AUTHORITY TO DRILL A WELL

National Energy Board / Office national de l'énergie

NATIONAL ENERGY BOARD
ENGINEERING BRANCH
NOV 2 3 1999

Exploratory x Delineation
Development 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: Northrock et al East MacKay I-77

Operator: Northrock Resources Ltd. Drilling Program No.:

Contractor: Akita Sahtu Drilling Interest Identifier:

Drilling Rig or Unit: 51 Estimated Well Cost: $3,000,000

Location-Unit: I Section: 77 Grid Area: 64-50-125-30

Coordinates: Lat.: 64° 46' 41.610" Long.: 125° 43' 10.277"

Area: Tulita Field/Pool: MacKay

Elevation-KB/RT: 200.5 (ASL) GL/Seafloor: 197.1

Approx. Spud Date: December 10, 1999 Est. Days on Location: 30

Anticipated Total Depth: 2400m Target Horizons: Hume, Bear Rock, Ramparts

EVALUATION PROGRAM

Ten-metre sample intervals N/A

Five-metre sample intervals From Surface Casing to Ramparts – 3m intervals thereafter

Canned sample intervals from casing shoe to TD every 10 metres

Conventional cores at Possibility of 2 – 18m cores in the Hume

Logs and Tests E-log, Sonic, Neutron – Density from TD – Surface Casing. Dipmeter from TD to Ramparts

CASING AND CEMENTING PROGRAM

O.D. (mm)	Weight (kg/m)	Grade	Setting Depth (m KB)	Cementing Program (m^3)
340mm	71.43	J-55	30m	2.9m3 Artic Set Cement
244.5mm	53.6	J-55	600m	35.0m3 Artic Set Cement
177.8mm	38.7/34.2	J-55	2400m	49.4m3 RFC

B.O.P. Equipment: Shaffer spherical 279mm x 21MPa annular preventer. 2 – Shaffer LWS 279mm x 21MPa single gate ram preventers.
Valvcon 340 litre x 21MPa 5 station accumulator, electric remote. Cameron WKM 51mm x 76mm x 21MPa choke manifold

Other Information:

Signed: for Responsible Officer Title: Drilling Manager

Name: Brian Merchant Company: Northrock Resources Ltd.

Date: October 29, 1999. Phone: 403-264-7478

APPROVAL

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

Date: Dec 17/99 Signed:

File: 9211-N046-1-1 *Chief Conservation Officer*

WID: 1879

UWI: 300I776450125300

WELL TERMINATION RECORD

National Energy Board / Office national de l'énergie

WELL TERMINATION RECORD

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

Well Name: Northrock et al MacKay I-77 Area: Tulita

Grid Area: N64°50' W125°30' Field / Pool:

Interest Identifier: Final Coordinates: Lat: 64°46' 41.610" Long: 125°43' 10.277"

Drilling Unit: 51 (Akita) Elevations-KB/RT: 202.35m (ASL) GL/Seafloor: 198.1m

Spud Date: 99/12/21 R.R.: 00/01/24 Total Depth: 2400m

O.D (mm)	Weight (kg/m)	Grade	Depth Set (m KB)	Cement (m³)
339.7	71.4	H-40	42.0	4T
244.5	53.6	J-55	615.0	35T

PLUGGING PROGRAM

Approval of the following program was obtained by (person) Chris Knoechel

from (person) Tom Logan/Kevin Kerwin of the N.L.Fisher

by means of phone on Jan. 21/2000

Type of Plug	Interval (m KB)	Felt	Cement (m³)
Cement	1750-1650		5.7
Cement	1250-1150		5.6
Cement	630-588		1.6
Cement	30-5		0.5

Lost Circulation/Overpressure Zones: N/A

Equipment left on Seafloor (Describe): N/A

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

Cores: Type: N/A Intervals:

Other Downhole Completion/Suspension Equipment:

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: Consultant

Name: W. Tom Logan Date: 00-04-01

Company: N.L. Fisher

Well Status

Suspended ☐

Completed ☐

Abandoned ☒

Acknowledged by:

Chief Conservation Officer

Date: Apr. 14/00

File: 9211-N046-1-1

UWI: 300177645012530 0 WID: 1879

444 Seventh Avenue SW
Calgary, Alberta T2P 0X8

444 Septième Avenue S.-O
Calgary (Alberta) T2P 0X8

Canada

Telephone/Téléphone (403) 292-4800
Facsimile/Télécopieur : (403) 292-5876
http://www.neb.gc.ca

FINAL
WELL
REPORT

1879

N.E.B. COPY

FINAL WELL REPORT

NORTHROCK RESOURCES LTD.

NORTHROCK ET AL MACKAY I-77

Grid # N 64°50', W 125°30'

DATE: JANUARY 28, 2000

COMPANY REPRESENTATIVE: MR. KEVIN KERWIN

NATIONAL ENERGY BOARD
ENERGY RESEARCH
APR 1 2 2000

TABLE OF CONTENTS

A. INTRODUCTION — Page

Summary 1
Locality Map 1

B. GENERAL DATA

Well Name 2
Well Location 2
Unique Well Identifier 2
Operator 2
Contractor 2
Drilling Unit 2
Position Keeping 3
Support Craft 3
Drilling Unit Performance 3
Difficulties and Delays 3
Total Well Cost 3
Horizontal/Deviated Wells Require Bottom Hole Co-ordinates 3

C. SUMMARY OF DRILLING OPERATIONS

Elevations 3
Total Depth 3
Date and Hour Spudded 3
Date Drilling Completed 3
Date of Rig Release 3
Well Status 3
Hole Sizes and Depths 3
Casing and Cementing Record 3
Sidetracked Hole 4
Drilling Fluid 4
Fishing Operations 5
Well Kicks and Well Control Operations 5
Formation Leak Off Tests 5
Time Distribution 5
Deviation Survey 6
Abandonment Plugs 6
Composite Well Record 6
Completion Record 7

D. GEOLOGY

Page

Geological Summary.....
Tops.....
Sample Descriptions .....
Coring Record.....
Gas Detection Report.....
Drill Stem Tests .....
Well Evaluation .....
Analyses.....
Mud Salinity Record .....
Gas, Oil & Water .....
Formation Stimulation .....
Formation and Test Results .....
Detailed Test Pressure Data Readings .....

See Attachment

A. INTRODUCTION

Northrock Resources Ltd. drilled a 2400 metre exploratory well spudded on 99/12/21 and finishing on 00/01/24 to evaluate oil potential in the Bear Rock formation at a depth of 2322 mKB.

The drilling contractor was Akita Sahtu Drilling based out of Calgary, Alberta. The drilling rig used was a mechanical land rig rated for 2500 m. The rig had a 60 m^3 mud system and was equipped with two boilers.

The well was drilled on Exploration License No 1879 in which Northrock has a 100 % working interest. The license was issued to Northrock on December 17, 1999.

The exact co-ordinates of the well are as follows:

Latitude: 64°46'41.610"
Longitude: 125°43'10.277"

The rig was moved onto the location 99/12/18 and the well spudded on 99/12/21at 24:00 hours to drill the 444.5 mm conductor hole to a depth of 42 m. The 339.7 mm x 71.4 kg/m x H-40 LT&C conductor pipe was set with the shoe depth being at 42 m. The conductor pipe was cemented with good mud returns throughout the cement job and 0.5 m^3 returns of cement. The diverter was nippled up and functioned tested with the HCR.

Drill 311mm surface hole and set 244.5 mm x 53.6 kg/m x J-55 LT&C casing at 615mKB and cemented with 35 tonnes of Arctic set Cement + 12%DWOW + 0.5 % D65 + 0.5% D13 + 0.2% D46. There was good mud returns reported throughout the cement job with 3 m^3 cement returns. The plug was bumped with 3,500 kPa and the pressure held. The plug was down at 23:16 hours on 99/12/31.

The BOP's were installed and pressure tested. The annular preventor was pressure tested to 1,400 kPa low and 10,500 kPa high. The pipe rams, kelly cock, stabbing valve and downhole BOP valve were tested to 1,400 kPa low and 21,000 kPa high. The accumulator precharge bottles were checked and the accumulator function tested prior to drilling out.

The float collar and shoe were drilled out on 00/01/02. A formation leak off test was done and the gradient was taken to 19.5 kPa/m without breaking down the formation. The 222mm main hole was drilled ahead to 890 m where lost circulation occured. Lost circulation material was pumped and the system was mudded up to help heal the losses. The problem was corrected as no losses were encountered for the remainder of the well.

After total depth had been reached the open hole was logged by Schlumberger. Log #1 was an E-Log, Sonic, and Neutron Density from TD to surface casing. Log #2 was a Dipmeter

form TD to the Ramparts formation at 1714mKB.

Ran DST #1 from 2175 – 2204mKB. Inflated packer and then lost seat after approximately 4 minutes.

After the logs were evaluated it was decided to abandon the well and cement plugs were run. Plug # 1 was run from 1750 m to 1650 m using 5.7 tonnes of RFC + 1.1% B30 + 0.4% D13 + 0.2% D46 + 0.5% D65. WOC 6 hours and felt plug at 1641m. Plug # 2 was run from 1250 m to 1150 m using 5.6 m^3 of same cement. The second plug was tagged at 1121 m after waiting on cement for six hours. Plug #3 was run from 630 m to 588 m using 1.6 tonnes of previous cement. Plug #4 (surface plug) was run from 10 m – surface using RFC + additives.

B. GENERAL DATA

1. Well Name: Northrock et al East MacKay I-77

   Authority to Drill a Well No: 1879

   Exploration Agreement Number:

   Location Unit: I

   Section: 77

   Grid Area: 64-50-125-30

   Classification: Exploratory

2. Well Location: I-77-64-50-125-30
   Coordinates: Latitude: 64°46'41.610"
   Longitude: 125°43'10.277"

3. Unique Well Identifier: 300I776450125300

4. Operator: Northrock Resources Ltd.

5. Contractor: Akita Drilling

6. Drilling Unit: Akita Rig #51
   Mechanical, Land Rig

7. Position Keeping: Not Applicable, Land Rig

8. Support Craft (Helicopter):

9. Drilling Unit Performance:

10. Difficulties and Delays:

11. Total Well Cost: $1,561,335

12. Horizontal Deviated Wells Require Bottom Hole Co-ordinates:
Latitude: N/A
Longitude: N/A

C. SUMMARY OF DRILLING OPERATIONS

1. Elevations:
Ground: 198.1 (m above sea level)
KB: 202.35 (m above sea level)
KB To Casing Flange: 4.25m (KB to CF)

2. Total Depth:
FTD: 2400mKB
PBTD: 0mKB
TVD: 2400mKB

3. Date and Hour Spudded: 99/12/21 at 24:00 hours

4. Date Drilling Completed: 00/01/19

5. Date of Rig Release: 00/01/24

6. Well status: Dry and Abandoned

7. Hole Sizes and Depths:
Conductor Hole: Size 444.5 mm to 42 mKB
Surface Hole: Size 311 mm to 615 mKB
Main Hole: Size 222 mm to 2400 mKB

8. Casing and Cementing Record:
Conductor Hole: 444.5mm

Casing Size:	339.7 mm
Casing Weight:	71.4 kg/m
Casing Grade:	H-40
Casing Make:	Ipsco
Number of Joints:	3
Thread:	LT&C
Depth Set:	42 m (KB)
Cut Height:	At Surface KB
Cut off Depth:	After abandonment
Date Set:	99/12/23
Cement Volume:	4 Tonnes
Cement Type:	Arctic Set Cement
Additives:	12% DWOW
	0.5% D-65
	0.5% D-13
	0.2% D-46

Surface Hole: 311mm

Casing Size:	244.5 mm
Casing Weight:	53.6 kg/m
Casing Grade:	J-55
Casing Make:	Ipsco
Number of Joints:	49
Thread:	LT&C
Depth Set:	615 m (KB)
Cut Height:	At Surface (KB)
Date Set:	99/12/31
Cement Volume:	35 Tonnes
Cut Off Depth:	After abandonment
Cement Type:	Arctic Set Cement
Additives:	12% DWOW
	0.5% D-65
	0.5% D-13
	0.2% D-46
Cement Top:	Surface (mKB)
Casing Bowl Size:	279 mm x 244.5 mm x 21 mpa
Casing Bowl Make:	StreamFlo

9. Sidetracked Hole: N/A

10. Drilling Fluid:

Conductor Hole: Gel - Chemical

Properties:	Viscosity:	40 - 50 sec/L
	Weight:	1060 - 1200 kg/m^3
	PH:	9 – 9.5
	Gels:	1 – 5 / 3 - 8
	PV / YP:	8 - 12 / 8 - 10

Surface Hole:	Gel - Chemical	
Properties:	Viscosity:	40 - 50 sec/L
	Weight:	1060 - 1200 kg/m^3
	PH:	9 – 9.5
	Water loss:	Natural
	Gels:	1 - 5 / 3 - 8
	PV / YP:	8 - 12 / 8 - 10

Main:	Gel - Chemical	
Properties:	Viscosity:	40 - 100 sec/L
	Weight:	1000 - 1110 kg/m^3
	PH:	9.5 – 10.5
	Water loss:	6 - 8 cc
	Gels:	2 - 4 / 6 - 8
	PV / YP:	8 - 20 / 4 - 12

11. Fishing Operations: N/A

12. Well Kicks and Well Control Operations: Lost circulation was encountered at 890mKb, but quickly remedied by pumping lost circulation material and mudding up the system.

13. Formation Leak Off Tests:

Depth:	615m
Fluid Density:	1900kg/m^3
Applied Pressure:	~~20000~~kPa 9000 KPa
Hydrostatic Press.	..... kPa
Mud Weight Equi.	..... kg/m^3
Casing Setting Depth:	615mKB

The leak-off test was taken to a gradient of 19.5 kPa /m without breaking down the formation.

14. Time Distribution:

Time Break Down

Activity	Hours
Drilling:	388
Surveying:	34
Circulating:	26
Logging	11.25
WOC:	31.25
Rig Service:	20
Tripping, Reaming:	177.5
Running casing:	15.25

15. Deviation Survey: **See section 128 of the *Canada Oil and Gas Drilling Regulations*.**

16. Abandonment Plugs: **Also a surface plug from 10 m – 0 m**

	Plug 1	Plug 2	Plug 3
Date	00/01/23	00/01/23	00/01/24
Interval (KB)	1750 - 1650	1250 - 1150	630 - 588
Formation Name	Devonian/Ramparts	Little Bear/Slater Rvr	Inside Casing
Formation Depth (KB)	1489 - 1848	825 - 1456	
Tonnes of Cement	5.7	5.6m^3	1.6
Additives	1.1% B30, 0.4% D13, 0.2% D46, 0.3% D65	Same as Plug #1	Same as Plug #1
Volume of H_2O Ahead	3m^3	7.5m^3	0m^3
Displacement (Mud)	10m^3	6.7m^3	20m^3
Slurry Density	1900kg/m^3	1900kg/m^3	1900kg/m^3
Calculated Plug Depth	m KB	m KB	m KB
Felt Plug Depth (KB)	1641m	1121m	588 m
Fluid Between Plugs	Gel-Chem mud	Gel-Chem mud	Gel-Chem mud

17. Composite Well Record: See attached well logs

18. Completion Record: N/A

Completion Summary: N/A

D: GEOLOGY

Geological Summary

Tops: **Example (use if applicable)**

Formation	Revised Prog (m)	Sample (m)	Log (m)	Subsea (m)
Cretaceous				
Little Bear	825	770		
Slater River	1218	1213.5		
Radioactive Shale	1456	1454		
Devonian				
Imperial	1489	1525		
Hare Indian	1848	1871		
Bluefish	1959	1987		
Hume	1976	2006		
Headless	2292	2059		
Landry		2143		
Arnica		2183		
Total Depth (final)	2400m			

DRILL STEM TEST:

TOP:	2175 mKB
BOTTOM:	2204 mKB
OIL RATE:	nil m^3/d
GAS RATE:	nil $10^3m^3/d$
CONDENSATE:	nil m^3/d
WATER RATE:	130m of salt water
OIL GRAVITY:	N/A
Water Salinity:	80,000ppm
Recovery ISIP:	..... kPa

Recovery FSIP: ..... kPa

WELL EVALUATION

The following logs were run:	(Example depths)
Phasor Induction SFL:	2390m – 615m
Comp Neutron Lithodensity:	2388.2m – 615m
Borehole Comp Sonic:	2390m – 615m

GEOLOGICAL REPORT

N.E.B. COPY 1879

764508 ALBERTA LIMITED

(formerly KNOWLING GEOLOGICAL SERVICE)

Geological Report

NORTHROCK et al East MacKay I-77

I - 77 - 64 - 50 - 125 - 30

N.W.T.

By:

David N.K.Roberts
P.Geol

24-Jan-00

APR 1 2 2000

512 - 32nd Street NW, Calgary, Alberta, T2N 2V7. Ph: 283-7190
Cellular: (403) 860-6400 (Calgary)

TABLE OF CONTENTS:

Well Data.....3

Formation Tops.....4

Drill Bits.....5

Surveys.....6

Sample Descriptions.....7

DST Results.....Appendix "A"

Striplog.....in pocket

WELL DATA:

Operator: Northrock Resources Ltd. **AFE:** 990437

Well Name: NORTHROCK et al E.MacKay I-77 **Wid #:** 1879

Field: Undefined **UWI:** 300I776450125300

Surface Location: I-77-64-50-125-30

Surface Co-ordinates: Lat: 64 46'41 610" Long: 125 43'10 277" (NAD83)

Well Status: Exploratory, Plugged and Abandoned

Contractor: Akita/Sahtu Ptnshp. **Rig:** 51

Spud Date: 23-Dec-99 @ 0930hrs **TD Date:** 19-Jan-00 @ 2215hrs

Total Depth: 2400.00m Driller **Rig Release:** 23-Jan-99
2399.00m Logger

Elevations: **Kelly Bushing:** 202.35m **Ground Level:** 198.10m

Hole Size: 311mm to 615m, 222mm to FTD.

Casing Record:
Surface Casing: 244.5mm, 53.6m kg/m, ST&C, J-55, set at 615.0m.

Mud Type: Floc water to 1600m. Gel/chem to FTD.

Logs Run:

BHCS-GR-CAL	TD-SC	GR to Surface
CNL-LDT-PE-GR-DAC/AIT-SP	TD-SC	Hi Res 2175-2250m

Drill Stem Tests:
#1 2175-2204m Arnica 5-60-60-180
Failed 4 minutes into preflow. Recover 40m mud, 74m mud & SW, and 56m SW. Packers failed. No mud drop.

Rotating Hours:

Surface Hole:	118.25 hrs
Main Hole:	287.75 hrs

Supervision:

Foreman:	Bruce Webber
Geologist:	David N.K.Roberts

FORMATION TOPS:

Elevations: Ground Level: **198.10m** Kelly Bushing: **202.35m**

Formation	Prog MD	Prog SS	Smpl MD	Log MD	Log SS
Little Bear	833.4	- 631	790	770.0	- 567.6
Slater River	1226.4	-1024	1207	1213.5	-1011.1
R/A Shale	1464.4	-1262	1449	1454.0	-1251.6
Devonian Imperial	1497.4	-1295	1521	1525.0	-1322.6
Turbidite	1722.4	-1520	1715	1727.5	-1525.1
Hare Indian Shale	1856.4	-1654		1871.0	-1668.6
Bluefish	1967.4	-1765		1987.0	-1784.6
Hume	1984.4	-1782	2006	2006.0	-1803.6
Headless	2300.4	-2098		2059.0	-1856.6
Landry				2143.0	-1940.6
Arnica				2183.0	-1980.6
White Dolomite				2254.0	-2051.6
Pink Dolomite				2378.0	-2175.6
Bear Rock	2330.4	-2128	Not seen		
Total Depth	2408.4	-2206	2400	2399.0	-2196.6

BIT RECORD:

Bit	Size	Type	Depth Out	Meters	Hours	WOB dan	RPM	Condition
1a	311	Reed HP13G	122	122	17.25	2-5	140	N/A
2a	311	Smith MFDSS	236	114	30.00	2-3	140	N/A
3a	222	Hughes GT-SG1	290	64	13.25	2-3	160	Drill pilot hole.
4a #2rr	311	Smith MFDSS	465	229	28.00	12	50	N/A
5a	311	Smith MFDSSHC	615	150	29.75	12	50	N/A
1 #3rr	222	Hughes GT-SG1	1031	416	47.75	12	90	Good
2	222	Hughes GT-SG1	1224	193	47.75	6-8	50 +mudmotor	Good
3	222	Hughes GT-G1	1414	190	38.75	10-14	50 +mudmotor	Good
4 (MWD)	222	Hughes GT-S20	1983	759	65.00	15-17	30 +mudmotor	BT on heel.
5 (MWD)	222	Hughes GT-S09C	2055	72	10.00	15-18	30-40 +mudmotor	Bit scrubbed.
6 (MWD)	222	Hughes ATJ-44	2270	215	36.75	14-18	40 +mudmotor	Good
7 (rot)	222	Hughes GT-S20	2342	72	22.75	14-18	85	Bit scrubbed.
8 #6rr (rot)	222	Hughes ATJ-44	2400	58	19.00	15-20	65	Good

SURVEYS

Depth	Inclination	Depth	Inclination
21m.	1.00	620m	0.50
34m.	1.07	670m	0.50
41m.	0.75	720m	0.25
62m.	0.50	765m	0.75
90m.	0.75	810m	0.87
162m	1.00	858m	0.87
190m.	1.00	919m	1.00
227m.	1.25	960m	1.87
236m.	1.25	998m	1.75
244m	1.00	1017m	1.87
253m.	1.50	1050m	1.87
263m	1.00	1065m	1.75
272m.	0.87	1096m	1.50
290m.	0.50	1120m	1.50
293m.	0.50	1172m	2.00
302m	1.00	1208m	2.25
311m.	1.25	1218m	2.12
320m.	1.25	1270m	2.12
334m	1.00	1312m	2.12
367m	1.00	1360m	2.87
424m.	1.00	1414m	Pick up MWD.
452m	0.75	2396m	1.00
477m.	0.75		
519m.	1.00		
547m.	0.75		
572m.	0.75		
615m.	1.00		
615m.	Set Casing.		

SAMPLE DESCRIPTIONS:

615-620m Cement: 100%

620-625m Cement: 50%.
Shale: 50%, light grey to grey, blocky, very sandy, silty.

625-630m Cement: 15%.
Shale: 85%, as above.

630-635m Cement: 5%.
Sandstone: 95%, white/clear, black, salt and pepper textured, fine grained, very fine grained in part, well sorted, angular to subangular clasts, poorly cemented with silica, quartz overgrowths, mica flakes, good porosity in part.

635-640m Cement: 10%.
Shale: Trace, dark grey to black, subfissile to fissile.
Sandstone: 90%, as above.

640-645m Shale: 5%, as above.
Sandstone: 95%, as above, rare medium grained, quartz overgrowths.

645-650m Shale: 20%, dark grey to black, fissile to subfissile, flat luster.
Sandstone: 80%, as above, generally fine grained, good porosity, quartz overgrowths.

650-655m Shale: 30%, as above, becoming grey and soft.
Sandstone: 70%, as above.

655-660m Shale: 40%, as above.
Sandstone: 60%, as above.

660-665m Shale: 50%, as above.
Sandstone: 50%, as above.

665-675m Shale: 5%, dark grey, fissile.
Sandstone: 95%, white/clear, black, salt and pepper textured, fine grained, in part medium grained, well sorted, angular to subangular clasts, poorly cemented with silica, good porosity, trace chert pebbles and granules.

675-680m Shale: Trace.
Sandstone: 100%, as above.

680-690m Sandstone: 100%, as above, fine grained, in part medium grained, rare coarse grained.

690-695m Shale: 5%, dark grey, fissile, flat luster.
Sandstone: 95%, white/clear, black, salt and pepper textured, fine grained, in part medium grained, rare coarse grained, well sorted, angular to subangular clasts, poorly cemented, good porosity.

695-700m Shale: 90%, as above.
Sandstone: 10%, as above, in part soft.

700-705m Shale: 5%, as above.
Sandstone: 95%, as above.

705-710m Shale: 20%, dark grey, fissile to subfissile, flat luster.
Sandstone: 80%, as above.

710-715m Shale: 5%, as above.
Sandstone: 95%, as above.

715-730m Shale: 30%, grey, soft.
Sandstone: 70%, as above.

730-740m Shale: 40%, as above.
Sandstone: 60%, as above.

740-745m Shale: 70%, grey to dark grey, subfissile to fissile, flat luster.
Sandstone: 30%, as above.

745-750m Shale: 95%, as above.
Sandstone: 5%, as above.

750-755m Shale: 90%, as above.
Sandstone: 10%, as above.

Little Bear log top at 770.0m.

755-770m Shale: 95%, grey to dark grey, blocky to subfissile, micromicaceous in part.
Sandstone: 5%, as above.

770-780m	Shale: 5%, as above. Sandstone: 95%, white/clear, black, salt and pepper textured, fine to medium grained, well sorted, angular to subangular clasts, in part subrounded clasts, poorly cemented with silica, good porosity.
780-785m	Shale: Trace. Sandstone: 100%, as above, coarse grained in part.
785-790m	Shale: 100%, dark grey, subfissile to blocky, flat luster.
790-800m	Sandstone: 100%, white/clear, black, salt and pepper textured, fine to medium grained, common chert pebbles, well sorted, angular to subangular in part subrounded poorly cemented with silica, good porosity, white grey yellow and orange chert clasts, abundant chert pebbles.
800-805m	Sandstone: 100%, as above, becoming moderate to well cemented, tight in part.
805-810m	Sandstone: 100%, as above, very fine to medium grained, common to abundant chert pebbles.
810-815m	Shale: 5%, dark grey, subfissile to blocky. Sandstone: 95%, white/clear, black, salt and pepper textured, fine to medium grained, trace chert pebbles, well sorted, angular to subangular clasts, moderately cemented with silica, fair to good porosity.
815-820m	Shale: 20%, as above. Sandstone: 80%, as above.
820-825m	Shale: 10%, as above. Sandstone: 90%, as above, trace chert pebbles.
825-830m	Shale: Trace. Sandstone: 100%, as above.
830-835m	Shale: 10%, as above. Sandstone: 90%, as above.
835-840m	Shale: 5%, as above. Sandstone: 95%, as above.
840-845m	Sandstone: 100%, as above.

845-850m Shale: 15%, dark grey, subfissile to blocky.
Sandstone: 85%, white/clear, black, salt and pepper textured, fine to medium grained, well sorted, poor to moderately cemented with silica, fair to good porosity, trace chert pebbles.

850-855m Shale: 60%, as above.
Sandstone: 40%, as above.

855-860m Shale: 50%, dark grey to black, subfissile, carbonaceous in part.
Sandstone: 10%, as above.
Coal: 40%, vitreous to subvitreous, shaley in part.

860-865m Shale: 30%, as above.
Sandstone: 30%, white/clear, black, salt and pepper textured, fine to medium grained, in part coarse grained, subangular clasts, poorly cemented with silica, good porosity.
Coal: 40%, as above.

865-870m Shale: 5%, as above.
Sandstone: 90%, as above, fine to coarse grained, well sorted, subangular to subrounded clasts, poorly cemented, pebbly in part, good porosity.
Coal: 5%, as above.

870-875m Shale: 10%, light to dark grey, subfissile to blocky, silty.
Sandstone: 90%, as above, fine to medium grained.

875-880m Shale: 15%, as above.
Sandstone: 85%, as above.

880-890m Shale: 70%, dark grey, blocky to subfissile, silty.
Sandstone: 30%, as above.

890-895m Shale: 85%, dark grey, blocky, silty.
Sandstone: 15%, as above.

895-905m No sample. Working tight hole and high seepage losses.

905-910m Shale: 90%, dark grey, blocky to subfissile, silty in part, sideritic in part.
Sandstone: 10%, as above.

910-915m Shale: 5%, as above.
Sandstone: 95%, white/clear, black, salt and pepper textured, fine to medium grained, in part common coarse grains, well sorted, angular to subrounded, poor to moderately cemented with silica, trace chert pebbles, good porosity in part.

915-920m Shale: 10%, as above.
Sandstone: 90%, as above, becoming well cemented in part, moderately cemented in part.

920-925m Shale: 5%, as above.
Sandstone: 95%, as above, generally well cemented with silica, moderate to well sorted, fair porosity in part.

925-930m Shale: 10%, as above.
Sandstone: 90%, light grey, salt and pepper textured, fine to medium grained, in part coarse grained, moderate to well sorted, angular to subangular, well cemented with silica, tight to fair porosity.

930-935m Shale: 70%, dark grey, blocky, silty.
Sandstone: 30%, as above.

935-940m Shale: 50%, as above.
Sandstone: 50%, as above, generally well sorted, moderately cemented, good porosity in part.

940-945m Shale: 70%, dark grey, subfissile, blocky in part, silty.
Sandstone: 30%, white/clear, black, salt and pepper textured, medium grained, well sorted, moderately cemented with silica, good porosity in part.

945-950m Shale: 40%, as above.
Sandstone: 60%, as above.

950-955m Shale: Trace.
Sandstone: 100%, white/clear, black, salt and pepper textured, medium to coarse grained, well sorted, angular to subangular clasts, rounded clasts in part, moderate to well sorted, quartz overgrowths, fair to good porosity in part.

955-960m Shale: 20%, as above.
Sandstone: 80%, as above, medium to coarse grained.

960-965m Shale: 30%, as above.
Sandstone: 70%, as above, fine to medium grained.

965-970m Shale: 20%, as above.
Sandstone: 80%, as above, fine to medium grained.

970-975m Sandstone: 100%, as above, fine grained, common medium grained, moderate to well cemented with silica, tight to fair porosity, scattered coarse grained, rare glauconite (or green chert).

975-980m Sandstone: 100%, as above, becoming very fine to fine grained, well cemented and tight.

980-985m Sandstone: 100%, light grey, salt and pepper textured, very fine to fine grained, well sorted, angular clasts, well cemented with silica, tight to trace porosity in part.

985-990m Shale: 5%, as above, cavings?
Sandstone: 95%, as above.

990-995m Shale: 15%, grey to dark grey, fissile to blocky, silty in part, pyritic in part.
Sandstone: 85%, as above.
Coal: Trace.

995-1005m Shale: 15%, as above.
Sandstone: 85%, as above, becoming silty in part.

1005-1010m Shale: 25%, dark grey, black in part, subfissile to blocky, silty, sandy streaks in part.
Sandstone: 75%, as above.

1010-1015m Shale: 15%, as above.
Sandstone: 85%, light grey, salt and pepper textured, very fine to fine grained, silty, moderate sorting, well cemented and tight, pyritic in part, argillaceous in part.

1015-1020m Shale: 30%, as above.
Sandstone: 70%, as above, becoming very fine grained and silty, slightly argillaceous, tight.

1020-1025m Shale: 50%, grey to dark grey, blocky to subfissile, silty, sandy in part, pyritic.
Sandstone: 50%, as above, generally very fine grained and silty, argillaceous.

1025-1030m Shale: 80%, as above, sideritic, pyritic.
Sandstone: 20%, as above.

Trip for bit at 1031m.

1030-1035m Shale: 100%, dark grey, generally blocky, silty, very sandy in part, sandy streaks.

1035-1040m Shale: 80%, as above.
Sandstone: 20%, light grey, salt and pepper textured, very fine to fine grained, silty in part, moderate sorting, well cemented, tight to fair porosity in part, very fine grained and silty in part, trace mica flakes.

1040-1045m Shale: 30%, as above.
Sandstone: 70%, as above, scattered medium to coarse grained in part?

1045-1050m Shale: 20%, as above.
Sandstone: 80%, white/clear, black, salt and pepper textured, very fine to medium grained, in part coarse grained, moderate to well sorted, angular to subangular in part rounded clasts, poorly consolidated, good porosity?

1050-1055m Shale: 60%, grey to dark grey, blocky to subfissile, commonly silty, in part sandy.
Sandstone: 40%, as above. Also; grey, very fine to fine grained, silty and argillaceous, tight.

1055-1060m Shale: 90%, dark grey, blocky, silty, very sandy in part.
Sandstone: 10%, grey, very fine to fine grained, silty, argillaceous, poor sorting, tight.

1060-1065m Shale: 80%, as above, in part brown ,hard, sideritic.
Sandstone: 20%, as above, in part light grey, very fine to fine grained, moderately sorted, well cemented, tight.

1065-1070m Shale: 40%, as above, very silty, sandy in part, sideritic in part.
Sandstone: 60%, light grey to grey, very fine to fine grained, silty, poor to moderate sorting, argillaceous in part, well cemented and tight.

1070-1075m Shale: 10%, as above.
Sandstone: 90%, as above, moderately to well sorted in part, in part medium grained.

1075-1080m Shale: 70%, as above.
Sandstone: 30%, as above.

1080-1085m Shale: 95%, as above.
Sandstone: 5%, as above.

1085-1090m Shale: 85%, dark grey, blocky to subfissile, generally not silty, sandy in part.
Sandstone: 15%, light grey, salt and pepper textured, very fine to fine grained, silty in part, moderate sorting, angular clasts, well cemented and tight.

1090-1095m Shale: 30%, as above.
Sandstone: 70%, as above, common fine to medium grained (see below).

1095-1100m Shale: 90%, as above.
Sandstone: 10%, as above.

1100-1105m Shale: 70%, as above.
Sandstone: 30%, white/clear, black, salt and pepper textured, fine to medium grained, well sorted, angular to subangular, poorly consolidated, good porosity? Minor as above.

1105-1110m Shale: 40%, as above.
Sandstone: 60%, light grey, salt and pepper textured, moderate to well sorted, well cemented and tight. Also; white/clear, black, fine to medium grained, in part coarse grained, well sorted, angular to subangular and in part subrounded clasts, poorly consolidated? Trace to fair porosity in part.

1110-1115m Shale: 5%, as above.
Sandstone: 95%, light grey, salt and pepper textured, moderate to well sorted, well cemented and tight. Minor fine to medium grained, in part coarse grained.

1115-1125m Shale: 5%, grey to dark grey, blocky to subfissile, silty in part.
Sandstone: 95%, as above, rare glauconite in part?

1125-1130m Shale: 30%, common siderite.
Sandstone: 70%, as above, very fine to fine grained and silty.

1130-1135m Shale: 80%, grey, blocky, generally very sandy, common sandy laminations, (very fine to fine grained).
Sandstone: 20%, as above. Minor; white/clear, black, salt and pepper textured, fine to medium grained, well sorted, poorly consolidated? Porosity?

1135-1140m Shale: 5%, dark grey, blocky to subfissile, silty in part.
Sandstone: 95%, light grey, salt and pepper textured, very fine to fine grained, in part medium grained, well sorted, angular to subangular clasts, well cemented with silica, sideritic in part, slightly calcareous, tight, trace mica flakes.

1140-1145m Shale: Trace.
Sandstone: 100%, as above.

1145-1150m Sandstone: 100%, as above. Becoming light grey to grey, salt and pepper textured, very fine grained and silty, moderate to well sorted, tight.

1150-1155m Shale: 80%, grey, blocky, very silty, commonly sandy.
Sandstone: 20%, grey, salt and pepper textured, very fine grained and silty, argillaceous, poor to moderate sorting, well cemented and tight.

1155-1160m Shale: 70%, as above, generally very sandy.
Sandstone: 30%, as above.

1160-1165m Shale: 95%, grey to dark grey, blocky, silty, very sandy in part.
Sandstone: 5%, grey, salt and pepper textured, very fine grained and silty, argillaceous, well cemented and tight.

1165-1170m Shale: 100%, as above.

1170-1175m Shale: 100% dark grey, blocky to subfissile, silty, sandy in part.

1175-1180m Shale: 100%, dark grey to black, subfissile, micromicaceous, flat luster, trace pyrite.

1180-1185m Shale: 5%, as above.
Sandstone: 95%, white/clear, black, salt and pepper textured, fine to coarse grained, very coarse grained in part, well sorted, angular to subrounded, well cemented with silica and calcite, fair to good porosity in part (?), sideritic in part, rare chert pebbles, common light green clasts.

1185-1200m Sandstone: 100%, as above, fine to coarse grained, in part very coarse grained, trace quartz overgrowths, fair to good porosity in part, trace pyritic matrix in part.

1200-1205m Sandstone: 100%, white/clear, black, salt and pepper textured, fine to medium grained, in part coarse grained, well sorted, moderate to well cemented with silica, trace quartz overgrowths, trace to fair porosity in part.

Slater River log top at 1213.5m.

1205-1215m Shale: 5%, dark grey, blocky, silty.
Sandstone: 95%, as above, cavings.

1215-1220m Shale: 70%, dark grey, blocky to subfissile, micromicaceous, silty in part, sandy laminations in part.
Sandstone: 30%, light grey, salt and pepper textured, very fine grained and silty, argillaceous in part, well cemented and tight.

1220-1224m Shale: 80%, dark grey, subfissile to fissile, micromicaceous, occasional silty/sandy streaks, mica flakes in part.
Sandstone: 20%, as above.

Trip for bit at 1224m.

1224-1240m Shale: 100%, dark grey, blocky to subfissile, micromicaceous, silty in part, occasional sandy streaks.

1240-1250m Shale: 100%, as above, common sandy laminations.
Sandstone: Trace, light grey, salt and pepper textured, very fine to fine grained, silty, poor to moderate sorting, well cemented and tight.

1250-1255m Shale: 100%, dark grey, subfissile, micromicaceous, flat luster, common sandy laminations.

1255-1260m Shale: 90%, as above.
Sandstone: 10%, as above. Minor very fine grained and silty, well cemented and tight.

1260-1265m Shale: 80%, as above.
Sandstone: 20%, as above.

1265-1270m Shale: 60%, as above.
Sandstone: 40%, as above, in part moderate to well sorted, well cemented and tight, kaolinitic.

1270-1275m Shale: 5%, as above.
Sandstone: 95%, light grey, salt and pepper textured, very fine to fine grained, silty in part, moderate to well sorted, angular to subangular clasts, well cemented with silica, kaolinitic, trace porosity in part.

1275-1280m Shale: 20%, dark grey, subfissile, silty in part, micromicaceous, flat luster.
Sandstone: 80%, as above.

1280-1295m Shale: 10%, as above.
Sandstone: 90%, as above.

1295-1300m Shale: 10%, dark grey, blocky to subfissile, micromicaceous, silty in part.
Sandstone: 90%, light grey, salt and pepper textured, very fine to fine grained, silty in part, moderate to well sorted, angular to subangular clasts, moderate to well cemented with silica and kaolinite, trace porosity in part, becoming very fine grained and silty in part.

1300-1325m Shale: 30%, as above.
Sandstone: 70%, as above, locally abundant pyrite.

1325-1330m Shale: 70%, dark grey, fissile to subfissile, micromicaceous, silty in part.
Sandstone: 30%, light grey, salt and pepper textured, very fine to fine grained, silty, commonly very fine grained and silty, poor to moderate sorting, well cemented and tight, kaolinitic.

1330-1335m Shale: 50%, as above.
Sandstone: 50%, as above.

1335-1340m Shale: 70%, as above.
Sandstone: 30%, as above.

1340-1350m Shale: 80%, dark grey to black, subfissile to fissile, micromicaceous, silty in part.
Sandstone: 20%, as above.

1350-1370m Shale: 70%, as above.
Sandstone: 30%, as above.

1370-1375m Shale: 80%, dark grey, blocky to subfissile, micromicaceous, silty in part, flat luster in part.
Sandstone: 20%, as above.

1375-1380m Shale: 70%, as above.
Sandstone: 30%, light grey, very fine to fine grained, silty in part, moderate to well sorted, poor sorting in part, well cemented and tight.

1380-1385m Shale: 60%, as above, sideritic in part.
Sandstone: 40%, as above.

1385-1390m Shale: 80%, dark grey, blocky to subfissile, micromicaceous, flat luster.
Sandstone: 20%, as above.

1390-1405m Shale: 90%, as above.
Sandstone: 10%, becoming very fine grained and silty.

1405-1410m Shale: 80%, as above.
Sandstone: 20%, light grey, salt and pepper textured, very fine grained and silty, fine grained in part, moderate sorting, well cemented and tight.

1410-1414m Shale: 70%, as above.
Sandstone: 30%, as above.

Trip for bit at 1414m.

1414-1430m Shale: 70%, dark grey, blocky to subfissile, micromicaceous, silty in part.
Sandstone: 30%, as above.

1430-1435m Shale: 80%, as above, sideritic in part.
Sandstone: 20%, as above, mostly very fine grained and silty, sideritic in part, tight.

1435-1440m Shale: 95%, as above, sideritic in part.
Sandstone: 5%, as above.

1440-1450m Shale: 100%, dark grey to black, blocky to subfissile, micromicaceous, commonly sideritic.

Radioactive Shale log top at 1454.0m.

1450-1455m Shale: 100%, black, subfissile to blocky, fossiliferous in part.

1455-1460m Shale: 100%, as above, trace fossiliferous, trace calcite veining.

1460-1465m Shale: 100%, black to dark brown/black, blocky to subfissile, flat earthy luster, rare silty streaks, trace fossiliferous, calcareous in part, white specks in part.

1465-1480m Shale: 100%, black, subfissile to blocky, flat earthy luster, no fossils.

1480-1485m Shale: 100%, as above, trace fossiliferous, trace calcareous, trace Inoceramus.

1485-1495m Shale: 100%, black to brown/black, subfissile to blocky, flat earthy luster, fossiliferous in part, slightly calcareous, rare sandy streak.

1495-1510m Shale: 100%, black to brown/black, blocky, flat luster, slightly calcareous in part, silty in part, trace sandy, trace fossiliferous, trace dolomite rhombs in shale matrix.

1510-1515m Shale: 100%, as above, becoming flat luster in part, not dolomitic or sandy.

1515-1520m Shale: 95%, as above.
Sandstone: 5%, grey/brown, salt and pepper textured, very fine to fine grained, silty, poor to moderate sorting, well cemented and tight.

1520-1525m Shale: 90%, as above.
Sandstone; 10%, as above.

Devonian Imperial log top at 1525.0m.

1525-1530m Shale: 70%, black to brown/black, blocky to subfissile, flat luster in part, silty/sandy in part.
Sandstone: 30%, grey/brown, salt and pepper textured, very fine to fine grained, silty, poor to moderate sorting, well cemented, argillaceous in part, tight. Minor fine grained, salt and pepper textured, well sorted, angular to subangular clasts, well cemented, tight.

1530-1535m Shale: 70%, as above, trace light grey to light grey/brown, waxy luster, silty.
Siltstone: 10%, light grey, commonly very fine to fine sandy, poor to moderate sorting, kaolinitic, tight, trace glauconite, grading to sandstone in part.
Sandstone: 20%, light grey, very fine grained and silty, poor to moderate sorting, slightly argillaceous, kaolinitic, trace glauconitic, tight. Also; as above.

1535-1540m Shale: 60%, predominantly dark cavings. Minor; grey, subfissile to blocky.
Siltstone: 40%, light grey, commonly very fine to fine sandy, poor to moderate sorting, kaolinitic, tight, trace pyrite, grading to sandstone in part.

1540-1545m Shale: 70%, mostly dark cavings. Minor; light grey, blocky, pyritic in part.
Siltstone: 30%, as above.

1545-1555m Shale: 20%, as above.
Siltstone: 80%, light grey, very fine sandy in part, argillaceous/kaolinitic, tight, slightly calcareous in part, trace mica flakes.

1555-1565m Shale: 30%, as above.
Siltstone: 70%, as above.

1565-1575m Shale: 40%, as above.
Siltstone:50%, as above, abundant dolomitized fossil debris in part, crinoids and brachiopods, locally sandy adjacent fossil debris.
Sandstone: 10%, white/clear, black, salt and pepper textured, fine to medium grained, well sorted, angular to subangular clasts, well cemented with silica and dolomite, fossil debris in part.

1575-1580m Shale: 5%, as above, mostly cavings.
Siltstone: 95%, as above, abundant dolomitized fossil debris, crinoids, tight.

1580-1585m Shale: 25%, as above.
Siltstone: 75%, as above, common fossil debris, tight.

1585-1590m Shale: 30%, dark cavings.
Siltstone: 70%, as above, trace dolomitic fossil debris, brachiopods and crinoids.

1590-1595m Shale: 70%, as above, cavings.
Siltstone: 30%, as above.

Wiper trip at 1595m.

1595-1600m Shale: 20%, cavings.
Sandstone: 80%, as above, trace crinoids.

1600-1605m Shale: 10%, cavings.
Siltstone: 90%, light grey to grey, trace very fine to fine sandy in part, kaolinitic, tight, trace pyrite, no fossils, calcareous in part.

1605-1610m Shale: 5%, dark cavings.
Siltstone: 95%, as above.

1610-1640m Siltstone: 100%, light grey to grey, very fine sandy in part, kaolinitic, locally argillaceous, pyritic in part, mica flakes, trace calcite veining in part, slightly calcareous in part. Rare fossil debris in part.

1640-1645m Shale: 5%, grey, subfissile to blocky, micromicaceous, silty.
Siltstone: 95%, as above, rare fossil debris.

1645-1650m Shale: 10%, as above.
Siltstone: 90%, as above.

1650-1655m Shale: 30%, as above.
Siltstone: 70%, as above, common shale partings.

1655-1660m Shale: 40%, as above.
Siltstone: 60%, light grey to grey, very fine sandy in part, slightly argillaceous, kaolinitic, mica flakes, rare fossil.

1660-1680m Shale: 70%, grey, blocky, silty, micromicaceous.
Siltstone: 30%, as above, no fossils.

1680-1685m Shale: 40%, grey, blocky, silty, micromicaceous in part.
Siltstone: 60%, as above, trace pyritic.

1685-1695m Shale: 30%, as above.
Siltstone: 70%, as above.

1695-1700m Shale: 50%, as above, common dark cavings.
Siltstone: 50%, as above, common dolomitic fossil debris.

1700-1715m Shale: 70%, as above, abundant cavings.
Siltstone: 30%, as above, shale partings in part.

1715-1720m Shale: 30%, as above, abundant dark cavings also.
Siltstone: 70%, light grey, very fine sandy in part, slightly argillaceous in part, argillaceous partings in part, kaolinitic, tight, mica flakes.

1720-1721m Shale: 80%, dark grey, fissile to subfissile, rare micromicaceous in part, flat luster.
Siltstone: 20%, as above.
Sandstone: Trace, off white, quartzitic, very fine to medium grained, moderate to well sorted, well cemented with silica and dolomite, tight.

1721-1725m Shale: 90%, as above.
Siltstone: 10%, as above.

Radioactive Shale log top at 1727.5m.

1725-1730m Shale: 50%, as above.
Siltstone: 50%, as above.

1730-1735m Shale: 50%, as above.
Sandstone: 50%, light grey to grey, common very fine to fine sandy, kaolinitic, argillaceous in part, well cemented and tight, dolomitic in part, grading to sandstone in part.
Sandstone: Trace, white to light grey, silt to fine grained, moderate sorting, angular clasts, well cemented and tight, dolomitic.

1735-1740m Shale: 30%, as above.
Siltstone: 60%, as above.
Sandstone: 10%, as above.

1740-1745m Shale: 40%, dark grey, subfissile to fissile, trace silty in part, flat luster, micromicaceous in part.
Siltstone: 30%, as above, grading to sandstone in part, dolomitic in part.
Sandstone: 30%, as above.

1745-1760m Shale: 20%, as above.
Siltstone: 70%, as above.
Sandstone: 10%, as above.

1760-1765m Shale: 10%, as above.
Siltstone: 90%, light grey, commonly very fine sandy, well cemented, kaolinitic, tight, dolomitic, trace dolomitized fossil debris, crinoidal.

1765-1775m Shale: Trace.
Sandstone: 100%, off white, quartzitic, very fine to fine grained, silty, poor to moderate sorting, moderately cemented with silica and dolomite, trace porosity in part, mica flakes.

1775-1780m Shale: 10%, dark grey, blocky to subfissile, silty.
Sandstone: 90%, as above.

1780-1785m Shale: 30%, as above.
Sandstone: 70%, as above, becoming light grey, very fine grained and silty, poor to moderate sorting, well cemented with silica and dolomite, tight, in part grading to sandy siltstone.

1785-1790m Shale: 90%, dark grey, fissile, rare micromicaceous, rare silty, flat luster.
Sandstone: 10%, as above.

1790-1795m Shale: 100%, as above.

1795-1810m Shale: 100%, dark grey/black, subfissile to fissile, trace micromicaceous, trace pyritic in part, slightly dolomitic in part.

1810-1820m Shale: 100%, dark brown/black, subfissile to blocky, trace pyritic, slightly dolomitic in part, trace silty in part.

1820-1870m Shale: 100%, grey to dark grey, subfissile to fissile, waxy luster, silty, pyritic in part.

Hare Indian Shale log top at 1871.0m.

1870-1890m Shale: 100%, dark grey to dark brown/black, subfissile to blocky, flat earthy luster, trace pyritic, trace calcite veining in part, slightly calcareous in part.

1890-1910m Shale: 100%, black to dark brown/black, subfissile to blocky, trace micromicaceous in part, rare pyrite, trace calcite veining, trace coarse crystalline calcite fracture fill.

1910-1920m Shale: 100%, as above, trace calcite veining.

1920-1935m Shale: 100%, dark brown/black, subfissile to blocky, micromicaceous in part, common to abundant calcite veining, locally slickensided, trace coarse crystalline calcite fracture fill.

1935-1950m Shale: 100%, dark brown/black, subfissile to blocky, micromicaceous in part, common calcite veining.

1950-1955m Shale: 100%, as above, becoming dark grey/black, trace pyrite, trace calcite veining.

1955-1960m Shale: 100%, as above, common calcite veining, locally silty in part, white specks in part.

1960-1970m Shale: 100%, as above, common calcite veining, abundant pyrite.

1970-1983m Shale: 100%, dark grey/black, subfissile to fissile, micromicaceous in part, flat luster, trace pyrite in part, trace silty streaks.

Trip for bit at 1983m.

1983-1985m Shale: 100%, dark grey to black, fissile to subfissile, flat luster.

Bluefish log top at 1987.0m.

1985-1990m Shale: 100%, dark grey to black, fissile to subfissile, abundant calcite veining, locally very calcareous, white specks in part.

1990-1995m Shale: 100%, dark brown/black, subfissile to blocky, flat luster, commonly very calcareous, common calcite veining.

1995-2000m Shale: 100%, as above, trace calcite veining with pyrobitumen fill in part, trace "egg shaped" fossils, abundant white specks in part.

2000-2005m Shale: 100%, as above, very calcareous in part, white specks in part, trace fossiliferous, common calcite veining.

Hume log top at 2006.0m.

2005-2007m Shale: 100%, as above.
Limestone: Trace, off white to light brown, medium to coarse bioclastic, grainstone or packstone, dense, trace Amphipora Sp. seen.

2007-2010m Limestone: 100%, off white to light brown, micro-crystalline to very fine crystalline matrix, type II/I, coarse bioclastic fragments, dense, wackestone to packstone, brachiopods, crinoids, no show.

2010-2015m Limestone: 100%, as above, trace cherty in part, wackestone to packstone, dense, possible calcite veining, styolitic.

2015-2020m Limestone: 100%, as above, generally light brown, cryptocrystalline to microcrystalline, type I-II/I, no visable porosity, wackestone to mudstone, non dolomitic, non cherty, rare calcite fracture lining with pyrobitumen.

2020-2025m Limestone: 100%, as above, rare calcite veining with pyrobitumen fill, rare streak of bioclastic grainstone with patchy I/III intercrystalline porosity with pyrobitumen fill, no effective porosity, no show.

2025-2030m Limestone: 100%, Off white to light brown, crypto-crystalline to microcrystalline, scattered bioclasts, mudstone to wackestone. Rare grainstone, type I/III, 6% intercrystalline porosity filled with pyrobitumen, no effective porosity.

2030-2035m Limestone: 100%, as above, no porosity or show, common very coarse crystalline calcite fracture fill, mudstone to wackestone, dense.

2035-2040m Limestone: 100%, as above, generally type I/III, mudstone, dense, common calcite veins. Trace grainstone with 6% intercrystalline porosity with pyrobitumen fill.

2040-2045m Limestone: 100%, off white to light brown, cryptocrystalline to microcrystalline, type II/I-I, no visable porosity, mudstone to wackestone, fossiliferous, crinoids and brachiopods.

2045-2048m Limestone: 100%, as above. Trace of fine to medium crystalline calcite fracture lining with 6-10% porosity containing dead oil specks, faint fluorescence and a quick streaming cut fluorescence, poor live oil show.

2048-2050m Limestone: 100%, off white to light brown, cryptocrystalline to microcrystalline, type II/I, no visable porosity, wackestone to packstone, non dolomitic.

2050-2055m Limestone: 100%, as above, mostly packstone, disseminated pyrite in part, minor dark brown, cryptocrystalline, type I, dense, slightly argillaceous, silty, mudstone, grading to grainstone in part.

Trip for bit at 2055m.

Headless log top at 2059m.

2055-2060m Shale: 60%, trip cavings.
Limestone: 40%, off white, minor light grey, microcrystalline, type II/I, ostracod mudstone, no visable porosity, commonly silty, slightly argillaceous.

2060-2065m Shale: 10%, trip cavings.
Limestone: 90%, as above, rare ostracod, mudstone, no visable porosity.

2065-2070m Shale: 50%, as above.
Limestone: 50%, as above, commonly silty, slightly argillaceous in part, minor type I, ostracod mudstone.

2070-2075m Shale: 40%, cavings.
Limestone: 60%, as above, locally moderate silty and argillaceous, dense.

2075-2080m Shale: 30%, as above, predominantly cavings, minor light grey, blocky, very silty.
Limestone: 70%, off white to light grey, light grey/brown, cryptocrystalline to microcrystalline, type II/I-I, mudstone, fossiliferous in part, crinoids and brachiopods, slight to moderately silty, argillaceous in part, local sandy streaks.

2080-2085m Shale: 20%, cavings.
Limestone: 80%, off white to light brown, microcrystalline to cryptocrystalline, type II/I, minor type I, mudstone, no visable porosity, crinoidal, minor packstone.

2085-2095m Shale: 30%, cavings.
Limestone: 70%, as above, ostracod mudstone, crinoidal, no visable porosity, rare grainstone streak, trace pyrite in part, calcite veining in part.

2095-2100m Shale: 10%, dark brown, blocky, very calcareous, grading to limestone.
Limestone: 90%, off white to light brown to light grey/brown, cryptocrystalline to microcrystalline, type II/I, mudstone, no visable porosity, trace calcite veining, locally very argillaceous, silty in part, grading to shale in part.

2100-2105m Shale: 5%, as above.
Limestone: 95%, as above, locally very silty.

2105-2115m Shale: 20%, as above.
Limestone: 80%, as above.

2115-2120m Shale: 10%, as above.
Limestone: 90%, off white to light brown to light grey/brown, cryptocrystalline to microcrystalline, type II/I, type I in part, mudstone, locally very silty, slightly argillaceous in part, minor packstone, crinoidal.

2120-2125m Shale: 20%, as above.
Limestone: 80%, as above, trace pyrite, rare anhydrite, crinoids and brachiopods, mudstone, minor packstone.

2125-2130m Shale: 40%, predominantly cavings, minor light grey, subfissile, waxy luster, silty, slightly calcareous.
Limestone: 60%, as above, ostracod mudstone, commonly very silty, no visable porosity, argillaceous in part, brachiopods.

2130-2135m Shale: 10%, as above.
Limestone: 90%, off white to light brown to light grey/brown, microcrystalline to cryptocrystalline, type II/I-I, mudstone, no visable porosity, minor packstone, ostracods, brachiopods.

2135-2140m Shale: 30%, as above.
Limestone: 70%, as above, commonly very silty, grading to siltstone in part.

Landry log top at 2143.0m.

2140-2145m Shale: 20%, as above, mostly cavings.
Limestone: 80%, light grey to light grey/brown, microcrystalline, type II/I, mudstone, scattered fossils, generally silty to very silty, slightly argillaceous in part.

2145-2148m Limestone: 100%, as above, ostracod brachiopod mudstone, rare grainstone with trace porosity with dead oil specks, no effective porosity.

2148-2150m Limestone: 100%, as above, rare porosity with dead oil as above.

2150-2155m Limestone: 100%, off white to light brown cryptocrystalline to microcrystalline, type II/I, mudstone, minor packstone, ostracods, brachiopods, pelletal in part, commonly light grey and very silty.

2155-2160m Limestone: 100%, as above, common dark brown, type I, very argillaceous grading to shale in part, rare calcite veining.

2160-2165m Shale: 10%, dark brown, blocky, very calcareous.
Limestone: 90%, off white to light grey/brown, light grey, cryptocrystalline to microcrystalline, commonly very silty, type II/I, mudstone, fossiliferous in part, pelletal in part? Trace very argillaceous in part.

2165-2170m Shale: 30%, as above, trace calcite veining.
Limestone: 70%, as above.

2170-2180m Shale: 50%, as above, brown to dark brown.
Limestone: 50%, as above, generally very silty, slightly argillaceous, rare pellets, mudstone, no visable porosity. Abundant calcite veining.

Arnica log top at 2183.0m.

2180-2185m Limestone: 10%, as above, pelletal in part.
Dolomite: 90%, light brown, microcrystalline to very fine crystalline, trace fine crystalline, type I/III-III/I, 6-8% intercrystalline and pinpoint porosity, trace pyrobitumen in part, mudstone, crinoidal.

2185-2190m Dolomite: 100%, light brown, microcrystalline to very fine crystalline, type I-I/III, rare 6% intercrystalline porosity in part, generally tight, slightly calcareous. Common calcite veining.

2190-2195m Dolomite: 100%, as above, 6-8% intercrystalline porosity in part, rare pyrobitumen slightly calcareous, trace anhydritic, common calcite veining, common coarse crystalline calcite fracture fill.

2195-2200m Dolomite: 100%, as above, becoming moderately calcareous in part, microcrystalline to fine crystalline, type I, no visable porosity, in part type I/III, common calcite veining.

2200-2205m Dolomite: 100%, light brown to grey/brown, predominantly type I, cryptocrystalline to fine crystalline, mudstone, no visable porosity.

2205-2210m Limestone: 10%, off white, cryptocrystalline, type I, dense, mudstone.
Dolomite: 90%, light brown, mottled, cryptocrystalline to microcrystalline, type I-I/III, minor microcrystalline to very fine crystalline, 6-8% intercrystalline porosity in part, common dead oil staining on fractures, commonly very calcareous, calcite veining in part, bioclastic textured in part.

2210-2215m Limestone: 60%, off white to light brown, cryptocrystalline, type II/I-I, dense, mudstone.
Dolomite: 40%, as above, in part microcrystalline to very fine crystalline, type I/III, 6% intercrystalline porosity with trace pyrobitumen.

2215-2220m Limestone: 70%,as above.
Dolomite: 30%, light brown to grey/brown, microcrystalline to very fine to fine crystalline, type I-I/III, in part III/I, 6-10% intercrystalline porosity an pinpoint porosity without pyrobitumen, no fluorescence or cut fluorescence.

2220-2225m Limestone: 70%, off white to light brown, cryptocrystalline to microcrystalline, type II/I, mudstone, dense, common coarse crystalline euhedral calcite crystals with rare pyrobitumen.
Dolomite: 30%, light grey/brown, microcrystalline to very fine crystalline, type I/II-I, mudstone (?), pelletal in part, very calcareous in part, rare intercrystalline porosity with pyrobitumen fill.

2225-2230m Limestone: 80%, as above, common coarse crystalline euhedral calcite crystals fracture lining.
Dolomite: 20%, as above, local very fine crystalline type III/I, 8% intercrystalline porosity, trace anhydritic.

2230-2235m Limestone: 70%, as above, trace coarse euhedral calcite void lining.
Dolomite: 30%, light brown, microcrystalline to very fine crystalline, type I-I/III, mottled textured, very calcareous in part, bioclastic packstone, tight to 6% intercrystalline porosity with pyrobitumen fill in part.

2235-2240m Limestone: 40%, as above.
Dolomite: 60%, as above, trace microcrystalline with 4-6% intercrystalline porosity without pyrobitumen, trace anhydrite.

2240-2245m Limestone: 30%, as above.
Dolomite: 70%, light brown, microcrystalline to very fine crystalline, type I, minor type I/III, 4-6% intercrystalline porosity in part, pyrobitumen fill in part, generally calcareous, common calcite veining.

2245-2250m Limestone: Trace.
Dolomite: 100%, light grey/brown, minor brown, microcrystalline to fine crystalline, type I-I/III, trace III/I, 6-8% intercrystalline porosity in very fine to fine crystalline, trace pyrobitumen, minor pinpoint porosity, common calcite veining, common very coarse crystalline calcite fracture lining.

White Dolomite log top at 2254.0m.

2250-2255m Dolomite: 100%, light brown to light grey/brown, cryptocrystalline to microcrystalline, type I, mudstone, minor packstone, generally very calcareous, no visable porosity.

2255-2265m Dolomite: 100%, off white to very light grey/brown, cryptocrystalline to microcrystalline, type I, generally calcareous, no visable porosity, calcite filled microfractures, mudstone, ghost ostracods.

2265-2270m Dolomite: 100%, as above, commonly very calcareous, mudstone.

Trip for bit and laydown MWD tools.

2270-2275m Shale: 90%, trip cavings.
Dolomite: 10%, off white to very light grey/brown, cryptocrystalline to microcrystalline, type I-I/II, no visable porosity, mudstone, slightly calcareous in part, slightly silty.

2275-2280m Shale: 10%, cavings.
Dolomite: 50%, as above.
Limestone: 40%, off white, cryptocrystalline to microcrystalline, type II/I-I, dense, mudstone, rare ostracod, very abundant coarse euhedral calcite fracture lining, trace anhydrite.

2280-2285m Shale: Trace.
Dolomite: 95%, white to off white, light brown to brown, cryptocrystalline to microcrystalline, in part fine to coarse crystalline, mudstone, common coarse bioclastic grainstone, calcareous in part, trace coarse crystalline calcite void lining, trace of 6-8% intercrystalline porosity with pyrobitumen fill, possible vuggy porosity.
Limestone: 5%, as above.

2285-2290m Dolomite: 100%, off white to light brown, microcrystalline to very fine crystalline, type I, no visable porosity, mudstone, trace light grey and silty, trace anhydrite, trace coarse crystalline calcite fracture lining.

2290-2295m Siltstone: Trace, light grey, blocky, silty, slightly argillaceous, trace pyritic, dolomitic, tight.
Dolomite: 100%, off white to light brown, microcrystalline, type I, minor type I/II, no visable porosity, mudstone, calcareous in part.
Limestone: Trace, cryptocrystalline, dense, mudstone.

2295-2300m Siltstone: 40%, as above.
Dolomite: 60%, as above, cherty in part, mudstone textured with sparse fossils.

2300-2305m Siltstone: 20%, as above.
Dolomite: 60%, off white to light brown, microcrystalline to very fine crystalline, type I, trace type I/III with 4% intercrystalline porosity, mudstone.
Chert: 20%, white to off white, light grey and light brown, mottled, grainstone textured, possible pelletal.

2305-2310m Dolomite: 100%, as above, very cherty, silty in part, type I, dense, mudstone.

2310-2315m Dolomite: 100%, as above, becoming fine to very coarse crystalline, type I, no visable porosity, grainstone, cherty in part, silty in part.

2315-2320m Dolomite: 100%, off white to white, mottled in part, microcrystalline to very fine crystalline, fine to very coarse crystalline, mudstone and grainstone, type I, no visable porosity, locally light grey and silty.

2320-2325m Dolomite: 100%, as above, mudstone and grainstone, type I, no visable porosity, anhydritic in part, trace silty streaks.

2325-2330m Siltstone: 5%, light grey to grey, hard, dolomitic, locally moderately argillaceous, locally grading to shale in part.
Dolomite: 95%, off white to light brown, microcrystalline to very fine crystalline, in part fine crystalline, mudstone, minor grainstone, no visable porosity, trace coarse crystalline calcite void fill.

2330-2335m Shale: Trace, grey, grey/green, subfissile, silty.
Siltstone: Trace, as above, locally very argillaceous.
Dolomite: 100%, as above.

2335-2340m Shale: Trace, light grey to light grey/green, subfissile, waxy luster in part.
Dolomite: 100%, white to off white, mottled, medium to very coarse crystalline, grainstone, type I, no visable porosity, minor mudstone, trace silty in part, local sandy streaks.

2340-2342m Siltstone: Trace as above.
Dolomite: 100%, as above, mostly bioclastic grainstone.

Trip for bit at 2342m. Bit scrubbed.

2342-2345 Siltstone: 50%, light grey, hard, dolomitic, slightly argillaceous.
Dolomite: 50%, off white to light grey/brown, micro-crystalline to fine crystalline, type I, no visable porosity, generally very silty/sandy, mudstone, generally very silty/sandy, mudstone, grading to siltstone in part.

2345-2350m Shale: Trace, light green/grey, light grey, subfissile, silty, grading to siltstone in part.
Dolomite: 100%, white to off white, microcrystalline to fine crystalline, type I/III-I, no visable porosity, mudstone(?), rare glauconite grains, common very silty/sandy.

2350-2355m Siltstone: Trace, as above.
Dolomite: 100%, as above, trace disseminated pyrite in part, commonly very silty/sandy.

2355-2360m Siltstone: Trace, as above.
Shale: Trace, as above.
Dolomite: 100%, as above, very rare glauconite grains, rare pyrite, trace intercrystalline porosity in part, generally very silty/sandy.

2360-2365m Dolomite: 100%, off white to white, microcrystalline to fine crystalline, type I/III-I, no visable porosity, trace disseminated pyrite, mudstone (?), possible grainstone in part, locally very silty, trace coarse crystalline calcite void lining.

2365-2368m Dolomite: 100%, as above, locally medium to coarse crystalline, type I/III-III/I, bioclastic grainstone.

2368-2375m Dolomite: 100%, as above, microcrystalline to fine crystalline, type I/III-I, no visable porosity, mudstone, disseminated pyrite in part.

Pink Dolomite log top at 2378.0m.

2375-2380m Siltstone: Trace, light grey to grey, dolomitic, tight.
Dolomite: 100%, off white to white, very fine to fine crystalline, minor microcrystalline, type I/III-I, trace intercrystalline porosity to 6-8% in part, mudstone, trace silty streaks, disseminated pyrite in part, trace slightly silty and sandy.

2380-2385 Siltstone: 5%, light grey, hard, dolomitic, slightly argillaceous.
Dolomite: 95%, as above, minor reddish mottled cast (Iron staining)generally slightly silty, common siltstone streaks.

2385-2390m Shale: 5%, light grey to light green/grey, subfissile, silty, dolomitic.
Dolomite: 95%,white to off white, very fine to fine crystalline, in part microcrystalline, type I/III-I no visable porosity, mudstone (?), trace reddish cast in part - Iron staining, rare red mottled chert? slightly silty/sandy, trace euhedral coarse crystalline calcite void lining.

2390-2395m Siltstone: Trace, as above.
Dolomite: 100%, as above, pinkish cast in part - Iron staining, generally slightly silty, trace coarse crystalline calcite void lining, trace bright green shaley patches (glauconite?).

2395-2400m Shale: Trace, light green/grey, pale green, silty, subfissile.
Siltstone: 5%, as above.
Dolomite: 95%, off white to white, pinkish cast in part, very fine to fine crystalline, in part microcrystalline, type I/IIII, no visable porosity, slightly silty.

FTD: 2400m **Reached at 2215hrs 19-JAN-00.**

Appendix "A"

Drill Stem Test results attached.

DELTA-P TEST CORP.

WELL TESTING AND EVALUATIONS

PO BOX 48157
40 MIDLAKE BLVD.,
CALGARY , ALBERTA T2X 3C9

Northrock et al East MacKay

64-46-41.610 / 125-43-10.277
Arnica 2175-2204
DST # 1

Fri, Jan 21, 2000

Northrock et al East MacKay
64-46-41.610 / 125-43-10.277
Arnica 2175-2204
DST # 1

PRETEST CALCULATIONS

FILENAME	N2361.DST
GAS GRAVITY	.65
FORMATION DEPTH	2190.00 MKB
FORMATION PRESSURE	22294.20 KPAg
FORMATION TEMPERATURE	68.31 DEG C
AVE CHAMBER TEMP	36.41 DEG C
INITIAL CHM SURFACE PRESSURE	90.00 KPAa
INITIAL GAS/N2 HEAD PRESSURE	105.35 KPAa
INITIAL TOTAL CUSH. PRESSURE	105.35 KPAa
INITIAL CUSHION LENGTH	.00 m
LIQUID CUSHION GRADIENT	.00 kPA/m
DOWN HOLE CHOKE DIAMETER	12.70 mm
CHOKE COEFFICIENT	18.02 m3/D/KPA
DRILL COLLAR LENGTH	56.11 m
DRILL COLLAR I.D.	74.00 mm
DRILL COLLAR CAPACITY	.004301 m3/m
DRILL COLLAR VOLUME	.241 m3
LOWER DRILL PIPE LENGTH	2105.53 m
LOWER DRILL PIPE I.D.	91.00 mm
LOWER DRILL PIPE CAPACITY	.006504 m3/m
LOWER DRILL PIPE VOLUME	13.694 m3
UPPER DRILL PIPE LENGTH	.00 m
UPPER DRILL PIPE I.D.	.00 mm
UPPER DRILL PIPE CAPACITY	.000000 m3/m
UPPER DRILL PIPE VOLUME	.000 m3
TOTAL CHAMBER VOLUME	13.94 m3
LIQUID CUSHION VOLUME	.00 m3
NET CHAMBER VOLUME	13.94 m3

	MAX. RATE	MAX. SURFACE DP/DT
GAS	497116.1 m3/D	2484.6 KPA/min
GAS SATURATED H2O	1137.4 m3/D	24.5 KPA/min
PURE LIQUID INFLUX	1137.4 m3/D	5.5 KPA/min

	INITIAL CONVERSION FACTORS
GAS	200.1 m3/D/KPA/min
GAS SATURATED H2O	46.4 m3/D/KPA/min
PURE LIQUID INFLUX	205.9 m3/D/KPA/min

Fri, Jan 21, 2000

Northrock et al East MacKay
64-46-41.610 / 125-43-10.277
Arnica 2175-2204
DST # 1

CLOSED CHAMBER REPORT SUMMARY

FLOW TIMES (minutes)

FLOW # 1 = 4 SHUT IN # 1 = n/a

FLOW RATES (m3/D)

		GAS	LIQUID
FLOW # 1	initial	0	390
	final	0	390

RECOVERY

LENGTH (m)	VOLUME (m3)	DESCRIPTION
40	0.260	DRILLING MUD
74	0.481	MUD CUT SALT WATER (66000 ppm NaCl)
56	0.159	SALT WATER (80000 ppm NaCl)
170	0.900	TOTAL RECOVERY

COMMENTS

Surface pressures and gas flow rates have been recorded on a minute by minute basis throughout three flow periods and the results, in tabular and graphical form, are contained in the following pages. In summary, salt water (80000 ppm NaCl or 48000 mg/L Chlorides) with no sign of hydrocarbon was produce following the initial preflow mud surge. Please note that the packer seat was lost 4 minutes into the preflow and the test was terminated after two attempts were made to re-inflate the packers.

Analysis for liquid production during this test was undertaken ultilizing pressure readings from the gauge above the shut-in tool (#70359) in conjunction with the reported recovery. Calculations indicate a recovery gradient of 11.94 kPa/m which is reasonable for muddy salt water and the reported recovery is verified. The liquid rate stabilized at 390 m3/D before the pack seat failed.

Baker Testers' test tool was inflate straddle. Gauges #70359 (fluid recovery @2162m) and #70360 (outside recorder @2178m) have been converted and included in this report.

PRESSURES kPa(g) outside @2177 meters

IH 24234
IPF 10315
FPF 7818
ISI n/a
FH 24117

BHT 71.3 degrees Celcius.

LIQUID AND GAS FLOW RATES

DELTA P TEST CORP. 520,400 - 5th Avenue S.W. CALGARY, ALTA. T2P 0L6

Northrock et al East MacKay
64-46-41.610 / 125-43-10.277
Fri, Jan 21, 2000
Arnica 2175-2204
DST # 1

Testtime (24 Hr.)	Flowtime (min)	Surface Dp/Dt (KPa/mn)	Surface Pressure (KPabs)	Recovery Dp/Dt (KPa/mn)	Recovery Pressure (KPabs)	Liquidrate (m3/D)	Gasrate (m3/D)
START OF FLOW #1							
07:50:00	0.00	0.00	99.17	0.0	125.3		
07:50:15	0.25	0.23	99.23	502.7	251.0	170.5	0.0
07:50:30	0.50	0.88	99.44	502.7	376.6	170.4	3.8
07:50:45	0.75	1.83	99.90	502.7	502.3	170.0	201.2
07:51:00	1.00	1.91	100.38	502.7	628.0	169.9	216.1
07:51:30	1.50	2.10	101.43	502.7	879.3	239.5	177.2
07:52:00	2.00	1.97	102.41	502.7	1130.7	390.8	0.0
07:52:30	2.50	2.10	103.46	502.7	1382.0	390.7	0.0
07:53:00	3.00	2.27	104.60	502.7	1633.4	390.6	25.7
07:53:30	3.50	2.29	105.74	502.7	1884.7	390.5	20.4
07:54:00	4.00	0.15	105.82	502.7	2136.1	392.5	0.0
START OF SHUT IN #1						(Apparent Rates)	
07:54:00	0.00	0.00	105.82	0.0	2136.1		
07:55:00	1.00	-0.01	105.81	-4.4	2131.7	0.0	1.9
07:56:00	2.00	-0.02	105.79	883.5	3015.1	690.0	0.0
07:57:00	3.00	0.00	105.79	-776.7	2238.4	0.0	676.6
07:58:00	4.00	0.00	105.79	-106.1	2132.3	0.0	92.3
07:59:00	5.00	0.00	105.79	-9.2	2123.1	0.0	8.0
08:09:00	15.00	0.00	105.80	2.8	2151.3	2.2	0.0
08:19:00	25.00	0.01	105.86	0.1	2152.4	0.1	1.0
08:29:00	35.00	0.00	105.86	0.0	2152.8	0.0	0.0
08:39:00	45.00	0.00	105.89	-0.0	2152.4	0.0	0.6
08:44:00	50.00	-1.37	99.04	-1.9	2142.9	0.0	0.0

END OF RECORDED SURFACE PRESSURE DATA

Baker Oil Tools — FIELD REPORT

TEST DATA

TEST No 1 LUS. TEST No 1
FORMATION TESTED ARNICA T.D. 2400.00 m
INTERVAL TESTED: From 2175.00 m to 2204.00 m
TOTAL INTERVAL TESTED 29.00 m
TEST TYPE INFLATE STRADDLE RESET: YES ☐ NO ☒
CUSHION: YES ☐ NO ☒ TYPE AMOUNT m
STARTED IN HOLE @ 23:00 HRS. OPENED TOOL 07:50 HRS.
DATE & TIME OUT OF HOLE 2000-01-22 @ 14:30 HRS.
TEST TIMES:

PRE-FLOW	4	MIN.	INITIAL SHUT-IN		MIN.
SECOND FLOW		MIN.	SECOND SHUT-IN		MIN.
FINAL FLOW		MIN.	FINAL SHUT-IN		MIN.

PRE-FLOW BLOW DESCRIPTION: CLOSED CHAMBER WITH DELTA-P. NO SEAT WHEN TIME TO SHUT-IN TOOL. PUMPED FOR 20 MIN, NO SEAT MOVED UP 1 METER PUMPED 20 MIN, NO SEAT. P.O.O.H.
FINAL FLOW BLOW DESCRIPTION:

MECHANICAL RECORDERS

No.	INSIDE ☐ OUTSIDE ☒	No.	INSIDE ☐ OUTSIDE ☐	No.	INSIDE ☐ OUTSIDE ☐
	21099				
DEPTH	2178.00 m	DEPTH	m	DEPTH	m
CLOCK	16223	CLOCK		CLOCK	
REC. SEC. #	11673	REC. SEC. #		REC. SEC. #	
No.	INSIDE ☐ OUTSIDE ☐	No.	INSIDE ☐ OUTSIDE ☐	No.	INSIDE ☐ OUTSIDE ☐
DEPTH	m	DEPTH	m	DEPTH	m
CLOCK		CLOCK		CLOCK	
REC. SEC. #		REC. SEC. #		REC. SEC. #	

ELECTRONIC RECORDERS

No.	INSIDE ☐ OUTSIDE ☒	No.	INSIDE ☒ OUTSIDE ☐	No.	INSIDE ☒ OUTSIDE ☐
	70360		70014		70359
DEPTH	2178.00 m	DEPTH	2166.64 m	DEPTH	2162.42 m
TEMP.	71.3	TEMP.		TEMP.	
FILE	ni77a.dec	FILE		FILE	

FIELD READINGS

REC. No. 70360 REC. No.

DEFLECTION	PRESSURE kPa	DEFLECTION	PRESSURE kPa
1	24234.30	1	
2	10315.08	2	
3	7817.96	3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14	24116.64	14	

REMARKS

SEQUENCE OF TEST EVENTS:

SAMPLES LEFT WITH GEOLOGIST
Sampler drained on location.

GENERAL INFORMATION

COMPANY NORTHROCK RESOURCES LTD.
CONTACT IN CALGARY
CONTACT'S PHONE FAX
WELL NAME NORTHROCK ET AL EAST MacKAY I-77
LOCATION 64-46-41.610/125-43-10.277
K.B. 202.35 m GROUND ELEV 198.1 m
COMPANY REP BRUCE WEBBER
TESTER MARC SAMPIETRO
JAR No 1026 HYDRAULIC TOOL No 145
UNIT # SKID #2 PUMP No 82
CONTRACTOR AKITA/SAHTU RIG No 51
TICKET No 809939 DATE 2000-01-22

MUD & HOLE DATA

HOLE CONDITION @ TEST TIME:
EXCELLENT ☐ GOOD ☒ FAIR ☐ POOR ☐
WAS HOLE CONDITIONED PRIOR TO TEST: YES ☐ NO ☒
HOLE DEVIATION: YES ☐ NO ☒ AMOUNT DEGREES
CALIPER LOG RUN PRIOR TO TEST: YES ☐ NO ☒
CALIPERED HOLE SIZE @ TEST DEPTH 230 MAX. mm
MUD TYPE GEL CHEM
WEIGHT 1140 kg/m³ VISCOSITY 92 WATER LOSS 7.5
FILTER CAKE 1.5 mm
DRILL PIPE SIZE: O.D. 114 mm I.D. 91 mm WEIGHT 29.77 kg/m
DRILL COLLARS: O.D. 158 mm I.D. 74 mm RUN 75.81 m
MAIN HOLE OR CASING SIZE 222 mm
BOTTOM HOLE OR CHOKE SIZE 12.7 mm
PACKER RUBBER SIZE: DIAM. IN mm 191 LENGTH IN m 1.65
RUBBER LEFT IN HOLE: YES ☐ NO ☒
TOP PACKER: SERIAL No 2069 CONDITION 2
BTM PACKER: SERIAL No 3164 CONDITION 1

GAS MEASUREMENTS

MEASURED WITH:
SIDE STATIC ☐ CRITICAL FLOW PROVER ☐
FLOOR MANIFOLD ☐ ORIFICE WELL TESTER ☐
CLOSED CHAMBER ☒ OTHER
RISER SIZE

FLOW #	TIME	CHOKE mm	READING kPa	RATE m3/D

RECOVERY

RECOVERY VERIFICATION SIGNATURE:

TOTAL FLUID RECOVERED 170 m CONSISTING OF:
40 m OF MUD SALINITY
74 m OF MUD CUT SALT WATEER SALINITY
56 m OF SALT WATER SALINITY 80000
m OF SALINITY
TEST WAS REVERSED OUT: YES ☐ NO ☒

BTM. H. SAMPLER # 299 SENT TO
GAS BOMB # SENT TO
No. OF FLUID SAMPLES TAKEN 5 SENT TO

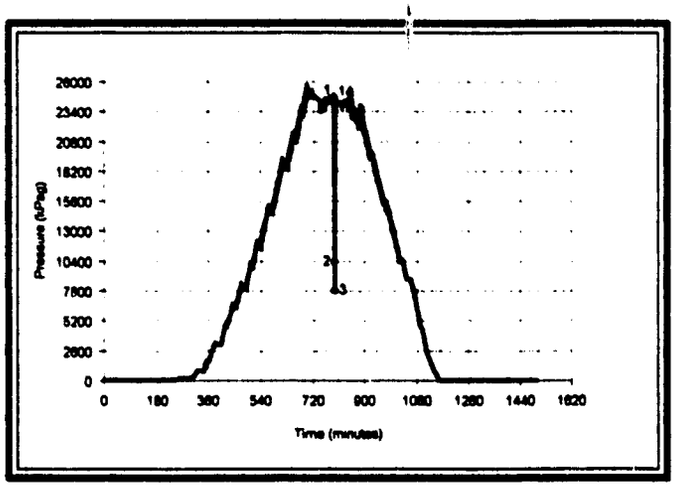
NORTHROCK ET AL EAST MacKAY I-77
64-46-41.610/125-43-10.277
DST# 1

Baker Oil Tools

Formation: ARNICA
Interval - from: 2175.00 **to:** 2204.00 m

Test Date: 2000-01-22
Test Type: INFLATE STRADDLE
Tester Name: MARC SAMPIETRO
Drill Pipe O.D.: 114.00 mm
Drill Collar I.D.: 74.00 mm
Drill Collar Length: 75.81 m
Hole Size: 222.00 mm

Recorder# 70360 at 2178.00 m



Maximum Btm Hole Temperature @ FSI: 71.3 C

		Pressure (kPag)	*Time (min)*	*Extrapolated Pressure (kPag)*
1	Initial Hydrostatic	24234		
2	Start of 1st Flow	10315		
3	End of 1st Flow	7818	2.5	
14	Final Hydrostatic	24117		

Liquid Recovery of 170.00 m

Recovery	*Description*	*Salinity*
40.00 m	MUD	
74.00 m	MUD CUT SALT WATEER	
56.00 m	SALT WATER	80000

Blow Description:

PREFLOW - CLOSED CHAMBER WITH DELTA-P. NO SEAT WHEN TIME TO SHUT-IN TOOL. PUMPED FOR 20 MIN, NO SEAT MOVED UP 1 METER PUMPED 20 MIN, NO SEAT. P.O.O.H.

Remarks:

SAMPLES LEFT WITH GEOLOGIST SAMPLER DRAINED ON LOCATION

BAKER HUGHES

Baker Oil Tools

TEST TOOL & PIPE RECORD

Well Name: NORTHROCK ET AL E... Location: 64-46-41.610/125-43... Date 2000-01-22 Ticket # 809939

Interval Tested: from 2175.00 to 2204.00 Total Depth 2400.00 Test No. 1

CONVENTIONAL

DRILL COLLARS

JOINT	LENGTH	JOINT	LENGTH
1	0.62	11	19.18
2	18.61	12	0.52
3	19.81	13	
4	18.07	14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	
1st TOTAL	56.11	2nd TOTAL	19.70

DRILL PIPE

1	19.00	11	18.24	21	18.80	31	18.85	41	19.27
2	19.04	12	19.39	22	19.20	32	19.31	42	19.26
3	19.22	13	19.12	23	18.53	33	19.22	43	19.24
4	18.91	14	18.42	24	18.73	34	18.84	44	19.08
5	18.25	15	18.64	25	19.16	35	18.07	45	18.63
6	19.05	16	19.07	26	19.06	36	18.92	46	18.52
7	19.28	17	19.16	27	19.05	37	18.59	47	19.26
8	18.93	18	19.08	28	19.15	38	19.13	48	18.95
9	19.37	19	19.24	29	18.72	39	19.09	49	19.28
10	18.88	20	19.22	30	19.30	40	18.26	50	19.22
3rd TOTAL	189.93	4th TOTAL	189.58	5th TOTAL	189.70	6th TOTAL	188.28	7th TOTAL	190.71

51	18.56	61	18.74	71	19.14	81	18.60	91	19.13
52	19.15	62	18.62	72	18.70	82	18.71	92	19.13
53	19.14	63	19.16	73	19.08	83	18.48	93	19.23
54	18.36	64	19.16	74	18.62	84	18.98	94	19.14
55	18.79	65	18.43	75	19.15	85	18.17	95	18.84
56	18.39	66	19.14	76	19.15	86	18.67	96	19.16
57	19.13	67	19.13	77	19.21	87	19.16	97	19.12
58	19.12	68	19.12	78	19.20	88	18.74	98	19.12
59	18.17	69	19.09	79	19.18	89	19.17	99	19.11
60	19.11	70	19.11	80	18.73	90	19.12	100	19.05
8th TOTAL	187.92	9th TOTAL	189.70	10th TOTAL	190.16	11th TOTAL	187.80	12th TOTAL	191.03

101	18.82		
102	19.15		
103	19.03		
104	19.11		
105	19.13		
106	19.19		
107	19.15		
108	19.18		
109	19.15		
110	19.11		
13th TOTAL	191.02		

TOOL	15.25
1st TOTAL	56.11
2nd TOTAL	19.70
3rd TOTAL	189.93
4th TOTAL	189.58
5th TOTAL	189.70
6th TOTAL	188.28
7th TOTAL	190.71
8th TOTAL	187.92
9th TOTAL	189.70
10th TOTAL	190.16
11th TOTAL	187.80
12th TOTAL	191.03
13th TOTAL	191.02

BEFORE TEST IN DERRICK

TOTAL DRILL COLLARS	3
TOTAL DRILL PIPE	122

TESTING

	IN	OUT	TOTAL
DRILL COLLARS	3	0	3
DRILL PIPE	111	11	122

CONVENTIONAL PIPE TALLY

BELOW BOTTOM PACKER SEAL	
BETWEEN PACKER SEALS	
TOOL ABOVE PACKER SEAL	
DRILL COLLARS	
DRILL PIPE	
TOTAL STRING	
TOTAL DEPTH	
TOP SINGLE ABOVE TABLE	

INFLATE PIPE TALLY

TOOL ABOVE INTERVAL	15.25
DRILL COLLARS	75.81
DRILL PIPE	2085.83
TOTAL STRINGS ABOVE INTERVAL	2176.89
BOTTOM OF TOP PACKER SEAL DEPTH	2175.00
TOP SINGLE ABOVE TABLE	1.89

INFLATABLE

Tool	Length
POS	0.33
XOS	0.30
POS	0.83
Car	1.38
CSub	0.31
Hydr	1.50
BHS	1.03
Car	1.38
Jar	2.22
SJ	0.65
Pump	2.38
Scr	1.16
TPack	1.78
2175.0 Top Packer Seal Depth	
PSD	0.82
PS	0.31
Car	2.04
XOS	0.30
DC	18.10
XOS	0.30
Spg	6.71
PSU	0.42
2204.0 Btm Packer Seal Depth	
BPack	1.90
BS	2310

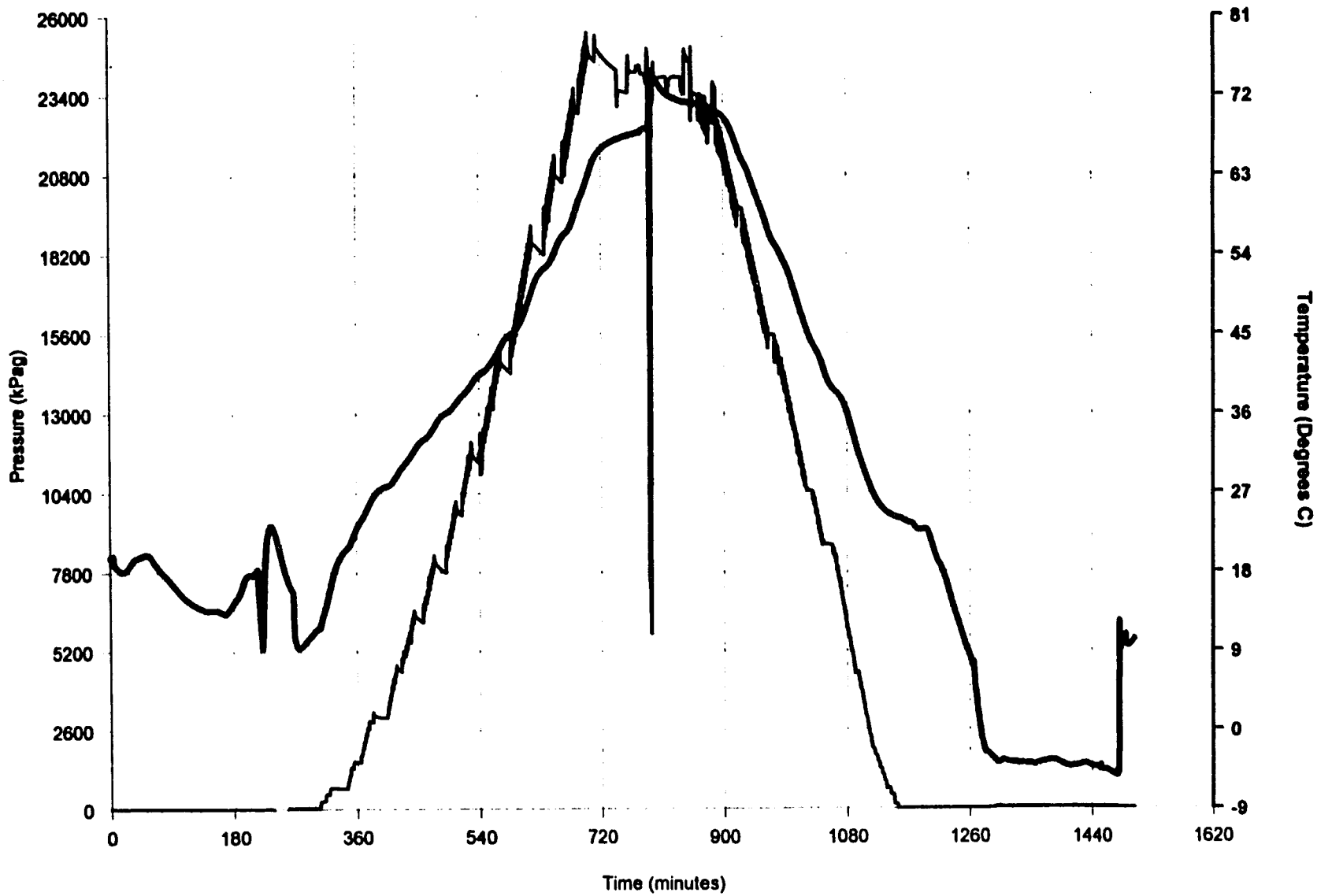
Top Packer Seal Depth

Btm Packer Seal Depth

Tester Signature _____ Approved by Oil Co. Rep. _____

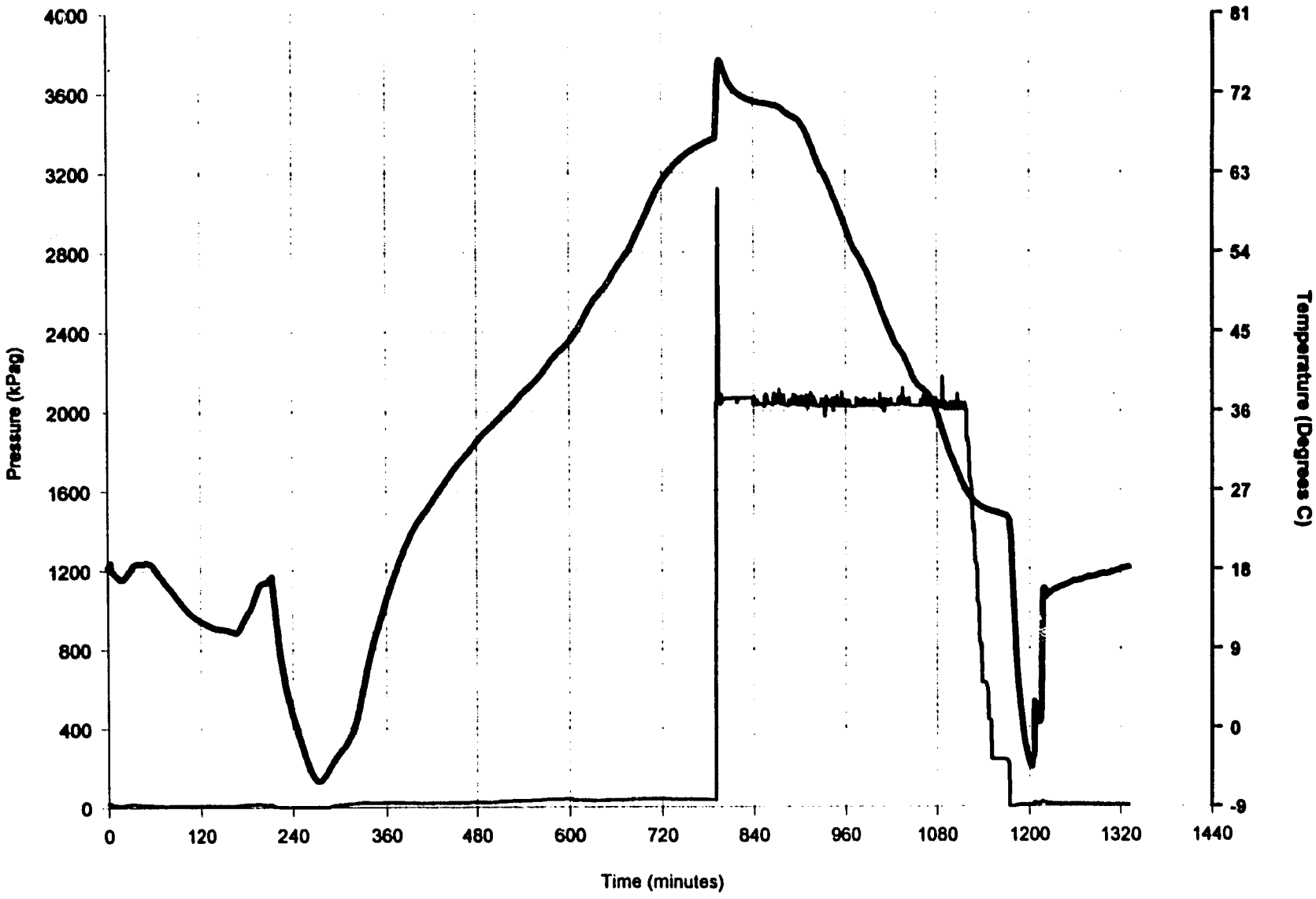
Baker Oil Tools Drill Stem Testing

NORTHROCK ET AL EAST MacKAY I-77
64-46-41.610/125-43-10.277
DST #: 1
Recorder: 70014



Baker Oil Tools Drill Stem Testing

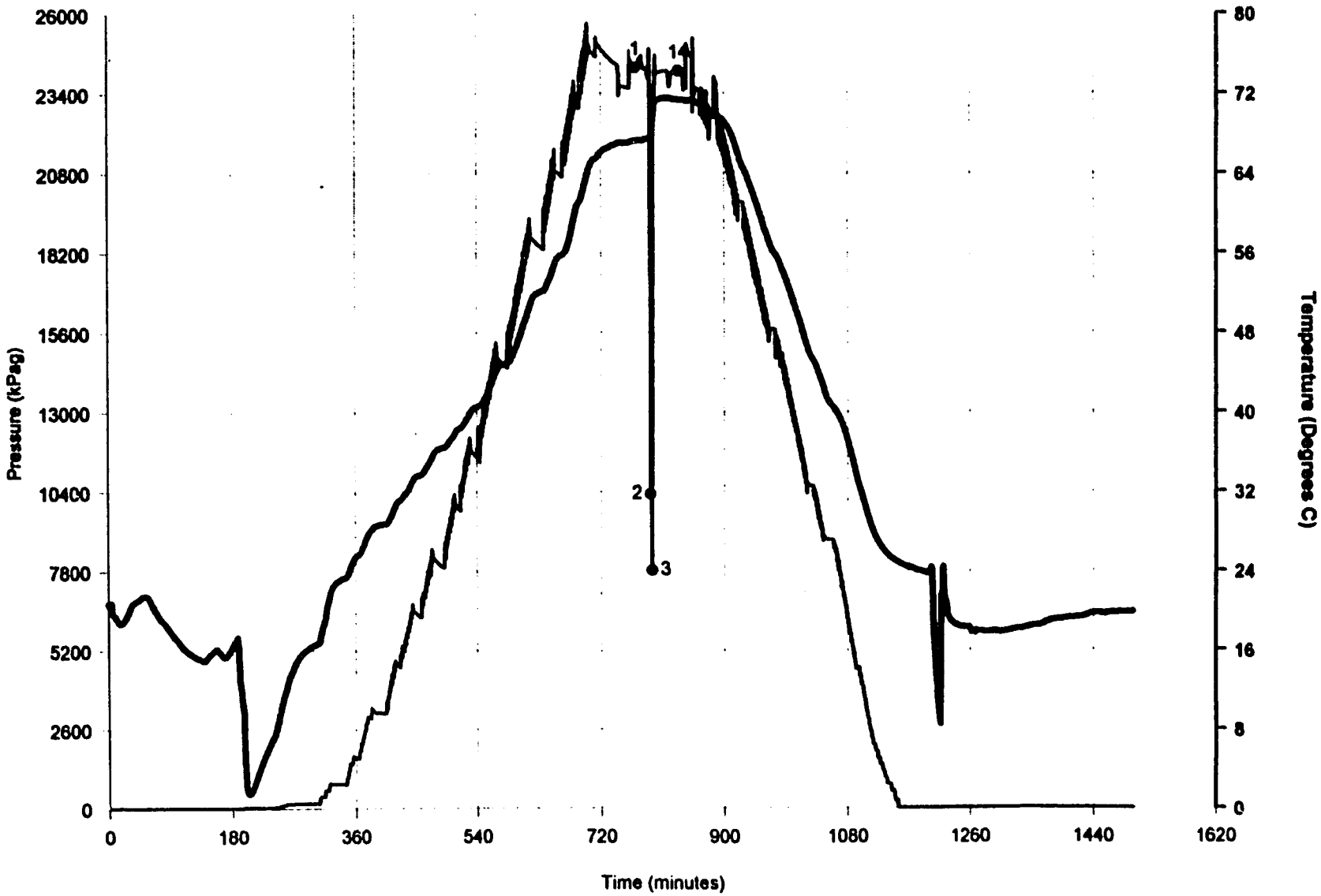
NORTHROCK ET AL EAST MacKAY I-77
64-46-41.610/125-43-10.277
DST #: 1
Recorder: 70359



Baker Oil Tools Drill Stem Testing

NORTHROCK ET AL EAST MacKAY I-77
64-46-41.610/125-43-10.277
DST #: 1
Recorder: 70360

Pressure (kPag) at Critical Points:
1: 24234 14: 24117
2: 10315
3: 7818



Appendix "B"

MWD Directional Surveys attached.....

PathTracker 4.0
Survey Calculation Program
NORTHROCK et al N MACKAY I-77

Customer: NORTHROCK RESOURCES LTD.
WellName: NORTHROCK et al east MACKAY I-77
Location: I-7764-50-125-30

Vertical Section Calculated on: 0.0000
Survey Calculation Method: Minimum Curvature
FileName: C:\PATHTRKR\NORTH.SR3

#	Depth Meters	Inc Degrees	Azimuth Degrees	TVD Meters	North Meters	East Meters	Section Meters	Dogleg /30m
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	637.00	0.70	267.70	636.98	-0.16	-3.89	-0.16	0.03
2	775.00	0.80	253.70	774.97	-0.46	-5.65	-0.46	0.05
3	921.60	1.00	184.80	921.56	-2.02	-6.74	-2.02	0.21
4	1057.00	1.60	161.20	1056.92	-4.99	-6.23	-4.99	0.18
5	1189.80	2.20	132.60	1189.65	-8.47	-3.76	-8.47	0.25
6	1401.10	3.30	84.70	1400.73	-10.65	5.28	-10.65	0.35
7	1411.70	3.20	85.40	1411.31	-10.60	5.88	-10.60	0.30
8	1420.80	2.50	85.40	1420.40	-10.57	6.33	-10.57	2.31
9	1430.40	2.50	82.60	1429.99	-10.52	6.75	-10.52	0.38
10	1440.00	2.10	77.00	1439.59	-10.46	7.13	-10.46	1.43
11	1449.50	0.70	27.80	1449.08	-10.36	7.32	-10.36	5.45
12	1459.10	0.70	287.20	1458.68	-10.30	7.30	-10.30	3.37
13	1468.70	1.10	287.20	1468.28	-10.25	7.15	-10.25	1.25
14	1478.20	1.50	290.00	1477.78	-10.18	6.95	-10.18	1.28
15	1487.80	1.90	297.10	1487.38	-10.07	6.69	-10.07	1.41
16	1496.90	1.90	298.50	1496.47	-9.93	6.42	-9.93	0.15
17	1506.50	1.80	316.80	1506.07	-9.74	6.18	-9.74	1.86
18	1516.00	1.90	326.60	1515.56	-9.50	5.99	-9.50	1.05
19	1525.60	1.80	333.60	1525.16	-9.23	5.83	-9.23	0.77
20	1535.00	1.80	323.80	1534.55	-8.98	5.68	-8.98	0.98
21	1544.50	1.90	324.50	1544.05	-8.73	5.50	-8.73	0.32
22	1554.10	1.90	321.00	1553.64	-8.48	5.31	-8.48	0.36
23	1563.70	2.20	326.60	1563.23	-8.20	5.11	-8.20	1.13
24	1573.20	2.20	324.50	1572.73	-7.90	4.90	-7.90	0.25
25	1582.40	2.00	334.30	1581.92	-7.61	4.73	-7.61	1.34
26	1592.00	2.00	326.60	1591.52	-7.32	4.56	-7.32	0.84
27	1601.20	1.90	330.10	1600.71	-7.05	4.40	-7.05	0.51
28	1610.80	0.70	333.40	1610.31	-6.86	4.29	-6.86	3.76
29	1620.30	0.30	318.20	1619.81	-6.79	4.25	-6.79	1.32
30	1629.80	0.30	12.30	1629.31	-6.75	4.24	-6.75	0.86
31	1639.40	0.40	10.90	1638.91	-6.69	4.25	-6.69	0.31
32	1648.50	0.40	7.40	1648.01	-6.63	4.26	-6.63	0.08
33	1657.40	0.40	4.60	1656.91	-6.57	4.27	-6.57	0.07

Customer: NORTHROCK RESOURCES LTD.
WellName: NORTHROCK et al east MACKAY I-77
Location: I-7764-50-125-30

Vertical Section Calculated on: 0.0000
Survey Calculation Method: Minimum Curvature
FileName: C:\PATHTRKR\NORTH.SR3

#	Depth Meters	Inc Degrees	Azimuth Degrees	TVD Meters	North Meters	East Meters	Section Meters	Dogleg /30m
34	1666.90	0.70	3.20	1666.41	-6.48	4.27	-6.48	0.95
35	1676.50	1.00	341.40	1676.01	-6.34	4.25	-6.34	1.36
36	1685.90	0.90	346.30	1685.40	-6.19	4.21	-6.19	0.41
37	1695.00	1.10	349.10	1694.50	-6.04	4.17	-6.04	0.68
38	1704.60	1.50	355.40	1704.10	-5.82	4.15	-5.82	1.33
39	1714.20	1.50	6.70	1713.70	-5.57	4.15	-5.57	0.92
40	1723.70	2.00	18.60	1723.19	-5.29	4.22	-5.29	1.94
41	1733.30	2.20	20.80	1732.79	-4.96	4.34	-4.96	0.67
42	1742.90	2.50	30.60	1742.38	-4.61	4.51	-4.61	1.56
43	1752.50	2.90	39.00	1751.97	-4.24	4.77	-4.24	1.76
44	1761.50	2.50	41.80	1760.96	-3.91	5.04	-3.91	1.40
45	1771.10	2.00	72.10	1770.55	-3.71	5.34	-3.71	3.97
46	1780.70	2.20	67.90	1780.14	-3.58	5.67	-3.58	0.79
47	1790.20	2.40	60.10	1789.64	-3.42	6.01	-3.42	1.17
48	1799.80	1.90	49.60	1799.23	-3.21	6.31	-3.21	1.98
49	1809.40	1.60	52.40	1808.82	-3.03	6.54	-3.03	0.97
50	1819.00	1.30	51.00	1818.42	-2.88	6.73	-2.88	0.94
51	1828.10	1.20	22.20	1827.52	-2.73	6.84	-2.73	2.07
52	1837.60	1.60	0.40	1837.02	-2.50	6.88	-2.50	2.08
53	1847.20	2.20	4.60	1846.61	-2.18	6.90	-2.18	1.92
54	1856.80	2.60	10.20	1856.20	-1.78	6.95	-1.78	1.45
55	1866.30	2.80	36.20	1865.69	-1.39	7.13	-1.39	3.88
56	1875.90	2.30	69.30	1875.28	-1.13	7.44	-1.13	4.78
57	1885.50	2.10	81.20	1884.88	-1.03	7.80	-1.03	1.55
58	1894.60	2.00	95.30	1893.97	-1.02	8.12	-1.02	1.69
59	1903.20	1.80	109.30	1902.57	-1.08	8.40	-1.08	1.76
60	1913.60	1.10	150.80	1912.96	-1.22	8.60	-1.22	3.51
61	1923.20	1.10	143.80	1922.56	-1.38	8.70	-1.38	0.42
62	1932.40	0.90	164.20	1931.76	-1.52	8.77	-1.52	1.32
63	1942.00	1.10	165.60	1941.36	-1.68	8.82	-1.68	0.63
64	1951.00	1.10	155.10	1950.36	-1.84	8.87	-1.84	0.67
65	1961.10	1.30	134.00	1960.45	-2.01	9.00	-2.01	1.43
66	1970.70	0.20	139.60	1970.05	-2.10	9.09	-2.10	3.44
67	1980.30	0.70	283.70	1979.65	-2.10	9.04	-2.10	2.72

Customer: NORTHROCK RESOURCES LTD.
WellName: NORTHROCK et al east MACKAY I-77
Location: I-7764-50-125-30

Vertical Section Calculated on: 0.0000
Survey Calculation Method: Minimum Curvature
FileName: C:\PATHTRKR\NORTH.SR3

#	Depth Meters	Inc Degrees	Azimuth Degrees	TVD Meters	North Meters	East Meters	Section Meters	Dogleg /30m
68	1989.30	1.20	284.80	1988.65	-2.06	8.90	-2.06	1.67
69	1998.90	0.90	285.80	1998.25	-2.01	8.73	-2.01	0.94
70	2008.40	1.20	280.90	2007.75	-1.97	8.56	-1.97	0.99
71	2017.60	0.80	318.90	2016.95	-1.91	8.42	-1.91	2.46
72	2027.10	0.50	307.60	2026.45	-1.83	8.34	-1.83	1.03
73	2036.70	0.60	313.30	2036.05	-1.77	8.27	-1.77	0.36
74	2040.00	0.60	315.40	2039.35	-1.75	8.25	-1.75	0.20
75	2046.30	0.50	299.20	2045.65	-1.71	8.20	-1.71	0.88
76	2055.90	0.40	322.40	2055.25	-1.66	8.14	-1.66	0.64
77	2065.50	0.70	318.20	2064.85	-1.59	8.09	-1.59	0.95
78	2075.00	0.40	328.10	2074.34	-1.52	8.03	-1.52	0.99
79	2084.60	0.30	347.00	2083.94	-1.47	8.01	-1.47	0.47
80	2094.20	0.60	21.50	2093.54	-1.40	8.02	-1.40	1.22
81	2103.80	0.60	51.70	2103.14	-1.32	8.08	-1.32	0.98
82	2113.30	0.40	42.50	2112.64	-1.26	8.14	-1.26	0.68
83	2122.90	0.50	50.30	2122.24	-1.21	8.19	-1.21	0.37
84	2132.60	0.90	67.20	2131.94	-1.16	8.30	-1.16	1.38
85	2142.10	0.90	59.40	2141.44	-1.09	8.43	-1.09	0.39
86	2151.70	1.00	67.90	2151.04	-1.02	8.57	-1.02	0.54
87	2161.20	1.30	68.60	2160.54	-0.95	8.75	-0.95	0.95
88	2170.80	1.30	81.90	2170.14	-0.89	8.96	-0.89	0.94
89	2180.40	1.40	80.50	2179.73	-0.86	9.18	-0.86	0.33
90	2190.00	1.30	84.70	2189.33	-0.83	9.40	-0.83	0.44
91	2199.60	1.10	84.00	2198.93	-0.81	9.60	-0.81	0.63
92	2209.20	1.10	84.00	2208.53	-0.79	9.79	-0.79	0.00
93	2218.80	1.40	79.10	2218.12	-0.76	9.99	-0.76	0.99
94	2228.40	1.20	84.70	2227.72	-0.73	10.21	-0.73	0.74
95	2237.90	1.50	94.60	2237.22	-0.73	10.43	-0.73	1.20
96	2247.10	1.60	96.00	2246.42	-0.75	10.68	-0.75	0.35
97	2257.10	1.60	98.80	2256.41	-0.79	10.96	-0.79	0.23

Closure is 10.9859 Meters on an azimuth of 94.1116

PROPOSED SURVEY PLAN

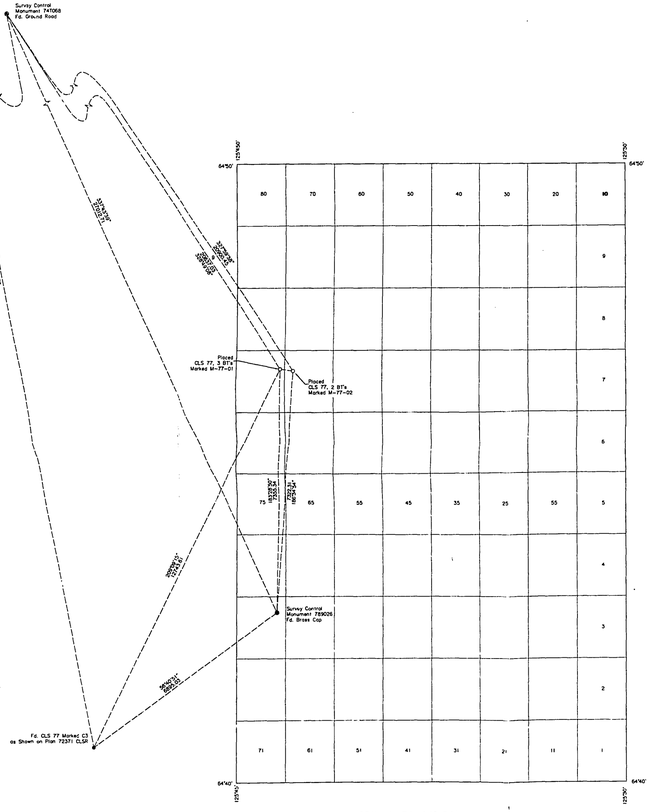
OVERSIZED

DOCUMENT

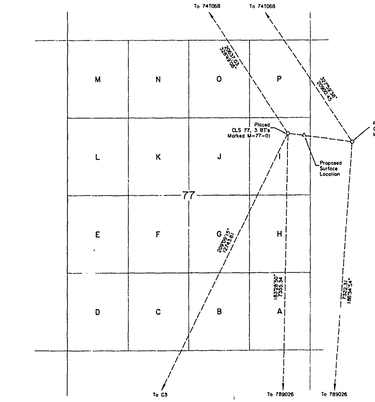
FILMED

ON

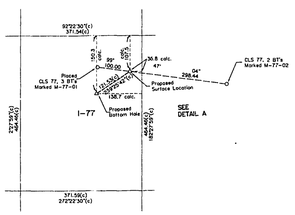
35mm



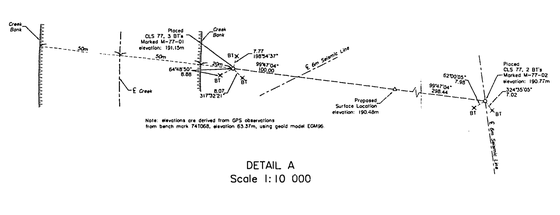
GRID AREA 64° 50', 125° 30'
Scale 1:50 000



SECTION DETAIL
Scale 1:10 000



UNIT DETAIL
Scale 1:5000



Note: elevations are derived from GPS observations from bench mark 741068, elevation 63.37m, using geoid model CGM96.

DETAIL A
Scale 1:10 000

GEODETIC AND UTM COORDINATES, (NAD 1927)

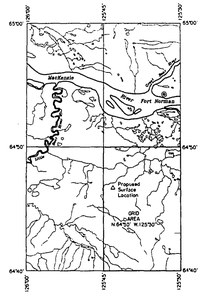
The co-ordinates shown in this table are NAD 1927 Datum. They are derived from a least squares adjustment of GPS observations holding Geodetic Control Stations 789026 and 747068 fixed. The UTM co-ordinates are Zone 10, W. 123°.

Station	Latitude	Longitude	Northings	Eastings
CONTROL MONUMENTS				
789026	64°42'44".55836	125°43'27".61244	7178597.693	370175.352
747068	64°55'56".04000	125°57'48".12176	7203990.723	355937.801
GRID AREA 64°40' X 125°30'				
N.E.	64°50'00".00	125°30'00".00	7190208.984	381383.424
S.E.	64°40'00".00	125°30'00".00	7173465.677	380660.371
S.W.	64°40'00".00	125°45'00".00	7173358.958	368731.955
N.W.	64°50'00".00	125°45'00".00	7190250.811	369538.311
I-77 N.E.	64°48'45".08428	125°43'07".49298	7186472.018	370781.118
I-77-S.E.	64°48'30".08434	125°43'07".49257	7185962.587	370741.187
I-77-S.W.	64°48'30".06560	125°43'39".81712	7185975.185	370368.913
I-77-N.W.	64°48'45".06571	125°43'35".81747	7186462.414	370389.900
TRAVERSE STATIONS				
M-77-01	64°48'47".02115	125°43'17".78410	7186338.097	370821.211
M-77-02	64°48'40".38136	125°42'47".57069	7186270.365	371013.856
C3	64°42'34".21457	125°50'29".38827	7175211.008	384414.180
PROPOSED WELL				
Proposed Surface Location	64°48'41".60051	125°43'10".27898	718321.103	370118.757
Proposed Subsurface Location	64°48'39".46893	125°43'17".58880	718239.290	370615.120

GEODETIC AND UTM COORDINATES, (NAD 1983)

The co-ordinates shown in this table are NAD 1983 Datum. They are derived from a least squares adjustment of GPS observations holding Control Stations 789026 and 747068 fixed. The UTM co-ordinates are Zone 10, W. 123°.

Station	Latitude	Longitude	Northings	Eastings
CONTROL MONUMENTS				
789026	64°42'44".58121	125°43'33".39159	7172205.481	370030.772
747068	64°55'56".37837	125°57'54".54350	7204138.248	355859.783
TRAVERSE STATIONS				
M-77-01	64°48'42".35909	125°43'54".24567	7186545.837	370542.869
M-77-02	64°48'40".71584	125°43'24".24567	7186478.132	370833.512
C3	64°42'34".53322	125°50'35".79044	7175418.783	364333.437
PROPOSED WELL				
Proposed Surface Location	64°48'41".54759	125°43'18".62258	7186528.845	370641.415
Proposed Subsurface Location	64°48'39".80780	125°43'24".36512	7186457.030	370530.776



KEY PLAN
Scale 1:250 000

PLAN AND FIELD NOTES
OF SURVEY OF

PROPOSED EXPLORATORY WELL
NORTHROCK et al NORTH MACKAY I-77
IN UNIT I, SECTION 77
GRID AREA 64° 50', 125° 30'

NORTHWEST TERRITORIES
CANADA OIL AND GAS LAND REGULATIONS

SCALE: 1:50,000
100 0 100 200 300 400 m

SURVEYED FOR
NORTHROCK RESOURCES LTD.
BY: P. LANTEIGNE, C.L.S. on July 18 and 19, 1999.

LEGEND
Bearings are grid, referenced to the central meridian of UTM zone 10, W. 123°, and are derived from a least squares adjustment of GPS observations holding Geodetic Control Stations 789026 and 747068 fixed.
Distances are in metres, and, except for the grid area dimensions, are at ground level.
The dimensions of the grid area are UTM grid distances.
For the computation of coordinates measured ground distances have been reduced to the UTM plane by multiplying them by an average combined scale factor of 0.9998043.

This survey was completed prior to drilling; therefore well as drilled may not necessarily agree with proposed location.

Survey Control Monuments found shown thus ..... ⊕
OLS 77 monuments placed shown thus ..... ⊙
OLS 77 monuments found shown thus ..... ⊙
Iron Bars shown thus ..... ○
25cm Iron Spike shown thus ..... ●
Traverse lines shown thus ..... — — —
UTM denotes Universal Transverse Mercator.
GPS denotes Global Positioning System.

I, Patrice Lanteigne, of the City of Calgary, Alberta, Canada Lands Surveyor, make oath and say that I have in my own proper person carried out the survey of the lands shown on the plan of Canada Lands, truthfully and correctly executed the survey shown by this plan and field notes, and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD

Sworn before me at Calgary, Alberta
this 24th day of August, 1999.

Blair Anderson (expiry date, March 25, 2002)
a Commissioner for Oaths in and for the Province of Alberta.

Patrice Lanteigne
Canada Lands Surveyor

NORTHROCK RESOURCES LTD.

.....
Witness
Date

NORTHROCK RESOURCES LTD.

SESL GEOMATICS
LAND SURVEYING & SURVEY ENGINEERING
Surveyor: D. Brithgarson AM Chk'd: PL
Job No.: 99N013B
Tel: (403) 236-9909 Free 1-800-565-2389 Fx. (403) 236-9908 Fax. (403) 266-2999
No. Revision Date

36X

RESISTIVITY/

CONDUCTIVITY

1879 N.E.B. COPY

COMPANY: NORTHROCK RESOURCES LTD.

WELL: NORTHROCK ET AL E. MACKAY I-77

FIELD: EAST MACKAY

PROVINCE: NWT

Schlumberger

PHASOR INDUCTION SFL

PROVINCE:NWT | Field: EAST MACKAY | Well: NORTHROCK ET AL E. MACKAY I-77 | Company: NORTHROCK RESOURCES LTD.

LAT: 64 46 41.94759 | LONG: 125 43 16.95258 | UWI: 300079460125300

Elev.: K.B. 202.35 m | G.L. 198.1 m | D.F.

Permanent Datum: GROUND LEVEL | Elev.: 198.1 m
Log Measured From: KELLY BUSHING 4.2 m above Perm. Datum
Drilling Measured From: KELLY BUSHING

API Serial No.	SECTION	TOWNSHIP	RANGE

CORRECTED LOG

	Run 1	Run 2	Run 3	Run 4
Logging Date	20-JAN-2000			
Run Number	1			
Depth Driller	2400 m			
Schlumberger Depth	2398 m			
Bottom Log Interval	2390 m			
Top Log Interval	615 m			
Casing Driller Size @ Depth	244.5 mm @ 615 m	@	@	@
Casing Schlumberger	615 m			
Bit Size	222.000 mm			
Type Fluid In Hole	GEL-CHEM			
Density / Viscosity	1140 kg/m3 / 78 s			
Fluid Loss / PH	7 cm3 / 10			
Source Of Sample	RIG			
RM @ Measured Temperature	2.200 ohm.m @ 17 degC	@	@	@
RMF @ Measured Temperature	2.040 ohm.m @ 18 degC	@	@	@
RMC @ Measured Temperature	@	@	@	@
Source: RMF / RMC	RIG			
RM @ MRT	1.163 @ 52	1.097 @ 52	@	@
Maximum Recorded Temperatures	52			
Circulation Stopped / Time	20-JAN-2000 04:00			
Logger On Bottom / Time	20-JAN-2000 21:30			
Unit Number / Location	9418 / 9854			
Recorded By	SEAN MCCONKEY			
Witnessed By	DAVE ROBERTS			

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT, WARRANT THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATION, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

OTHER SERVICES
OBI LDT-CNL
OBA SHDT
OBB
OBC
OBD

REMARKS: RUN NUMBER 1

DEPTH CORRELATED TO GAMMA RAY BETWEEN 2 PASSES
2 PASSES OF PHASOR INDUCTION SFL WITH CENTRALIZERS ONLY
SCALE AND INTERVAL AS REQUESTED
TOOL STRING RAN WITH STANDARD DECENTRALIZERS
STRETCH OF ACCESTOLE TO NO BOREHOLE DEPTH CONTROL

RUN 1 — RUN 2

RIGNO CYDEN #; 6530233 / 6530234 / 6530235
FLUID LOSS: 8 cm3 / 9 cm3 / 9 cm3
SAMPLE SOURCE: RIG / RIG / RIG
RECORDED BY: SHDT / SHDT / SHDT
WITNESSED BY: DAVE ROBERTS / DAVE ROBERTS / DAVE ROBERTS
BIT SIZE: 222.000 mm / 222.000 mm / 222.000 mm
CASING SCHLUMBERGER: 615 m / 615 m / 615 m
CASING DRILLER SIZE @ DEPTH: 244.5 mm @ 615 m / 244.5 mm @ 615 m / 244.5 mm @ 615 m
TOP LOG INTERVAL: 615 m / 615 m / 615 m
BOTTOM LOG INTERVAL: 2390 m / 2398 m / 2398 m
SCHLUMBERGER DEPTH: 2398 m / 2398 m / 2398 m
DEPTH DRILLER: 2400 m / 2400 m / 2400 m
LOGGING DATE: 20-JAN-2000 / 20-JAN-2000 / 20-JAN-2000

EQUIPMENT DESCRIPTION

RUN 1 SURFACE EQUIPMENT WITH: (CTN_A)

DOWNHOLE EQUIPMENT

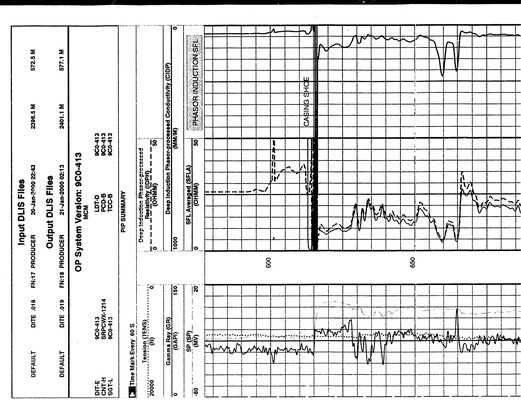
NOS 8 / NOS 9 / NOS 10

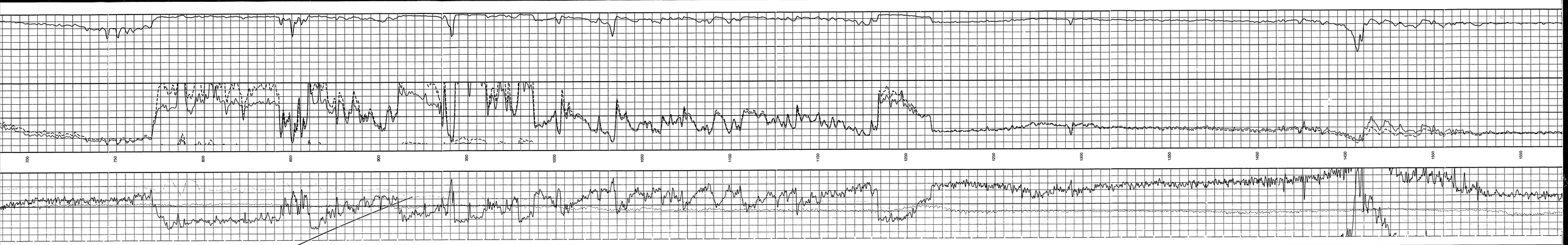
FEH-A			24.99
AH-64			24.44
ECC-40			24.04
SDFT-L	Tension	23.12	23.12
SDFT-L	Gamma Ray	22.84	
SDFT-A			
PCD-B			21.45
PCD-1	YCD3 Data	19.77	
PCD-A			
AH-107			18.85
AH-107			18.24
AH-107			
CNT-H			17.63
CNTC-A		16.28	
CNTC-A	CITC	16.18	
LDT-D			15.42
LDT-D		13.03	
NGS-U		12.78	
NGS-U		12.69	
DPIC-2		10.95	
DPIC-2	Cal pad	10.77	
DPIC-2		10.13	
AH-107			9.92
AH-107			
DPIC-2		3.15	
DPIS-B	SP	2.99	
DPIS-B	Depth Ref	1.83	
	Acc Offset (m)		
	Mud (m)	0.00	
PCSS	Telltale		
	Stretch		
	TOOL ZERO	0.00	

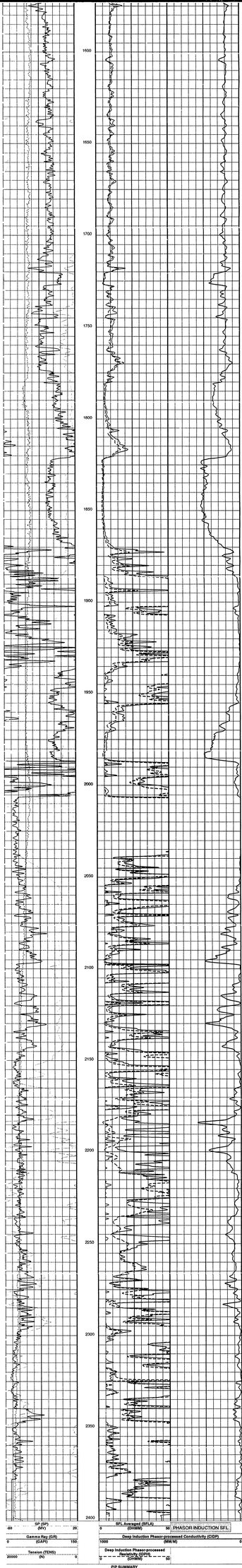
MEASUREMENTS TAKEN FROM TOOL ZERO
ALL LENGTHS IN METERS

Run 1 | Run 2 | Run 3 | Run 4

Logging Date
Run Number
Depth Driller
Schlumberger Depth
Bottom Log Interval
Top Log Interval
Casing Driller Size @ Depth
Casing Schlumberger
Bit Size
Type Fluid In Hole
Density / Viscosity
Fluid Loss / PH
Source Of Sample
RM @ Measured Temperature
RMF @ Measured Temperature
RMC @ Measured Temperature
Source: RMF / RMC
RM @ MRT / RMF @ MRT
Maximum Recorded Temperatures
Circulation Stopped / Time
Logger On Bottom / Time
Unit Number / Location
Recorded By
Witnessed By




700
750
800
850
900
950
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550



SP (SP)
(MV)
-80 20

Gamma Ray (GR)
(GAPI)
0 150

Tension (TENS)
(N)
20000 0

SFL Averaged (SFLA)
(OHMM)
0 50

PHASOR INDUCTION SFL

Deep Induction Phasor-processed Conductivity (CIDP)
(MMHO)
1000 0

Deep Induction Phasor-processed Resistivity (RIDP)
(OHMM)
0 50

Time Mark Every 60 S

PIP SUMMARY

Parameters

DLIS Name	Description	Value	
BHT	Bottom Hole Temperature (used in calculations)	90	DEGC
DFD	Drilling Fluid Density	1140.05	K/M3
DOF2	Deep 20 kHz Gain Factor	1.00488	
DZ	Depth Offset	4.6	M
DRE2	Deep 20 kHz Phase Shift	-0.681143	DEG
DRE2	Deep 20 kHz Sonde Error Correction	13.3403	MM/M
DSR2	Deep Sigma Reference (20 kHz)	1843	MM/M
GXE2	Deep Quad 20 kHz Sonde Error Correction	71.7062	MM/M
GXE2	Deep Quad 20 kHz Correction of Borehole from Normal	0	DEG
GXSO	Geothermal Gradient	0.01027	DC/M
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
IFRQ	DITE Induction Frequency Selector	20	
IPAV	DITE Phasor Processing Selector	ON	
IPRO	DITE Phasor Processing Mode Selector	PHASOR	
ITEN	DITE Temperature Enable	ENABLE	
MDF2	Medium 20 kHz Gain Factor	1.01461	
MRE2	Medium Real 20 kHz Phase Shift	-0.2331	DEG
MRE2	Medium Real 20 kHz Sonde Error Correction	18.2331	MM/M
MSR2	Medium Sigma Reference (20 kHz)	3350	MM/M
SDE2	Shallow 20 kHz Sonde Error Correction	31.3333	MM/M
SFCM	Sheave Mode	NORMAL	
SFCR	SFL Channel Ratio	1000	
SHT	Surface Hole Temperature	0	DEGC
SPNV	SP Null Value	-80	MV
TVD	Total Vert Depth	2402	M

Format: DITE_600_LINPHAS Vertical Scale: 1:600 Graphics File Created: 21-Jan-2000 02:13

OP System Version: 9C0-413
MCM

DIT-E	9CA-813	LDT-D	9C0-413
CNT-D1	SRPD3XK-1214	CNT-D	9C0-413
SGT-L	9C0-413	TCC-B	9C0-413

Input DLIS Files

DEFAULT	DITE .010	FN:17	PRODUCER	20-Jan-2000 22:43	2396.5 M	572.9 M

Output DLIS Files

DEFAULT	DITE .019	FN:18	PRODUCER	21-Jan-2000 02:13

Input DLIS Files

DEFAULT	DITE .018	FN:17	PRODUCER	20-Jan-2000 22:43	2396.5 M	572.5 M

Output DLIS Files

DEFAULT	DITE .019	FN:18	PRODUCER	21-Jan-2000 02:13	2401.1 M	577.1 M

OP System Version: 9C0-413
MCM

MCM

DIT-E	9C0-413	LDT-D	9C0-413
CNT-H	SRPCWX-1214	PCD-B	9C0-413
SGT-L	9C0-413	TCC-B	9C0-413

PIP SUMMARY

Time Mark Every 60 S

Tension (TNS)
20000 (lb) 0

PHASOR-INDUCTION

Gamma Ray (GR)
0 (GAPI) 150

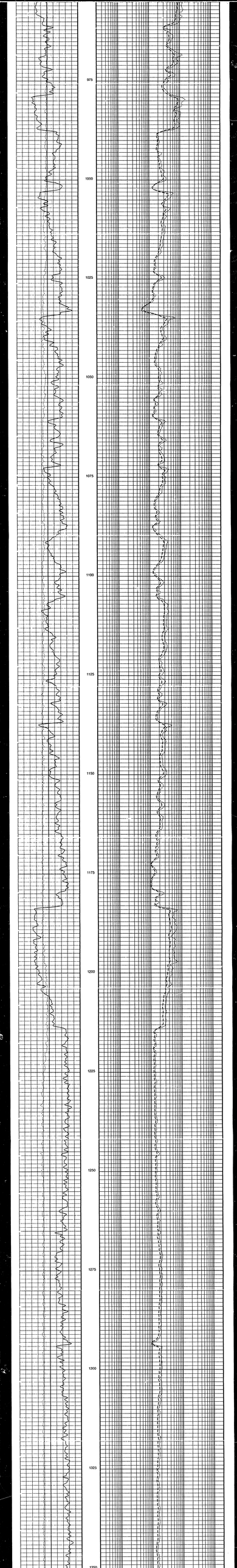
Medium Induction Phasor-processed Resistivity (IDPM)
0.2 (OHMM) 2000

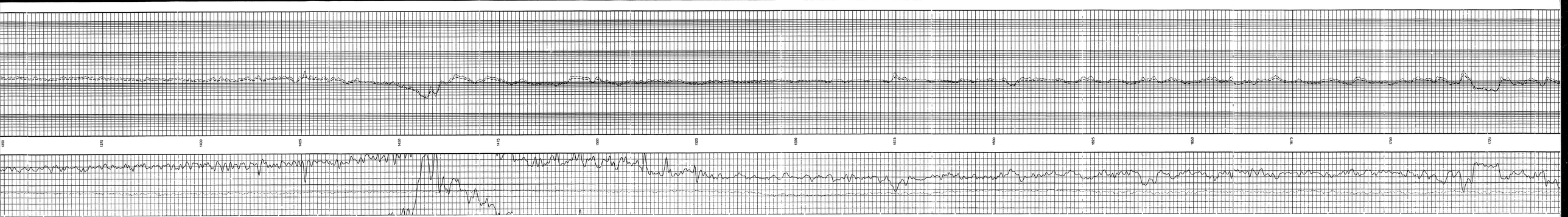
SP (SP)
-80 (MV) 20

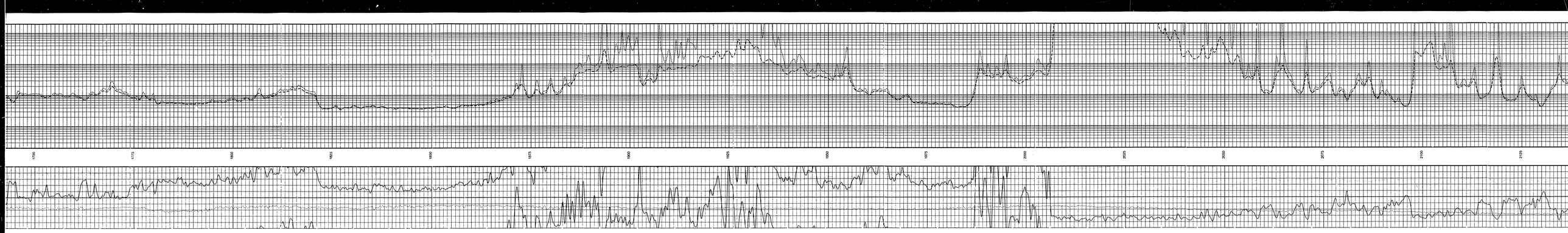
Deep Induction Phasor-processed Resistivity (IDPD)
0.2 (OHMM) 2000

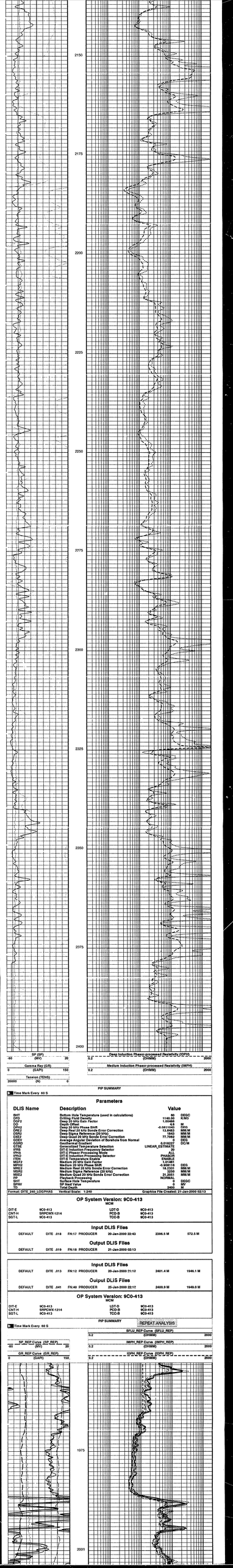
CASING SHOE

600
625
650
675
700
725
750
775
800
825
850
875
900
925
950


975
1000
1025
1050
1075
1100
1125
1150
1175
1200
1225
1250
1275
1300
1325
1350


1350
1375
1400
1425
1450
1475
1500
1525
1550
1575
1600
1625
1650
1675
1700
1725


1750
1775
1800
1825
1850
1875
1900
1925
1950
1975
2000
2025
2050
2075
2100
2125



PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
BHT	Bottom Hole Temperature (used in calculations)	60	DEGC
DFD	Drilling Fluid Density	1140.00	K/M3
DFD_2	Drilling Fluid Gain Factor	1.0040	
DFL	Depth Offset	0.0	M
DPH2	Deep 20 kHz Phase Shift	-0.0811043	DEG
DRE2	Deep Real 20 kHz Sonde Error Correction	13.6483	MM/M
DSE2	Deep Quad 20 kHz Sonde Error Correction	77.1062	MM/M
DXE2	Deep Quad 30 kHz Sonde Error Correction	0.7783	MM/M
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.018227	DC/M
HTEM	DIT-E Temperature Selection	LINEAR_ESTIMATE	
IFRE	DIT-E Induction Frequency Selector	20	
IPHA	DIT-E Phasor Processing Mode	ALL	
IPRO	DIT-E Selection Processing Selector	PHASOR	
MAIN	DIT-E Main Processing Mode	ENABLED	
MDF2	Medium 20 kHz Gain Factor	1.01461	
MPH2	Medium 20 kHz Phase Shift	-0.636116	DEG
MRE2	Medium Real 20 kHz Sonde Error Correction	18.2331	MM/M
MSE2	Medium Quad 20 kHz Sonde Error Correction	21.2001	MM/M
MXE2	Medium Quad 30 kHz Sonde Error Correction	21.2001	MM/M
PP	Playback Processing	NORMAL	
SBHT	Surface Hole Temperature	0	DEGC
SHW	Sill Height	0	M
TD	Total Depth	2400	M

Format: DITE_240_LOGPASS Vertical Scale: 1:240 Graphics File Created: 21-Jan-2000 02:13

OP System Version: 9C0-413 MCM

DIT-E	9C0-413	LDT-D	9C0-413
CNT-H	SRPCWC-1214	PCD-B	9C0-413
SGT-L	9C0-413	TCC-B	9C0-413

Input DLIS Files

DEFAULT	DITE .018	FN:17	PRODUCER	20-Jan-2000 22:43	2396.5 M	572.5 M

Output DLIS Files

DEFAULT	DITE .019	FN:18	PRODUCER	21-Jan-2000 02:13		

Input DLIS Files

DEFAULT	DITE .013	FN:12	PRODUCER	20-Jan-2000 21:12	2401.4 M	1946.1 M

Ouiput DLIS Files

DEFAULT	DITE .041	FN:40	PRODUCER	20-Jan-2000 22:12	2400.9 M	1949.0 M

OP System Version: 9C0-413 MCM

DIT-E	9C0-413	LDT-D	9C0-413
CNT-H	SRPCWX-1214	PCD-B	9C0-413
SGT-L	9C0-413	TCC-B	9C0-413

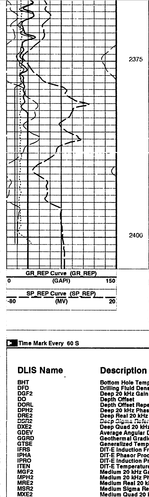
PIP SUMMARY

REPEAT ANALYSIS

Time Mark Every 60 S

SP_REP Curve (SP_REP)
(MV)
-60
20
GR_REP Curve (GR_REP)
(GAPI)
0
150
SFLU_REP Curve (SFLU_REP)
(OHMM)
0.2
2000
IMPH_REP Curve (IMPH_REP)
(OHMM)
0.2
2000
IDPH_REP Curve (IDPH_REP)
(OHMM)
0.2
2000

2025
2050
2075
2100
2125
2150
2175
2200
2225
2250
2275
2300
2325



GR_REP Curve (GR_REP)
0 (GAPI) 150

IDPH_REP Curve (IDPH_REP)
0.2 (OHMM) 2000

SP_REP Curve (SP_REP)
-80 (MV) 20

IMPH_REP Curve (IMPH_REP)
0.2 (OHMM) 2000

SFLU_REP Curve (SFLU_REP)
0.2 (OHMM) 2000

PIP SUMMARY

REPEAT ANALYSIS

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
BHT	Bottom Hole Temperature (used in calculations)	60	DEGC
DFD	Drilling Fluid Density	1140.00	K/M3
DOF2	Deep 20 kHz Gain Factor	1.00488	
DOFF	Deep Offset	0.5	M
DOM	Depth Offset Repeat Analysis	3.5	M
DPH2	Deep 20 kHz Phase Shift	-0.6811043	DEG
DRE2	Deep Real 20 kHz Borehole Error Correction	13.6483	MM/M
DXE2	Deep Quad 20 kHz Borehole Error Correction	7.642	MM/M
GDF2	Deep Quad 20 kHz Skin Effect Correction	77.7007	MM/M
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.018227	DC/M
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
IFRB	DITE-I Induction Frequency Selector	20	
IPAV	DITE-I Induction Averaging	1	
IPRO	DITE-I Induction Processing Selector	PHASOR	
ITEN	DITE-I Temperature Enable	ENABLE	
MGF2	Medium 20 kHz Gain Factor	1.01451	
MPH2	Medium 20 kHz Phase Shift	-0.9081118	DEG
MRE2	Medium Real 20 kHz Borehole Error Correction	13.2239	MM/M
MSR2	Medium Sigma Reference (20 kHz)	1000	MM/M
MXE2	Medium Quad 20 kHz Borehole Error Correction	31.2091	MM/M
PP	Playback Processing	NORMAL	
SFCR	SFL Channel Ratio	1000	
SPD	Surface Temperature	20	DEGC
SPW	SP Head Value	0	MV
TD	Total Depth	2400	M

Format: DITE_LOGPHAS_REP Vertical Scale: 1:240 Graphics File Created: 25-Jan-2000 22:12

OP System Version: 9C0-413

MCM

DIT-E	9C0-413	LDT-D	9C0-413
CNT-H	SWPCWX-1214	TCC-B	9C0-413
SGT-L	9C0-413	TCC-B	9C0-413

Input DLIS Files

DEFAULT	DITE .013	FN:12	PRODUCER	20-Jan-2000 21:12	2401.4 M	1946.1 M

Output DLIS Files

DEFAULT	DITE .041	FN:40	PRODUCER	25-Jan-2000 22:12		

Calibration and Check Summary

Measurement	Nominal	Master	Before	After	Change	Limit	Units
Litho Density - D Wellsite Calibration Background Measurement							
Master: 16-JAN-2000 17:08 Before: 16-JAN-2000 20:12							
LL Background	30.00	19.28	19.21	N/A	N/A	1.000	CPS
LU Background	76.00	73.67	73.16	N/A	N/A	1.000	CPS
LS Background	57.00	56.11	55.79	N/A	N/A	1.000	CPS
STH Background	5.000	5.289	5.289	N/A	N/A	0.3000	CPS
SSH Background	8.000	8.297	8.297	N/A	N/A	0.3000	CPS
SSU Background	11.00	8.507	8.520	N/A	N/A	0.5000	CPS
Litho Density - D Wellsite Calibration - Tool Quality Control Information HV							
Master: 16-JAN-2000 17:08 Before: 16-JAN-2000 20:12							
STH Background	1000	1351	1342	N/A	N/A	N/A	V
SSH Background	1000	1355	1342	N/A	N/A	N/A	V
Litho Density - D Wellsite Calibration - Detectors Resolution From BKG Measurements							
Master: 16-JAN-2000 17:08 Before: 16-JAN-2000 20:12							
LS Resolution Background	8.000	8.554	8.448	N/A	N/A	N/A	
SS Resolution Background	8.000	8.736	8.702	N/A	N/A	N/A	
Litho Density - D Wellsite Calibration - Caliper Calibration							
Before: 16-JAN-2000 19:40							
Caliper Small Ring	203.2	N/A	150.8	N/A	N/A	N/A	MM
Caliper Large Ring	304.8	N/A	290.3	N/A	N/A	N/A	MM
Compensated Neutron - H Wellsite Calibration - Zero Measurement							
Master: 16-JAN-2000 8:32 Before: 16-JAN-2000 19:56							
CNTC Background	27.54	27.54	27.53	N/A	N/A	4.132	CPS
CFTC Background	34.27	34.27	36.17	N/A	N/A	5.140	CPS
Powered Caliper Device - B Wellsite Calibration - Large Arm Calibration							
Before: 16-JAN-2000 19:56							
Large Arm Small Ring	203.2	N/A	176.7	N/A	N/A	N/A	MM
Large Arm Large Ring	304.8	N/A	310.2	N/A	N/A	N/A	MM
Powered Caliper Device - B Wellsite Calibration - Small Arm Calibration							
Before: 16-JAN-2000 19:56							
Small Arm Small Gauge	25.40	N/A	N/A	N/A	N/A	N/A	MM
Small Arm Large Gauge	127.0	N/A	N/A	N/A	N/A	N/A	MM
Powered Caliper Device - B Wellsite Calibration - Micro Inverse Calibration							
Before: 16-JAN-2000 19:59							
Micro Inverse Pos	0	N/A	4.420	N/A	N/A	0.1000	OHMM
Micro Inverse Plus	5.000	N/A	4.420	N/A	N/A	0.2000	OHMM
Powered Caliper Device - B Wellsite Calibration - Micro Normal Calibration							
Before: 16-JAN-2000 19:59							
Micro Normal Zero	0	N/A	4.420	N/A	N/A	0.1000	OHMM
Micro Normal Plus	5.000	N/A	4.420	N/A	N/A	0.2000	OHMM
Scintillation Gamma Ray - L Wellsite Calibration - Detector Calibration							
Before: 16-JAN-2000 20:00							
Gamma Ray Background	30.00	N/A	38.66	N/A	N/A	N/A	GAPI
Gamma Ray - Big Bicron	153.5	N/A	153.5	N/A	N/A	13.98	GAPI
Gamma Ray (Calibrated)	165.0	N/A	165.0	N/A	N/A	15.00	GAPI

The CNT Master Calibration Was Done With The Following Parameters :

NCT-B Water Temperature	10.0	DEGC
Thermal Housing Size	65/25	MM

Dual Induction - E / Equipment Identification

Primary Equipment:

Dual Induction Sonde	DIS - HB	61
Dual Induction Cartridge	DIC - EB	36

Auxiliary Equipment:

Mass Isolated Housing	MIH - ZA

Dual Induction - E Wellsite Calibration

Induction Electronics (12 kHz)

Phase	ID Eect Real Offset 12 kHz	MM/M	Value
Before			26.62
After			
Change	-26.57	26.57	326.3
Limit	Minimum	Maximum	Minimum

Phase	ID Eect Quad Offset 12 kHz	MM/M	Value
Before			33.37
After			
Change	-26.57	26.57	326.3
Limit	Minimum	Maximum	Minimum

Phase	ID Eect Real Offset 12 kHz	MM/M	Value
Before			36.79
After			
Change	-37.84	37.84	326.3
Limit	Minimum	Maximum	Minimum

Phase	ID Eect Quad Offset 12 kHz	MM/M	Value
Before			67.45
After			
Change	448.9	448.9	326.5
Limit	Minimum	Maximum	Minimum

Before: 28-JAN-2000 20:42

Phase	ID Eect Gain 12 kHz	Value
Before		0.9491
After		
Change	0.9497	1.048
Limit	Minimum	Maximum

Phase	ID Eect Gain 12 kHz	Value
Before		0.9953
After		
Change	0.9953	1.152
Limit	Minimum	Maximum

Phase	MI Eect Real Offset 12 kHz	MM/M	Value
Before			0.9638
After			
Change	0.9638	1.036	0.9638
Limit	Minimum	Maximum	Minimum

Phase	MI Eect Quad Offset 12 kHz	MM/M	Value
Before			0.9924
After			
Change	0.9924	1.147	0.9924
Limit	Minimum	Maximum	Minimum

Phase	MI Eect Real Gain 12 kHz	Value
Before		0.9989
After		
Change	0.9948	1.136
Limit	Minimum	Maximum

Phase	MI Eect Quad Gain 12 kHz	Value
Before		0.9902
After		
Change	0.9902	1.144
Limit	Minimum	Maximum

Before: 28-JAN-2000 20:43

Dual Induction - E Wellsite Calibration

Induction Electronics (20 kHz)

Phase	ID Eect Real Offset 20 kHz	MM/M	Value
Before			11.20
After			
Change	114.9	10.57	135.1
Limit	Minimum	Maximum	Minimum

Phase	ID Eect Quad Offset 20 kHz	MM/M	Value
Before			13.28
After			
Change	112.8	11.40	136.9
Limit	Minimum	Maximum	Minimum

Phase	MI Eect Real Offset 20 kHz	MM/M	Value
Before			19.47
After			
Change	208.7	19.35	240.3
Limit	Minimum	Maximum	Minimum

Phase	MI Eect Quad Offset 20 kHz	MM/M	Value
Before			35.76
After			
Change	189.9	34.12	201.1
Limit	Minimum	Maximum	Minimum

Phase	ID Eect Gain 20 kHz	Value
Before		0.9494
After		
Change	0.9509	1.139
Limit	Minimum	Maximum

Phase	ID Eect Gain 20 kHz	Value
Before		0.9545
After		
Change	0.9524	1.147
Limit	Minimum	Maximum

Phase	MI Eect Real Gain 20 kHz	Value
Before		0.9548
After		
Change	0.9548	1.136
Limit	Minimum	Maximum

Phase	MI Eect Quad Gain 20 kHz	Value
Before		0.9402
After		
Change	0.9402	1.144
Limit	Minimum	Maximum

Before: 28-JAN-2000 20:44

Dual Induction - E Wellsite Calibration

Induction Resolutions

Phase	ID Eect Real Offset 40 kHz	MM/M	Value
Before			6.722
After			
Change	78.62	6.228	97.38
Limit	Minimum	Maximum	Minimum

Phase	ID Eect Quad Offset 40 kHz	MM/M	Value
Before			8.987
After			
Change	77.63	7.377	93.46
Limit	Minimum	Maximum	Minimum

Phase	MI Eect Real Offset 40 kHz	MM/M	Value
Before			12.01
After			
Change	138.2	11.40	138.9
Limit	Minimum	Maximum	Minimum

Phase	MI Eect Quad Offset 40 kHz	MM/M	Value
Before			23.16
After			
Change	108.3	10.19	152.2
Limit	Minimum	Maximum	Minimum

Phase	ID Eect Gain 40 kHz	Value
Before		0.9183
After		
Change	0.9706	1.084
Limit	Minimum	Maximum

Phase	ID Eect Gain 40 kHz	Value
Before		0.9496
After		
Change	0.9496	1.124
Limit	Minimum	Maximum

Phase	MI Eect Real Gain 40 kHz	Value
Before		0.9589
After		
Change	0.9589	1.138
Limit	Minimum	Maximum

Phase	MI Eect Quad Gain 40 kHz	Value
Before		0.9462
After		
Change	0.9462	1.156
Limit	Minimum	Maximum

Before: 28-JAN-2000 20:45

Dual Induction - E Wellsite Calibration

Induction Resolutions (60 kHz)

Phase	ID Eect Real Offset 60 kHz	MM/M	Value
Before			4.576
After			
Change	57.58	4.579	70.27
Limit	Minimum	Maximum	Minimum

Phase	ID Eect Quad Offset 60 kHz	MM/M	Value
Before			6.906
After			
Change	57.58	4.579	70.27
Limit	Minimum	Maximum	Minimum

Phase	MI Eect Real Offset 60 kHz	MM/M	Value
Before			9.581
After			
Change	102.8	8.181	104.7
Limit	Minimum	Maximum	Minimum

Phase	MI Eect Quad Offset 60 kHz	MM/M	Value
Before			16.98
After			
Change	84.37	7.113	107.2
Limit	Minimum	Maximum	Minimum

Phase	ID Eect Gain 60 kHz	Value
Before		0.9183
After		
Change	0.9706	1.084
Limit	Minimum	Maximum

Phase	ID Eect Gain 60 kHz	Value
Before		0.9496
After		
Change	0.9496	1.124
Limit	Minimum	Maximum

Phase	MI Eect Real Gain 60 kHz	Value
Before		0.9589
After		
Change	0.9589	1.138
Limit	Minimum	Maximum

Phase	MI Eect Quad Gain 60 kHz	Value
Before		0.9462
After		
Change	0.9462	1.156
Limit	Minimum	Maximum

Before: 28-JAN-2000 20:46

Dual Induction - E Wellsite Calibration

SFL Electronics

Phase	SFL Voltage Offset	MV	Value
Before			1.328
After			
Change	15.00	15.00	1.600
Limit	Minimum	Maximum	Minimum

Phase	SFL Current Offset	MA	Value
Before			0.5992
After			
Change	0.4000	0.4000	1.000
Limit	Minimum	Maximum	Minimum

Before: 22-JAN-2000 20:46

Phase	SFL Voltage Gain	Value
Before		0.9943
After		
Change	0.9800	1.200
Limit	Minimum	Maximum

Phase	SFL Current Gain	Value
Before		0.9811
After		
Change	0.9800	1.200
Limit	Minimum	Maximum

Before: 22-JAN-2000 20:46

Litho Density - D / Equipment Identification

Primary Equipment:

Nuclear Sensonde Cartridge	NSC - E	785
Gamma Source Shielding	PSD - D	2721
Gamma Source Radioactive	GSR - J	2043

Auxiliary Equipment:

Density Receiving Sonde	DRS - C	2836
Electronics Cartridge Housing	ECH - MXA	787
Powered Decentor Housing	PDH - L	2850

Litho Density - D Wellsite Calibration

Background Measurement

Master	LL Background	CPS	Value
Before			19.28
After			
Change	19.30	20.00	19.21
Limit	Minimum	Maximum	Minimum

Master	LTH Background	CPS	Value
Before			5.289
After			5.289
Change	4.500	5.500	7.500
Limit	Minimum	Maximum	Minimum

Master: 16-JAN-2000 17:08

Master	LU Background	CPS	Value
Before			73.67
After			73.16
Change	69.20	78.50	94.00
Limit	Minimum	Maximum	Minimum

Master	LSH Background	CPS	Value
Before			8.297
After			8.297
Change	7.500	8.500	10.50
Limit	Minimum	Maximum	Minimum

Before: 16-JAN-2000 20:12

Master	LS Background	CPS	Value
Before			56.11
After			55.79
Change	42.50	57.50	72.00
Limit	Minimum	Maximum	Minimum

Master	SSU Background	CPS	Value
Before			8.507
After			8.520
Change	8.000	11.00	13.80
Limit	Minimum	Maximum	Minimum

Before: 16-JAN-2000 20:12

Litho Density - D Wellsite Calibration

Detectors Resolution From BKG Measurements

Master	LS Resolution Background	Value
Before		8.554
After		
Change	8.000	8.448
Limit	Minimum	Maximum

Master	SS Resolution Background	Value
Before		8.736
After		
Change	8.000	8.702
Limit	Minimum	Maximum

Master: 16-JAN-2000 17:08

Before: 16-JAN-2000 20:12

Compensated Neutron - H / Equipment Identification

Primary Equipment:

Compensated Neutron Cartridge	CNC - HH	1247
Neutron Logging Source	NLS - KL	
Neutron Source Radioactive	NSR - F	1451
Neutron Detector with Alpha Source	CND - A	1257
Compensated Neutron Sonde	CNS - AB	

Auxiliary Equipment:

Compensated Neutron Housing	CNH - A	4465
Neutron Calibration Tank	NCT - B	

Compensated Neutron - H Wellsite Calibration

MR-1 MR-2 MR-3 MR-4

Phase	CNTC Background	CPS	Value
Master			27.54
Before			27.53
After			
Change	5.000	27.54	40.00
Limit	Minimum	Maximum	Minimum

Master: 16-JAN-2000 8:32

Phase	CFTC Background	CPS	Value
Master			34.27
Before			36.17
After			
Change	5.000	34.27	40.00
Limit	Minimum	Maximum	Minimum

Before: 16-JAN-2000 19:56

Powered Caliper Device - B / Equipment Identification

Primary Equipment:

Powered Caliper Mechanical (sonde) - A	PCM - A	
Powered Caliper Cartridge - H	PCC - H	

Auxiliary Equipment:

Powered Caliper Housing - A	PCH - A	1371

Powered Caliper Device - B Wellsite Calibration

Micro Inverse Zero

Phase	Micro Inverse Zero	OHMM	Value
Before	EXCESS LIMIT		4.420
After			
Change	1.000	12.00	4.250
Limit	Minimum	Maximum	Minimum

Before: 16-JAN-2000 19:59

Phase	Micro Inverse Plus	OHMM	Value
Before			4.420
After			
Change	4.250	5.000	5.750
Limit	Minimum	Maximum	Minimum

Powered Caliper Device - B Wellsite Calibration

Micro Normal Calibration

Phase	Micro Normal Zero	OHMM	Value
Before	EXCESS LIMIT		4.420
After			
Change	1.000	12.00	4.250
Limit	Minimum	Maximum	Minimum

Before: 16-JAN-2000 19:59

Phase	Micro Normal Plus	OHMM	Value
Before			4.420
After			
Change	4.250	5.000	5.750
Limit	Minimum	Maximum	Minimum

Scintillation Gamma Ray - L / Equipment Identification

Primary Equipment:

Scintillation Gamma Cartridge	SGC - SA	
Scintillation Gamma Detector	SGD - TAA	

Auxiliary Equipment:

Scintillation Gamma Housing	SGH - K	
Gamma Source Radioactive	GSR - LIY	

Scintillation Gamma Ray - L Wellsite Calibration

Detector Calibration

Phase	Gamma Ray Background	GAPI	Value
Before			38.66
After			
Change	24.00	120.0	153.6
Limit	Minimum	Maximum	Minimum

Phase	Gamma Ray (Big Bicron)	GAPI	Value
Before			153.5
After			
Change	129.8	193.8	187.7
Limit	Minimum	Maximum	Minimum

Phase	Gamma Ray (Calibrated)	GAPI	Value
Before			165.0
After			
Change	180.0	195.0	180.0
Limit	Minimum	Maximum	Minimum

Before: 16-JAN-2000 20:00

COMPANY:	NORTHROCK RESOURCES LTD.
WELL:	NORTHROCK ET AL EAST MACKAY I-77
FIELD:	EAST MACKAY
PROVINCE:	NWT

BOTTOM LOG INTERVAL	2390 m
SCHLUMBERGER DEPTH	2398 m
DEPTH DRILLER	2400 m
KELLY BUSHING	202.35 m
DRILL FLOOR	
GROUND LEVEL	198.1 m

Schlumberger

PHASOR
INDUCTION SFL

SONIC

1879 N.E.B. COPY

COMPANY: NORTHROCK RESOURCES LTD.

WELL: NORTHROCK ET AL E. MACKAY I-77

FIELD: EAST MACKAY

PROVINCE: NWT

Schlumberger

BOREHOLE COMPENSATED SONIC LOG

LAT: 64 46 41.94799 | Elev.: K.B. 200.35 m
LONG: 125 43 16.65256 | G.L. 198.1 m
UWI: 300775400125300 | D.F.

Permanent Datum: GROUND LEVEL | Elev.: 198.1 m
Log Measured From: KELLY BUSHING 4.2 m | above Perm. Datum
Drilling Measured From: KELLY BUSHING

API Serial No.	SECTION	TOWNSHIP	RANGE

CORRECTED LOG

	Run 1	Run 2	Run 3	Run 4
Logging Date	20-JAN-2000			
Run Number	1			
Depth Driller	2400 m			
Schlumberger Depth	2390 m			
Bottom Log Interval	2390 m			
Top Log Interval	615 m			
Casing Driller Size @ Depth	244.5mm @ 615 m	@	@	@
Casing Schlumberger	615 m			
Bit Size	222.000 mm			
Type Fluid in Hole	GEL-CHEM			
Density / Viscosity	1140 kg/m3 / 76 s			
Fluid Loss / PH	7 cm3 / 10			
Source Of Sample	RIG			
RM @ Measured Temperature	2.200 ohm m @ 17 degC	@	@	@
RMF @ Measured Temperature	2.040 ohm m @ 18 degC	@	@	@
RMC @ Measured Temperature	@	@	@	@
Source RMF / RMC	RIG			
RM @ MRT / RMF @ MRT	1.163 @ 52 / 1.097 @ 52	@ @	@ @	@ @
Maximum Recorded Temperatures	52 degC			
Circulation Stopped / Time	20-JAN-2000 / 4:00			
Logger On Bottom / Time	20-JAN-2000 / 14:15			
Unit Number / Location	9418 / 6904	/	/	/
Recorded By	SEAN MCCONKEY			
Witnessed By	DAVE ROBERTS			

	Run 1	Run 2	Run 3	Run 4
Logging Date				
Run Number				
Depth Driller				
Schlumberger Depth				
Bottom Log Interval				
Top Log Interval				
Casing Driller Size @ Depth	@	@	@	@
Casing Schlumberger				
Bit Size				
Type Fluid in Hole				
Density / Viscosity				
Fluid Loss / PH				
Source Of Sample				
RM @ Measured Temperature	@	@	@	@
RMF @ Measured Temperature	@	@	@	@
RMC @ Measured Temperature	@	@	@	@
Source RMF / RMC				
RM @ MRT / RMF @ MRT	@ @	@ @	@ @	@ @
Maximum Recorded Temperatures				
Circulation Stopped / Time				
Logger On Bottom / Time				
Unit Number / Location	/	/	/	/
Recorded By				
Witnessed By				

RUN 1 | RUN 2

EQUIPMENT DESCRIPTION

SURFACE EQUIPMENT

STN-C - SGC-SA
WTN1 GTS-A

DOWNHOLE EQUIPMENT

	RUN 1	RUN 2
SERVICE ORDER #	632003	
PROGRAM VERSION	MCM 5.2	
LOGGED INTERVAL	START 615 m	START STOP

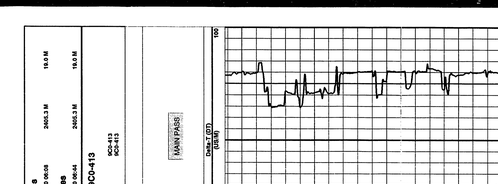
OTHER SERVICES
CDS
DSI
CBIL
CBIL
SLS
REMARKS

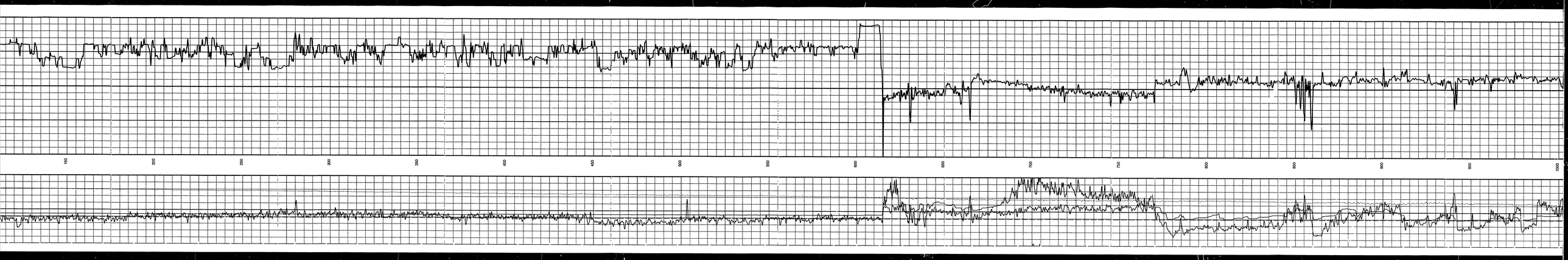
1) RUN 1 WAS RUN WITH A 9.875" BIT AND 8.5" DRILL COLLARS.
2) RUN 2 WAS RUN WITH A 8.5" BIT AND 6.5" DRILL COLLARS.
3) THE DEPTH CORRELATED TO CASING BOTTOM SET AT 615M.
4) THE TOOLS WERE ECCENTRALIZED WITH ONE BOW SPRING CENTRALIZER.
5) SCALES AND INTERVALS AS PER CLIENT REQUEST.
6) THE DATA WAS RECORDED IN METRIC UNITS.
7) DATA RECORDED TO SCHLUMBERGER FRASER DLIS TO RSCH.
8) CABLE HEAD TENSION WAS 2000 LBS.
9) WHEEL ENCODER PRIMED ON SECOND PASS.

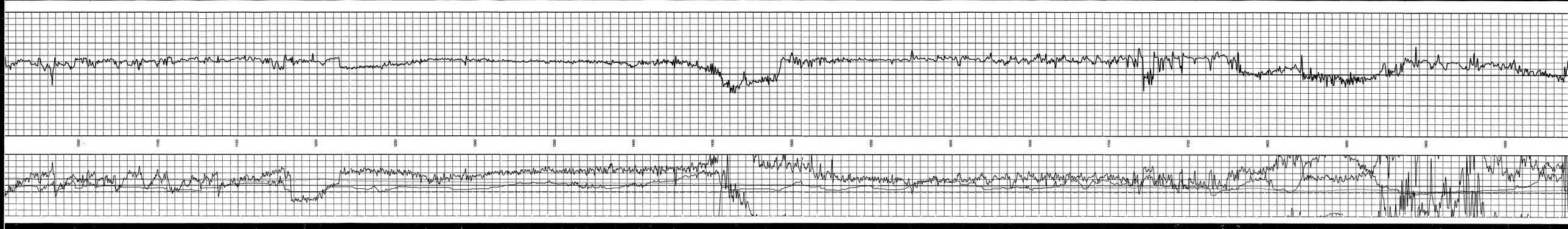
	RUN 1	RUN 2
SERVICE ORDER #	632003	
PROGRAM VERSION	MCM 5.2	
LOGGED INTERVAL	START 615 m	START STOP

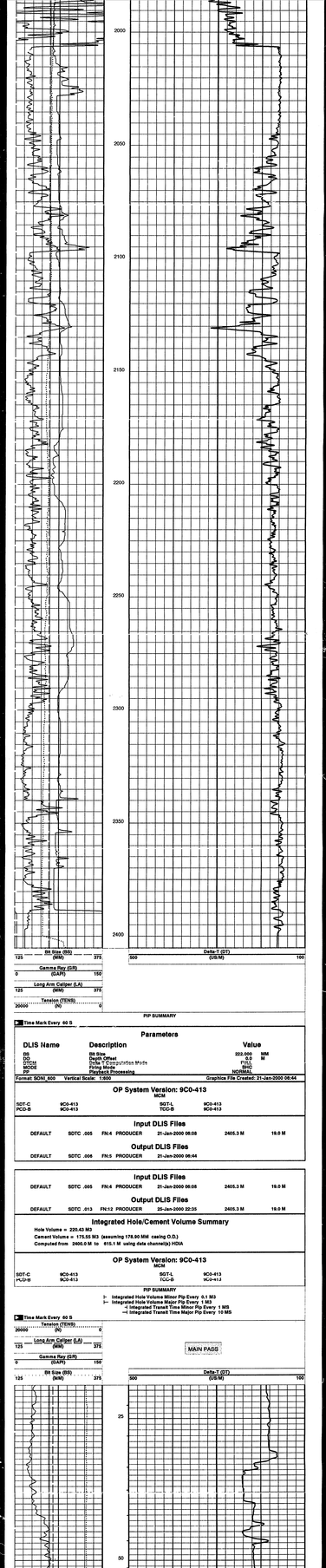
RUN 1

RSH-A 14.88
RSH-A 14.33
AH-64 13.93
AH-64 13.91 13.01
TCC-B
TCC-B
TOOL TYPE
THERMA CHEM
POSR 13 11.33
POSR 371
POSR A
POSR Data
AH-107 10.41
AH-107 9.80
AH-107 8.19
Rt Hz
SGT-L
SGT-SA
SGC-SA
Gamma Ray
SDT-C 7.52
SDT-C 19
POSR 1481
POSR 1481
SGT-SA
SGC-SA
LAN 2.49
LLF VOL 2.18
LF 1.35
LAN 1.04
POSR Rel HV
Tension
TOOL CODE 4.00
MAXIMUM STRING DIAMETER I AM MF
MODULAR SONIC TOOL 3.625 INCHES
ALL LENGTHS IN METERS




150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000


1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
1700
1750
1800
1850
1900
1950



PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value
BS	Bit Size	222.000 MM
DO	Depth Offset	0.0 M
MSD	Mud Salinity Distribution Mode	FILT
MODE	Firing Mode	SWC
PP	Playback Processing	NORMAL

Format: SONI_600 Vertical Scale: 1:600 Graphics File Created: 21-Jan-2000 06:44

OP System Version: 9C0-413

MCM

SDT-C	9C0-413	SDT-L	9C0-413
PCD-B	9C0-413	TCC-B	9C0-413

Input DLIS Files

DEFAULT	SDTC .005	FN:4	PRODUCER	21-Jan-2000 06:08	2405.3 M	19.0 M

Output DLIS Files

DEFAULT	SDTC .006	FN:5	PRODUCER	21-Jan-2000 06:44		

Input DLIS Files

DEFAULT	SDTC .005	FN:4	PRODUCER	21-Jan-2000 06:08	2405.3 M	19.0 M

Output DLIS Files

DEFAULT	SDTC .013	FN:12	PRODUCER	25-Jan-2000 22:35	2405.3 M	19.0 M

Integrated Hole/Cement Volume Summary

Hole Volume = 220.43 M3
Cement Volume = 175.55 M3 (assuming 178.00 MM casing O.D.)
Computed from 2400.0 M to 615.1 M using data channel(s) HDIA

OP System Version: 9C0-413

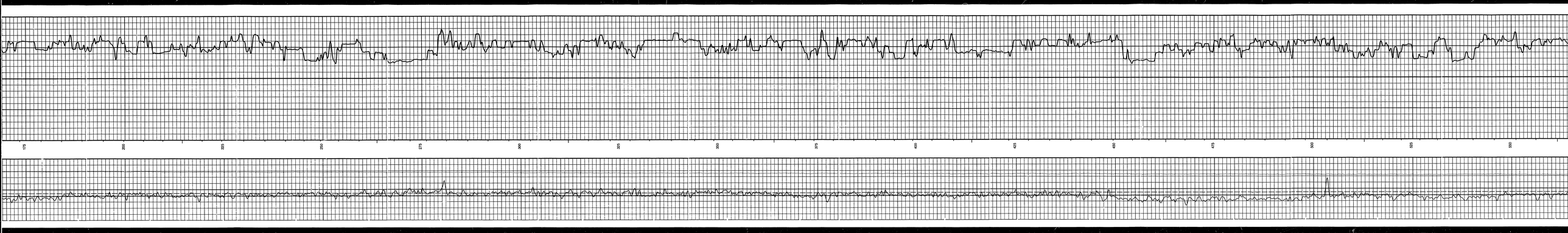
MCM

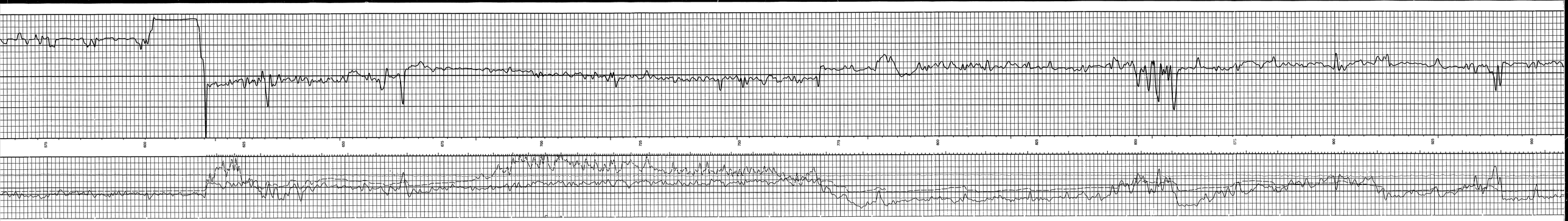
SDT-C	9C0-413	SDT-L	9C0-413
PCD-B	9C0-413	TCC-B	9C0-413

PIP SUMMARY

Integrated Hole Volume Minor Pip Every 0.1 M3
Integrated Hole Volume Major Pip Every 1 M3
Integrated Transit Time Minor Pip Every 1 MS
Integrated Transit Time Major Pip Every 10 MS

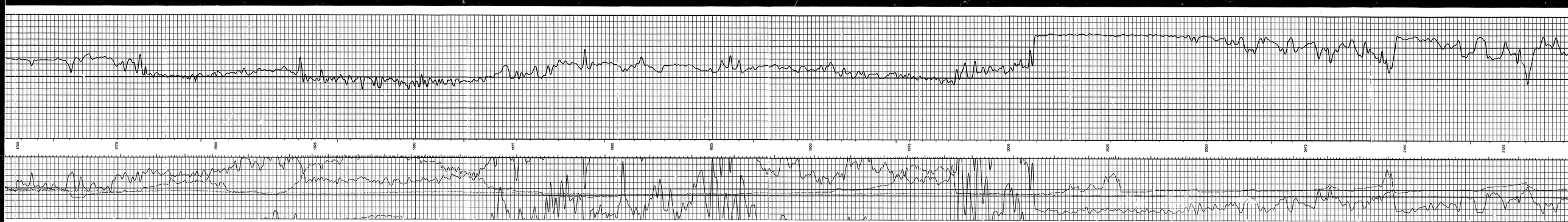
Time Mark Every 60 S

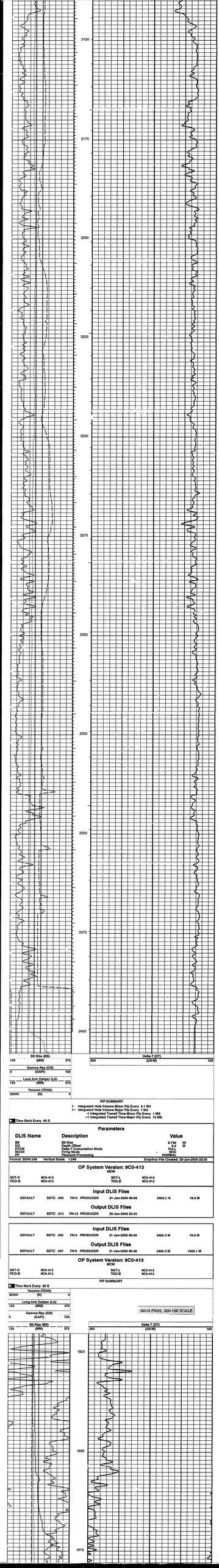

175
200
225
250
275
300
325
350
375
400
425
450
475
500
525
550


575
600
625
650
675
700
725
750
775
800
825
850
875
900
925
950

975
1000
1025
1050
1075
1100
1125
1150
1175
1200
1225
1250
1275
1300
1325
1350

1375
1400
1425
1450
1475
1500
1525
1550
1575
1600
1625
1650
1675
1700
1725


1750
1775
1800
1825
1850
1875
1900
1925
1950
1975
2000
2025
2050
2075
2100
2125



Parameters

DLIS Name	Description	Value
BS	Bit Size	8.740 IN
DFD	Drilling Offset	0.0 M
DTCM	Delta-T Computation Mode	FULL
MODE	Firing Mode	SHOT
PP	Playback Processing	NORMAL

Format: SONI-240 Vertical Scale: 1:240 Graphics File Created: 25-Jan-2000 22:35

OP System Version: 9C0-413

MCM

SDT-C	9C0-413	SGT-L	9C0-413
PCD-B	9C0-413	TCC-B	9C0-413

Input DLIS Files

DEFAULT	SDTC .005	FN:4	PRODUCER	21-Jan-2000 06:08	2405.2 M	19.0 M

Output DLIS Files

DEFAULT	SDTC .005	FN:4	PRODUCER	21-Jan-2000 06:08	2405.2 M	19.0 M
DEFAULT	SDTC .007	FN:6	PRODUCER	21-Jan-2000 06:49	2400.3 M	1920.1 M

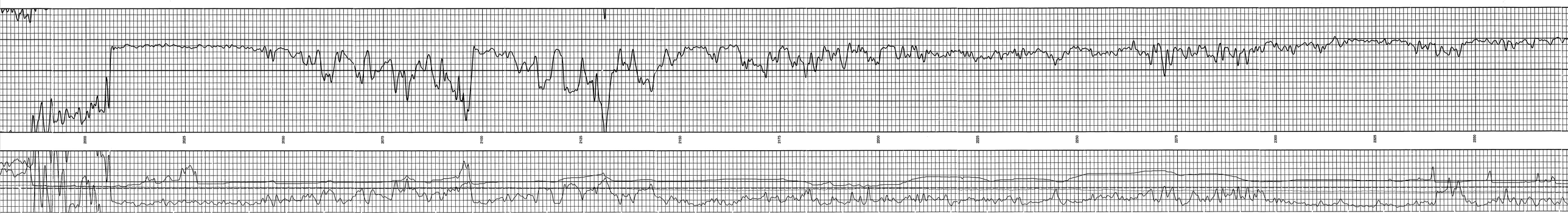
OP System Version: 9C0-413

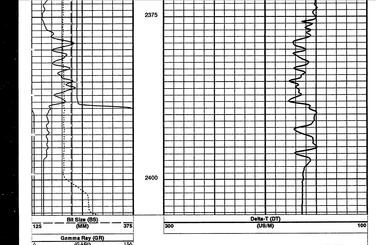
MCM

SDT-C	9C0-413	SGT-L	9C0-413
PCD-B	9C0-413	TCC-B	9C0-413

PIP SUMMARY

Time Mark Every 60 S


2000
2025
2050
2075
2100
2125
2150
2175
2200
2225
2250
2275
2300
2325
2350



Bit Size (BS)
125 (MM) 375

Gamma Ray (GR)
0 (GAPI) 150

Long Arm Caliper (LA)
125 (MM) 375

Tension (TENS)
20000 (N) 0

Delta-T (DT)
300 (US/M) 100

MAIN PASS, 500-100 SCALE

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value
BS	Bit Size	222.000 MM
DO	Depth Offset	0 M
DTCM	Delta-T Computation Mode	FULL
MODE	Firing Mode	SHC
PP	Playback Processing	NORMAL

Format: SONI-240-300 Vertical Scale: 1:240 Graphics File Created: 21-Jan-2000 06:49

OP System Version: 9C0-413

MCM

SDT-C	9C0-413	SGT-L	9C0-413
PCD-B	9C0-413	TCC-B	9C0-413

Input DLIS Files

DEFAULT	SDTC .005	FN:4	PRODUCER	21-Jan-2000 06:08	2405.3 M	19.0 M

Output DLIS Files

DEFAULT	SDTC .007	FN:6	PRODUCER	21-Jan-2000 06:49		

Input DLIS Files

DEFAULT	SDTC .004	FN:3	PRODUCER	21-Jan-2000 06:08	2405.3 M	19.0 M
DEFAULT	SDTC .006	FN:5	PRODUCER	20-Jan-2000 15:43	2405.0 M	1945.5 M

Output DLIS Files

DEFAULT	SDTC .012	FN:11	PRODUCER	21-Jan-2000 07:37	2405.3 M	1950.0 M

OP System Version: 9C0-413

MCM

SDT-C	9C0-413	SGT-L	9C0-413
PCD-B	9C0-413	TCC-B	9C0-413

PIP SUMMARY

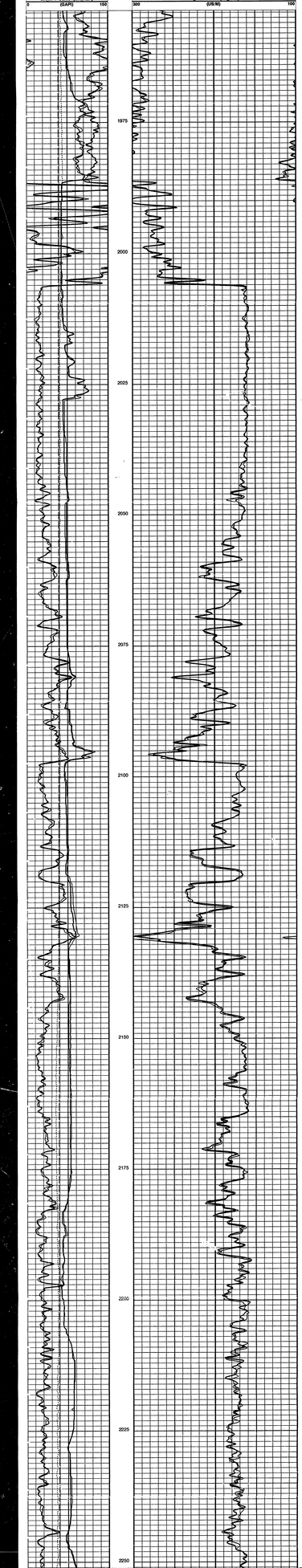
Time Mark Every 60 S

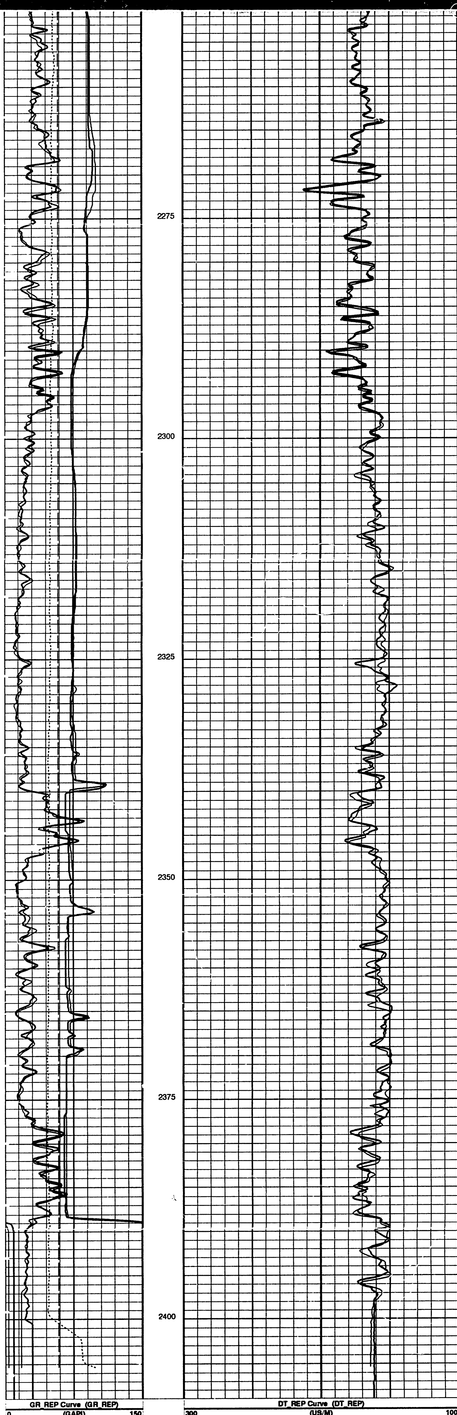
LA_REP Curve (LA_REP)
125 (MM) 375

GR_REP Curve (GR_REP)
0 (GAPI) 150

REPEAT ANALYSIS

DT_REP Curve (DT_REP)
300 (US/M) 100





GR_REP Curve (GR_REP) 0 (GAPI) 150

LA_REP Curve (LA_REP) 125 (MM) 375

DT_REP Curve (DT_REP) 300 (US/M) 100

REPEAT ANALYSIS

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
BS	Bit Size	222.000	MM
DO	Depth Offset	0.0	M
DORL	Depth Offset Repeat Analysis	4.0	M
DTCM	Delta-T Computation Mode	FULL	
MODE	Firing Mode	SHC	
PP	Playback Processing	NORMAL	

Format: SONI-240-300_REP Vertical Scale: 1:240 Graphics File Created: 21-Jan-2000 07:37

OP System Version: 9C0-413

MCM

SDT-C	9C0-413	SGT-L	9C0-413
PCD-B	9C0-413	TCC-B	9C0-413

Input DLIS Files

DEFAULT	SDTC .005	FN:4	PRODUCER	21-Jan-2000 06:08	2405.3 M	19.0 M
DEFAULT	SDTC .006	FN:5	PRODUCER	20-Jan-2000 15:43	2405.0 M	1945.5 M

Output DLIS Files

DEFAULT	SDTC .012	FN:11	PRODUCER	21-Jan-2000 07:37

Calibration and Check Summary

Measurement	Nominal	Master	Before	After	Change	Limit	Units
Scintillation Gamma-Ray - L Wellsite Calibration - Detector Calibration							
Before: 18-JAN-2000 20:00							
Gamma Ray Background	30.00	N/A	38.66	N/A	N/A	N/A	GAPI
Gamma Ray (Jig - Bkg)	153.8	N/A	153.8	N/A	N/A	13.86	GAPI
Gamma Ray (Calibrated)	165.0	N/A		N/A	N/A	15.00	GAPI
Powered Caliper Device - B Wellsite Calibration - Large Arm Calibration							
Before: 18-JAN-2000 19:56							
Large Arm Small Ring	203.2	N/A	178.7	N/A	N/A	N/A	MM
Large Arm Large Ring	304.8	N/A	310.2	N/A	N/A	N/A	MM
Powered Caliper Device - B Wellsite Calibration - Small Arm Calibration							
Before: Calibration not done							
Small Arm Small Gauge	25.40	N/A	N/A	N/A	N/A	N/A	MM
Small Arm Large Gauge	127.0	N/A	N/A	N/A	N/A	N/A	MM
Powered Caliper Device - B Wellsite Calibration - Micro Inverse Calibration							
Before: 18-JAN-2000 19:59							
Micro Inverse Zero	0	N/A	4.420	N/A	N/A	0.1000	OHMM
Micro Inverse Plus	5.000	N/A	4.420	N/A	N/A	0.2000	OHMM
Powered Caliper Device - B Wellsite Calibration - Micro Normal Calibration							
Before: 18-JAN-2000 19:59							
Micro Normal Zero	0	N/A	4.420	N/A	N/A	0.1000	OHMM
Micro Normal Plus	5.000	N/A	4.420	N/A	N/A	0.2000	OHMM

Scintillation Gamma-Ray - L / Equipment Identification

Primary Equipment:	
Scintillation Gamma Cartridge	SGC - SA
Scintillation Gamma Detector	SGD - TAA
Auxiliary Equipment:	
Scintillation Gamma Housing	SGH - K
Gamma Source Radioactive	GSR - UIY

Scintillation Gamma-Ray - L Wellsite Calibration

Detector Calibration

Phase	Gamma Ray Background GAPI	Value	Phase	Gamma Ray (Jig - Bkg) GAPI	Value	Phase	Gamma Ray (Calibrated) GAPI	Value
Before	38.66		Before	153.8		Before		165.0
0 (Minimum)	30.00 (Nominal)	120.0 (Maximum)	139.8 (Minimum)	153.8 (Nominal)	167.7 (Maximum)	150.0 (Minimum)	165.0 (Nominal)	180.0 (Maximum)

Before: 18-JAN-2000 20:00

Powered Caliper Device - B / Equipment Identification

Primary Equipment:	
Powered Caliper Mechanical (sonde) - A	PCM - A
Powered Caliper Cartridge - H	PCC - H
Auxiliary Equipment:	
Powered Caliper Housing - A	PCH - A 1371

Powered Caliper Device - B Wellsite Calibration

Micro Inverse Calibration

Phase	Micro Inverse Zero OHMM	Value	Phase	Micro Inverse Plus OHMM	Value
Before	EXCEEDS LIMIT	4.420	Before		4.420
-1.000 (Minimum)	0 (Nominal)	1.000 (Maximum)	4.280 (Minimum)	5.000 (Nominal)	5.760 (Maximum)

Before: 18-JAN-2000 19:59

Powered Caliper Device - B Wellsite Calibration

Micro Normal Calibration

Phase	Micro Normal Zero OHMM	Value	Phase	Micro Normal Plus OHMM	Value
Before	EXCEEDS LIMIT	4.420	Before		4.420
-1.000 (Minimum)	0 (Nominal)	1.000 (Maximum)	4.280 (Minimum)	5.000 (Nominal)	5.760 (Maximum)

Before: 18-JAN-2000 19:59

COMPANY	NORTHROCK RESOURCES LTD.
WELL	NORTHROCK ET AL EAST MACKAY I-77
FIELD	EAST MACKAY
PROVINCE	NWT

BOTTOM LOG INTERVAL	2390 m
SCHLUMBERGER DEPTH	2389 m
DEPTH DRILLER	2400 m
KELLY BUSHING	202.35 m
DRILL FLOOR	
GROUND LEVEL	198.1 m

Schlumberger

BOREHOLE COMPENSATED SONIC LOG

DENSITY

1879 N.E.B. COPY

COMPANY: NORTHROCK RESOURCES LTD.

WELL: NORTHROCK ET AL E. MACKAY I-77

FIELD: EAST MACKAY

PROVINCE: NWT

Schlumberger

COMPENSATED NEUTRON LITHO-DENSITY

LAT: 64 46 41.84759 Elev.: K.B. 200.35 m
LONG: 125 43 16.85358 G.L. 198.1 m
UWI: 300784501203300 D.F.

Permanent Datum: GROUND LEVEL Elev.: 198.1 m
Log Measured From: KELLY BUSHING 4.2 m above Perm. Datum
Drilling Measured From: KELLY BUSHING

API Serial No.	SECTION	TOWNSHIP	RANGE

CORRECTED LOG

	Run 1	Run 2	Run 3	Run 4
Logging Date	20-JAN-2000			
Run Number	1			
Depth Driller	2400 m			
Schlumberger Depth	2399 m			
Bottom Log Interval	2398.2 m			
Top Log Interval	615 m			
Casing Driller Size @ Depth	273.1 MM @ 615 m	@	@	@
Casing Schlumberger	615 m	@	@	@
Bit Size	200.000 mm			
Type Fluid In Hole	GEL-CHEM			
Density Viscosity	1140 kg/m3 78 s			
Fluid Loss PH	7 cm3 10			
Source Of Sample	RIG			
RM @ Measured Temperature	2.000 ohm.m @ 17 degC	@	@	@
RMF @ Measured Temperature	2.040 ohm.m @ 18 degC	@	@	@
RMC @ Measured Temperature	@	@	@	@
Source RMF RMC	RIG			
RM @ MRT RMF @ MRT	1.553 @ 52 1.539 @ 52	@ @	@ @	@ @
Maximum Recorded Temperature	52			
Circulation Stopped Time	20-JAN-2000 4:00			
Logger On Bottom Time	20-JAN-2000 21:30			
Unit Number Location	8418 9864			
Recorded By	SEAN MCCONKEY			
Witnessed By	CHAD ROBERTS			

	Run 1	Run 2	Run 3	Run 4
Logging Date				
Run Number				
Depth Driller				
Schlumberger Depth				
Bottom Log Interval				
Top Log Interval				
Casing Driller Size @ Depth	@	@	@	@
Casing Schlumberger	@	@	@	@
Bit Size				
Type Fluid In Hole				
Density Viscosity				
Fluid Loss PH				
Source Of Sample				
RM @ Measured Temperature	@	@	@	@
RMF @ Measured Temperature	@	@	@	@
RMC @ Measured Temperature	@	@	@	@
Source RMF RMC				
RM @ MRT RMF @ MRT	@ @	@ @	@ @	@ @
Maximum Recorded Temperature				
Circulation Stopped Time				
Logger On Bottom Time				
Unit Number Location				
Recorded By				
Witnessed By				

ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS AND WE CANNOT, AND DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATION, AND WE SHALL NOT, EXCEPT IN THE CASE OF GROSS OR WILLFUL NEGLIGENCE ON OUR PART, BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COSTS, DAMAGES OR EXPENSES INCURRED OR SUSTAINED BY ANYONE RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR OFFICERS, AGENTS OR EMPLOYEES. THESE INTERPRETATIONS ARE ALSO SUBJECT TO OUR GENERAL TERMS AND CONDITIONS AS SET OUT IN OUR CURRENT PRICE SCHEDULE.

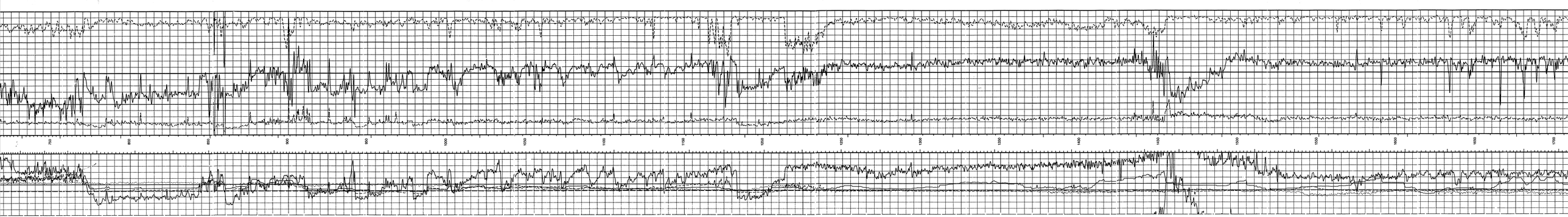
OTHER SERVICES
CBIL
DSN
SDL
CSNG

RESERVOIR FLUID STUDIES
WELL SERVICES
SCHLUMBERGER OILFIELD SERVICES
ANCHORAGE, HOUSTON, DENVER, BAKERSFIELD, CASPER, MIDLAND, LAFAYETTE, ELLWOOD, NEW ORLEANS, PITTSBURGH, ARLINGTON, OKLAHOMA CITY, SHREVEPORT, TULSA, ROCK SPRINGS, ALASKA, CALGARY, EDMONTON, FORT NELSON, NISKU, LEDUC, GRANDE PRAIRIE, REDWATER, BRAZEAU, DRAYTON VALLEY, HOUSTON, TECHNICAL CENTER, OKLAHOMA, CANADA, INTERNATIONAL

DEPTH	EQUIPMENT DESCRIPTION		
	RUN 1	RUN 2	RUN 3
	SURFACE EQUIPMENT WITH SON-A		
	DOWN-HOLE EQUIPMENT		
	PEH-A		
	APH-A		
	TTC-B		
	ISO-HC		
	SGC-C		
	SGC-SA		
	SGC-A		
	NGC-L1371		
	NGC-A		
	POEA		
	AH-107		
	AH-107		
	AH-107		
	CNT-H		
	CNTG-H1497		
	CDT-C		
	SDC-F2301		
	SDC-F2302		
	SDC-F2306		
	AH-107		
	DIT-E		
	DIT-E		
	SFC-H		
	SFC-H		
	NOTE: CNSG CSNG CSNGUT		

DEPTH	EQUIPMENT DESCRIPTION		
	RUN 1	RUN 2	RUN 3
	SURFACE EQUIPMENT WITH SON-A		
	DOWN-HOLE EQUIPMENT		
	PEH-A		
	APH-A		
	TTC-B		
	ISO-HC		
	SGC-C		
	SGC-SA		
	SGC-A		
	NGC-L1371		
	NGC-A		
	POEA		
	AH-107		
	AH-107		
	AH-107		
	CNT-H		
	CNTG-H1497		
	CDT-C		
	SDC-F2301		
	SDC-F2302		
	SDC-F2306		
	AH-107		
	DIT-E		
	DIT-E		
	SFC-H		
	SFC-H		
	NOTE: CNSG CSNG CSNGUT		

RUN 1
BRINE/CRUDE/4 PROGRAMMABLE, 10000lb, EXTERNAL
3.625" 3.625" 3.625"
24.89
24.44
24.04
23.12
23.12
20.94
21.45
19.77
POOR Data
18.85
18.24
17.83
16.25
15.42
CNTG CNTC
10.95 10.77
Caliper
10.13
9.52
Gamma Ray
Tension
CBHC CBHT
Gamma Ray
Gamma Ray
Gamma Ray


700
800
900
1000
1050
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
1700

Bit Size (BS) (MM) 125 375

Area BDQC C From BDQC to BDQF

PhotoElectric Factor (PEF) (---) 0 10

Bulk Density Correction (DRHO) (K/M3) -.05 .00

Caliper (CALI) (MM) 125 375

Bulk Density Quality Curve (BDQC) (---) 0 10

Bulk Density (RHOB) (K/M3) 3000 3000

Gamma Ray (GR) (GAPI) 0 150

MAIN PASS, LIMESTONE MATRIX, 2710 KG/M3

Long Arm Caliper (LA) (MM) 125 375

Tension (TENS) (N) 20000 0

PIP SUMMARY

Integrated Hole Volume Minor Pip Every 0.1 M3
Integrated Hole Volume Major Pip Every 1 M3
-t Integrated Cement Volume Minor Pip Every 0.1 M3
-=t Integrated Cement Volume Major Pip Every 1 M3

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
BFM	Borehole Fluid Medium	LIQUID	
BS	Bit Size	200.000	MM
DHC	Density Hole Correction	ON	
DO	Depth Offset	0.0	M
DPRM	Density Processing Mode	STD	
FD	Fluid Density	1140	K/M3
MDEN	Matrix Density	2710	K/M3
PP	Playback Processing	RECOMPUTE	
WMUD	Mud Weight	1160	K/M3

Format: DENS-600 Vertical Scale: 1:600 Graphics File Created: 21-Jan-2000 04:37

OP System Version: 9C0-413

MCM

DIT-E	9C0-413	LDT-D	9C0-413
CNT-H	SRPCWX-1214	PCD-B	9C0-413
SGT-L	9C0-413	TCC-B	9C0-413

Input DLIS Files

DEFAULT	DITE .019	FN:18	PRODUCER	21-Jan-2000 02:13	2401.1 M	577.1 M

Output DLIS Files

DEFAULT	DITE .026	FN:25	PRODUCER	21-Jan-2000 04:36		

Input DLIS Files

DEFAULT	DITE .019	FN:18	PRODUCER	21-Jan-2000 02:13	2401.1 M	577.1 M

Output DLIS Files

DEFAULT	DITE .032	FN:31	PRODUCER	21-Jan-2000 05:03	2001.9 M	577.1 M

Integrated Hole/Cement Volume Summary

Hole Volume = 63.50 M3
Cement Volume = 26.64 M3 (assuming 178.00 MM casing O.D.)
Computed from 2001.9 M to 915.1 M using data channel(s) CALI LA

OP System Version: 9C0-413

MCM

DIT-E	9C0-413	LDT-D	9C0-413
CNT-H	SRPCWX-1214	PCD-B	9C0-413
SGT-L	9C0-413	TCC-B	9C0-413

PIP SUMMARY

Integrated Hole Volume Minor Pip Every 0.1 M3
Integrated Hole Volume Major Pip Every 1 M3
-t Integrated Cement Volume Minor Pip Every 0.1 M3
-=t Integrated Cement Volume Major Pip Every 1 M3

Time Mark Every 60 S

Tension (TENS) (N) 20000 0

MAIN PASS, SANDSTONE, 2650 KG/M3

Long Arm Caliper (LA) (MM) 125 375

Gas Effect From DPHI to NPOR (---) 0 10

Bulk Density Correction (DRHO) (K/M3) -.05 .00

Gamma Ray (GR) (GAPI) 0 150

PhotoElectric Factor (PEF) (---) 0 10

Bulk Density (RHOB) (K/M3) 1600 3000

Bulk Density Quality Curve (BDQC) (---) 0 10

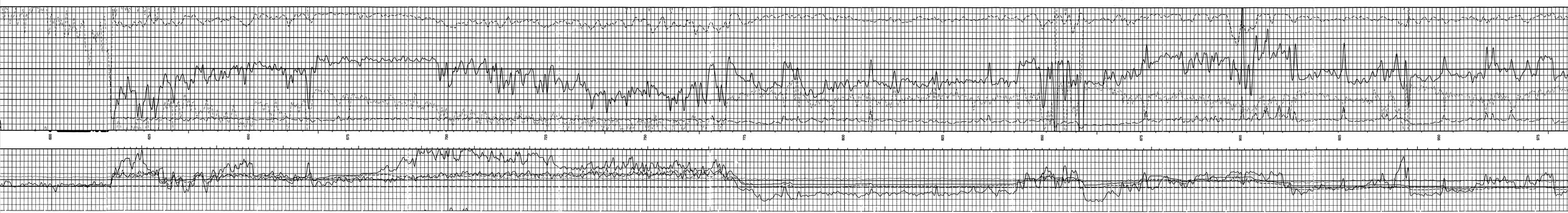
Caliper (CALI) (MM) 125 375

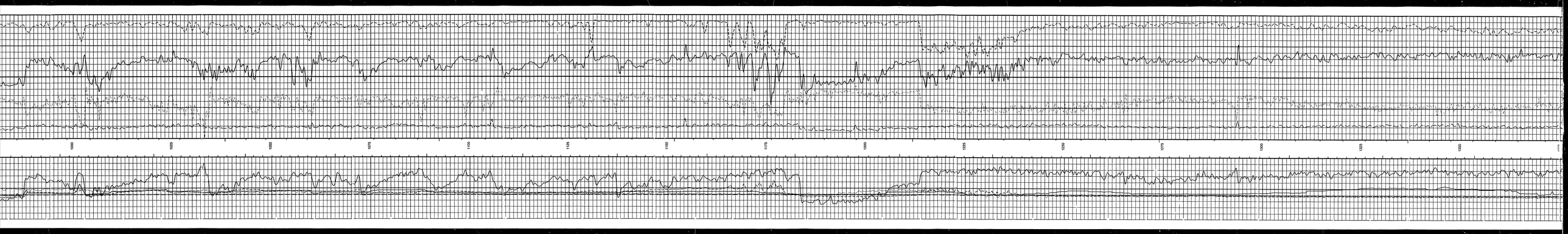
Alpha Processed Neutron Porosity (NPOR) (V/V) 0.45 -0.15

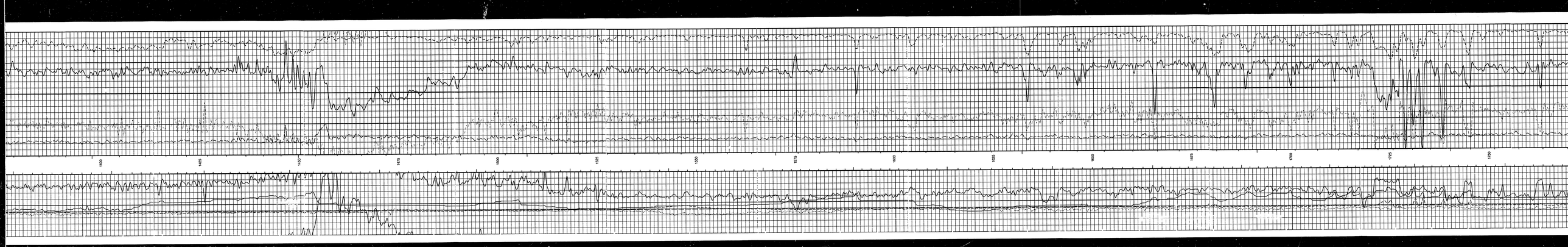
Bit Size (BS) (MM) 125 375

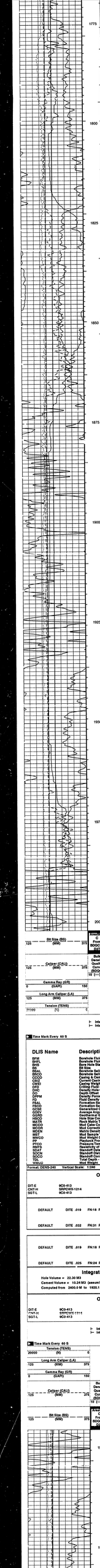
Area BDQC C From BDQC to BDQF

Density Porosity (DPHI) (V/V) 0.45 -0.15


600
625
650
675
700
725
750
775
800
825
850
875
900
925
950
975


1000
1025
1050
1075
1100
1125
1150
1175
1200
1225
1250
1275
1300
1325
1350


1400
1425
1450
1475
1500
1525
1550
1575
1600
1625
1650
1675
1700
1725
1750



Bit Size (BS) (MM)	125 / 375	Density Porosity (DPHI) (V/V)	0.45 / -0.15
Caliper (CALI) (MM)	125 / 375	Alpha Processed Neutron Porosity (NPOR) (V/V)	0.45 / -0.15
Gamma Ray (GR) (GAPI)	0 / 150	Photoelectric Factor (PEF) (---)	1 / 11.600
Long Arm Caliper (LA) (MM)	125 / 375	Bulk Density Correction (DRHO) (K/M3)	1 / -600 / -50
Tension (TENS) (N)	0 / 0	Gas Effect From DPHI to NPOR	

Annotation C From SDOC to CUT

Bulk Density Quality Curve (BDOC) 10 / 0

MAIN PASS, SANDSTONE, 2650 KG/M3

PIP SUMMARY

- Integrated Hole Volume Minor Pip Every 0.1 M3
- Integrated Hole Volume Major Pip Every 1 M3
- Integrated Cement Volume Minor Pip Every 0.1 M3
- Integrated Cement Volume Major Pip Every 1 M3

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value
BFM	Borehole Fluid Medium	LIQUID
BHFL	Borehole Fluid Type	WATER
BHS	Bore Hole Status	OPEN
BS	Bit Size	222.25 MM
BSAL	Borehole Salinity	45000.00 PPM
BSCO	Borehole Salinity Correction Option	NO
CCOP	Casing & Cement Thickness Correction Option	NO
CDIA	Casing Diameter Size	0.000 MM
CWEI	Casing Weight	0.00 KG/M
DFD	Drilling Fluid Density	1140.00 K/M3
DHC	Density Hole Correction	BS
DMF	Drilling Mud Filtrate	M
DPRM	Density Porosity Processing Mode	STAN
FD	Fluid Density	1160 K/M3
FSAL	Formation Salinity	0000 PPM
FSCO	Formation Salinity Correction Option	NO
GCSC	Generalized Caliper Selection	BS
GCSV	Average Angular Deviation of Borehole from Normal	0 DEG
GGDO	Geothermal Gradient	0.018287 DC/M
GSCO	Gravel Pack Correction Option	NO
MATR	Rock Matrix Type	SANDSTONE
MCCO	Mud Cake Correction Option	NO
MCTO	Mud Cake Type	NAT
MDEN	Matrix Density	2650 K/M3
MST	Mud Sample Temperature	17.00 DEGC
MWCO	Mud Weight Correction Option	NO
PLOC	Playback Location	RECOMPUTE
PTCO	Pressure Temperature Correction Option	NO
RMFS	Resistivity of Mud Filtrate Sample	2.0400 OHMM
SDAT	Standoff Data Source	SCHN
SDCO	Standoff Correction	0.00 MM
SOCO	Standoff Correction Option	NO
TDL	Total Depth - Logger	2398.00 M
WMW	Mud Weight	1140 K/M3

Format: DENS-240 Vertical Scale: 1:240 Graphics File Created: 21-Jan-2000 05:03

OP System Version: 9C0-413

MCM

DIT-E	9C0-413	LDT-D	9C0-413
CNT-H	SRPCWX-1214	PCD-B	9C0-413
SGT-L	9C0-413	TCC-B	9C0-413

Input DLIS Files

DEFAULT	DITE .019	FN:18	PRODUCER	21-Jan-2000 02:13	2401.1 M	577.1 M

Output DLIS Files

DEFAULT	DITE .032	FN:21	PRODUCER	21-Jan-2000 05:03		

Input DLIS Files

DEFAULT	DITE .019	FN:18	PRODUCER	21-Jan-2000 02:13	2401.1 M	577.1 M

Output DLIS Files

DEFAULT	DITE .025	FN:24	PRODUCER	21-Jan-2000 04:26	2401.1 M	1920.1 M

Integrated Hole/Cement Volume Summary

Hole Volume = 22.30 M3
Cement Volume = 10.24 M3 (assuming 178.90 MM casing O.D.)
Computed from 2400.0 M to 1920.1 M using data channel(s) CALI LA

OP System Version: 9C0-413

MCM

DIT-E	9C0-413	LDT-D	9C0-413
CNT-H	SRPCWX-1214	PCD-B	9C0-413
SGT-L	9C0-413	TCC-B	9C0-413

PIP SUMMARY

- Integrated Hole Volume Minor Pip Every 0.1 M3
- Integrated Hole Volume Major Pip Every 1 M3
- Integrated Cement Volume Minor Pip Every 0.1 M3
- Integrated Cement Volume Major Pip Every 1 M3

Time Mark Every 60 S

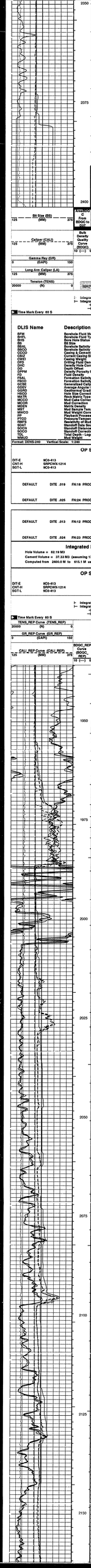
Tension (TENS) (N)	20000 / 0	Density Porosity (DPHI) (V/V)	0.45 / -0.15
Long Arm Caliper (LA) (MM)	125 / 375	Gas Effect From DPHI to NPOR	
Gamma Ray (GR) (GAPI)	0 / 150	Photoelectric Factor (PEF) (---)	1 / 11.600
Caliper (CALI) (MM)	125 / 375	Bulk Density Correction (DRHO) (K/M3)	1 / -600 / -50
Bit Size (BS) (MM)	125 / 375	Alpha Processed Neutron Porosity (NPOR) (V/V)	0.45 / -0.15

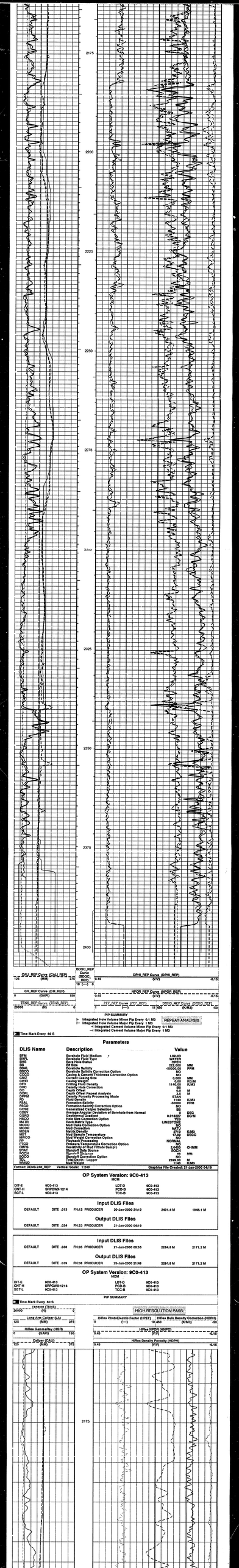
Annotation C From SDOC to CUT

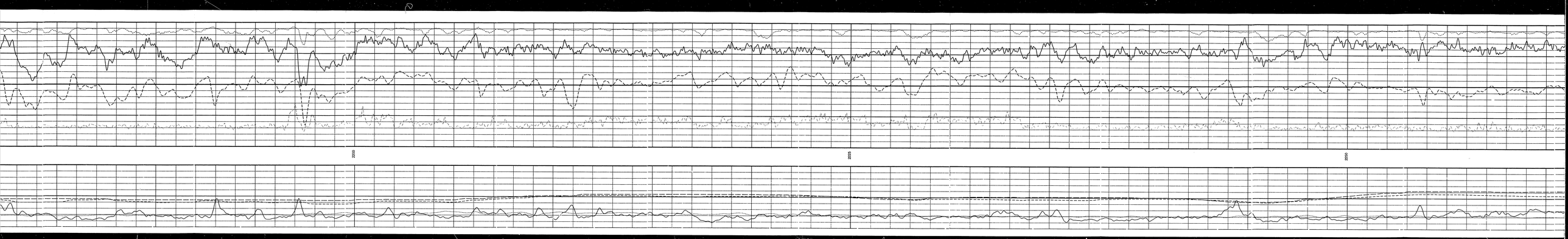
Bulk Density Quality Curve (BDOC) 10 / 0

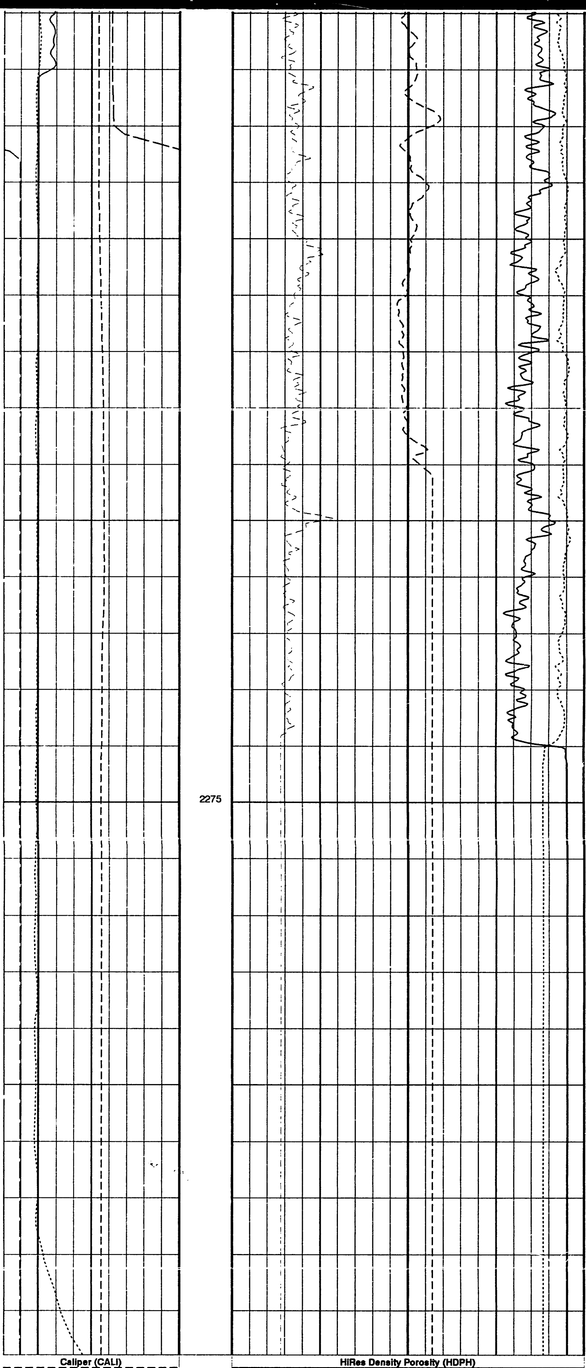
MAIN PASS, LIMESTONE, MDEN = 2710KG/M3

1975
2000
2025
2050
2075
2100
2125
2150
2175
2200
2225
2250
2275
2300
2325
2350


2350
2375
2400
BS Size (BS)
(MM)
125
375
Caliper (CALI)
(MM)
125
375
Gamma Ray (GR)
(GAPI)
0
150
Long Arm Caliper (LA)
(MM)
125
375
Tension (TENS)
(N)
30000
0
Density Porosity (DPHI)
(V/V)
0.45
-0.15
Alpha Processed Neutron Porosity (NPOR)
(V/V)
0.45
-0.15
Photoelectric Factor (PEF)
(---)
1
11 ISO
Bulk Density Correction (DRHO)
(K/M3)
.40
Gas Effect
From DPHI to NPOR
MAIN PASS, LIMESTONE, MDEN = 2710KG/M3
PIP SUMMARY
Integrated Hole Volume Minor Pip Every 0.1 M3
Integrated Hole Volume Major Pip Every 1 M3
Integrated Cement Volume Minor Pip Every 0.1 M3
Integrated Cement Volume Major Pip Every 1 M3
Time Mark Every 60 S
Parameters
DLIS Name
Description
Value
RPM
Borehole Fluid Medium
LIQUID
MUD
Mud Sample Type
OBEN
BHS
Bore Hole Status
OPEN
BS
BS Size
222.000
MM
SEAL
Borehole Salinity
-55000.00
PPM
CSCO
Casing & Cement Thickness Correction Option
NO
CSCZ
Casing & Cement Thickness Correction
0.000
MM
CWEI
Current Casing Size
0.00
KG/M
CWGT
Casing Weight
11.60
K/M3
DHC
Density Hole Correction
.00
DO
Depth Offset
0.5
M
DPHM
Density Porosity Processing Mode
STAN
FF
Fluid Density
1.00
K/M3
FSAL
Formation Salinity
-55000
PPM
FSCO
Formation Salinity Correction Option
NO
GCSE
Generalized Caliber Selection
BS
GDEV
Geothermal Gradient Correction of Borehole from Normal
0
DEG
GGRD
Geothermal Gradient
0.016227
DC/M
HSCO
Hole Size Correction Option
YES
LITH
Lithology Type
LIMESTONE
MCOO
Mud Cake Correction Option
NO
MCOR
Mud Correction
NATU
MDEN
Matrix Density
2710
K/M3
MSTE
Mud Sample Temperature
71.00
DEGC
MVCO
Mud Viscosity Correction Option
NO
PP
Playback Processing
NORMAL
PTCO
Pressure/Temperature Correction Option
NO
RMFS
Resistivity of Mud Filtrate Sample
2.000
OHMM
SDAT
Standoff Data Source
SOCS
SOCN
Standoff Distance
68
MM
SOCO
Standoff Correction Option
NO
TDEP
Tool Depth - Logger
2000.0
M
WMUD
Mud Weight
11.60
K/M3
Format: DENS-240 Vertical Scale: 1:240
Graphics File Created: 21-Jan-2000 04:26
OP System Version: 9C0-413
MCM
DIT-E 9C0-413 LDT-D 9C0-413
CNT-H SRPCWX-1214 PCD-B 9C0-413
SGT-L 9C0-413 TCC-B 9C0-413
Input DLIS Files
DEFAULT DITE .019 FN:18 PRODUCER 21-Jan-2000 02:13 2401.1 M 577.1 M
Output DLIS Files
DEFAULT DITE .025 FN:24 PRODUCER 21-Jan-2000 04:26
Input DLIS Files
DEFAULT DITE .013 FN:12 PRODUCER 20-Jan-2000 21:12 2401.4 M 1946.1 M
Output DLIS Files
DEFAULT DITE .024 FN:23 PRODUCER 21-Jan-2000 04:19 2401.1 M 577.1 M
Integrated Hole/Cement Volume Summary
Hole Volume = 82.19 M3
Cement Volume = 37.33 M3 (assuming 178.90 MM casing O.D.)
Computed from 2400.0 M to 615.1 M using data channel(s) CALI LA
OP System Version: 9C0-413
MCM
DIT-E 9C0-413 LDT-D 9C0-413
CNT-H SRPCWX-1214 PCD-B 9C0-413
SGT-L 9C0-413 TCC-B 9C0-413
PIP SUMMARY
Integrated Hole Volume Minor Pip Every 0.1 M3
Integrated Hole Volume Major Pip Every 1 M3
Integrated Cement Volume Minor Pip Every 0.1 M3
Integrated Cement Volume Major Pip Every 1 M3
REPEAT ANALYSIS
Time Mark Every 60 S
TENS_REP Curve (TENS_REP)
(N)
30000
0
PEF_REP Curve (PEF_REP)
(---)
1
11 ISO
DPHD_REP Curve (DPHD_REP)
(V/V)
.45
-0.15
GR_REP Curve (GR_REP)
(GAPI)
0
150
NPOR_REP Curve (NPOR_REP)
(V/V)
.45
-0.15
CALI_REP Curve (CALI_REP)
(MM)
125
375
RHOC_REP Curve (RHOC_REP)
(---)
10
0
DPHI_REP Curve (DPHI_REP)
(V/V)
0.45
-0.15
1950
1975
2000
2025
2050
2075
2100
2125
2150


2175
2200
2225
2250
2275
2300
2325
2350
2375
2400
CALI_REP Curve (CALI_REP)
(MM)
6
375
BDOC_REP Curve (BDOC_REP)
(K/M3)
0
100
DPHI_REP Curve (DPHI_REP)
(V/V)
0.45
-0.15
GR_REP Curve (GR_REP)
(GAPI)
0
150
NPOR_REP Curve (NPOR_REP)
(V/V)
0.45
-0.15
TENS_REP Curve (TENS_REP)
(N)
20000
0
ZZ_REP Curve (ZZ_REP)
(---)
1
1 400
HPOR_REP Curve (HPOR_REP)
(K/M3)
50
-50
PIP SUMMARY
Integrated Hole Volume Minor Plp Every 0.1 M3
Integrated Hole Volume Major Plp Every 1 M3
Integrated Cement Volume Minor Plp Every 0.1 M3
Integrated Cement Volume Major Plp Every 1 M3
REPEAT ANALYSIS
Time Mark Every 60 S
Parameters
DLIS Name
Description
Value
BFM Borehole Fluid Medium LIQUID
BHFL Borehole Fluid Type WATER
BHS Borehole Status OPEN
BS Bit Size 311.15 MM
BSAL Borehole Salinity -50000.00 PPM
BSCO Borehole Salinity Correction Option NO
CCCO Casing & Cement Thickness Correction Option NO
CSIZ Casing Outer Size 244.48 MM
CWG Casing Weight 0.00 KG/M
DFC Drilling Fluid Density 1140.00 K/M3
DFCO Density Offset Correction 0.00 G
DO Depth Offset 0.0 M
DORL Depth Offset Repeat Analysis 3.0 M
DPM Density Porosity Processing Mode SYAU
FD Fluid Density 1140 K/M3
FSAL Formation Salinity -50000 PPM
FSCO Formation Salinity Correction Option NO
GCSE Generalized Caliper Selection BS
HAZI Hole Azimuth - Direction of Borehole from Normal 0 DEG
HGRD Geothermal Gradient 0.018277 DC/M
HSCO Hole Size Correction Option YES
MATR Rock Matrix Type LIMESTONE
MCCO Mud Cake Correction Option NO
MCSN Mud Cake Source NATU
MDEN Matrix Density 2710 K/M3
MST Mud Sample Temperature 17.00 DEGC
MTCO Matrix Density Correction Option NO
PP Playback Processing NORMAL
PTCO Pressure/Temperature Correction Option NO
RMFS Resistivity of Mud Filtrate Sample 0.0000 OHMM
SCSN Standoff Data Source SOCN
SOCN Standoff Value 0.00 MM
SOCO Standoff Correction Option NO
TDL Total Depth - Logger 2399.00 M
TVDD Total Vertical Depth 11.00 K/M3
Format: DENS-240_REP Vertical Scale: 1:240 Graphics File Created: 21-Jan-2000 04:19
OP System Version: 9C0-413
MCM
DIT-E 9C0-413 LDT-D 9C0-413
CNT-H 9R0CWX-1214 POD-B 9C0-413
SGT-L 9C0-413 TCC-B 9C0-413
Input DLIS Files
DEFAULT DITE .013 FN:12 PRODUCER 20-Jan-2000 21:12 2401.4 M 1046.1 M
Output DLIS Files
DEFAULT DITE .024 FN:23 PRODUCER 21-Jan-2000 04:19
Input DLIS Files
DEFAULT DITE .036 FN:35 PRODUCER 21-Jan-2000 06:55 2284.8 M 2171.2 M
Output DLIS Files
DEFAULT DITE .039 FN:38 PRODUCER 25-Jan-2000 21:48 2284.8 M 2171.2 M
OP System Version: 9C0-413
NCM
DIT-E 9C0-413 LDT-D 9C0-413
CNT-H 9R0CWX-1214 POD-B 9C0-413
SGT-L 9C0-413 TCC-B 9C0-413
PIP SUMMARY
Time Mark Every 60 S
Tension (Tbob)
20000
0
HIGH RESOLUTION PASS
Long Arm Caliper (LA)
(MM)
125
375
HiRes Photoelectric Factor (HPEF)
(---)
0
10 400
HiRes Bulk Density Correction (HDPO)
(K/M3)
50
-50
HiRes Gamma Ray (HGR)
(GAPI)
0
150
HiRes NPOR (HNPO)
(V/V)
0.45
-0.15
Caliper (CALI)
(MM)
125
375
HiRes Density Porosity (HDPH)
(V/V)
0.45
-0.15
2175


2200
2225
2250



Caliper (CALI)		HiRes Density Porosity (HDPH)
125 (MM) 375		0.45 (V/V) -0.15
HiRes GammaRay (HGR)		HiRes NPOR (HNPO)
0 (GAPI) 150		0.45 (V/V) -0.15
Long Arm Caliper (LA)	HiRes PhotoElectric Factor (HPEF)	HiRes Bulk Density Correction (HDRH)
125 (MM) 375	0 (---) 10	.450 (K/M3) -50
Tension (TENS)		
20000 (N) 0		

HIGH RESOLUTION PASS

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
BFM	Borehole Fluid Medium	LIQUID	
BHFL	Borehole Fluid Type	WATER	
BHS	Bore Hole Statue	OPEN	
BS	Bit Size	222.000	MM
BSAL	Borehole Salinity	-50000.00	PPM
BSCO	Borehole Salinity Correction Option	NO	
CCCO	Casing & Cement Thickness Correction Option	NO	
CSIZ	Current Casing Size	0.000	MM
CWEI	Casing Weight	0.00	KG/M
DFD	Drilling Fluid Density	1140.00	K/M3
DHC	Density Hole Correction	BS	
DO	Depth Offset	0.0	M
DPPM	Density Porosity Processing Mode	HIRS	
FD	Fluid Density	1140	K/M3
FSAL	Formation Salinity	-50000	PPM
FSCO	Formation Salinity Correction Option	NO	
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.018227	DC/M
HSCO	Hole Size Correction Option	YES	
MATR	Rock Matrix Type	SANDSTONE	
MCCO	Mud Cake Correction Option	NO	
MCOR	Mud Correction	NATU	
MDEN	Matrix Density	2650	K/M3
MST	Mud Sample Temperature	17.00	DEGC
MWCO	Mud Weight Correction Option	NO	
PP	Playback Processing	NORMAL	
PTCO	Pressure/Temperature Correction Option	NO	
RMFS	Resistivity of Mud Filtrate Sample	2.0400	OHMM
SDAT	Standoff Data Source	SOCN	
SOCN	Standoff Distance	68	MM
SOCO	Standoff Correction Option	NO	
TDL	Total Depth - Logger	2399.00	M
WMUD	Mud Weight	1140	K/M3

Format: LDT_CNT_HiRes Vertical Scale: 1:48 Graphics File Created: 25-Jan-2000 21:48

OP System Version: 9C0-413

MCM

DIT-E	9C0-413	LDT-D	9C0-413
CNT-H	SRPCWX-1214	PCD-B	9C0-413
SGT-L	9C0-413	TCC-B	9C0-413

Input DLIS Files

DEFAULT	DITE .036	FN:35	PRODUCER	21-Jan-2000 06:55	2284.8 M 2171.2 M

Output DLIS Files

DEFAULT	DITE .039	FN:38	PRODUCER	25-Jan-2000 21:48

Calibration and Check Summary

Measurement	Nominal	Master	Before	After	Change	Limit	Units
Litho Density - D Wellsite Calibration - Background Measurement							
Master: 16-JAN-2000 17:08 Before: 16-JAN-2000 20:12							
LL Background	20.00	19.26	19.21	N/A	N/A	1.000	CPS
LU Background	76.00	73.67	73.16	N/A	N/A	1.000	CPS
LS Background	57.00	56.11	55.79	N/A	N/A	1.000	CPS
LTH Background	5.500	5.286	5.289	N/A	N/A	0.3000	CPS
SS1 Background	16.00	12.27	12.22	N/A	N/A	0.5000	CPS
SS2 Background	11.00	8.507	8.520	N/A	N/A	0.5000	CPS
Litho Density - D Wellsite Calibration - Tool Quality Control Information HV							
Master: 16-JAN-2000 17:08 Before: 16-JAN-2000 20:12							
LSHV Background	1500	1351	1342	N/A	N/A	N/A	V
SSHV Background	1500	1354	1342	N/A	N/A	N/A	V
Litho Density - D Wellsite Calibration - Detectors Resolution From BKG Measurments							
Master: 16-JAN-2000 17:08 Before: 16-JAN-2000 20:12							
LS Resolution Background	8.000	8.554	6.448	N/A	N/A	N/A	
SS Resolution Background	8.000	8.738	8.702	N/A	N/A	N/A	
Litho Density - D Wellsite Calibration - Caliper Calibration							
Before: 16-JAN-2000 19:48							
Caliper Small Ring	203.2	N/A	180.6	N/A	N/A	N/A	MM
Caliper Large Ring	304.8	N/A	290.3	N/A	N/A	N/A	MM
Compensated Neutron - H Wellsite Calibration - Zero Measurement							
Master: 16-JAN-2000 8:32 Before: 16-JAN-2000 19:56							
CNTC Background	27.54	27.54	27.53	N/A	N/A	4.132	CPS
CFTC Background	34.27	34.27	36.17	N/A	N/A	5.140	CPS
Powered Caliper Device - B Wellsite Calibration - Large Arm Calibration							
Before: 16-JAN-2000 19:56							
Large Arm Small Ring	203.2	N/A	176.7	N/A	N/A	N/A	MM
Large Arm Large Ring	304.8	N/A	310.2	N/A	N/A	N/A	MM
Powered Caliper Device - B Wellsite Calibration - Small Arm Calibration							
Before: Calibration not done							
Small Arm Small Gauge	25.40	N/A	N/A	N/A	N/A	N/A	MM
Small Arm Large Gauge	127.0	N/A	N/A	N/A	N/A	N/A	MM
Powered Caliper Device - B Wellsite Calibration - Micro Inverse Calibration							
Before: 16-JAN-2000 19:59							
Micro Inverse Zero	0	N/A	4.420	N/A	N/A	0.1000	OHMM
Micro Inverse Plus	5.000	N/A	4.420	N/A	N/A	0.2000	OHMM
Powered Caliper Device - B Wellsite Calibration - Micro Normal Calibration							
Before: 16-JAN-2000 19:59							
Micro Normal Zero	0	N/A	4.420	N/A	N/A	0.1000	OHMM

Micro Normal Zero	0	N/A	4.420	N/A	N/A	0.1000	OHMM
Micro Normal Plus	5.000	N/A	4.420	N/A	N/A	0.2000	OHMM

Scintillation Gamma-Ray - L Wellsite Calibration - Detector Calibration
Before: 16-JAN-2000 20:00

Gamma Ray Background	30.00	N/A	38.86	N/A	N/A	N/A	GAPI
Gamma Ray (J/g - Bkg)	153.8	N/A	153.8	N/A	N/A	13.98	GAPI
Gamma Ray (Calibrated)	165.0	N/A	165.0	N/A	N/A	15.00	GAPI

The CNT Master Calibration Was Done With The Following Parameters :

NCT-B Water Temperature 10.0 DEGC.
Thermal Housing Size 85.725 MM.

Dual Induction - E / Equipment Identification

Primary Equipment:

Dual Induction Sonde	DIS - HB	61
Dual Induction Cartridge	DIC - EB	38

Auxiliary Equipment.

Mass Isolated Housing	MIH - ZA	

Dual Induction - E Wellsite Calibration

Induction Electronics (10 kHz)

Phase	ID Elect Real Offset 10 kHz MM/M	Value
Before		26.62
	-273.4 (Minimum) 26.57 (Nominal) 326.6 (Maximum)	

Phase	ID Elect Real Gain 10 kHz	Value
Before		0.9491
	0.8107 (Minimum) 0.9607 (Nominal) 1.145 (Maximum)	

Phase	ID Elect Phase 10 kHz DEG	Value
Before		7.620
	-3.078 (Minimum) 8.926 (Nominal) 16.93 (Maximum)	

Phase	ID Elect Quad Offset 10 kHz MM/M	Value
Before		33.37
	-270.7 (Minimum) 29.33 (Nominal) 329.3 (Maximum)	

Phase	ID Elect Quad Gain 10 kHz	Value
Before		0.9563
	0.8163 (Minimum) 0.9663 (Nominal) 1.182 (Maximum)	

Phase	IM Elect Phase 10 kHz DEG	Value
Before		10.39
	-0.3801 (Minimum) 9.620 (Nominal) 19.62 (Maximum)	

Phase	IM Elect Real Offset 10 kHz MM/M	Value
Before		35.09
	-512.1 (Minimum) 37.88 (Nominal) 587.9 (Maximum)	

Phase	IM Elect Real Gain 10 kHz	Value
Before		0.9039
	0.7760 (Minimum) 0.9260 (Nominal) 1.095 (Maximum)	

Phase	IM Elect Quad Offset 10 kHz MM/M	Value
Before		87.49
	-461.5 (Minimum) 88.52 (Nominal) 638.5 (Maximum)	

Phase	IM Elect Quad Gain 10 kHz	Value
Before		0.9264
	0.7953 (Minimum) 0.9453 (Nominal) 1.123 (Maximum)	

Before: 20-JAN-2000 20:42

Dual Induction - E Wellsite Calibration

Induction Electronics (20 kHz)

Phase	ID Elect Real Offset 20 kHz MM/M	Value
Before		10.20
	-114.9 (Minimum) 10.07 (Nominal) 136.1 (Maximum)	

Phase	ID Elect Real Gain 20 kHz	Value
Before		0.9454
	0.8069 (Minimum) 0.9569 (Nominal) 1.139 (Maximum)	

Phase	ID Elect Phase 20 kHz DEG	Value
Before		4.575
	-11.46 (Minimum) 3.542 (Nominal) 18.54 (Maximum)	

Phase	ID Elect Quad Offset 20 kHz MM/M	Value
Before		13.09
	-113.8 (Minimum) 11.43 (Nominal) 136.4 (Maximum)	

Phase	ID Elect Quad Gain 20 kHz	Value
Before		0.9545
	0.8124 (Minimum) 0.9624 (Nominal) 1.147 (Maximum)	

Phase	IM Elect Phase 20 kHz DEG	Value
Before		7.917
	-6.213 (Minimum) 6.787 (Nominal) 21.79 (Maximum)	

Phase	IM Elect Real Offset 20 kHz MM/M	Value
Before		15.47
	-209.7 (Minimum) 15.35 (Nominal) 240.3 (Maximum)	

Phase	IM Elect Real Gain 20 kHz	Value
Before		0.9389
	0.8048 (Minimum) 0.9548 (Nominal) 1.136 (Maximum)	

Phase	IM Elect Quad Offset 20 kHz MM/M	Value
Before		35.76
	-186.9 (Minimum) 36.13 (Nominal) 261.1 (Maximum)	

Phase	IM Elect Quad Gain 20 kHz	Value
Before		0.9622
	0.8248 (Minimum) 0.9748 (Nominal) 1.164 (Maximum)	

Before: 20-JAN-2000 20:43

Dual Induction - E Wellsite Calibration

Induction Electronics (40 kHz)

Phase	ID Elect Real Offset 40 kHz MM/M	Value
Before		6.522
	-78.62 (Minimum) 6.383 (Nominal) 91.38 (Maximum)	

Phase	ID Elect Real Gain 40 kHz	Value
Before		0.9163
	0.7748 (Minimum) 0.9248 (Nominal) 1.094 (Maximum)	

Phase	ID Elect Phase 40 kHz DEG	Value
Before		17.93
	-5.135 (Minimum) 14.86 (Nominal) 34.86 (Maximum)	

Phase	ID Elect Quad Offset 40 kHz MM/M	Value
Before		8.587
	[illegible] (Minimum) [illegible] (Nominal) [illegible] (Maximum)	

Phase	ID Elect Quad Gain 40 kHz	Value
Before		0.9246
	[illegible] (Minimum) [illegible] (Nominal) [illegible] (Maximum)	

Phase	IM Elect Phase 40 kHz DEG	Value
Before		21.00
	0.158 (Minimum) 17.21 (Nominal) 37.84 (Maximum)	

Phase	IM Elect Real Offset 40 kHz MM/M	Value
Before		10.01
	-120.2 (Minimum) 9.820 (Nominal) 139.8 (Maximum)	

Phase	IM Elect Real Gain 40 kHz	Value
Before		0.9430
	0.8005 (Minimum) 0.9505 (Nominal) 1.139 (Maximum)	

Phase	IM Elect Quad Offset 40 kHz MM/M	Value
Before		23.16
	-108.8 (Minimum) 23.18 (Nominal) 153.2 (Maximum)	

Phase	IM Elect Quad Gain 40 kHz	Value
Before		0.9662
	0.8202 (Minimum) 0.9702 (Nominal) 1.186 (Maximum)	

Before: 20-JAN-2000 20:44

Dual Induction - E Wellsite Calibration

SFL Electronics

Phase	SFL Voltage Offset MV	Value
Before		1.328
	-15.00 (Minimum) 0 (Nominal) 15.00 (Maximum)	

Phase	SFL Voltage Gain	Value
Before		0.9943
	0.8500 (Minimum) 1.000 (Nominal) 1.200 (Maximum)	

Phase	SFL Current Offset MA	Value
Before		0.03882
	-0.6000 (Minimum) 0 (Nominal) 0.6000 (Maximum)	

Phase	SFL Current Gain	Value
Before		0.9911
	0.8500 (Minimum) 1.000 (Nominal) 1.200 (Maximum)	

Before: 20-JAN-2000 20:45

Litho Density - D / Equipment Identification

Primary Equipment:

Nuclear Services Cartridge	NSC - E	785
Powered Gamma Detector	PGD - G	2721
Gamma Source Radioactive	GSR - J	2043

Auxiliary Equipment:

Density Resistivity Sonde	DRS - C	3926
Electronics Cartridge Housing	ECH - MKA	787
Powered Detector Housing	PDH - L	2980

Litho Density - D Wellsite Calibration

Background Measurement

Phase	LL Background CPS	Value
Master		19.26
Before		19.21
	15.00 (Minimum) 20.00 (Nominal) 25.00 (Maximum)	

Phase	LU Background CPS	Value
Master		73.67
Before		73.16
	58.00 (Minimum) 76.00 (Nominal) 94.00 (Maximum)	

Phase	LS Background CPS	Value
Master		56.11
Before		55.79
	43.00 (Minimum) 57.00 (Nominal) 72.00 (Maximum)	

Phase	LITH Background CPS	Value
Master		5.286
Before		5.289
	4.000 (Minimum) 5.500 (Nominal) 7.000 (Maximum)	

Phase	SS1 Background CPS	Value
Master		12.27
Before		12.22
	12.00 (Minimum) 16.00 (Nominal) 19.50 (Maximum)	

Phase	SS2 Background CPS	Value
Master		8.507
Before		8.520
	8.000 (Minimum) 11.00 (Nominal) 13.50 (Maximum)	

Master: 16-JAN-2000 17:08 Before: 16-JAN-2000 20:12

Litho Density - D Wellsite Calibration

Detectors Resolution From BKG Measurments

Phase	LS Resolution Background	Value
Master		8.554
Before		8.448
	5.000 (Minimum) 8.000 (Nominal) 11.50 (Maximum)	

Phase	SS Resolution Background	Value
Master		8.738
Before		8.702
	5.000 (Minimum) 8.000 (Nominal) 11.50 (Maximum)	

Master: 16-JAN-2000 17:08 Before: 16-JAN-2000 20:12

Compensated Neutron - H / Equipment Identification

Primary Equipment:

Compensated Neutron Cartridge	CNC - HA	1247
Neutron Logging Source	NLS - KL	
Neutron Source Radioactive	NSR - F	1491
Neutron Detector with Alpha Source	CND - A	1257
Compensated Neutron Box	CNB - AB	

Auxiliary Equipment:

Compensated Neutron Housing	CNH - A	4465
Neutron Calibration Tank	NCT - B	

Compensated Neutron - H Wellsite Calibration

Auto Measurement

Phase	CNTC Background CPS	Value
Master		27.54
Before		27.53
	5.000 (Minimum) 27.54 (Nominal) 40.00 (Maximum)	

Phase	CFTC Background CPS	Value
Master		34.27
Before		34.17
	5.000 (Minimum) 34.27 (Nominal) 40.00 (Maximum)	

Master: 16-JAN-2000 8:32 Before: 16-JAN-2000 19:56

Powered Caliper Device - B / Equipment Identification

Primary Equipment:

Powered Caliper Mechanical (sonde) - A	PCM - A	
Powered Caliper Cartridge - H	PCC - H	

Auxiliary Equipment:

Powered Caliper Housing - A	PCH - A	1371

Powered Caliper Device - B Wellsite Calibration

Micro Inverse Calibration

Phase	Micro Inverse Zero OHMM	Value
Before	EXCEEDS LIMIT	4.420
	-1.000 (Minimum) 0 (Nominal) 1.000 (Maximum)	

Phase	Micro Inverse Plus OHMM	Value
Before		4.420
	4.250 (Minimum) 5.000 (Nominal) 5.750 (Maximum)	

Before: 16-JAN-2000 19:59

Powered Caliper Device - B Wellsite Calibration

Micro Normal Calibration

Phase	Micro Normal Zero OHMM	Value
Before	EXCEEDS LIMIT	4.420
	-1.000 (Minimum) 0 (Nominal) 1.000 (Maximum)	

Phase	Micro Normal Plus OHMM	Value
Before		4.420
	4.250 (Minimum) 5.000 (Nominal) 5.750 (Maximum)	

Before: 16-JAN-2000 19:59

Scintillation Gamma-Ray - L / Equipment Identification

Primary Equipment:

Scintillation Gamma Cartridge	SGC - SA	
Scintillation Gamma Detector	SGD - TAA	

Auxiliary Equipment:

Scintillation Gamma Housing	SGH - K	
Gamma Source Radioactive	GSR - U/Y	

Scintillation Gamma-Ray - L Wellsite Calibration

Detector Calibration

Phase	Gamma Ray Background GAPI	Value
Before		38.86
	0 (Minimum) 30.00 (Nominal) 120.0 (Maximum)	

Phase	Gamma Ray (J/g - Bkg) GAPI	Value
Before		153.8
	139.5 (Minimum) 153.8 (Nominal) 167.7 (Maximum)	

Phase	Gamma Ray (Calibrated) GAPI	Value
Before		165.0
	150.0 (Minimum) 165.0 (Nominal) 180.0 (Maximum)	

Before: 16-JAN-2000 20:00

COMPANY:	NORTHROCK RESOURCES LTD.	BOTTOM LOG INTERVAL	2388.2 m
		SCHLUMBERGER DEPTH	2399 m
WELL:	NORTHROCK ET AL EAST MACKAY I-77	DEPTH DRILLER	2400 m
FIELD:	EAST MACKAY	KELLY BUSHING	202.35 m
PROVINCE:	NWT	DRILL FLOOR	-
		GROUND LEVEL	198.1 m

Schlumberger

COMPENSATED NEUTRON LITHO-DENSITY

MISCELLANEOUS

N.E.B. COPY 879

KNOWLING GEOLOGICAL
315-32nd Street N.W.
CALGARY, Alberta
T2P 1G5
(403) 560-6400

COMPOSITE WELL HISTORY
DRILLING TIME
LITHOLOGY LOG

COMPANY: Northrock Resources Ltd.
WELL: NORTHROCK et al E. Mackay I-77
FIELD: Undefined.
PROVINCE: N.W.T.
LOCATION: I-77-54-50-125-30

COORDINATES: Lat:64.46.4 Lon:125.43.
ELEVATIONS: GD 198.1 m LOG MEASURED FROM KB
KB 202.4 m ABOVE GROUND
WELL TYPE: Exploratory P&A
SPUD DATE: 23-Dec-99 @ 2130hr
LICENCE No.: 1679

TOTAL DEPTH: 2400m
T.D. DATE: 19-Jan-00 @ 2215hr
AFE No.: 99437

CONTRACTOR: Akita/Saitu Pnshp.
MUD TYPE: Gel/chem
MUD UP @: 980m
SAMPLES: 615m to FTD
1 bag @ 2 wells @5m, 1 jar @10m GSC
1 vial @5m NRK
DSTs: DST #1 Arrisa
2175-2204m 10-60-60-180
Failed at 4 min into PF.
Rec: 40m DF, 74m Muddy SW, 56m SW

CORES: None.

OPEN HOLE LOGS:
BHCS-GR-CAL TD-SC GR to Surface.
AIT-CNL-LDT-PE-DAC-GR TD-SC
HI Res 2250-2175m

SUPERVISION
GEOLOGICAL: Dave Roberts
DRILLING: Bruce Webber

HOLE SIZE		CASING SIZE		CASING DEPTH	
SURFACE:	311 mm	SURFACE:	244.5 mm	SURFACE:	615.0 m
INTERMEDIATE:	222 mm	INTERMEDIATE:	n/a mm	INTERMEDIATE:	n/a m
MAIN:	mm	MAIN:	mm	MAIN:	m

REMARKS: Deviation problems in surface and main hole. Seepage losses at 900m.

ROCK TYPE

CONGLOMERATE
SANDSTONE
SILTSTONE
SHALE, grey
SHALE, black
SHALE, coloured
CHERT
LIMESTONE
DOLOMITE
ANHYDRITE
COAL
CLAYSTONE, grey
CLAYSTONE, col
MARLSTONE, calc
MARLSTONE, dol
SALT
SIDERITE, LIMONITE
BRECCIA
IGNEOUS, basic
IGNEOUS, acidic
CANNOT INTERPRET
NO SAMPLE
CEMENT
TUFF
ULTRABASIC

ACCESSORIES

SANDY
SILTY
FELDSPAR
SILICEOUS
CHERTY, light
CHERTY, dark
ARGILLACEOUS
CARBONACEOUS
BITUMENOUS
CALCAREOUS
LIMESTONE strg
DOLOMITIC
DOLOMITE strg
ANHYDRITIC
ANHYDRITE strg
PHOSPHATE pel
FERRUGINOUS
GLAUCONITIC
BENTONITIC
PYRITIC
KAOLINITIC
BIOCLASTIC
OOLITES
PELLETS
INTRACLASTS
FOSSILS
CRINOID
PELECYPOD
BRACHIOPOD
OSTRACOD
CORAL
STROMATOPOROID
AMPHIPORA
FISH REMAINS
PLANT REMAINS
BRECCIA frag
SANDSTONE strg
SILTSTONE strg
SHALE lam
TUFFACEOUS
Heavy, dark Minerals
FORAMINIFERA/Rad
ANTIGORITE
BRUCITE
BRONZITE
CHROMITE
CHRYSOTILE
DUNITE
TALC
SERPENTINE

OIL SHOWS

EVEN STAINING, FLUORESCES
SPOTTY STAIN, FLUORESCES
QUESTIONABLE, NO FLUORESCENCE,
DEAD, ASPHALTIC

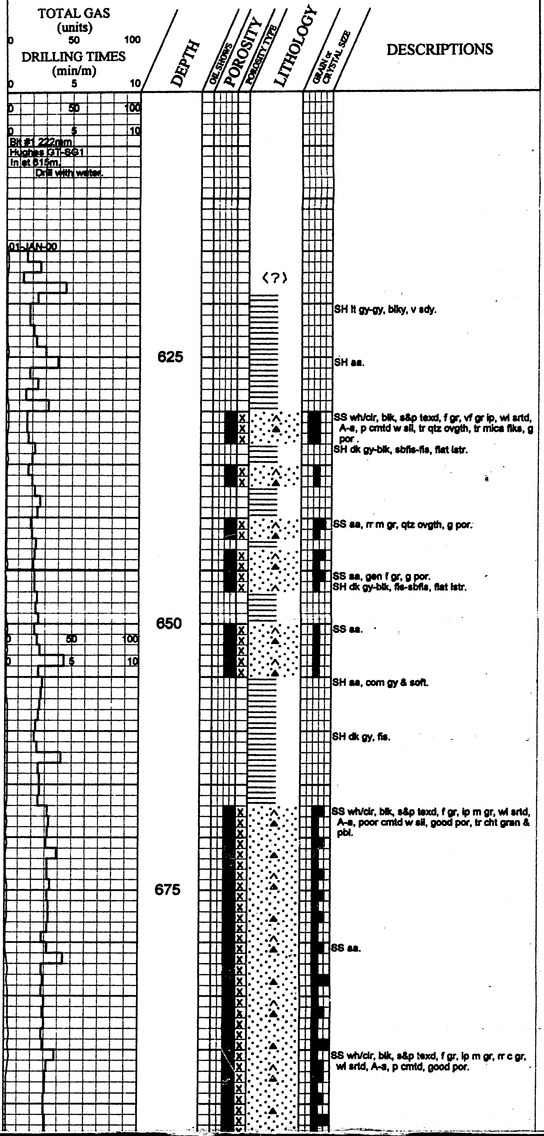
POROSITY TYPES

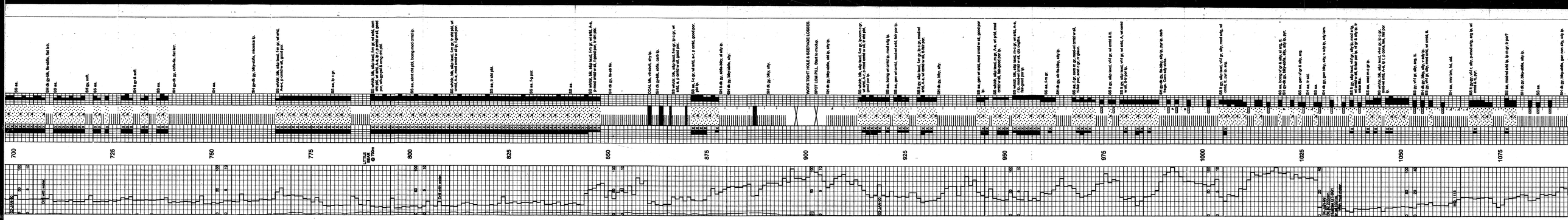
INTERCRYSTALLINE, INTERGRANULAR
INTEROOLITIC, INTEPELLETOID,
VUGGY,
PINPOINT,
MOLDIC
ORGANIC
FRACTURE
EARTHY
FENESTRAL

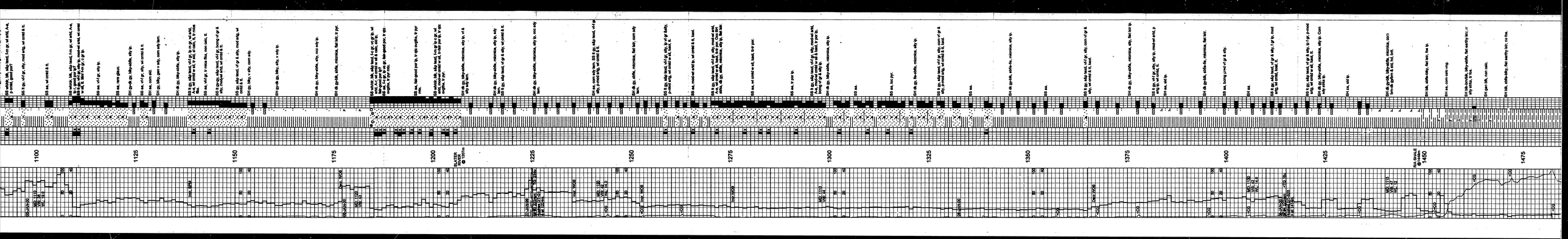
DUNHAM CLASSES

PK PACKSTONE
WK WACKESTONE
MD MUDSTONE
BD BOUNDSTONE
GR GRAINSTONE

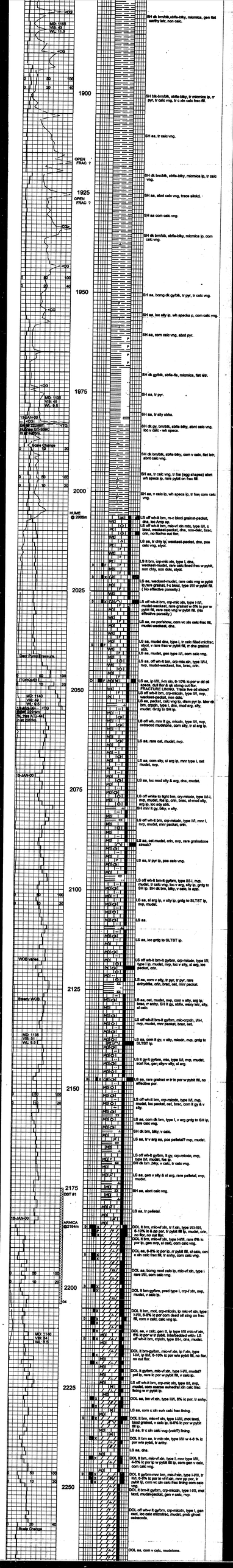
SCALE 1:240

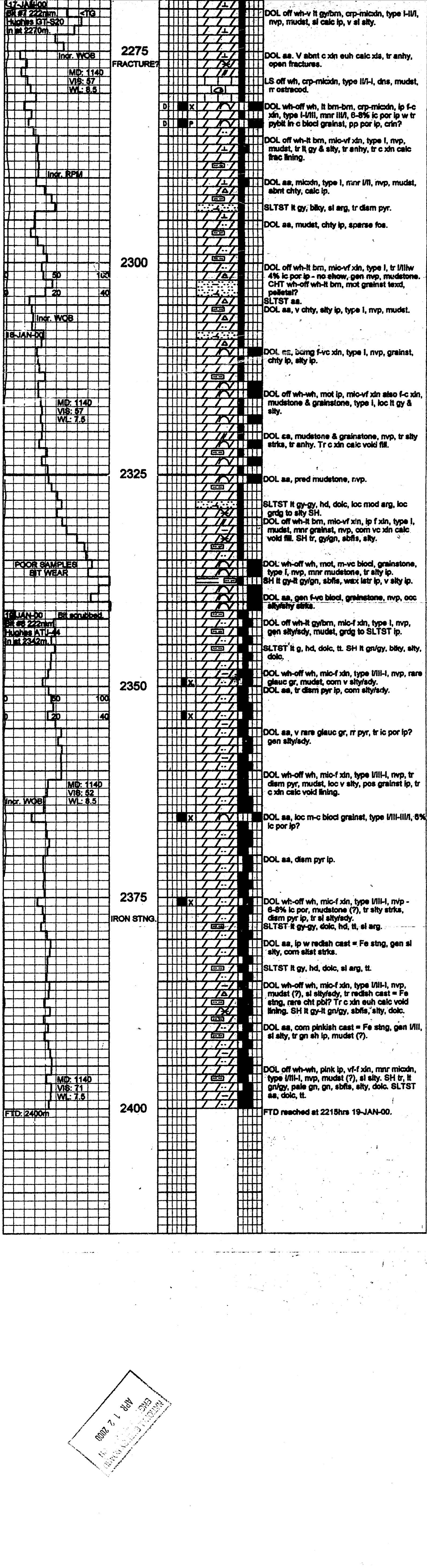



700
725
750
775
800
825
850
875
900
925
950
975
1000
1025
1050
1075
LITTLE BOW Bottom
Coal, shaly, impure
Coal, shaly, impure
BOUNDARY
BOUNDARY
WORK THRIFT HOLE & SEEPAGE LOSSES
SPOT LOW PULL - Reel to muckp.
Sh dk gy, bby-calc, sdy ls, shy ls.
Sh dk gy-blk, calc, carb ls.
Sh dk gy, shy, shy.
Sh dk gy-blk, bby-calc, sdy ls, shy ls.
Sh dk gy, fis-ls, fis.
Sh dk gy, shy, bby-calc, mamoc ls.
Sh dk gy, bby-calc, fis-ls.
Sh dk gy, shy, bby-calc, mamoc ls.
Sh dk gy, shy, bby-calc, fis-ls.
Sh dk gy-blk, calc, fis-ls.
Sh dk gy, fis-ls.
Sh dk gy-blk, calc, fis-ls.
Sh dk gy-blk, calc, carb ls.
Sh dk gy, fis-ls.
Sh dk gy, fis-ls.
Sh dk gy, fis-


1100
1125
1150
1175
1200
1225
1250
1275
1300
1325
1350
1375
1400
1425
1450
1475
CLASTER
@ 1201m
OIL SHALE
@ 1440m

1500
1525
1550
1575
1600
1625
1650
1675
1700
1725
1750
1775
1800
1825
1850
1875
DEVONIAN
SPIRIFER
ARGILLITE
MEMBER
MARCELLUS
MARCELLUS
MARCELLUS


1900
1925
1950
1975
2000
2025
2050
2075
2100
2125
2150
2175
2200
2225
2250
MD: 1135
VR: 48
WL: 12.9
OPEN
FRAC ?
MD: 1138
VR: 45
WL: 6.8
13-JUN-00
HUMBLE
@ 2006m
Deer Point Sandstone
[TORQUE]
MD: 1140
VR: 49
WL: 6.8
13-JUN-00
[TORQUE]
RUN 1 - 1441
to jet packer
WOB varies
MD: 1138
VR: 51
WL: 8.8
Steady WOB
MD: 1149
VR: 54
WL: 8.5
05-JAN-00
ARNICA
G617-04n
DST #1
Scale Change
SH dk brn/blk,slofs-blky, micmica, gen flat earthy lstr, non calc.
SH bit-brn/blk, slofs-blky, tr micmica lp, rr pyr, tr calc vng, tr c stn calc frac fill.
SH se, tr calc vng.
SH dk brn/blk, slofs-blky, micmica lp, tr calc vng.
SH as, abnt calc vng, trace silclut.
SH as com calc vng.
SH dk brn/blk, slofs-blky, micmica lp, com calc vng.
SH sa, bcmg dk gy/blk, tr pyr, tr calc vng.
SH as, loc slty lc, wh spackle p, com calc vng.
SH as, com calc vng, abnt pyr.
SH dk gy/blk, slofs-fis, micmica, flat lstr.
SH as, tr pyr.
SH as, tr slty stria.
SH dk gy, brn/blk, slofs-blky, abnt calc vng, loc v calc - wh specs.
SH dk brn/blk, slofs-blky, com v calc, flat lstr, abnt calc vng.
SH as, tr calc vng, tr foe (egg shapes) abnt wh specs lp, rare pyrbit on frac fill.
SH as, v calc lp, wh specs lp, tr foe; com calc vng.
LS off wh-lt brn, m-c blocl grainst-packst, dns, lex Amrp sp.
LS off wh-lt brn, mic-vf xln mtx, type I/II, c blocl, wackest-packst, dns, non-calc, brac, strn, no fluoro out flor.
LS as, tr chty lp; wackest-packst, dns, pos calc vng, slyol.
LS lt brn, cry-mic xln, type I, dns, wackest-mudst, rare calc lined frac w pybit, non chty, non calc, slyol.
LS as, wackest-mudst, rare calc vng w pybit fill,rare grainst, f-c blocl, SHV lt pybit fill. (No effective porosity.)
LS off wh-lt brn, cry-mic xln, type I-II/I, mudst-wackest, rare grainst w 6% ip por w pybit fill, rare calc vng w pybit fill. (No effective porosity.)
LS as, no pore/vug, com vc xln calc frac fill, mudst-wackest, dns.
LS as, mudst dns, type I, tr calc filled microfrac, slyol, v rare frac w pybit fill, tr dns grainst stks.
LS as, mudst, gen type I/I, com calc vng.
LS as, off wh-lt brn, cry-mic xln, type I/I-I, mvp, mudst-wackest, fos, brac, c/rn.
LS as, no pors/vugs, com vc xln calc frac fill, mudst-wackest, dns.
LS as, lt I/II, f-m stn, 8-10% ip por w dd oil specs, dull flor & qic stming out flor, FRACTURE LINING. Trace live oil show?
LS off wh-lt brn, cry-micxln, type I/II, mvp, wackest-packst, non calc.
LS as, packst, calc vng lp, dkarn ppy lp, kinr dk brn, crystln, type I, dns, mod arg, slty, mudst. Grdg to SH lp.
LS off wh, mnr lt gy, micxln, type I/II, mvp, calcrscd mudstone, com slty; tr sl arg lp.
LS as, rare calc, mudst, mvp.
LS as, com slty, sl arg lp, mnr type I, oat mudst, mvp.
LS as, loc mod slty & arg, dns, mudst.
LS off white to light brn, cry-micxln, type I/I-I, mvp, mudst, frg sh, brac, sl-mod slty, arg lp, loc ady stn. SH mnr lt gy, bby, v slty.
LS off wh-lt brn, cry-micxln, type I/I, mnr i, mvp, mudst, mnr packst, calc.
LS as, oat mudst, c/rn, mvp, rare grainstone streak?
LS as, tr pyr lp, pos calc vng.
LS off wh-lt brn-lt gy/brn, type I/I-I, mvp, mudst, tr calc vng, loc v arg, slty lp, grdg to SH lp. SH dk brn, bby, v calc, lo app.
LS as, sl arg lp, v slty lp, grdg to SLTST lp, mvp, mudst.
LS as.
LS as, loc grdg to SLTST lp.
LS off wh-lt brn-lt gy/brn, cry-micxln, type I/II, type I lp, mudst, mvp, loc v slty, sl arg, loc packst, rnn.
LS as, com v slty, tr pyr, tr pyr, rare anhydrite, c/rn, brac, cst, mnr packst.
LS as, oat, mudst, mvp, com v slty, arg lp, brac, rr anhy. SH lt gy, sltfis, waxy sstr, slty, sl calc.
LS off wh-lt brn-lt gy/brn, mic-cryxln, I/I-I, mvp, mudst, mnr packst, brac, oat.
LS as, com lt gy, v slty, micxln, mvp, grdg to SLTST lp.
LS lt gy-lt gy/brn, mic, type I/I, mvp, mudst, scat fos, gen slty-v slty, sl arg.
LS as, rare grainst w tr to por w pybit fill, no effective por.
LS off wh-lt brn, cry-micxln, type I/I, mvp, mudst, loc packst, oat, brac, com lt gy & v slty.
LS as, com dk brn, type I, v arg grdg to SH lp, rare calc vng.
SH dk brn, bby, v calc.
LS as, tr v arg as, pos pelletal? mvp, mudst.
LS off wh-lt gy/brn, lt gy, cry-micxln, mvp, type I/I, mudst, loc sl.
SH dk brn, bby, v calc, tr calc vng.
LS as, gen v slty & sl arg, rare pelletal, mvp, mudst.
SH as, abnt calc vng.
LS as, tr pelletal.
DOL lt brn, mic-vf xln, tr f stv, type I/II-I/II, 6-10% ip & pp por, tr pybit fill ip, mudst, c/rn, no flor, no oil flor.
DOL lt brn, mic-vf xln, type I-I/II, rare 8% ip por ip, gen mvp, sl calc, com calc vng.
DOL as, 6-8% ip por ip, tr pybit fill, sl calc, com c xln calc frac fill, tr anhy, com calc vng.
DOL as, bcmg mod calc lp, mic-vf xln, type i rare I/II, com calc vng.
DOL lt brn-gy/brn, pred type I, crp-f xln, mvp, mudst, v calc lp.
DOL lt brn, mod, crp-micxln, lp mic-vf xln, type I/II-I, 6-8% ip por com dead oil stng on frac fill, com v calc, calc vng lp.
DOL as, v calc, gen lt, ip type I/II mic-vf xln, 8% ip por w pybit, interbedded with- LS off wh-lt brn, crpxln, type I/I-I, dns, mudst.
DOL lt brn-gy/brn, mic-vf xln, ip f xln, type I-I/I, lt I/II, 6-10% ip por wlo pybit fill, no flor, no oil flor.
DOL lt gy/brn, mic-vf xln, type I-I/I, mudst? pel lp, rare lo por w pybit fill, v calc lp.
LS off wh-lt brn, cry-micxln, type I/I, mvp, mudst, com coarse subedral xln calc frac lining w rr pybit lt.
DOL as, loc vf xln, type I/II, 8% ip por, tr anhy.
LS as, com c xln wth calc frac lining.
DOL lt brn, mic-vf xln, type I-I/II, mot text, bind grainst, v calc lp, 6-8% lo por w pybit fill lp.
LS as, tr v xln calc vug (solid?) lining.
DOL lt brn as, tr mic xln, type I/II w 4-6 % ic por wlo pybit, tr anhy.
LS as, dns.
DOL lt brn, mic-vf xln, type I, mnr type I/II, 4-8% lo por lp w pybit fill lp, com-gen v calc, com calc vng.
DOL lt brn-gy/brn, mic-f xln, type I-I/II, tr I/II, 6-8% lo por lp w vf xln, mnr pp por, tr pybit, tr com vc xln calc frac lining com calc vng.
DOL lt brn-lt gy/brn, crp-micxln, type I-I/II, mot text, mudst-packst, gen v calc, mvp.
DOL off wh-v lt gy/brn, crp-micxln, type I, gen calc, loc calc microfrac, mudst, pods ghost oolstcode.
DOL as, com v calc, mudstone.



DOL off wh-v lt gy/bm, crp-micxln, type I-II/I, nvp, mudst, sl calc ip, v sl slty.

DOL aa. V abnt c xln euh calc xls, tr anhy, open fractures.

LS off wh, crp-micxln, type II/I-I, dns, mudst, rr ostracod.

DOL wh-off wh, lt bm-bm, crp-micxln, ip f-c xln, type I-I/III, mnr III/I, 6-8% ic por ip w tr pybit in c biocl grainst, pp por ip, crin?

DOL off wh-lt bm, mic-vf xln, type I, nvp, mudst, tr lt gy & slty, tr anhy, tr c xln calc frac lining.

DOL aa, micxln, type I, mnr I/II, nvp, mudst, abnt chty, calc ip.

SLTST lt gy, blky, sl arg, tr dism pyr.

DOL aa, mudst, chty ip, sparse fos.

DOL off wh-lt bm, mic-vf xln, type I, tr I/IIIw 4% ic por ip - no show, gen nvp, mudstone.
CHT wh-off wh-lt bm, mot grainst texd, pelletal?
SLTST aa.
DOL aa, v chty, slty ip, type I, nvp, mudst.

DOL aa, [illegible] f-vc xln, type I, nvp, grainst, chty ip, slty ip.

DOL off wh-wh, mot ip, mic-vf xln also f-c xln, mudstone & grainstone, type I, loc lt gy & slty.

DOL aa, mudstone & grainstone, nvp, tr slty strks, tr anhy. Tr c xln calc void fill.

DOL aa, pred mudstone, nvp.

SLTST lt gy-gy, hd, dolc, loc mod arg, loc grdg to slty SH.
DOL off wh-lt bm, mic-vf xln, ip f xln, type I, mudst, mnr grainst, nvp, com vc xln calc void fill. SH tr, gy/gn, sbfis, slty.

DOL wh-off wh, mot, m-vc biocl, grainstone, type I, nvp, mnr mudstone, tr slty ip.
SH lt gy-lt gy/gn, sbfis, wax lstr ip, v slty ip.

DOL aa, gen f-vc biocl, grainstone, nvp, occ slty/shy strks.

DOL off wh-lt gy/bm, mic-f xln, type I, nvp, gen slty/sdy, mudst, grdg to SLTST ip.

SLTST lt g, hd, dolc, tt. SH lt gn/gy, blky, slty, dolc.

DOL wh-off wh, mic-f xln, type I/III-I, nvp, rare glauc gr, mudst, com v slty/sdy.
DOL aa, tr dism pyr ip, com slty/sdy.

DOL aa, v rare glauc gr, rr pyr, tr ic por ip? gen slty/sdy.

DOL wh-off wh, mic-f xln, type I/III-I, nvp, tr dism pyr, mudst, loc v slty, pos grainst ip, tr c xln calc void lining.

DOL aa, loc m-c biocl grainst, type I/III-III/I, 6% ic por ip?

DOL aa, dism pyr ip.

DOL wh-off wh, mic-f xln, type I/III-I, nvp - 6-8% ic por, mudstone (?), tr slty strks, dism pyr ip, tr sl slty/sdy.
SLTST lt gy-gy, dolc, hd, tt, sl arg.

DOL aa, ip w redish cast = Fe stng, gen sl slty, com sltst strks.

SLTST lt gy, hd, dolc, sl arg, tt.

DOL wh-off wh, mic-f xln, type I/III-I, nvp, mudst (?), sl slty/sdy, tr redish cast = Fe stng, rare cht pbl? Tr c xln euh calc void lining. SH lt gy-lt gn/gy, sbfis, slty, dolc.

DOL aa, com pinkish cast = Fe stng, gen I/III, sl slty, tr gn sh ip, mudst (?).

DOL off wh-wh, pink ip, vf-f xln, mnr micxln, type I/III-I, nvp, mudst (?), sl slty. SH tr, lt gn/gy, pale gn, gn, sbfis, slty, dolc. SLTST aa, dolc, tt.

FTD reached at 2215hrs 19-JAN-00.

MINERALS DIVISION
ERC
APR 12 2000