & SIZE)	
					1600 1715 14 3/4 USED ON FLANGE FOR DIVERTER
					1715 2015 3 1/4 NIPPLE UP DIVERTER
					2015 2400 3 1/4 3/4 DRILL RAT HOLE
	LINER SIZE (mm.)	S.P.M.	LINER SIZE (mm.)	S.P.M.	
					SHIRS.
DEVIATION SURVEY					
DEPTH (m)	DEVIATION (°)	DIRECTION			
NOTES					
DRILLER'S SIGNATURE		BOILER MANAGER'S SIGNATURE		SUPERVISOR'S SIGNATURE	

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LICENCE NO.: **NEB 9211-D26-1-3** WELL NAME AND NO.: **DEVIAN at-2 THUNDER RIVER N-73**

OPERATOR: **DEVIAN EXPLORATION LTD** CONTRACTOR: **PIKITA DRILLING**

SURFACE LOCATION: _____ UNIQUE ID: _____

SIGNATURE OF OPERATOR'S REPRESENTATIVE: *[Signature]* SIGNATURE OF CONTRACTOR'S RIG MANAGER: *[Signature]*

DAILY CHECKS

- (1) Daily Well Around Inspection
- (2) Detailed Inspection (Weekly Lubing Checklist)
- (3) P.D. Signs Placed (if required)
- (4) Well Location P. Signs Designated Placed
- (5) Plans & Maps Updated
- (6) BOP Tests Performed
- (7) Heavy Impact BOP's, Flowlines & Discharge Lines
- (8) Rig Site Health and Safety Meeting (monthly/weekly)
- (9) C.A.O.D.C. Rig Safety Inspection Checklist (monthly/weekly)
- (10) Well Inspection Before Rigging or Lifting
- (11) Casing Lower Check
- (12) Motor Roto checked

OPL

R.M. *[Signature]*

Initial *[Signature]*

Initial *[Signature]*

Initial *[Signature]*

Initial *[Signature]*

Initial *[Signature]*

Initial *[Signature]*

Initial *[Signature]*

Initial *[Signature]*

Initial *[Signature]*

Initial *[Signature]*

Initial *[Signature]*

RIG NO.

201 87 22

14

FUEL: 5.00

SOLE

TEMPERATURE

CURRENT

CONDITIONS

WIND DIRECTION

ROAD

TIME	CODE NO.	OPER	RISE UP & TEAR DOWN	DRILL ACTUAL	REAMING	CORING	COND. MUD & C.C.	TRIPS	R.O. SERVICE	REPAIR RIG	CUT OFF DRILL LINE	DEV SURVEY	WIRE LINE LOGS	RUN CABLE & CEMENT	WALL ON CEMENT	WALL UP B.O.P.	TEST B.O.P.	DRILL STEM TEST	PLUG BACK	BOULETS CEMENT	PREPARED	DR. WORK	SAFETY MTD.	LA
MORN.																								
DAY																								
EVE.																								
TOTAL																								

DRILLING ASSEMBLY (At End of Tour)		BIT RECORD		MUD RECORD		METRES DRILLED	
BIT NO.	SIZE (mm)	TIME	DENSITY kg/m ³	FROM	TO	ROTARY R.P.M.	W.C. (mm)
W.C. CODE	MFG	FUNNEL VIS. (SL)	W.L. (cm)	DEPTH (m)	DEVIATION (°)	DIRECTION	
TYPE	SERIAL NO.	PH	PRODUCT	AMOUNT X UNIT			
JETS	DEPTH OUT						
DEPTH IN	TOTAL METRES DRILLED						
TOTAL HOURS RUN	CUTTING STRUCTURE						
D.P. STANDS	D.P. SINGLES						
KELLYDOWN							
TOTAL	HOLE DRAG						
WT. OF DC	TORQUE AT BOTTOM						
WT. OF STRING	FILL ON BOTTOM (m)						

DRILLING ASSEMBLY (At End of Tour)		BIT RECORD		MUD RECORD		METRES DRILLED	
BIT NO.	SIZE (mm)	TIME	DENSITY kg/m ³	FROM	TO	ROTARY R.P.M.	W.C. (mm)
W.C. CODE	MFG	FUNNEL VIS. (SL)	W.L. (cm)	DEPTH (m)	DEVIATION (°)	DIRECTION	
TYPE	SERIAL NO.	PH	PRODUCT	AMOUNT X UNIT			
JETS	DEPTH OUT						
DEPTH IN	TOTAL METRES DRILLED						
TOTAL HOURS RUN	CUTTING STRUCTURE						
D.P. STANDS	D.P. SINGLES						
KELLYDOWN							
TOTAL	HOLE DRAG						
WT. OF DC	TORQUE AT BOTTOM						
WT. OF STRING	FILL ON BOTTOM (m)						

DRILLING ASSEMBLY (At End of Tour)		BIT RECORD		MUD RECORD		METRES DRILLED	
BIT NO.	SIZE (mm)	TIME	DENSITY kg/m ³	FROM	TO	ROTARY R.P.M.	W.C. (mm)
W.C. CODE	MFG	FUNNEL VIS. (SL)	W.L. (cm)	DEPTH (m)	DEVIATION (°)	DIRECTION	
TYPE	SERIAL NO.	PH	PRODUCT	AMOUNT X UNIT			
JETS	DEPTH OUT						
DEPTH IN	TOTAL METRES DRILLED						
TOTAL HOURS RUN	CUTTING STRUCTURE						
D.P. STANDS	D.P. SINGLES						
KELLYDOWN							
TOTAL	HOLE DRAG						
WT. OF DC	TORQUE AT BOTTOM						
WT. OF STRING	FILL ON BOTTOM (m)						

SIGNATURE OF CONTRACTOR'S RIG MANAGER:

- (1) Daily Waste Around Inspection
- (2) Detailed Inspection Weekly (waste checked)
- (3) MTS Signs Posted (if required)
- (4) Aerial License & Sign Diagram Posted
- (5) Flame Line Stained
- (6) BOM Drills Performed
- (7) Visually inspect BOM's Furnaces & Discharge

- (1) Hog Site Health and Safety Meeting (concerns)
- (2) C A D G Hog Safety Inspection Checklist
- (3) Meet Inspection Before Running or Cribbing
- (4) Crook Saver Checked
- (5) Motor Mats checked

_____	Initial _____
_____	Initial _____
_____	Initial _____
_____	Initial _____
_____	Initial _____
_____	Initial _____
_____	Initial _____
()	Initial _____
G/msh)	Initial _____
	Initial _____
	Initial _____
	Initial _____

YEAR	MONTH	DAY
01	02	21
RIG NO. 14		
FUEL @ 8:00		
RIG		BOILER
WEATHER	TEMPERATURE °C	
	CURRENT CONDITIONS	
	WIND DIRECTION	
	ROAD	

[illegible]

DRILLING ASSEMBLY (At End of Tour)				BIT RECORD				MUD RECORD				METRES DRILLED							
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100				1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100				1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100				1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100				1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97			

[illegible]

DRILLING ASSEMBLY				BIT RECORD				MUD RECORD				METRES DRILLED			
At End of Run															
DRILLING ASSEMBLY				BIT NO.				MUD TYPE				METRES DRILLED			
SIZE (mm)				SIZE (mm)				TIME				FROM TO			
MDC CODE				MDC CODE				DENSITY (g/cm³)				TO DRY CORR.			
MFG.				MFG.				FUNNEL VISC. (SA)				ROTARY R.P.M.			
TYPE				TYPE				W.L. (cm)				WT. ON BIT (1000gms)			
SERIAL NO.				SERIAL NO.				pH							
JETS				JETS											
DEPTH OUT (m)				DEPTH OUT (m)				MUD MATERIALS ADDED				REDUCED RUN SPEED			
DEPTH IN (m)				DEPTH IN (m)				PRODUCT AMOUNT X UNIT				DEVIATION SCALE			
TOTAL METRES DRILLED				TOTAL METRES DRILLED				HOURS RUN				DEPTH (m)			
TOTAL HOURS RUN				TOTAL HOURS RUN				INTAKE DENSITY (g/cm³)				DEVIATION (°)			
CUTTING STRUCTURE				CUTTING STRUCTURE				OVERFLOW DENSITY (g/cm³)				DIRECTION			
D.P. STANDS				D.P. STANDS				UNDERFLOW DENSITY (g/cm³)							
D.P. SINGLES				D.P. SINGLES				CENTRIFUGAL							
KELLY DOWN				KELLY DOWN				HOURS RUN							
TOTAL				TOTAL				INTAKE DENSITY (g/cm³)							
WT. OF DC				WT. OF DC				OVERFLOW DENSITY (g/cm³)							
WT. OF STRING				WT. OF STRING				UNDERFLOW DENSITY (g/cm³)							
TORQUE AT BOTTOM				TORQUE AT BOTTOM				DRILLER'S SIGNATURE							
FILL ON BOTTOM (m)				FILL ON BOTTOM (m)											

139776

DAILY CHECKS

- (1) Daily Walk Around Inspection
- (2) Detailed Inspection Weekly (using Checksheet)
- (3) HVS Signs Posted (if required)
- (4) Wall License & Stairs Diagram Posted
- (5) Floor Lines Staked
- (6) BOP Drills Performed
- (7) Visually inspect BOP's - Flarepans & Degasser Lines
- (8) Rig Site Health and Safety Meeting (once a week/month)
- (9) C.A.O.D. Rig Safety Inspection Checksheet (once a week/month)
- (10) Mast Inspection Before Raising or Lowering
- (11) Crown Shear Checked
- (12) Motor Kils Checked

O.P.R.	R.M.
Initial _____	Initial _____
Initial _____	Initial _____
Initial _____	Initial _____
Initial _____	Initial _____
Initial _____	Initial _____
Initial _____	Initial _____
Initial _____	Initial _____
(empty)	Initial _____
	Initial _____
	Initial _____
	Initial _____

YEAR	MONTH	DAY
RIG NO.	FUEL @ 8:00	
RIG	BOLLER	
WEATHER	TEMPERATURE	
	CURRENT CONDITIONS	
	WIND DIRECTION	

[illegible][illegible]

TO FROM	SHALE SHAKER(S)		RENTALS SERVICES			
	NO.	TYPE				
C	SCREENS CHANGED		YES	NO		
	TOP	TOP				
	MIDDLE	MIDDLE				
	BOTTOM	BOTTOM				

MUD RECORD

[illegible]

METRES DRILLED

[illegible]

TIME LOG

[illegible]

DETAILS OF OPERATION IN SEQUENCE AND REMARKS

DETAILS OF OPERATION IN SEQUENCE AND REMARKS

WAIT ON DAYLIGHT.

NO CREW, FLIGHT FR. FIRSTAIR
TO INUVIK - STOPPED IN.

HAD 2 DRIVE FR (200)
TO INUVIK.

MUD RECORD

COUNT X UNIT			
HOURS RUN	INTAKE DENSITY (gpm)	OVERFLOW DENSITY (gpm)	UNDERFLOW DENSITY (gpm)
CENTRIFUGES			
HOURS RUN	INTAKE DENSITY (gpm)	OVERFLOW DENSITY (gpm)	UNDERFLOW DENSITY (gpm)
HOURS RUN	INTAKE DENSITY (gpm)	OVERFLOW DENSITY (gpm)	UNDERFLOW DENSITY (gpm)

METRES DRILLED

METRES DRILLED				
FROM	TO	DR-D CORE-C	ROTARY R.P.M.	WT ON BIT (1000 gms)
FOOT		ROTARY		
LINER SIZE (mm)	S.P.M.	LINER SIZE (mm)	S.P.M.	
REDUCED RPM/ SPEED				
	@		@	
DEVIATION SURVEY				
DEPTH (m)	DEVIATION (°)		DIRECTION	
DRILLER SIGNATURE				

TIME LOG

[illegible]

DETAILS OF OPERATION IN SEQUENCE AND REMARKS

DETAILS OF OPERATION IN SEQUENCE AND REMARKS

MOVE AKITA #14 FOR DEULAN
FR. TRF RIVER B-10 TO THUNDER RIVER
N-73 W/ 4 PENTASTAR TRUCKS
16 Km.

NO RELIEF.

MUD RECORD

[illegible]

MÈTRES DRILLED

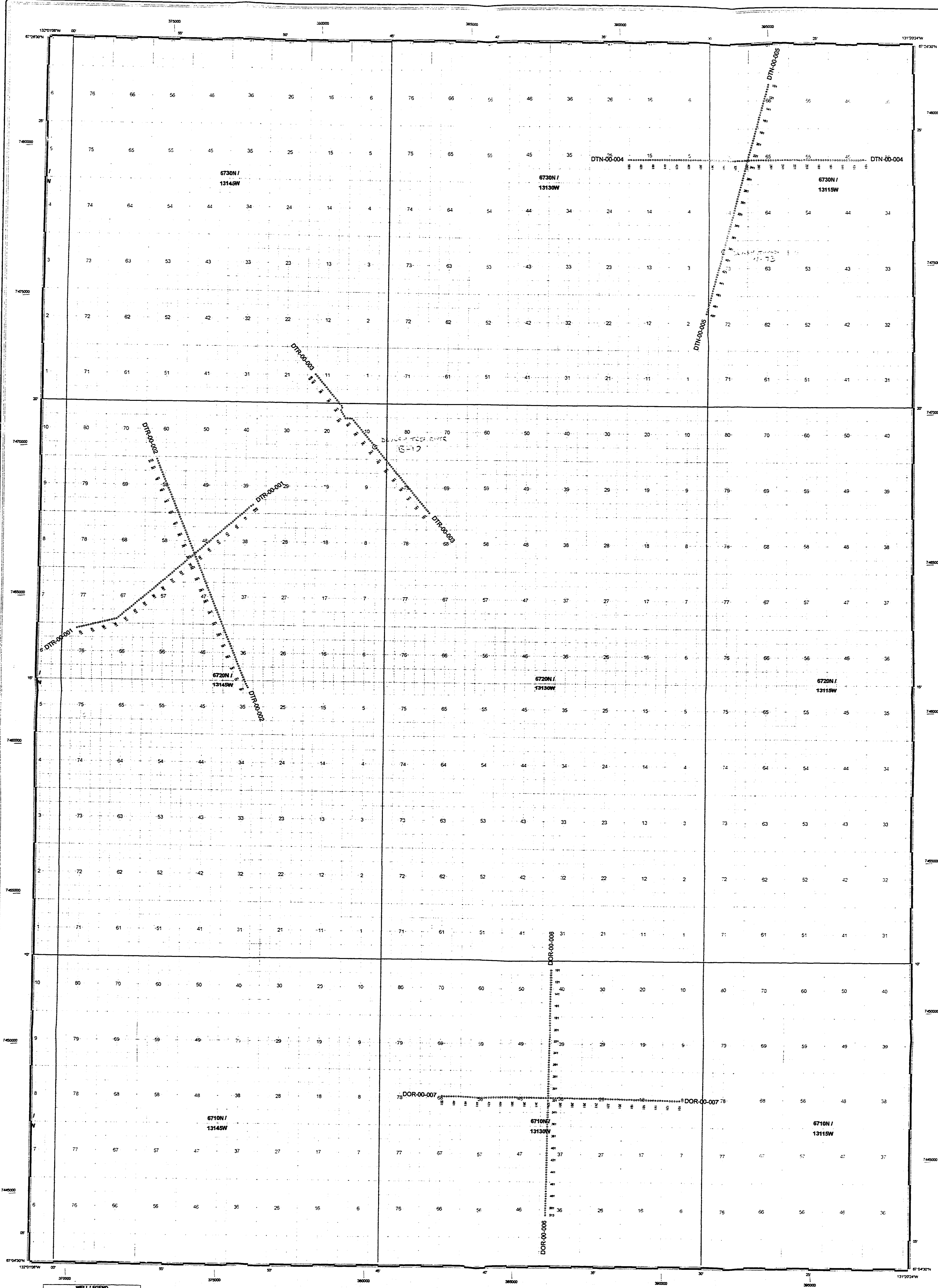
FROM	TO	D.D. P.M. CORREC	ROTARY R.P.M.	WT. ON BT. (1000-grs)
CRACK AND PRESSURE	WIRE LOG	WIRE LOG		
	LINEA SLOT (mm)	S.P.M.	LINEA SIZE (mm)	S.P.M.
REDUCED PUMP SPEED				
	Q		Q	
DEVIATION (7' VE)				
DEPTH (m)	DEVIATION (m)	DIRECTION		
DRILLER SIGNATURE		TIME		
[Signature]		12:00		

TIME LOG

[illegible]

DETAILS OF OPERATION IN SEQUENCE AND REMARKS.

MOVING
IN. O. CREW.
CREW FLIGHT - EDM TO INUVIK
2 HOURS LATE
CREW HAD TO DRIVE FR INUVIK
TO CAMP. STORMED IN.
CAMP.



WELL LEGEND

○ Location	● Suspended Oil
✕ Dry and Abandoned	✕ Clipped Oil
✕ Oil	✕ Abandoned Gas
✕ Gas	✕ Suspended Gas
✕ Oil and Gas	✕ Clipped Gas
✕ Water Injection	✕ Abandoned Oil & Gas
✕ Sensor	✕ Suspended Oil & Gas
✕ Clipped / Potential	✕ Clipped Oil & Gas
✕ Abandoned Oil	✕ Abandoned Water Inj.

Universal Transverse Mercator
Zone 18N, GCS NAD 83
North American Datum 1983
Elevated, Curve 1995

0 1 2
Kilometers
0 1 2
Miles

DEVLAN EXPLORATION INC.
GRANDVIEW HILLS

2001-11223

Date	Feb 1, 2001	Author	grant g
Scale	1 : 50000	DLS Vers.	C.L.S.