

9211-C4-1-5

Chevron Canada Resources

# Final Well Report

## Volume 1



MICROFILMED  
SUR MICROFILM:

Chevron Sperry Creek N-58

65° 37' 56.07" N

129° 25' 24.73" W



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ENGINEERING AND CONTROL  
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## FINAL WELL REPORT

CHEVRON SPERRY CREEK N-58

65° 37' 56.07" N

129° 25' 24.73" W

Grid Area 65° 40', 129° 15'

1991-05-15

## TABLE OF CONTENTS

### VOLUME I

Introduction

General Data

Summary of Drilling Operations

Geology

Well Evaluation

Environmental Well Report

Appendices

Appendix 1	Wellsite Operations Summary
Appendix 2	Composite Well Record
Appendix 3	Sample Description
Appendix 4	Core Analysis
Appendix 5	Testing Results
Appendix 6	Locality Map
Appendix 7	Drilling Fluid Report
Appendix 8	Deviation Surveys
Appendix 9	Wellsite Rock Log
Appendix 10	Wellsite Hydrocarbon Report
Appendix 11	Water Analysis

### VOLUME II

Appendix 12 Logs



## FINAL WELL REPORT

### INTRODUCTION

#### 1) Summary

The stratigraphy and pertinent details of the depositional sequence in the Fort Good Hope region are as follows:

The Cambrian sequence, deposited unconformably on the Proterozoic basement, consists of basal marine/non-marine sandstones (Mount Clark Formation) with shallow marine shales of the overlying Mount Cap Formation. Salts and shales of the Saline River Formation complete the Cambrian stratigraphy. This formation acts as a decollement zone for many of the structures in the southern part of the landblock.

Conformably overlying the Cambrian clastics are light colored dolomites of the Ordovician Franklin Mountains and Silurian Mount Kindle formations (Ronning Group) which are separated by a disconformity. These formations exhibit fair to good intercrystalline and vuggy porosity.

The Devonian sequence unconformably overlies the Ronning Group. The basal section consists of shallow marine dolomites (Arnica), limestones (Landry) and evaporites (Fort Norman). The Arnica Formation contains good intercrystalline porosity and has excellent reservoir potential. Both the Landry and Fort Norman formations are tight, but would form excellent seals.

Following Early Devonian sedimentation, open marine transgressive limestones and shales of the Headless and Nahanni formations were deposited. Isolated Nahanni reefs, such as at the Manitou Lake L-61 well, developed on the Nahanni platform. Laterally equivalent to, and overlying these reefs are shales and siltstones of the Hare Indian Formation, deposited in prograding clastic lobes. The lower Bluefish Member is composed of black, organic-rich shales which have excellent source potential. Argillaceous limestones characterize the upper Hare Indian. Black shales of the Canol Formation overlie the Hare Indian and are in turn overlain by siltstones, shales and sandstones of the Imperial Formation.

Basal Cretaceous fluvial/valley-fill sandstones, coals and shales of the Gilmore Lake Member probably infilled lows on the pre-Cretaceous unconformity surface. Continued transgression resulted in the deposition of widespread shallow marine sands of the Arctic Red Formation (sandstone member) which are porous locally. Marine shales and siltstones of the Arctic Red Formation (shale member) overlie these sandstones.

Upper Cretaceous sedimentation resulted in the deposition of marine shales, silts and sandstones of the Trevor Formation.

ii) Operator, Contractor, and Drilling Unit Used

See General Data

iii) Wellsite Operations

(Refer to Appendix 1)

iv) Formations Penetrated

(Refer to Appendices 2, 3 and 4)

v) Testing Results

(Refer to Appendix 5)

vi) Locality Map

(Refer to Appendix 6)

GENERAL  
DATA

GENERAL DATA

i) Well Name: Chevron Sperry Creek N-58  
Exploration Agreement Number: 9211-C4-1  
Federal Designation: N 65° 37' 56.07"/W 129° 25' 24.73"  
Unit N, Section 58  
Grid Area 65° 40', 129° 15'

ii) Well Location:

Wellsite Location

The well was staked at shot point 4326 line 16 XA.

Legal Survey Requirements

The well location was surveyed using found stations A-41-3 and 610 from the survey of Chevron Well site A-41 using Global Positioning Survey methods. The survey was done in September 1990. Access road survey was conducted between 11th and 13th of March 1991 by Global Positioning Survey kinematic methods.

Computations

All coordinates are UTM grid on NAD27 datum and were computed assuming the coordinates of stations A-41-3 and 610.

iii) Unique Well Identifier

Drilling Program No.: 9211-C4-1  
Land Use Permit No.: N90A418

iv) Operator and Drilling Contractor

(OPERATOR)

Chevron Canada Resources  
500 5 Avenue S.W.  
CALGARY, Alberta  
T2P 0L7  
Phone 234-5000

(CONTRACTOR)

Shehtah Drilling Limited  
P.O. Box 1467  
YELLOWKNIFE, N.W.T.  
X1A 2P1

General Manager: Mr. R. F. (Dick) Gajek  
Telephone: (403) 873-4225

v) Drilling Unit

Name:	Shehtah 1E
Type:	2 800 m capacity, Troy Series 600 (600 hp)
Registry:	N/A
Year Built:	1982
Shipyard:	N/A

vi) Position Keeping - N/A

vii) Aircraft Support

a) Company

The Chevron Aircraft which supported the drilling operations consisted of a Hawker Siddeley HS-748, a Cessna Citation C-2 and a Twin Otter.

The Hawker Siddeley and Citation were based in Calgary while the Twin Otter remained at Norman Wells.

b) Charter

Charter Aircraft consisted of North-Wright's Twin Otter and Okanagan's Bell 206B Helicopter. These services supplemented our Company aircraft and were contracted as required.

c) Commercial

Canadian Airlines had daily flights from Calgary to Norman Wells return, which were used periodically to transport supplies, groceries, and equipment.

viii) Drilling Unit Performance - N/A

ix) Difficulties and Delays

a) Conductor Hole

The 660.4mm conductor hole was drilled to 6m when circulation was lost. Lost circulation material was mixed, but circulation could not be regained. The hole was drilled to 26m. A 7.3m<sup>3</sup> (9t) Dowell Arctic Set cement plug was mixed with celloflake to 1800 kg/m<sup>3</sup>, pumped, and allowed to set. There were no returns and no cement present when an attempt was made to tag the plug. Two more 7.3m<sup>3</sup> (9t) Dowell Arctic Set cement plugs were mixed to 1800 kg/m<sup>3</sup> and pumped until returns to surface were observed. After waiting on cement, the hole was redrilled with full circulation to 44m and 508mm casing was ran and cemented.

Time to drill 660.4mm conductor hole and regain circulation	= 45 3/4 hours*
Time to run and cement 508.0mm conductor casing	= <u>7 1/4 hours</u>

TOTAL	53 hours
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= 35 1/4 hours
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\*Estimated Delay Time

SUMMARY OF  
DRILLING OPERATIONS

## SUMMARY OF DRILLING OPERATIONS

### i) Elevations

Ground:	154.50 m
Fill:	0.70 m
KB to Ground:	5.46 m
KB Elevation:	160.66 m

### ii) Total Depth

Drilled:	2 160 m
Logged:	2 160 m
Plugged Back:	400 m

### iii) Date Spudded

1991-01-04-23:00 hours.  
Notified COGLA Yellowknife of spud.

### iv) Date Drilling Completed

Drilling was completed 1991-02-09

### v) Date of Rig Release

Shehtah Rig 1E was released at 11:00 hrs 1991-02-19

### vi) Well Status

Abandoned.

### vii) Hole Size and Depth

	<u>Hole</u>	<u>Size</u>	<u>Depth</u>
a)	Conductor	660.4 mm (26")	42 m (138 ft)
b)	Surface	444.5 mm (17 1/2")	457 m (1499 ft)
c)	Main	311.2 mm (12 1/4")	2160 m (7087 ft)

viii) Casing and Cementing Record

HOLE	SIZE	WEIGHT	GRADE	MAKE	NO. OF JOINTS	THREAD TYPE	DATE SET	DEPTH SET(m)	CEMENT TYPE & VOLUME
CONDUCTOR	508.0 mm	197.9 kg/m	K-55		3	Buttress	91-01-06	42.2	3m3 SAPP water, pre-flush followed by 20.0m3 (24.7t) Alaskan Class "G" permafrost cement c/w 6% Gilsonite + 0.15% permafrost retarder mixed to 1760 kg/m3 slurry.
SURFACE	339.7 mm	90.8 kg/m	K-55	Sumitomo	39	LT&C	91-01-15	457.0	3m3 SAPP water, pre-flush followed by 56.5m3 (69.8t) Alaskan Class "G" permafrost cement c/w 6% Gilsonite + 0.15% permafrost retarder mixed to 1760 kg/m3 slurry density.

ix) Side Tracked Hole - N/A

x) Drilling Fluid  
(Refer to Appendix 7)

HOLE	SIZE mm (in)	TYPE	PROPERTIES									
			Dens- ity	Vis- cosity	W.L.	pH	PV	YP	Gel in/10min	Solids	Oil	Cl
Conduc- tor	660.4 (26)	Gel- Chemical	1220	45	15.0	11.5	16	8	6/8	15%	Nil	180
Surface	444.5 (17 1/2)	Gel- Chemical	1110	65	9.0	9	25	14	3/5	7%	Nil	180
Main	311.2 (8 1/2)	Gel- Chemical	1130	76	8.0	10.5	40	21	7.5/9	8%	Nil	180

xi) Fishing Operations N/A

xii) Well Kicks - N/A

xiii) Formation Leak-Off Tests (FLOT)

CASING SIZE mm (in)	SHOE DEPTH	FLUID DENSITY (kg/m <sup>3</sup> )	MAXIMUM SURFACE PRESSURE (kPa)	EQUIVALENT GRADIENT (kPa/m)	EQUIVALENT MUD DENSITY (kg/m <sup>3</sup> )	DATE FLOT CONDUCTED
508.0 (20)	42.2 m				N/A	N/A
339.7 (13 3/8)	457.0 m	1020	9 000	29.7	3030	91-01-18

xiv) Time Distribution

	<u>HOURS</u>	<u> DAYS</u>
<b>DRILLING OPERATIONS</b>		
1. Drilling	455	19.0
2. Tripping	77 1/4	3.2
3. Coring	26 1/2	1.1
4. Deviation Surveys	21 1/2	0.9
5. Rig Service and Tests	37 1/4	1.5
<b>DEAD TIME</b>		
1. Drillstem Testing	64	2.7
2. Logging	129 1/2	5.4
3. Circulating Samples	11 1/4	0.5
4. Casing, Cementing and WOC	183 1/2	7.7
5. Hole Conditioning	56 1/4	2.3
6. Rig Move, Up, Down	192	8.0
7. Completing	-	-
<b>LOST TIME</b>		
1. Fishing	-	-
2. Lost Circulation	19 1/4	0.8
3. Repairs	10 3/4	0.4
4. Waiting	-	-
5. Miscellaneous	-	-
<b>TOTAL:</b>	<b>1284</b>	<b>53.5</b>

xv) Deviation Surveys  
(Refer to Appendix 8)

xvi) Abandonment Plugs

PLUG NUMBER	INTERVAL	LENGTH (m)	FLUID BETWEEN PLUGS	FORMATION ISOLATED
1	2160m - 2060m	100 m	Gel-Chemical	Bottom hole
2	1900m - 1750m	150 m	Gel-Chemical	Arctic Red S.S.
3	910m - 760m	150 m	Gel-Chemical	Tatsieda/Mount Kindle
EZSV	430m			
4	430m - 400m	30 m	Gel-Chamical	In 339.7 mm surf. casing
5	17m - 7m	10 m	Gel-Chemical	In 339.7 mm surf. casing
WELD ON CAP ON 339.7 mm SURFACE CASING 1m BELOW GROUND				

xvii) Composite Well Record

(Refer to Appendix 2)

GEOLOGY

## SUMMARY REPORT

WELL NAME Chevron Sperry Creek N-58 (NWT)

LOCATION N-Section 58

COORDINATES Latitude 65° 37' 56.07" N  
Longitude 129° 25' 24.73" W

GROUND ELEVATION 154.5 m Fill 0.7 m

KB TO GROUND LEVEL 5.46 m

KB ELEVATION 160.66 m

TOTAL DEPTH 2160 m

STATUS Abandoned

SPUDDED 1991-01-04 @ 23:00 Hrs.

RIG RELEASE 1991-02-19 @ 11:00 Hrs.

GEOLOGIST Dave Hendry

ENGINEERS B. Meyer, I. Lundberg, B. Marsh  
L. Carefoot

CONTRACTOR Shethah # 1

MUD LOGGER Datalog

HOLE SIZE 660 mm Surface to 44  
445 mm 44 to 458 m  
311 mm 458 m to 2160 m

<u>CONDUCTOR CASING</u>	JOINTS:	3 (36.85 m)
	Size:	508 mm, 197.9 kg/m
	Type:	K55
	Landed at:	42.23 m
	CEMENT:	24.7 tonne (20 m <sup>3</sup> ) Permafrost + 6% Gilsonite + 0.15% PF mixed at 1760 kg/m <sup>3</sup>
	C.I.P.	1991-01-07 @ 04:30 Hrs.
<u>SURFACE CASING</u>	JOINTS:	39 (450.43 m)
	Size:	339.7 mm, 90.8 kg/m
	Type:	8RND, Range III, LT&C
	Landed at:	457 m
	CEMENT:	69.8 tonne Permafrost cement + 6% Gilsonite + .15% PF Retarder mixed at 1760 kg/m <sup>3</sup>
	C.I.P.	1991-01-15 @ 12:25 Hrs.
<u>ABANDONMENT PLUGS:</u>	<u>Plug # 1</u>	2160 - 2060 m
	<u>Plug # 2</u>	1900 - 1750 m
	<u>Plug # 3</u>	910 - 760 m
	<u>Plug # 4</u>	430 - 400 m
<u>DITCH SAMPLES</u>	5 m intervals	
	CHEVRON: 1 set 4" X 6" bags washed, 1 set 8" X 11" bags unwashed and 2 sets washed vials at 10 m intervals from 45 m to Sfc Csg & 5 m intervals to FTD.	
	COGLA: 1 set 1L plastic jugs at 10 m intervals from 45 m to FTD. 2 sets of plastic washed vials, at 10 m intervals from 45 m to Sfc Csg & at 5 m intervals to FTD.	
<u>SAMPLE DESCRIPTION</u>	45 m - 2160 m	

**WELL SITE ROCK LOG**

45 m - 2160 m

**CORED INTERVALS** Core # 1 845 - 863 m Cut 18 m Recovered 16.85 m

**LOST CIRCULATION** None

**FORMATION TESTS**      **DST # 1**      **1412.5 - 1416.5, Nahanni**

Times: --

Preflow: --

Valve Open: --

Recovery: No fluid recovery due to misrun, unable to obtain packer seat.

Pressure: IHP 15759 IPF IFP  
(kPa) FHP 15741 FPF FFP  
ISI FSI

Recorder at 1415 m

**DST # 2** 1412.5 - 1416.5, Nahanni

Times: --

Preflow: --

Valve Open: ---

Recovery: No fluid recovery due to misrun, unable to obtain a packer seat.

Pressure: IHP 15672 IPF IFP  
(kPa) FHP 15603 FPF FFP  
ISI FSI

Recorder aat 1415 m

**DST # 3** 1412.5 - 1416.5 m, Nahanni

Times: --

Preflow: --

Valve Open: --

Recovery: No fluid recovery due to misrun,  
unable to obtain packer seat.

Pressure:	IHP 15776	IPF	IFP
(kPa)	FHP 15776	FPP	FFP
		ISI	FSI

Recorder 1415 m

**DST # 4** 869 - 876 m, Imperial

Times: --

Preflow: --

Valve Open: --

Recovery: No fluid recovery due to misrun,  
unable to obtain packer seat.

Pressure:	IHP 9638	IPF	IFP
(kPa)	FHP 9655	FPP	FFP
		ISI	FSI

Recorder at 872 m

LOGGING      Computalog

<b>Run # 1</b>	LSS	450.3 - 19.8 m,	1:240,	1:600
<b>Run # 2</b>	DIL	2158.7 - 455 m,	1:240,	1:600
	DLL-MSFL	2157 - 1375 m,	1:240,	1:600
	MEL	2156.7 - 623.5 m,	1:240,	--
	CNS-SLD	2159.6 - 455 m,	1:240,	--
	BHC-GR	2149.7 - 455 m,	1:240,	1:600
	SSL	2156.5 - 455 m,	1:240,	--
	SGR	2158.8 - 5 m,	1:240,	1:600
	Sonic Calibration	2150 - 456 m,	1:240,	--
	DLL BH COR.	2158.3 - 456 m,	1:240,	--
	DIL BH COR.	2158.3 - 456 m,	1:240,	--

**GEOLOGICAL MARKERS**  
**Chevron Sperry Creek N-58**  
**KB Elevation 160 m (Actual KB 160.66 m)**

<u>Formation</u>	<u>Samples</u>	<u>Log</u>	
	<u>Depth - m</u>	<u>Depth - m</u>	<u>Elevation- m</u>
Trevor	--	566	- 405.3
Artic Red Sandstone	835	834	- 673.3
Imperial	848.1	847.5	- 686.8
Canol	1144	1146	- 985.3
Hare Indian	1161	1158.5	- 997.8
Bluefish	1401	1395.5	- 1234.8
Nahanni	1413	1413	- 1252.3
Headless	1464	1465	- 1304.3
Landry	1511	1522	- 1361.3
Arnica	1686	1687.5	- 1526.8
Tatsieta	1799	1797.5	- 1636.8
Mount Kindle	1812	1838	- 1677.3
Franklin Mountain	--	1988.5	- 1827.8
Total Depth	2160	2160	- 1999.3

WELL  
EVALUATION

i) Logging - Computalog

RUN #1	✓ LSS	450.3 - 19.8m
RUN #2	✓ DIL	2158.7 - 455m
	✓ DLL-MSFL	2157 - 1375m
	✓ MEL	2156.7 - 623.5m
	✓ CNS-SLD	2159.6 - 455m
	✓ BHC-GR	2149.7 - 455m
	✓ SSL	2156.5 - 455m
	✓ SGR	2158.8 - 5m
	✓ Sonic Calibration	2150 - 456m
	✓ DLL BH COR	2158.3 - 456m
	✓ DIL BH COR	2158.3 - 456m

ii) Formation Stimulation - N/A

iii) Formation & Production Test Results - N/A

ENVIRONMENTAL  
WELL REPORT

Environmental Well Report: N/A



APPENDIX 1

WELLSITE OPERATIONS SUMMARY

## CHEVRON SPERRY CREEK N-58

DAILY PROGRESS SUMMARYDATE: 91-01-04K.B.: 160.66mDAY: 0.1GND: 154.50mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY (2400): Spud in and drill ahead in 660mm hole to 6m. Lost 100% returns. Spotted LCM pills and drilled ahead.MIDNIGHT DEPTH: 6mOPERATIONS: DrillingPROGRESS: 6mSURVEYS:MUD DEPTH:WT:VIS:WL:pH:DATE: 91-01-05K.B.: 160.66mDAY: 1.1GND: 154.50mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY (2400): Drill to 26m. Lost circ. at 26m. Tryed to regain circ. with LCM pills (unsuccessful). Mixed and pumped 3 batches of Dowell Arctic Set Cement with celloflake (total of 32.5 t).MIDNIGHT DEPTH: 26mOPERATIONS: WOCPROGRESS: 20mSURVEYS:MUD DEPTH: 25mWT: 1090VIS: 90WL: 11.5 pH: 10.2DATE: 91-01-06K.B.: 160.66mDAY: 2.1GND: 154.50mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY (2400): WOC, Drill out cement and drill 660mm hole to 44m surveying as required. POOH, rig to and run 508.0mm csg. Csg. landed at 42.23m.MIDNIGHT DEPTH: 44mOPERATIONS: Running csg.PROGRESS: 18mSURVEYS: 33m - 1/2°MUD DEPTH: 44mWT: 1220VIS: 45WL: 15.0 pH: 11.5DATE: 91-01-07K.B.: 160.66mDAY: 3.1GND: 154.50mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY (2400): Cement csg., WOC 13 hrs and nipple up diverter system.MIDNIGHT DEPTH: 44mOPERATIONS: N/U diverterPROGRESS: 0mSURVEYS:MUD DEPTH: 44mWT: 1080VIS: 42WL: 12.8 pH: 9.5

DATE: 08-01-91K.B.: 160.66mDAY: 4.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Nipple up diverter, pressure test diverter, drill mouse hole, drill out cement and shoe, drill ahead with surveys.MIDNIGHT DEPTH: 99mOPERATION: DrillingPROGRESS: 55mSURVEYS: 60m 0, 90m 3/4MUD WT: 1190VIS: 39WL:pH: 11DATE: 09-01-91K.B.: 160.66mDAY: 5.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Drill ahead with surveys, repair wash pipe, drill ahead with surveys, repair swivel/wash pipe, drill ahead with surveys, survey out to 1&3/4 at 257m, POOH to change bit, tight hole problems tripping out.MIDNIGHT DEPTH: 275mOPERATION: Working tight hole on trip out PROGRESS: 176mSURVEYS: 117m 1/2, 145m 1/2, 173m 3/4, 230m 1, 257m 1&3/4MUD WT: 1080VIS: 42WL:pH: 9DATE: 10-01-91K.B.: 160.66mDAY: 6.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Work tight hole and mud rings all the way out of hole, change bit and add shock sub, RIH reaming tight spots, drill ahead.MIDNIGHT DEPTH: 283mOPERATION: Control Drilling for deviationPROGRESS: 8mSURVEYS: -MUD WT: 1070VIS: 82WL: 8pH: 9.0DATE: 11-01-91K.B.: 160.66mDAY: 7.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Drill ahead with 10000daN to control deviation, deviation out to 2.75 at 294m, reduce WOB to 6000daN, RPM 170, drill ahead 2-3m/hr.MIDNIGHT DEPTH: 350mOPERATION: Drill ahead 2.5m/hr PROGRESS: 67mSURVEYS: 294m 2.75, 325m 2,MUD WT: 1090VIS: 72WL: 8.2pH: 7.0

DATE: 12-01-91K.B.: 160.66mDAY: 8.1GRD: 154.5mRIG: SHEHTAH RIG 1

OPERATIONS SUMMARY: (24:00). Drill ahead with surveys to 379m, connections tight, hole cleaning poorly, wiper trip through new hole, drill ahead with 7-10000daN controlling WOB for deviation.

MIDNIGHT DEPTH: 404mOPERATION: Drilling 3-3.5m/hr PROGRESS: 54mSURVEYS: 350m 1.75, 372m 1, 391m 1.25.MUD WT: 1100VIS: 78WL: 8.4pH: 8.5DATE: 13-01-91K.B.: 160.66mDAY: 9.1GRD: 154.5mRIG: SHEHTAH RIG 1

OPERATIONS SUMMARY: (24:00). Drill ahead with 6-10000daN, reduced WOB to control deviation, POOH for wiper trip and strap at 478m, pick up stabilizer and jars.

MIDNIGHT DEPTH: 478mOPERATION: Make up BHA to RIH PROGRESS: 44mSURVEYS: 407m 1.5,MUD WT: 1105VIS: 72WL: 8.7pH: 9DATE: 14-01-91K.B.: 160.66mDAY: 10.1GRD: 154.5mRIG: SHEHTAH RIG 1

OPERATIONS SUMMARY: (24:00). Make up BHA with jars and stabilizer, RIH ream bridges at 225-230m and 360-448m, drill ahead 448-458m, circ, survey, POOH for loggers. Rig up loggers and log (15:15), first sonic tool had problems in one transmitter at full power and had to much noise at lower power levels, could not repair, pulled out and 2nd tool warmed up, rigged up and RIH, logging finished and rigging down at 24:00.

MIDNIGHT DEPTH: 458mOPERATION: Begin rigging up run casing PROGRESS: 10mSURVEYS: 448m 1.5MUD WT: 1105VIS: 65WL: 9.0pH: 9.0DATE: 15-01-91K.B.: 160.66mDAY: 11.1GRD: 154.5mRIG: SHEHTAH RIG 1

OPERATIONS SUMMARY: (24:00). Rig up and run casing, rig in cementers and cement, WOC, lay down landing joint, nipple down diverter, remove diverter, begin to install BOP's.

MIDNIGHT DEPTH: 458mOPERATION: Nipping up BOP's PROGRESS: 0mSURVEYS: -MUD WT: -VIS: -WL: -pH: -

DATE: 16-01-91                    DAY: 12.1                    RIG: SHEHTAH RIG 1  
K.B.: 160.66m                    GRD: 154.5m  
OPERATIONS SUMMARY: (24:00). Nipple up BOP's and all lines.

MIDNIGHT DEPTH: 458m                    OPERATION: Prepare to Pressure Test    PROGRESS: 0

SURVEYS: -

MUD WT: -    VIS: -    WL: -    pH: -

CASING: 339.7mm, 90.8kg/m, K-55, LT&C set at 457.0m

DATE: 17-01-91                    DAY: 134.1                    RIG: SHEHTAH RIG 1  
K.B.: 160.66m                    GRD: 154.5m  
OPERATIONS SUMMARY: (24:00). Pressure test, make up BHA and RIH, pressure test, RIH to bottom, drill out cement in shoe joint.

MIDNIGHT DEPTH: 458m                    OPERATION: Drilling out shoe joint    PROGRESS: 0

SURVEYS: -

MUD WT: Drill out w/water    VIS: -    WL: -    pH: -

DATE: 18-01-91                    DAY: 14.1                    RIG: SHEHTAH RIG 1  
K.B.: 160.66m                    GRD: 154.5m  
OPERATIONS SUMMARY: (24:00). Drill out shoe joint, cement contamination clobbered drill water, circ out clobbered water and displace hole to clean water, drill to 462m, run formation integrity test, drill ahead with 10000daN and 100RPM.

MIDNIGHT DEPTH: 572m                    OPERATION: Drilling at 12m/hr    PROGRESS: 114m

SURVEYS: 485m 1, 541m 1.

MUD WT: 1115    VIS: 52    WL: 10    pH: 9.5

DATE: 19-01-91                    DAY: 15.1                    RIG: SHEHTAH RIG 1  
K.B.: 160.66m                    GRD: 154.5m  
OPERATIONS SUMMARY: (24:00). Drill ahead with surveys to 665m, circ sample, drill ahead to 670m, circ sample, drill to 675m, circ sample, drill ahead.

MIDNIGHT DEPTH: 744m                    OPERATION: Drilling at 8m/hr    PROGRESS: 172m

SURVEYS: 645m 1, 692m 1.25, 740m 3/4.

MUD WT: 1110    VIS: 85    WL: 10    pH: 9.5

CHEVRON SPERRY CREEK N-58

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DATE: 20-01-91

DAY: 16.1

RIG: SHEHTAH RIG 1

K.B.: 160.66m

GRD: 154.5m

OPERATIONS SUMMARY: (24:00). Drill to 816m, bit locked up, POOH, pick up stabilizers and short collars, RIH with new bit, ream 480-615m as of 24:00.

MIDNIGHT DEPTH: 816m

OPERATION: Reaming in new BHA

PROGRESS: 72m

SURVEYS: 740m 0.75, 806m 1

MUD WT: 1100

VIS: 52

WL: 11.5

pH: 9.5

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DATE: 21-01-91

DAY: 17.1

RIG: SHEHTAH RIG 1 K.B.:

160.66m

GRD: 154.5m

OPERATIONS SUMMARY: (24:00). Drill ahead increasing WOB to 12000, 15000 and 20000daN, 100-120 RPM, ROP slightly quicker 835-845m, cleaner sand in 840 sample, stop and circ sample at 845m, survey, decision made to core, POOH, pick up core barrels, RIH with BHA, cut & slip line. STRAP CORRECTION TO 845m

MIDNIGHT DEPTH: 845m

OPERATION: Cut & slip line

PROGRESS: 29m

SURVEYS: -

MUD WT: 1110

VIS: 65

WL: 9.5

pH: 10

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DATE: 22-01-91

DAY: 18.1

RIG: SHEHTAH RIG 1

K.B.: 160.66m

GRD: 154.5m

OPERATIONS SUMMARY: (24:00). RIH, circ, cut core #1, hoist core, recover core, service barrels, make up BHA, RIH, ream rat hole, survey, drill ahead, circ sample at drilling break at 870m.

MIDNIGHT DEPTH: 882m

OPERATION: Drilling at 7-9m/hr

PROGRESS: 37m

SURVEYS: 854m 1

MUD WT: 1105

VIS: 49

WL: 9.3

pH: 10

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DATE: 23-01-91

DAY: 19.1

RIG: SHEHTAH RIG 1

K.B.: 160.66m

GRD: 154.5m

OPERATIONS SUMMARY: (24:00). Drill ahead, circ drilling break at 907m, drill ahead with 25000daN and 100RPM

MIDNIGHT DEPTH: 1000m

OPERATION: Drilling at 5m/hr

PROGRESS: 118m

SURVEYS: 938m 1

MUD WT: 1130

VIS: 54

WL: 8.5

pH: 10

DATE: 24-01-91K.B.: 160.66mDAY: 20.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Drill ahead, tight, connections, incr torque, circ sample, survey, POOH, change BHA, RIH, repair goose neck on kelly, drill ahead.MIDNIGHT DEPTH: 1047mOPERATION: Drilling 4.5-5m/hrPROGRESS: 47mSURVEYS: 1033m 1MUD WT: 1140VIS: 55WL: 8.5pH: 10DATE: 25-01-91K.B.: 160.66mDAY: 21.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Drill ahead, work tight hole on connections, wiper trip 5 stands, drill ahead, circ drilling break at 1148m, drill ahead.MIDNIGHT DEPTH: 1157mOPERATION: Drilling 12m/hrPROGRESS: 110mSURVEYS: -MUD WT: 1150VIS: 53WL: 8.2pH: 9.5DATE: 26-01-91K.B.: 160.66mDAY: 22.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Drill ahead, survey, drill ahead, high torque, circ, POOH to change bit, RIH, clean 29m to bottom, drill ahead with BIT#3 ATJ22.MIDNIGHT DEPTH: 1220mOPERATION: Drilling 4m/hrPROGRESS: 63mSURVEYS: 1172m 2MUD WT: 1130VIS: 60WL: 8.5pH: 9.0DATE: 27-01-91K.B.: 160.66mDAY: 23.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Drill ahead, work tight hole, drill, survey, circ while changing liners in both pumps, drill ahead, tight hole on connections.MIDNIGHT DEPTH: 1296mOPERATION: Drilling 4-5m/hrPROGRESS: 76mSURVEYS: 1265m 1.75MUD WT: 1120VIS: 60WL: 8.5pH: 9.5

DATE: 28-01-91  
K.B.: 160.66m

DAY: 24.1  
GRD: 154.5m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY: (24:00). Drill ahead working tight hole on connections (30-60 min per connection), circ sample at 1350m, very high gas readings, drill ahead, repair draw-works, drill ahead.

MIDNIGHT DEPTH: 1360m

OPERATION: Drilling

PROGRESS: 64m

SURVEYS: -

MUD WT: 1105

VIS: 60

WL: 10

pH: 10

DATE: 29-01-91  
K.B.: 160.66m

DAY: 25.1  
GRD: 154.5m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY: (24:00). Drill ahead with 25000daN and 60RPM, work tight hole on connections and half way through kelly, survey, drill ahead.

MIDNIGHT DEPTH: 1466m

OPERATION: Drilling 5m/hr

PROGRESS: 106m

SURVEYS: -

MUD WT: 1110

VIS: 50

WL: 10.2

pH: 10.5

DATE: 30-01-91  
K.B.: 160.66m

DAY: 26.1  
GRD: 154.5m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY: (24:00). Drill ahead with 25000daN and 60RPM, work tight hole on several connections.

MIDNIGHT DEPTH: 1567m

OPERATION: Drilling 5m/hr

PROGRESS: 101m

SURVEYS: -

MUD WT: 1105

VIS: 52

WL: 9.5

pH: 10

DATE: 31-01-91  
K.B.: 160.66m

DAY: 26.1  
GRD: 154.5m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY: (24:00). Drill, circ sample at 1482m, drill, survey, circ & work tight conn, drill, pull 15 stand wiper trip, cleam 3m fill to bottom, drill ahead.

MIDNIGHT DEPTH: 1660m

OPERATION: Drilling 4.8m/hr

PROGRESS: 93m

SURVEYS: 1593m 3/4

MUD WT: 1115

VIS: 54

WL: 10.4

pH: 10

DATE: 01-02-91K.B.: 160.66mOPERATIONS SUMMARY: (24:00). Drill, survey, drill ahead with 25000daN and 60RPMMIDNIGHT DEPTH: 1761mDAY: 27.1GRD: 154.5mRIG: SHEHTAH RIG 1PROGRESS: 101mSURVEYS: 1733m 1MUD WT: 1120VIS: 58WL: 9.6pH: 10.5DATE: 02-02-91K.B.: 160.66mOPERATIONS SUMMARY: (24:00). Drill ahead, work tight hole, drill, circ, POOH for bit change, lay down jars, shock sub and stabilizer, pick up monel and make up BHA, rig up and pressure test.MIDNIGHT DEPTH: 1794mDAY: 28.1GRD: 154.5mRIG: SHEHTAH RIG 1PROGRESS: 33mSURVEYS: -MUD WT: 1120VIS: 56WL: 10.5pH: 10DATE: 03-02-91K.B.: 160.66mDAY: 29.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Pressure test, install flow nipple, pump antifreeze into lines, RIH with collars and heavyweight, slip & cut line, trip in with directional surveys every 150m, circ and clean to bottom, drill ahead.

\*\*STRAP OUT and DOUBLE STRAP IN\*\* both long, 1.4m depth correction made to 1796.4m.

MIDNIGHT DEPTH: 1813mOPERATION: Drilling 3m/hrPROGRESS: 18mSURVEYS: 520m 1.5 NOW, 661m 1.5 N09E, 802m 1 N05E, 943m 1.25 N15E, 1084m 1.25 S75E, 1225m 2 S10E, misruns after this point, camera failed.MUD WT: 1110VIS: 69WL: 10.2pH: 10.5DATE: 04-02-91K.B.: 160.66mOPERATIONS SUMMARY: (24:00). Drill ahead, survey, drill with reduced WOB and RPM in hard dolomite.DAY: 30.1GRD: 154.5mRIG: SHEHTAH RIG 1MIDNIGHT DEPTH: 1899mOPERATION: Drilling variable 5m/hr PROGRESS: 86mSURVEYS: 1859m 1.25 S80WMUD WT: 1110VIS: 62WL: 9.6pH: 10.5

DATE: 05-02-91K.B.: 160.66mDAY: 31.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Drill ahead, ROP slowed to 2.5m/hr, spikes of torque, POOH to change bit, survey at 1714m, 1571m and 1429m on way out, make up BIT#5, RIH.MIDNIGHT DEPTH: 1950mOPERATION: Running in hole w/BIT #5 PROGRESS: 51mSURVEYS: 1429m 1.75 S60W, 1569m 1.0 N86W, 1708m 1.0 S83WMUD WT: 1110VIS: 57WL: 9.1pH: 10.5DATE: 06-02-91K.B.: 160.66mDAY: 32.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Finish RIH, clean 1.5m to bottom, drill, work tight hole, drill, work tight hole, drill, mix LCM pill and spot to plug lost circ, drill with varying WOB 10000-22000daN, RPM 40-65, to try to increase ROP and prevent bit damage in siliceous dolomite beds.MIDNIGHT DEPTH: 2000mOPERATION: Drilling 2-2.5m/hrPROGRESS: 50mSURVEYS: -MUD WT: 1095VIS: 57WL: 9.8pH: 10.5DATE: 07-02-91K.B.: 160.66mDAY: 33.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Drill, survey, drill varying WOB and RPM to try to increase ROP.MIDNIGHT DEPTH: 2051mOPERATION: Drilling 2.5-3.5m/hrPROGRESS: 51mSURVEYS: 2010m 1.75 N73WMUD WT: 1085VIS: 61WL: 9.6pH: 10DATE: 08-02-91K.B.: 160.66mDAY: 34.1GRD: 154.5mRIG: SHEHTAH RIG 1OPERATIONS SUMMARY: (24:00). Drill ahead with 30000daN and 60RPMMIDNIGHT DEPTH: 2122mOPERATION: Drilling 3.5m/hrPROGRESS: 71mSURVEYS: -MUD WT: 1110VIS: 68WL: 9.6pH: 10

CHEVRON SPERRY CREEK N-58

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DATE: 91-02-09

K.B.: 160.66m

DAY: 34.1

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): Drill to TD at 2.5 to 3.5 m/hr, circ 30 min, survey, wiper trip 10 stands, circ btms up, catch 2160m sample, POOH for logging, strap out.

MIDNIGHT DEPTH: 2160m      OPERATIONS: POOH to log      PROGRESS: 38m

SURVEYS: 2142m - 2.75°, N55W, TVD - 2141.44m, N4.52m, W13.57m, CLOSURE - 14.30m N71.6°W

MUD DEPTH: 2160m      WT: 1110      VIS: 75      WL: 9.5      pH: 10.5

---

DATE: 91-02-10

K.B.: 160.66m

DAY: 35.1

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): Finish POOH to log, lay down BHA, run open hole logs.

MIDNIGHT DEPTH: 2160m      OPERATIONS: Logging      PROGRESS: 0m

SURVEYS:

MUD DEPTH: 2160m      WT: 1110      VIS: 75      WL: 11.5      pH: 10.5

---

DATE: 91-02-11

K.B.: 160.66m

DAY: 36.1

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): Running open hole logs.

MIDNIGHT DEPTH: 2160m      OPERATIONS: Running logs.      PROGRESS: 0m

SURVEYS:

MUD DEPTH:      WT:      VIS:      WL:      pH:

---

DATE: 91-02-12

K.B.: 160.66m

DAY: 37.1

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): Running open hole logs.

MIDNIGHT DEPTH: 2160m      OPERATIONS: Running logs.      PROGRESS: 0m

SURVEYS:

MUD DEPTH:      WT:      VIS:      WL:      pH:

CHEVRON SPERRY CREEK N-58

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DATE: 91-02-13

K.B.: 160.66m

DAY: 38.1

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): Run open hole logs, logs not working properly, make cleanout trip, continue logging.

MIDNIGHT DEPTH: 2160m

OPERATIONS: Logging

PROGRESS: 0m

SURVEYS:

MUD DEPTH: 2160m

WT: 1100

VIS: 60

WL: 10.8 pH: 9.5

---

DATE: 91-02-14

K.B.: 160.66m

DAY: 39.1

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): Finish logging, make up test tools, RIH with test tools to run DST #1.

MIDNIGHT DEPTH: 2160m

OPERATIONS: RIH for DST

PROGRESS: 0m

SURVEYS:

MUD DEPTH:

WT:

VIS:

WL:

pH:

---

DATE: 91-02-15

K.B.: 160.66m

DAY: 40.1

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): RIH for DST #1, attempted to inflate packers at 3 different locations with no success, POOH and test packers - OK. RIH and try again, unsuccessful, POOH and service entire tool, 2 O-Rings missing in mandrell, replace and RIH.

MIDNIGHT DEPTH: 2160m

OPERATIONS: RIH for DST.

PROGRESS: 0m

SURVEYS:

MUD DEPTH:

WT:

VIS:

WL:

pH:

---

DATE: 91-02-16

K.B.: 160.66m

DAY: 41.1

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): RIH and test tool in casing - OK, attempt to run DST, tool still not working properly. POOH, no visible tool defects, make cleanout trip to 1500 m, RIH with completely reservised test tool.

MIDNIGHT DEPTH: 2160m

OPERATIONS: RIH for DST.

PROGRESS: 0m

SURVEYS:

MUD DEPTH:

WT:

VIS:

WL:

pH:

CHEVRON SPERRY CREEK N-58

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DATE: 91-02-17

K.B.: 160.66m

DAY: 42.1

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): Attempt to run DST, unsuccessful, lay down test tool and run abandonment plugs.

MIDNIGHT DEPTH: 2160m      OPERATIONS: Running plugs      PROGRESS: 0m

SURVEYS:

MUD DEPTH:

WT:

VIS:

WL:

pH:

---

DATE: 91-02-18

K.B.: 160.66m

DAY: 43.1

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): Finish running plugs, nipple down BOP's.

MIDNIGHT DEPTH: 2160m      OPERATIONS: N/D BOP's      PROGRESS: 0m

SURVEYS:

MUD DEPTH:

WT:

VIS:

WL:

pH:

---

DATE: 91-02-19

K.B.: 160.66m

DAY: 43.5

GND: 154.50m

RIG: SHEHTAH RIG 1

OPERATIONS SUMMARY (2400): N/D BOP's, clean tanks, cut off conductor and csg, place 10m cement plug inside csg, weld on cap and release rig.

MIDNIGHT DEPTH: 2160m      OPERATIONS: Rig released      PROGRESS: 0m

SURVEYS:

MUD DEPTH:

WT:

VIS:

WL:

pH:

APPENDIX 2

COMPOSITE WELL RECORD

APPENDIX 3

SAMPLE DESCRIPTION

SURFACE HOLE

45-50 Poor Sample under shoe.

Loose grains, very coarse and granules, rusty quartz, creamy dolomite, hematitic sandstone, granitic looking sandstone, large Pelecypod fragments, trace jasper?, probably all unconsolidated Till?

SHALE: medium grey, silty to very silty.

Very common cement grains, spotty dark oil specks in cement with cut.

50-60 SHALE: medium grey, blocky, firm, slightly silty and silty to very silty beds, trace micromicaceous.

SILTSTONE: 30%, medium grey, sandy, quartz, argillaceous, mica, trace carbonaceous specks, trace dolomitic, tight, firm, blocky. Locally grading to silty, argillaceous, tight sandstone.

60-70 SHALE: medium grey, silty, sandy common, carbonaceous specks, trace pyritic, grading to siltstone.

SILTSTONE: 15%, argillaceous, sandy, micaceous, carbonaceous specks, tight. Minor grading to silty, argillaceous sandstone.

70-80 SHALE: medium grey, silty to very silty, sandy, carbonaceous specks, mica, pyrite.

SILTSTONE: thin beds, sandy, argillaceous.

SANDSTONE: laminae, silty, argillaceous, quartz, mica, carbonaceous, tight.

80-90 SHALE: silty to very silty and sandy, locally pyritic.

SANDSTONE: 5%, thin beds, light speckled and poorly salt and pepper, very fine grained with fine grains, silty, argillaceous, minor cleaner streaks, quartz, mica, carbonaceous specks, pyritic, trace dolomitic, tight, no stain or cut.

SILTSTONE: minor amounts, sandy, argillaceous.

90-100 SHALE: as above, silty and sandy beds.

SANDSTONE: 10%, very fine grained, with fine grains, argillaceous, tight.

SILTSTONE: minor amounts, very argillaceous, sandy.

100-110 SHALE: medium to dark grey, silty, decreasing sandy, disseminated pyrite, trace calcareous fossil plates, carbonaceous specks, blocky, firm.

SILTSTONE and SANDSTONE: decrease to few laminae, argillaceous, tight, as above.

110-120 SHALE: silty, locally sandy, increasing disseminated pyrite, very pyritic laminae, trace dolomitic, locally grading to siltstone laminae, trace very silty and argillaceous sandstone laminae.

120-130 SHALE: as above.

SILTSTONE: laminae, argillaceous, pyritic, trace sandy, tight.

130-140 SHALE: medium to dark grey, silty, locally sandy, pyritic, carbonaceous specks, slightly micromicaceous.

SILTSTONE: speckled, argillaceous, pyritic, sandy, trace grading to very fine sandstone.

140-150 SHALE: as above.

SILTSTONE: 10%, light to medium grey, argillaceous, part sandy, disseminated pyritic, dolomitic, tight. Trace calcite microveinlets.

150-160 SHALE: medium to dark grey, silty, slightly sandy, pyritic, carbonaceous flakes, mica, with brown, very finely crystalline dolomite fossil plates?  
SILTSTONE: decrease to laminae, argillaceous, pyritic, trace sandy.

160-170 SHALE: silty, sandy in part, pyritic. Brown dolomitic fossil plates?  
SILTSTONE: laminae, argillaceous, trace sandy, trace dolomitic, tight.

170-180 SHALE: medium to dark grey, silty, trace sandy, disseminated and laminae pyrite, carbonaceous specks.  
SILTSTONE: few laminae, argillaceous, as above.

180-190 SHALE: as above, disseminated pyrite, pyritic microspines, firm, blocky to subplaty, trace siltstone laminae.

190-200 SHALE: medium to dark grey, slightly silty, slightly micromicaceous, pyritic, carbonaceous specks.  
SILTSTONE: 10%, sandy, argillaceous, slightly dolomitic, trace glauconitic, mica, cleaner streaks, locally pyritic, tight, part grading to silty, argillaceous, very fine sandstone laminae.

200-210 SHALE: as above, slightly silty, few siltstone laminae, argillaceous, sandy, pyritic.

210-220 SHALE: medium grey, slightly silty, slightly micromicaceous, decreasing disseminated pyrite, blocky, firm.

220-230 SHALE: as above, only slightly silty, trace siltstone laminae.

230-240 SHALE: slightly silty, disseminated pyrite, trace carbonaceous specks.

240-250 SHALE: medium grey, disseminated pyrite, trace carbonaceous/bituminous specks, generally trace silty, 20% silty beds, trace argillaceous siltstone laminae.

250-260 SHALE: medium grey, disseminated pyrite, 10% silty beds, subplaty to blocky, firm.

260-270 SHALE: disseminated pyrite, trace silty, silty interbeds, trace carbonaceous/bituminous specks. With thin laminae, very light grey, soft bentonitic shale. Trace laminae, white, very fine grained sandstone, creamy clay, trace dolomitic, tight, no stain or cut.

275-280 POOR SAMPLE after reaming and hole problems.  
SHALE: medium to dark grey, slightly silty, few silty beds, disseminated pyrite, subblocky, firm.

280-290 SHALE: dark grey, very pyritic, very fine pyrite laminae throughout, trace silty, trace carbonaceous specks.  
SANDSTONE: trace laminae, white, speckles, very fine to fine grained, quartz, very micaceous, very argillaceous, white clays, non-calcareous, tight, no stain or cut.

290-300 SHALE: slight decreasing pyritic, trace silty, trace carbonaceous/bitumen specks, trace calcite fossil tubes.

300-310 SHALE: dark grey, pyritic, few coarse pyrite blebs, becoming glauconitic throughout, trace silty, trace brown silty dolomite laminae or nodules.

310-320 SHALE: medium to dark grey, part as above, part becoming silty to very silty, sandy, disseminated pyrite, trace pyrite tubes, slightly glauconitic.  
SANDSTONE: 20%, light to medium grey, speckled, very fine grained, quartz, silty, argillaceous, mica, carbonaceous specks, trace glauconite and pyrite, tight, no stain or cut.  
SILTSTONE: 10-15%, argillaceous, sandy, trace glauconite, disseminated pyrite.

320-325 SHALE: silty, pyritic, sandy, part glauconitic.  
SILTSTONE: 40%, argillaceous, sandy, minor glauconite, pyrite, grading to silty sandstone.  
SANDSTONE: 15%, barely very fine grained, argillaceous, very silty, locally glauconite, trace pyrite, tight.

325-330 SHALE: as above, pyritic, silty, slightly glauconitic.  
SANDSTONE: 30%, light grey, speckled, very fine grained, very silty, grading to sandy siltstone, slightly argillaceous, slightly dolomitic, quartz, pyrite, mica, carbonaceous specks, subangular, moderate sorting, tight, no stain or cut.  
SILTSTONE: thin beds, 10-15%, argillaceous, pyritic, sandy.

330-335 SANDSTONE: light grey, very fine grained, very silty, grading to sandy siltstone, quartz, argillaceous, mica, rare pyrite, tight, no stain or cut.  
SHALE: 35%, slightly silty, carbonaceous specks, pyrite, with brown sideritic/dolomitic nodules or laminae, argillaceous & silty.  
SILTSTONE: 10-15%, light to medium grey, sandy, argillaceous, grading to silty sandstone.

335-340 SHALE: dark grey, silty, micromicaceous, pyritic, minor glauconite. With dense, hard, dark brown, sideritic/dolomitic nodules or laminae.  
SILTSTONE: 10%, thin beds.  
SANDSTONE: minor amounts, barely very fine grained, silty, tight.

340-345 SHALE: decreasing pyritic, decreasing to slightly silty, no glauconite, trace micromicaceous and carbonaceous specked, trace brown sideritic/dolomitic nodules.  
SILTSTONE: light grey, 25%, argillaceous, only trace sandy.

350-360 SHALE: dark grey, slightly silty, slightly pyrite, trace siltstone laminae.

360-370 POOR HOLE CLEANING, tight connections.  
SHALE: part slightly silty, slight disseminated pyrite, carbonaceous specks, blocky, firm, with 5% brown, sideritic/dolomitic nodules.

370-380 SHALE: increasing silty, disseminated pyrite, carbonaceous specks, hard brown sideritic/dolomitic nodules, trace siltstone laminae.

380-390 SHALE: medium grey, predominantly silty, disseminated pyrite, blocky, firm.

390-400 SHALE: slightly silty, disseminated pyrite.

400-410 SHALE: slightly silty throughout, disseminated pyrite, trace coarse pyrite blebs, trace carbonaceous specks.

410-420 SHALE: as above, with 5% dense, hard, brown sideritic/dolomitic nodules or laminae.

420-430 SHALE: medium to dark grey, slightly silty, disseminated pyrite, few very pyritic laminae, carbonaceous specks, slightly micromicaceous, blocky, firm, with slight increase sideritic/dolomitic nodules or laminae.

430-440 SHALE: as above, decreasing sideritic/dolomitic chips to trace.

440-448 SHALE: medium grey, slightly silty, slight pyrite locally, carbonaceous.

WIPER TRIP FOR STRAP

448-458 SHALE: medium grey, slight increase in silty beds, slight disseminated and laminae pyrite, carbonaceous specks, blocky, firm.

MAIN HOLE

458-460 SHALE: medium grey, very slightly silty, slight disseminated pyrite, trace micromicaceous, trace carbonaceous specks, trace calcareous fossil fragments, trace pelecypod.

460-465 SHALE: slight disseminated pyrite, locally blebs, trace dark carbonaceous laminae/partings, trace brown sideritic/dolomitic nodules.

465-470 SHALE: generally as above, trace carbonaceous specks, increasing pelecypod fragments.

470-475 SHALE: very slightly silty, carbonaceous specks, trace carbonaceous laminae, slight disseminated pyrite throughout, trace pelecypod fragments, trace brown sideritic/dolomitic nodules.

475-480 Sample caught after tight hole problems on connection.

Loose grains, quartz, limestone, mica, feldspar, all cavings from cement.

SHALE: medium grey, blocky, firm, trace sideritic/dolomitic nodules, Inoceramus fragments.

480-485 SHALE: very slightly silty, disseminated pyrite and blebs, trace glauconite, trace calcareous pelecypod and fossil fragments.

485-490 SHALE: as above, increasing medium to dark brown, sideritic/dolomitic nodules and laminae, 2%, microcrystalline, argillaceous, trace silty, trace ironstone plates.

490-495 SHALE: very slightly silty, slight disseminated pyrite and blebs.

495-500 SHALE: as above, blocky, firm, very slightly silty, slightly pyritic, no sideritic/dolomitic nodules.

500-505 SHALE: as above, trace silty, slight disseminated pyrite, trace pelecypod fragments.

505-510 SHALE: medium grey, increasing disseminated and blebs pyrite, becoming very glauconitic, trace silty.

510-515 SHALE: very glauconitic, disseminated and blebs pyrite, increasing brown, hard, sideritic/dolomitic nodules or laminae, silty, argillaceous, trace glauconitic.

515-520 SHALE: slightly pyritic throughout, trace glauconitic and silty, trace micromicaceous, decreasing to few sideritic/dolomitic nodules.

520-525 SHALE: as above, few glauconitic beds, increasing pyritic.

525-530 SHALE: medium grey, trace silty, increasing brown sideritic/dolomitic nodules, minor glauconitic beds, disseminated and blebs pyrite, with trace light grey shale laminae, very slightly calcareous and pyritic.

530-535 SHALE: as above, with 15% brown, sideritic/dolomitic nodules and laminae, microcrystalline, very argillaceous, slightly silty, trace pyritic, blocky, hard.

535-540 SHALE: medium grey, blocky to subplaty, trace silty and glauconitic, decreasing dolomitic/sideritic laminae to trace.

540-545 SHALE: medium grey, slightly micromicaceous, increasing subplaty to platy, only trace silty, trace pyrite, few sideritic/dolomitic nodules.

545-550 SHALE: as above, slight increase sideritic/dolomitic nodules or laminae.

550-555 SHALE: medium grey, blocky to subplaty, trace pyritic, slightly micromicaceous, few nodules.

555-560 SHALE: as above.

560-565 SHALE: medium grey, slightly micromicaceous, trace silty, very slightly pyritic, few sideritic/dolomitic nodules.

565-570 SHALE: as above, also begin silty and sandy shale, very glauconitic, grading to sandstone, minor thin laminae, brown, dolomitic/sideritic micropellets in silty and argillaceous matrix, trace glauconitic.  
SANDSTONE: medium grey, very fine grained, very silty and argillaceous, very glauconitic, pyritic, trace mica, subrounded, poor sorting, tight, no stain or cut.

570-575 SHALE: medium grey, with beds increasing silty, sandy, glauconitic to very glauconitic, disseminated and blebs pyrite, minor grading to very argillaceous, silty and glauconitic sandstone laminae. Trace dolomitic/sideritic laminae as above.

575-580 SHALE: silty throughout, disseminated and blebs pyrite, locally glauconitic, only trace sandy, blocky, firm.

580-585 SHALE: as above, silty, pyritic, glauconitic locally, increasing sandy beds, increasing micromicaceous, trace grading to very fine grained, very argillaceous, very silty, glauconitic, sandstone laminae.

585-590 SHALE: medium grey, very blocky, silty, disseminated pyrite, slightly sandy, trace glauconitic.

590-595 SHALE: slightly silty to silty, trace sandy, slight disseminated pyrite, trace glauconite, trace micromicaceous.

595-600 SHALE: slightly silty to silty, trace sandy, micromicaceous, slightly pyritic, minor brown, dolomitic/sideritic nodules.

600-605 SHALE: as above, medium grey, slightly silty to silty, increasing dolomitic/sideritic nodules or laminae, 5%, brown, microcrystalline, argillaceous, slightly silty, hard.

605-610 SHALE: silty, trace glauconitic, trace sandy, 5% sideritic/dolomitic nodules and laminae, light to dark brown, cryptocrystalline and microcrystalline, argillaceous, trace pyritic.

610-615 SHALE: slightly silty, with silty beds, trace sandy, disseminated, blebs and tubes pyrite, increasing sideritic/dolomitic chips to 10%, dense, hard, nodules, laminae and thin beds possibly.

615-620 SHALE: as above, silty beds, trace sandy and glauconitic, trace very fine grained sandstone laminae, argillaceous and silty, with 10% brown sideritic/dolomitic nodules and laminae.

620-625 SHALE: silty, micromicaceous, trace sandy laminae, decreasing sideritic dolomitic laminae and nodules to 5%.

625-630 SHALE: medium grey, slightly silty, micromicaceous, trace sandy, blocky to subplaty, firm, few nodules as above.

630-635 SHALE: slightly silty, slightly pyritic, trace sandy, micromicaceous, minor sideritic/dolomitic chips.

635-640 SHALE: as above, blocky to subplaty, slightly silty, slightly pyritic.

**TREVOR SANDSTONE 640m (-479.34m)**

640-645 SHALE: medium grey, increasing sandy, locally very sandy, silty, micromicaceous, pyritic locally, grading to very argillaceous, very silty, very fine sandstone.

SANDSTONE: grey, very fine grained, very argillaceous, very silty, micaceous, tight, thin beds.

645-650 SHALE: silty to very silty, sandy to very sandy, grading to very fine grained sandstone.

SANDSTONE: 15%, thin beds, very fine grained, very argillaceous and very silty, pyritic locally, micaceous, slightly glauconitic, very poorly sorted, tight.

650-655 SHALE: silty and sandy, with 25% very sandy, micromicaceous, pyritic, glauconitic, grading to very fine sandstone, trace pyritic fossil tubes.

SANDSTONE: 40%, light to medium grey, very fine grained, very silty, very argillaceous, grading to sandy shale, mica, pyrite, very slightly calcareous, tight, no stain or cut.

655-660 SANDSTONE: 60%, grey, very fine grained, very silty, very argillaceous, grading to sandy shale and part sandy, argillaceous siltstone, quartz, mica, disseminated and blebs pyrite, possible pyritic tentaculites, trace ostracods, tight, no stain or cut.

SHALE: 40%, silty, sandy, micromicaceous, pyritic.

660-665 SHALE: silty, sandy, micromicaceous, slightly glauconitic, with 20% very sandy, grading to very argillaceous sandstone.

SANDSTONE: decrease to 10-20%, very argillaceous, very silty, micaceous, tight.

665-670 SHALE: medium grey, slightly silty, with decreasing silty beds, glauconitic, pyritic, decreasing sandy beds to 10%.

SANDSTONE: thin beds, very fine grained, very argillaceous and silty, trace calcareous, tight.

670-675 SHALE: medium grey, blocky with increasing subplaty, slightly micromicaceous, slightly silty, trace pyrite. With 10% hard, brown, sideritic/dolomitic nodules, laminae and thin beds, microcrystalline, argillaceous, trace pyritic, part slightly calcareous.

675-680 SHALE: medium grey, increasing subplaty, micromicaceous, only slightly silty, trace pyritic, minor sideritic/dolomitic nodules or laminae.

680-685 SHALE: as above, trace silty, micromicaceous, platy, subplaty, firm.

685-690 SHALE: micromicaceous, trace silty, minor pyrite blebs and pyritic tubes.

690-695 SHALE: as above, trace silty beds, increasing brown sideritic/dolomitic nodules, laminae and thin beds, 5%, microcrystalline, argillaceous, trace pyritic, occasionally calcareous, hard, dense.

695-700 SHALE: slightly micromicaceous, very slightly silty, pyritic fossil fragments and tubes, with increasing sideritic/dolomitic chips, 15%, part slightly calcareous, also laminae of brownish grey, very argillaceous limestone, trace recrystallized calcite possibly after fossils.

700-705 SHALE: only trace silty, increasing subplaty to part platy.

705-710 SHALE: generally as above, few silty beds, trace sandy, begin darker grey shale, platy, very slightly carbonaceous specked, increasing disseminated pyrite, slightly silty, trace sandy. Trace pelecypod fragments, trace calcite microveinlets. Few sideritic/dolomitic nodules or laminae.

710-715 SHALE: slightly silty, slightly pyritic, micromicaceous, part darker with carbonaceous specks. With 15% hard, brown, cryptocrystalline and microcrystalline, sideritic/dolomitic nodules, laminae and thin beds, part slightly calcareous, minor dark reddish brown also.

715-720 SHALE: part subplaty, platy, only trace silty, also begin blocky, silty to very silty, very slightly sandy, micromicaceous, slightly pyritic, trace calcareous, part grading to thin beds sandy, argillaceous siltstone.

720-725 SHALE: medium to dark grey, micromicaceous, only minor silty beds, blocky to subplaty. With 5% dark brown and dark reddish brown sideritic/dolomitic nodules or laminae.

725-730 SHALE: predominantly dark grey, very slightly silty and micromicaceous, slight disseminated pyrite and blebs, subplaty.

730-735 SHALE: medium to dark grey, as above.

735-740 SHALE: subplaty to subblocky, trace silty, part darker grey, carbonaceous specked, trace fossil fragments, gastropod? slightly pyritic, trace slickensides.

740-745 SHALE: as above, increasing platy, few silty beds, dark brown sideritic/dolomitic nodules, 5%, trace fossil fragments.

745-750 SHALE: part slightly silty, slightly pyritic, few sideritic/dolomitic nodules or laminae.

750-755 SHALE: medium grey, micromicaceous, trace silty beds, few sideritic/dolomitic nodules as above.

755-760 SHALE: becoming predominantly slightly silty, micromicaceous, rare sand grains, slight disseminated pyrite.

760-765 SHALE: medium to dark grey, slightly silty, micromicaceous, slight carbonaceous specks, pyrite blebs.

765-770 SHALE: as above, slightly silty, few siltier beds.

770-775 SHALE: as above, with 5% brown, sideritic/dolomitic chips, nodules and laminae.

775-780 SHALE: subplaty to platy, slight silty beds, 5% brown, hard, sideritic/dolomitic nodules and laminae.

780-785 SHALE: medium grey, slightly silty throughout, few siltier beds, micromicaceous, with 5% brown, cryptocrystalline, argillaceous, hard, sideritic/dolomitic nodules and laminae.

785-790 SHALE: platy, subplaty, as above.

790-795 SHALE: slightly silty beds, slightly micromicaceous, dark brown sideritic/dolomitic nodules or laminae, very hard, slightly siliceous.

795-800 SHALE: as above, with 10% brown, sideritic/dolomitic chips, cryptocrystalline, argillaceous, very hard, nodules, laminae and thin beds.

800-805 SHALE: platy, subplaty as above, begin medium grey, blocky, silty, slightly sandy, micromicaceous, locally glauconitic, slightly pyritic, with few sideritic/dolomitic nodules or laminae.

805-810 SHALE: medium grey, silty, minor sandy laminae, glauconite locally, micromicaceous.

810-815 SHALE: medium grey, micromicaceous, very silty, becoming sandy to very sandy, grading to very argillaceous sandstone, pyrite blebs and tubes, locally glauconitic.

SANDSTONE: 25%, medium grey, very fine grained, very argillaceous, very silty, part glauconitic, slightly pyritic, trace calcareous, with thin beds lighter grey, cleaner, slightly argillaceous, silty, very fine grained, very slightly calcareous, poor sorting, tight, trace siliceous sandstone, Also rare fine quartz grains, in very argillaceous sandstone, glauconitic, trace calcareous, tight. No stain stain or cut.

815-820 Poor Sample after reaming stabilizers to bottom

SHALE: silty, slightly very sandy, micaceous, pyritic, carbonaceous specks.

SANDSTONE: 20-25%, very fine grained, very argillaceous, very silty, micaceous, pyritic, poorly sorted, tight, grading to very sandy shale. Also rare cleaner sandstone, very fine grained, quartz, silty, trace fine grains, slightly argillaceous, trace calcareous and siliceous, trace glauconite and mica, subangular, poor sorting, tight, no stain or cut. Trace pyritic sandstone laminae.

820-825 SHALE: silty, sandy, mica, pyrite.

SANDSTONE: 10%, thin beds, grey, very fine grained, very argillaceous, very silty, quartz, mica, pyrite, trace calcareous, minor slightly cleaner sandstone, tight, no stain or cut. Trace floating fine, medium and coarse quartz grains.

825-830 SHALE: as above, silty, sandy to very sandy, coarse pyrite blebs.  
SANDSTONE: 25-30%, medium to dark grey, very fine grained and very fine to fine grained, silty, argillaceous, mica, slightly glauconitic and pyritic, slightly siliceous and calcareous, subangular to subrounded, poor sorting, tight, no stain or cut.

830-837 \*\*Sample caught late, lags to 837m\*\*

SANDSTONE: very variable, part dark grey, very poorly sorted, fine-medium-coarse quartz grains, trace very coarse, in a very argillaceous and very silty, very fine to fine grained sandstone matrix, mica, pyrite, tight, bitumen specks coating some grains, no cut or fluorescence. Loose medium to coarse quartz grains probably from this sandstone. Also lighter brownish grey, very fine to fine grained, silty, slightly argillaceous, slight mica, trace glauconite, slightly calcareous, minor kaolinitic sandstone, trace pyrite, slight bitumen specks, tight, no cut or fluorescence.

SHALE: thin beds sandy shale as above decreasing with depth.

**ARCTIC RED SANDSTONE: 835m (-874.34m)**

837-840 SANDSTONE: very light grey, light brownish grey, predominantly medium grained with very fine grains and coarse to trace very coarse grains, quartz, clean to slightly argillaceous, slightly glauconitic, trace mica, carbonaceous specks, slightly calcareous and slightly siliceous, 10% of chips are kaolinitic sandstone, minor very siliceous sandstone, subangular, poor sorting, tight, no stain or cut. Loose grains of medium and coarse quartz suggest some poorly consolidated beds but mostly very firm to hard sandstone. Thin streaks greenish grey argillaceous sandstone.

840-845 SANDSTONE: light grey, slightly brownish, predominantly medium grained, with fine grains, coarse grains and occasional very coarse grains, very slightly silty, clean to slightly argillaceous, glauconite, disseminated pyrite, trace mica, carbonaceous specks, slightly calcareous, trace siliceous, tight, firm, bitumen specks, slight dead stain, no cut or fluorescence.

SHALE: minor sandy shale interbeds with trace carbonaceous partings.

845-863m SEE CORE DESCRIPTION #1

**IMPERIAL 848.1m (-687.44m)**

863-865 Poor Sample after reaming rat hole.

SHALE: medium grey, slightly silty, carbonaceous specks, micromicaceous.

SANDSTONE: 15%, very fine grained, silty, argillaceous, micromicaceous, carbonaceous specked, tight, minor thin siltstone interbeds.

865-870 SANDSTONE: light brownish, light grey, fine grained, quartz, trace silty, clean to slightly argillaceous, carbonaceous specks, trace glauconite, part (15%) very calcareous, very fossiliferous, grading to sandy limestone, tight, no stain or cut. Also light grey sandstone, very fine grained and very fine to fine grained, silty, argillaceous, carbonaceous specked, tight.  
SHALE: 30%, thin beds, slightly silty throughout.

870-875 SANDSTONE: grey, speckled, very fine grained, very silty, slightly argillaceous, mica, trace carbonaceous specks, subangular, moderate sorting, tight, no stain or cut. Minor grading to siltstone.

SHALE: thin beds and laminae, slightly silty, micromicaceous, carbonaceous specked.

875-880 SILTSTONE: medium grey, sandy in part, argillaceous, carbonaceous specked, micromicaceous, tight.  
SANDSTONE: grey, barely very fine grained, very silty, grading to siltstone, argillaceous, carbonaceous and bitumen specks locally, tight. Thin bed light brownish sandstone, fossiliferous, oolites, pellets, dolomitic, siliceous, clean, tight, no stain or cut.  
SHALE: 20%, platy, carbonaceous specked.

880-885 SHALE: 35%.  
SANDSTONE: 35%, barely very fine grained, very silty, argillaceous, as above, trace cleaner sandstone laminae, tight, no stain or cut.  
SILTSTONE: 20%, platy, slight carbonaceous specks.

885-890 SHALE: as above.  
SANDSTONE: part grey, barely very fine grained, silty, argillaceous, as above. Also 5% brownish sandstone, fine grained, fossiliferous, brachiopods, pellets, dolomite nodules, calcareous, bitumen specks, pyrite, tight, no stain or cut.  
SILTSTONE: 25%, argillaceous, sandy, grading to very fine silty sandstone.

890-895 SILTSTONE: as above.  
SHALE: micromicaceous, slightly silty.  
SANDSTONE: decreasing amounts, barely very fine grained, minor very light brown, very light brownish, fine grained, clean, siliceous, calcareous, unidentifiable fossil fragments, bitumen specks, tight, no stain or cut.

895-900 SANDSTONE: medium grey, speckled, very fine grained, silty, mica, carbonaceous specked, part grading to sandy siltstone, tight.  
SHALE: 30-35%.

900-905 SANDSTONE: very light grey, speckled, very fine grained, silty, quartz, slight mica, slight carbonaceous specks, locally kaolinitic, tight, no stain or cut.  
SHALE: 30%, very slightly silty, slightly micromicaceous.  
SILTSTONE: 15%, as above.

905-907 Circulated sample at drilling break  
SANDSTONE: very light grey, white, very fine to fine grained, silty, slightly argillaceous, carbonaceous specks locally, tight, no stain or cut. with 15% brownish sandstone, calcareous, fine grained, subangular quartz, fine fossil fragments, trace glauconite, clean, slightly silty, very poor porosity 2-3%, trace bitumen specks, no stain or cut.

907-910 Tight connections, cavings, poor samples.  
SHALE: platy, subplaty, slightly silty, with silty beds, carbonaceous specks, micromicaceous.  
SANDSTONE: 35%, white, speckled, fine grained and very fine to fine grained, quartz, mica, carbonaceous specks, slightly silty, trace calcareous, tight, no stain or cut. Trace brown, calcareous, fossiliferous sandstone.

910-915 Tight connections, cavings.  
SHALE: medium to dark grey, platy to splintery, very slightly silty, silty beds, trace pyrite, locally carbonaceous specks.  
SANDSTONE: 35%, very light grey, part light brownish, very fine to fine grained, silty to very silty, part slightly argillaceous, tight, no stain or cut.

915-920 SHALE: as above.  
SANDSTONE: 30%, predominantly barely very fine grained, some fine grains, tight.  
SILTSTONE: 10%, slightly argillaceous, micromicaceous, carbonaceous specks.

920-925 SANDSTONE: light grey, barely very fine grained, very silty, grading to sandy siltstone, only trace argillaceous, trace calcareous, carbonaceous specks, blocky, firm, tight.  
SHALE: very thin beds.

925-930 SANDSTONE: as above, barely very fine grained, grading to siltstone.  
SILTSTONE: 25%, micromicaceous, carbonaceous specked, trace argillaceous.  
SHALE: 15%.

930-935 SANDSTONE: light grey, barely very fine grained, very silty, blocky, tight.  
SILTSTONE: 30%, sandy, micromicaceous.  
SHALE: thin beds, 10%.

935-940 SANDSTONE: as above, barely very fine grained, carbonaceous specks throughout, mica, very slightly calcareous, tight.  
SILTSTONE: 35%, carbonaceous specked, micromicaceous, part sandy.  
SHALE: thin beds.

940-945 SILTSTONE: light grey, sandy, micromicaceous, carbonaceous specked.  
SANDSTONE: 30%, barely very fine grained, grading to sandy siltstone.  
SHALE: thin beds.

945-950 SANDSTONE: light grey, speckled, very fine grained, silty, micaceous, carbonaceous specked, trace calcareous, tight, trace ineffective porosity, no stain or cut, part grading to siltstone.  
SILTSTONE: 30-40%, grading to silty sandstone.  
SHALE: increasing silty beds, grading to siltstone.

950-955 SILTSTONE: sandy, very slightly argillaceous, carbonaceous specks and partings, micromicaceous, tight, firm.  
SANDSTONE: decreasing to 15%, barely very fine grained, very silty, grading to siltstone.  
SHALE: silty to very silty, thin beds.

955-960 SANDSTONE: light grey, very fine grained, silty, some fine grains, quartz, mica, rare glauconite, carbonaceous specks, slightly calcareous, very slightly argillaceous, tight.  
SILTSTONE: grading to very fine sandstone.  
SHALE: very silty, minor thin beds.

960-965 SANDSTONE: very fine grained, occasional fine grains, silty, mica, carbonaceous specks common, slightly calcareous, blocky, firm, tight, trace ineffective porosity, no stain or cut.  
SILTSTONE and SHALE: thin beds.

965-970 SANDSTONE: very fine grained, silty, slightly calcareous, trace siliceous, only trace argillaceous, tight, no stain or cut.  
SILTSTONE: 10%.  
SHALE: 10%.

970-975 SANDSTONE: as above.  
SHALE: 15%, platy, micromicaceous, silty beds.  
SILTSTONE: very thin beds.

975-980 Tight connections, cavings, poor samples.

SHALE: as above, slightly silty, trace carbonaceous specks.

SANDSTONE: 40%, as above.

SILTSTONE: thin beds, 10%, argillaceous, sandy.

980-985 Tight connections, cavings, poor samples.

SHALE: platy, difficult to interpret cavings.

SANDSTONE: light grey, very fine grained, some fine grains, silty, tight, no stain or cut. With thin bed or laminae of brownish, calcareous, fossiliferous sandstone, tight.

985-990 SANDSTONE: grey, very fine grained, quartz, mica common, carbonaceous specks, slightly calcareous, silty, part grading to sandy siltstone, blocky, firm, tight, no stain or cut.

SHALE: 10%, platy, medium grey.

990-995 SHALE: 40%, platy, subplaty, slightly silty, silty beds, carbonaceous specks, slight pyrite.

SILTSTONE: 40%, grey, sandy, slightly argillaceous.

SANDSTONE: 20%, barely very fine grained, silty.

995-1000 SANDSTONE: very fine grained, occasional fine grains, slightly calcareous, mica, carbonaceous specks, rare glauconite, tight.

SHALE: 40%.

SILTSTONE: 10%.

1000-1005 SANDSTONE: very fine grained, light grey, silty, mica, slightly calcareous, carbonaceous specks, tight.

SHALE: 20%, part silty.

SILTSTONE: thin beds, argillaceous, sandy.

1005-1010 SHALE: 40%.

SILTSTONE: 30%, argillaceous, slightly sandy, micromicaceous.

SANDSTONE: 30%, light grey, speckled, barely very fine grained, silty, grading to siltstone, micromicaceous, carbonaceous specks.

1010-1015 SHALE: medium to dark grey, platy, slightly silty, with silty beds, trace pyrite, part micromicaceous.

SILTSTONE: 25%, argillaceous, micromicaceous, grading to very silty shale.

SANDSTONE: 15%, very fine grained, mica, silty, part argillaceous, tight.

1015-1020 SILTSTONE: argillaceous, micromicaceous, sandy.

SANDSTONE: 30%, barely very fine grained, very silty, increasing argillaceous, micromicaceous, carbonaceous speckled, blocky, firm, tight.

SHALE: 15%.

1020-1025 SHALE: as above.

SILTSTONE: 35%, argillaceous, slightly sandy.

SANDSTONE: 10%, barely very fine grained, very silty, argillaceous, tight.

1025-1030 SILTSTONE: darker, medium grey, increasing argillaceous, sandy, carbonaceous specks, micromicaceous, trace calcareous.

SANDSTONE: 10%, barely very fine grained, with thin beds cleaner sandstone, very fine grained, with fine grains, quartz, mica, silty, slightly calcareous, trace siliceous, tight.

SHALE: thin beds, micromicaceous, silty, grading to siltstone.

1030-1035 SILTSTONE: very argillaceous, micromicaceous, carbonaceous specked, locally sandy.  
SANDSTONE: 15%, argillaceous, silty, carbonaceous specked, mica, tight, part grading to siltstone.  
SHALE: silty to very silty, grading to siltstone.

1035-1040 SILTSTONE: as above, sandy, very argillaceous.  
SHALE: silty to very silty.  
SANDSTONE: 20%, thin beds and laminae, very fine grained, very argillaceous, silty, grading to siltstone, loose fine grains suggest thin bed of cleaner sandstone, fine grained, slightly calcareous, tight.

1040-1045 SILTSTONE: medium to dark grey, sandy, argillaceous.  
SANDSTONE: 20%, very fine grained, silty, argillaceous to very argillaceous, mica, carbonaceous specks, grading to siltstone.  
SHALE: 15-20%.

1045-1050 Sample caught after wiper trip, tight connections, cavings.  
SHALE: slightly silty, silty beds, locally slightly pyritic.  
SILTSTONE: 20%, argillaceous, part sandy.  
SANDSTONE: 15%, barely very fine grained.

1050-1055 SHALE: platy, micromicaceous, slightly silty with silty beds.  
SANDSTONE: 15%, very fine grained, quartz, mica, silty, slightly argillaceous, tight.  
SILTSTONE: 10%, argillaceous.

1055-1060 SANDSTONE: light grey, very fine grained, quartz, mica, silty, part slightly argillaceous, carbonaceous specks and partings, tight, no stain or cut.  
SHALE: 15%.  
SILTSTONE: minor thin beds.

1060-1065 SANDSTONE: light grey, slightly brownish, very fine grained, some fine grains, clean to slightly argillaceous, silty, tight, no stain or cut.  
SHALE: 10%.  
SILTSTONE: thin beds.

1065-1070 SANDSTONE: light grey, very fine grained, with fine grains, slightly silty, generally clean to slightly argillaceous, part calcareous, quartz, mica, rare glauconite, tight, subangular, moderate sorting.  
SILTSTONE: 10%, sandy, argillaceous.  
SHALE: 10%.

1070-1075 SANDSTONE: generally as above, barely very fine grained, occasional fine grains, silty, clean to slightly argillaceous, quartz, mica, trace pyrite, tight, no stain or cut.  
SILTSTONE: 10%, sandy, argillaceous.  
SHALE: minor thin beds.

1075-1080 SANDSTONE: very fine grained, quartz, mica, silty, clean, part increasing argillaceous, tight, no stain or cut.  
SHALE: 20%, silty beds, trace pyrite.  
SILTSTONE: 10%, argillaceous, sandy.

1080-1085 SHALE: slightly silty to silty.  
SANDSTONE: 20%, very fine grained, as above.  
SILTSTONE: thin beds.

1085-1090 SHALE: silty to very silty, grading to siltstone, micromicaceous, subplaty to subblocky.  
SILTSTONE: thin beds and laminae.  
SANDSTONE: 10%, very fine grained.

1090-1095 SHALE: as above.  
SANDSTONE: 15%, barely very fine grained, quartz, mica, carbonaceous specks, clean to slightly argillaceous, silty, grading to siltstone, tight, no stain or cut.  
SILTSTONE: thin beds.

1095-1100 SILTSTONE: very argillaceous, slightly sandy, trace carbonaceous specks, slight disseminated pyrite, blocky, firm.  
SHALE: 30%, silty, grading to siltstone.  
SANDSTONE: minor laminae.

1100-1105 SILTSTONE: medium to dark grey, very argillaceous, slightly sandy, carbonaceous specks locally, disseminated pyrite.  
SHALE: 35%, slightly silty to silty.  
SANDSTONE: 5%, barely very fine grained.

1105-1110 SHALE: slight disseminated pyrite, slight carbonaceous specks, part silty.  
SILTSTONE: 50%, as above.

1110-1115 SHALE: as above.  
SANDSTONE: 15%, barely very fine grained, laminae and thin beds, silty, argillaceous, tight.  
SILTSTONE: thin beds.

1115-1120 SHALE: micromicaceous, slightly silty to silty, slight disseminated pyrite,  
SILTSTONE: thin beds, argillaceous, sandy.  
SANDSTONE: thin beds as above, part cleaner, very fine grained, tight.

1120-1125 SILTSTONE: dark grey, sandy, very argillaceous, micaceous, carbonaceous specks, slight bituminous specks, disseminated pyrite.  
SHALE: 35%, as above.  
SANDSTONE: thin beds, 10%, part argillaceous, silty, part cleaner, slightly calcareous, tight.

1125-1130 SILTSTONE: dark grey, argillaceous, micromicaceous, commonly sandy, disseminated pyrite, grading to very silty sandstone.  
SHALE: slightly silty, with very silty beds.  
SANDSTONE: medium to dark grey, very silty, grading to siltstone, argillaceous, mica, trace laminae cleaner sandstone.

1130-1135 SILTSTONE: as above, argillaceous, carbonaceous and bitumen specks.  
SHALE: 15-20%.  
SANDSTONE: very thin laminae, barely very fine grained, silty, argillaceous.

1135-1140 SHALE: micromicaceous, disseminated pyrite, slight carbonaceous specks, slightly silty, subplaty, subblocky.  
SILTSTONE: 20-25%, argillaceous, part sandy.  
SANDSTONE: only few laminae.

**CANOL SHALE 1144m (-983.34m)**

1140-1145 SHALE: darker grey, increasing pyrite, disseminated pyrite throughout, trace carbonaceous, becoming slightly bituminous, trace silty, with silty shale beds as above, grading to siltstone.

SILTSTONE: 10%, argillaceous, disseminated pyrite.

1145-1150 SHALE: dark grey to black, pyritic, bituminous, carbonaceous, crystalline calcite chips suggest recrystallized fossils and/or calcite veinlets, trace fluorescence from calcite, no cut. Trace loose fine and medium quartz grains from sandy laminae.

1150-1155 SHALE: dark grey to black, bituminous, carbonaceous, very pyritic, becoming calcareous, calcite fossil fragments, calcite veinlets, few silty beds, trace sandy laminae, part hard siliceous dark shale.

1155-1160 SHALE: as above, very pyritic, calcite fossil fragments, veinlets, trace sandy laminae.

LIMESTONE: 10%, microcrystalline to very finely crystalline, vague fossil fragments, clean, bitumen specks, part silty and sandy, trace grading to calcareous sandstone.

**HARE INDIAN 1161m (-1000.34m)**

1160-1165 LIMESTONE: mottled light brown, white, finely crystalline, crinoids, fossil fragments, grainstone, bitumen coated stylolites and grains, trace pyrite, clean, tight, no stain or cut. Trace sandy beds and calcareous sandstone laminae.

SHALE: as above.

1165-1170 LIMESTONE: white, light brown, mottled, microcrystalline to finely crystalline matrix with medium to coarse crystalline fossil debris, grainstone, crinoids, brachiopods, trace pyrite, clean, few argillaceous streaks, minor chalky and sucrosic beds, bitumen coated stylolites, minor streaks bitumen rich, dead stain locally, no cut or fluorescence, coarse calcite crystals suggest some isolated vugs.

1170-1175 LIMESTONE: mottled white and brown, finely crystalline, fossils fragments, grainstone, trace pyrite, trace siliceous, bitumen specks, stylolites, tight, trace isolated vugs, also part white chalky limestone.

1175-1180 LIMESTONE: light to medium brown, part becoming darker, finely crystalline, part microcrystalline, part chalky, fossil fragments, grainstone, trace argillaceous streaks, dead organic residue, trace siliceous, tight, bitumen specks, stylolites, no stain or cut.

1180-1185 LIMESTONE: as above, grainstone, crinoids, pellets, predominantly very finely crystalline, part microcrystalline, increasing darker beds, trace argillaceous, dead organic residue, trace very fine dolomitization, tight, no stain or cut.

SHALE: very thin beds, dark grey, slightly pyritic.

1185-1190 LIMESTONE: as above, grainstone, microcrystalline to very finely crystalline, increasing dead organic residue, bitumen specks, tight, no stain or cut.

SHALE: dark brown-grey, disseminated pyrite, trace calcareous, thin beds.

1190-1195 LIMESTONE: microcrystalline to very finely crystalline, part grainstone, crinoids, bitumen rich streaks, part becoming silty, tight, no stain or cut.  
SILTSTONE: 15%, light brownish, calcareous, argillaceous, disseminated pyrite, tight.  
SHALE: thin beds, disseminated pyrite, trace calcareous.

1195-1200 LIMESTONE: mottled brown, fossil fragments, pellets, crinoids, grainstone, becoming silty and sandy, trace pyrite, tight, bitumen specks, no stain or cut.  
SILTSTONE: 20%, light brownish, argillaceous, pyritic, calcareous, tight.  
SANDSTONE: 15%, mottled brown, fine grained, part very fine to fine grained, quartz, slightly silty, very calcareous, slightly argillaceous, scattered shale grains, trace pyrite, bitumen specks and coating grains, subangular, moderate to well sorted, tight, no stain or cut.  
SHALE: few laminae.

1200-1205 SILTSTONE: light brown, calcareous, argillaceous, pyritic, trace fossil fragments, tight.  
LIMESTONE: fine fragmental, grainstone, slightly silty, locally pyritic, trace sandy, tight, no stain or cut.  
SHALE: thin beds, brown, pyritic, slightly calcareous, slightly silty. Trace sandstone laminae, very calcareous, tight.

1205-1210 SILTSTONE: light brown, calcareous, argillaceous, disseminated pyrite, sandy beds.  
LIMESTONE: light brown, microcrystalline, silty, slightly argillaceous to argillaceous, blocky, tight.  
SHALE: laminae.

1210-1215 LIMESTONE: light to medium brown, microcrystalline, some very finely crystalline, silty to very silty, argillaceous, disseminated pyrite, part very hard, blocky, tight, no stain or cut.  
SILTSTONE: 40%, calcareous, argillaceous, disseminated pyrite.  
SHALE: laminae, silty, slightly calcareous, tight.

1215-1220 LIMESTONE: microcrystalline, silty to very silty, slightly argillaceous, disseminated pyrite, tight.  
SILTSTONE: 30%, light to medium brown, argillaceous, calcareous, pyritic.  
SHALE: thin beds, 10%, brown, slightly calcareous, slightly pyritic.

1220-1225 LIMESTONE: light to medium brown, darker, increasing argillaceous, silty to very silty, grading to silty marlstone and calcareous siltstone.  
SILTSTONE: 35%, argillaceous, very calcareous.  
SHALE: 30%, silty, trace pyrite, calcareous, grading to marlstone.

1225-1230 SHALE: medium brown, very calcareous, silty to very silty, blocky, hard, grading to silty marlstone.  
SILTSTONE: lighter brown, slightly argillaceous to argillaceous.  
LIMESTONE: decreasing amounts, very silty, argillaceous, grading to marlstone.

1230-1235 SHALE: very calcareous, silty to very silty, grading to marlstone.  
SILTSTONE: 40%, very calcareous.  
LIMESTONE: thin beds, 10-15%, grading to siltstone and silty marlstone.

1235-1240 SHALE: predominantly very calcareous, silty, grading to marlstone, with darker beds, only trace calcareous and silty.  
SILTSTONE: slightly argillaceous to argillaceous, calcareous.  
LIMESTONE: thin beds, silty and argillaceous.

1240-1245 SHALE: medium brownish grey, very silty, very calcareous, grading to silty marlstone.  
SILTSTONE: 15%, thin beds, calcareous, argillaceous.  
LIMESTONE: thin beds.

1245-1250 SHALE: as above, grading to marlstone.  
SILTSTONE: 20%, as above.  
LIMESTONE: 5%, lighter grey, argillaceous and silty, microcrystalline.

1250-1255 SHALE: grading to silty marlstone.  
SILTSTONE: thin interbeds.  
LIMESTONE: laminae, silty, argillaceous.

1255-1260 SHALE: as above, grading to silty marlstone and siltstone.  
SILTSTONE: 20%, calcareous, slightly argillaceous to argillaceous.  
LIMESTONE: laminae.

1260-1265 SHALE: as above, also begin dark brownish grey interbeds, non-calcareous, trace silty, trace calcite and bitumen lined microfractures, trace porosity on fractures, no stain or cut.  
SILTSTONE: thin beds and laminae.  
LIMESTONE: 5%, thin beds, clean, very fine to finely crystalline, trace fossil fragments, trace pyrite, tight.

1265-1270 SHALE: calcareous, silty, grading to marlstone and siltstone, trace pyrite, trace ostracods, with increasing darker, non-calcareous shale.  
SILTSTONE: thin beds, argillaceous and calcareous.

1270-1275 SHALE: very calcareous, silty to very silty, grading to marlstone and siltstone, trace very small blind vugs, trace calcite coated fractures.  
SILTSTONE: thin beds.

1275-1280 SHALE: as above, grading to marlstone and siltstone.  
SILTSTONE: as above.  
Trace fossil fragments and argillaceous limestone laminae.

1280-1285 SHALE: calcareous to very calcareous, silty to very silty, trace pyritic, grading to marlstone and minor siltstone.

1285-1290 SHALE: as above, grading to marlstone and siltstone.

1290-1295 SHALE: as above, grading to marlstone and siltstone.

1295-1300 SHALE: predominantly very calcareous, silty to very silty, grading to marlstone and siltstone, with thin beds darker shale, non-calcareous.

1300-1305 SHALE: very calcareous, slightly silty to very silty, slight disseminated pyrite, only trace siltstone, rare dead organic specks.

1305-1310 SHALE: calcareous, slightly silty to silty, decreasing marlstone, trace pyrite.

1310-1315 SHALE: calcareous, slightly silty, silty beds, slight disseminated pyrite throughout, microscopic spines pyrite, minor siltstone interbeds.

1315-1320 SHALE: medium brownish, calcareous, increasing silt throughout, trace disseminated pyrite, trace micromicaceous.

1320-1325 SHALE: increasing calcareous, silty, disseminated pyrite, grading to silty marlstone, minor grading to calcareous, argillaceous siltstone.

1325-1330 SHALE: as above, calcareous, part grading to marlstone, slightly silty, trace siltstone, trace calcite filled microfractures.

1330-1335 SHALE: as above, grading to silty marlstone.

SILTSTONE: laminae, calcareous, argillaceous to occasionally clean, pyrite crystals common, slight dark, dead organic/bitumen specks, tight, no stain or cut.

1335-1340 SHALE: medium brownish grey, calcareous to very calcareous, increasing silty, grading to silty marlstone, disseminated pyrite throughout.

SILTSTONE: laminae and thin beds, predominantly argillaceous, calcareous, disseminated pyrite, minor clean siltstone, trace bitumen specks, tight, no stain or cut.

1340-1342 SHALE: as above, grading to marlstone and siltstone.

SILTSTONE: 20%, predominantly argillaceous, calcareous, part clean to slightly argillaceous, euhedral pyrite crystals to fine grain throughout, trace pin point vugs, slight bitumen specks, no stain or cut.

1342-1345 SHALE: part very calcareous, very silty, grading to silty marlstone and siltstone, part grey slightly calcareous platy shale.

SILTSTONE: thin beds, predominantly argillaceous, part clean, pyritic, pin point bitumen specks, tight, trace pin point vugs, no stain or cut.

1345-1350 SHALE: platy, medium to dark grey, micromicaceous, trace pyrite, trace calcareous, probably cavings, also calcareous shale as above, grading to marlstone and minor siltstone laminae.

1350-1355 SHALE: predominantly medium grey, platy and splintery, slightly calcareous, slightly silty, also common calcareous shale as above, decreasing silty, occasionally very silty, slight disseminated pyrite.

1355-1360 SHALE: grey, silty, slightly calcareous to calcareous, micromicaceous, disseminated pyrite and few fine crystals.

1360-1365 SHALE: medium grey, slightly darker microlaminations, silty, calcareous, micromicaceous, trace pyrite.

1365-1370 SHALE: medium grey, silty, with increasing very silty beds, grading to argillaceous siltstone, slightly calcareous to calcareous, micromicaceous, blocky.

1370-1375 SHALE: slightly calcareous to calcareous, slightly silty.

1375-1380 SHALE: medium grey, micromicaceous, slightly silty, slightly calcareous to calcareous, disseminated pyrite, trace carbonaceous partings, blocky.

1380-1385 SHALE: calcareous, silty, few very silty beds.

1385-1390 SHALE: as above.

1390-1395 SHALE: calcareous, disseminated pyrite, few very silty beds, trace siltstone laminae. Trace calcite filled fractures.

LIMESTONE: 5%, light grey, microcrystalline, very silty, grading to clean siltstone, pyritic, tight.

1395-1400 SHALE: medium brown, calcareous to very calcareous, silty to very silty, grading to silty marlstone.

MARLSTONE: 40%, silty to very silty, blocky, hard, tight.

LIMESTONE: thin beds, slightly argillaceous to argillaceous, very silty, grading to siltstone, trace pyrite, tight, trace bitumen specks, no stain or cut.

1400-1405 MARLSTONE: brown, very silty, part grading to siltstone.

SHALE: darker, brownish grey, calcareous to very calcareous, silty, trace fossil fragments, pelecypod, pyrite. Begin minor dark grey to black shale, non-calcareous.

LIMESTONE: 20%, light grey, microcrystalline, soft, silty to very silty, increasingly grading to siltstone, slightly argillaceous, trace pyritic, tight.

SILTSTONE: thinly interbedded with limestone.

#### **BLUEFISH 1401m (-1240.34m)**

1405-1410 SHALE: dark grey to black, very dark brown, trace calcareous, carbonaceous/bituminous, white calcite microlaminations and specks, fossil?

MARLSTONE: with calcareous shale and trace siltstone as above.

1410-1415 SHALE: dark grey, black, pyrite blebs and laminae, white calcite specks and laminae, fossil fragments, calcite fracture filling, carbonaceous/bituminous.

LIMESTONE: 40%, brown, light grey, microcrystalline, with white calcite fossil fragments, wackestone, argillaceous, silty in part, trace pyrite, tight, no stain or cut.

#### **NAHAMNI 1413m (-1252.34m)**

1415-1420 LIMESTONE: brownish grey, microcrystalline, argillaceous, fine fossil fragments throughout, brachiopods, ostracods, wackestone, part packstone, tight, crystalline calcite on occasional fractures, no stain or cut.

SHALE: 15%, dark grey and black, as above.

1420-1425 LIMESTONE: light grey, light brown, argillaceous, scattered to packed fossil fragments, ostracods, wackestone and packstone, crystalline calcite and rare quartz lining trace small vugs, tight, no stain or cut. Also darker brownish grey, very argillaceous, grading to marlstone, scattered fossils, silty, trace pyrite, tight, blocky, hard.

SHALE: 15%, light grey, platy, soft, trace calcareous, trace fossil fragments, pyrite.

1425-1430 LIMESTONE: light brownish grey, microcrystalline, some very finely crystalline, slightly argillaceous, trace silty, small ostracods and brachiopods, wackestone. Also part darker, very calcareous, grading to marlstone, as above.

SHALE: 10%, light grey.

1430-1435 LIMESTONE: light to medium brown, microcrystalline, slightly argillaceous to argillaceous, ostracods, brachiopods, locally pyritic, also soft, white and light brownish, cleaner beds, tight, trace calcite filled fractures, trace very fine to fine recrystallization around small vugs, no stain or cut.

1435-1440 LIMESTONE: light-medium-dark brown, microcrystalline, slightly argillaceous to argillaceous, part grading to marlstone, scattered small fossil fragments, brachiopods, ostracods, trace silty, trace pyrite, tight, slightly bituminous. Trace dark bitumen coated stylolites, occasional vugs lined with calcite.

1440-1445 LIMESTONE: light to medium brown, microcrystalline, fossil fragments, packstone, minor very finely crystalline, tight, no stain or cut. With 20% dark brown, microcrystalline, very argillaceous, blocky, hard. Part with slight dead organic specks and bitumen, scattered small vugs, trace dolomitization probably associated with stylolites, no stain or cut.

1445-1450 LIMESTONE: part light brown, very slightly argillaceous, trace dolomitic, part dark brown and very argillaceous, trace brachiopods and ostracods, pellets, slight patchy dolomitization, few stylolites, very tight microfractures, no stain or cut.

SHALE: thin bed, dark brown, calcareous, slightly bituminous, pyritic.

1450-1455 LIMESTONE: increasing lighter brown, slightly argillaceous, microcrystalline, minor very finely crystalline, part soft, part poorly sucrosic, fossil fragments, wackestone, tight, few patches slight dolomitization, trace calcareous dolomite, slight dead stain, no cut or fluorescence, trace small vugs. With interbeds of argillaceous microcrystalline lime mudstone, trace fossils.

1455-1460 LIMESTONE: part clean, wackestone, part dark brown, argillaceous mudstone, trace patchy dolomitization, few bitumen coated stylolites, minor soft chalky white limestone, tight, no stain or cut.

1460-1465 LIMESTONE: as above, wackestone with argillaceous, lime mudstone interbeds, trace dolomitization, scattered small fossil fragments, trace pyrite, tight, trace vugs lined with calcite, also begin light grey, microcrystalline, argillaceous, slightly fossiliferous limestone, tight, no stain or cut.

**HEADLESS 1464m (-1303.34m)**

1465-1470 LIMESTONE: part clean, white, light grey, light brownish, packstone and wackestone, part light grey, microcrystalline, very argillaceous, trace silty, fossils, ostracods, pyrite, also brown, argillaceous beds as above, small stylolites, trace calcite crystals from vugs, no stain or cut.  
SHALE: 15%, medium grey.

**1470-1471 SAMPLE FROM DRILLING BREAK AND MUDLOG PEAK.**

LIMESTONE: microcrystalline to very finely crystalline, slightly argillaceous to argillaceous, fossil fragments. With thin band of drusy crystals of medium to coarse calcite, minor dolomite, trace quartz, very clean, very good drusy vugs or moldic intrafossil porosity in thin band, no stain or cut, possibly open fracture filling?

1471-1475 POOR SAMPLE

LIMESTONE: light grey, microcrystalline to very finely crystalline, packstone, clean, slightly silty, locally pyritic, ostracods and brachiopods, tight, few vugs, also darker, argillaceous, microcrystalline beds.

SHALE: 20%, grey, slightly silty, slightly calcareous. Black carbonaceous shale is probably all cavings.

1475-1480 LIMESTONE: packstone, as above, clean to slightly argillaceous, pellets, crinoids, gastropods, ostracods, brachiopods, microcrystalline to very finely crystalline, increasing darker brown, argillaceous beds, bitumen specks, few very bituminous streaks, carbonaceous coated stylolites.

SHALE: 5%, medium grey.

1480-1485 LIMESTONE: microcrystalline to very finely crystalline, argillaceous to very argillaceous, slightly silty, slightly dolomitic, increase bitumen specks, ostracod, brachiopod, crinoid fragments, packstone, some lighter cleaner beds and darker, lime mudstone interbeds, tight, no stain or cut. Few carbonaceous stylolites, trace dolomitization and calcareous sucrosic dolomite. Dark shale probably all cavings.

1485-1490 LIMESTONE: packstone, microcrystalline to very finely crystalline, ostracods brachiopods, crinoids, pellets, tight, minor chalky softer beds, also argillaceous to very argillaceous beds, slight dolomitization, pyrite.

SHALE: trace amounts, medium grey, pyritic, slightly calcareous.

1490-1495 LIMESTONE: as above, fossils, packstone, tight, no stain or cut, trace dolomitization.

SHALE: medium grey, thin beds. Carbonaceous/coaly chips from stylolites, may be all cavings?

1495-1500 SILTSTONE: medium grey, very calcareous, slightly argillaceous, disseminated pyrite, trace dolomitic, tight.

LIMESTONE: 40%, increasing light grey, light brown and white, fossiliferous, tight, no stain or cut.

SHALE: medium grey, platy, slightly silty, trace pyrite, slightly calcareous, very silty beds, with siltstone laminae.

1500-1505 LIMESTONE: grey, microcrystalline to very finely crystalline, slightly argillaceous to argillaceous, disseminated pyrite, crinoids, fossil fragments, wackestone, tight, trace calcite lined vugs, no stain or cut.

SHALE: 25%, medium grey, slightly silty, disseminated pyrite, slightly calcareous. Dark bituminous shale is all cavings?

1505-1510 SHALE: silty, slightly calcareous to calcareous, grading to limestone.

LIMESTONE: 45%, as above, scattered fossil fragments.

LANDRY 1511m (-1350.34m)

1510-1515 LIMESTONE: light grey, microcrystalline, very finely crystalline, packstone, possibly grainstone beds, increasing fine fossil fragments, crinoids, brachiopods, pellets, grey argillaceous pellets, shale clasts, disseminated pyrite, silty beds, tight, no stain or cut.

SHALE: 15%.

1515-1520 SHALE: grey, calcareous, slightly silty, disseminated pyrite.

LIMESTONE: microcrystalline, argillaceous, decreasing to only scattered fossils, disseminated pyrite, slightly silty, tight.

1520-1525 LIMESTONE: light brownish grey, slightly argillaceous, as above, begin white cleaner limestone, pellets, crinoids, trace stromatoporoid fragments, microcrystalline to very finely crystalline, occasional finely crystalline, silty, disseminated pyrite, tight, trace dead stain, no cut or fluorescence.

SHALE: 20%, as above.

1525-1530 LIMESTONE: light brown, light grey, white, very finely crystalline, some finely crystalline, brachiopods, pellets, ostracods, grey argillaceous pellets, pyrite, trace vugs, trace drusy crystals from vugs or moldic fossil porosity, no stain or cut.

SHALE: only trace grey shale.

1530-1535 LIMESTONE: as above, slightly argillaceous, fossil fragments, trace vugs. SHALE: 10%.

1535-1540 LIMESTONE: light to medium brownish grey, microcrystalline and very finely crystalline, scattered fossils, mudstone and wackestone, slightly argillaceous, slightly silty, pyrite, tight, trace coarse crystalline calcite from vugs or fracture filling, no stain or cut.

SHALE: 5%, medium grey.

1540-1545 LIMESTONE: darker, medium brownish grey, cryptocrystalline and microcrystalline, disseminated and blebs pyrite, mudstone with occasional pellets, fossil fragments, pyrite, argillaceous, tight. SHALE: 5%.

1545-1550 LIMESTONE: predominantly very dark brownish grey, cryptocrystalline, argillaceous to very argillaceous, scattered pellets and fragments, slight bitumen specks, trace pyrite tight, shale partings. Minor lighter brown and grey limestone.

1550-1555 LIMESTONE: predominantly dark brown, cryptocrystalline, argillaceous, wormy brecciated texture, bitumen rich matrix, blocky, dense, part lighter, cleaner, pellets and fragments, microcrystalline to very finely crystalline, tight, no stain or cut. Increasing black, bitumen rich patches and stylolites.

1555-1560 LIMESTONE: cryptocrystalline, argillaceous, wormy brecciated texture, pellets and fine cryptocrystalline fragments in bitumen rich matrix, pyrite, black bitumen partings, hard, dense, tight.

1560-1565 LIMESTONE: light to dark brown, cryptocrystalline, bitumen specks throughout on stylolites and microfractures, locally pellets and wormy texture, dense, tight.

1565-1570 LIMESTONE: light to dark brown, cryptocrystalline, trace argillaceous, bitumen specks and partings common, stylolites, trace fine dolomite crystals, tight, no stain or cut. Minor beds chalky white limestone.

1570-1575 LIMESTONE: light-medium-dark brown, cryptocrystalline, packed pellets and intraclasts, bitumen rich lime mudstone matrix, bitumen rich partings, stylolites, dense, tight, trace dolomitization, few vugs lined with calcite, no stain or cut. Minor part soft, chalky beds.

1575-1580 LIMESTONE: predominantly dark brown, cryptocrystalline, only trace argillaceous, pellets, bitumen specks throughout, stylolites, white calcite lined vugs and fracture filling.

1580-1585 LIMESTONE: predominantly dark, minor light brown, vague pellets and intraclasts, bitumen specks throughout, stylolites, bitumen coated microfractures, trace interpelletaloid pin point vugs, increasing white, fine to coarse crystalline, secondary calcite filling vugs and fracture, no stain or cut.

1585-1590 LIMESTONE: as above, decreasing secondary calcite, bitumen specks throughout, no stain or cut. Trace calcareous shale partings.

1590-1595 LIMESTONE: predominantly dark brown, cryptocrystalline, trace argillaceous, bitumen specks, part with intraclasts, black bitumen coated stylolites and partings.

1595-1600 LIMESTONE: as above, bitumen specks, coatings, stylolites, locally pellets and intraclasts, increasing white, crystalline, secondary calcite in small vugs and fractures.

1600-1605 LIMESTONE: predominantly dark brown as above, increasing lighter brown, soft, microcrystalline, bitumen specks, stylolites, tight, no stain or cut. White calcite filling fractures, veinlets?

1605-1610 LIMESTONE: generally as above, increasing lighter brown, soft, micro-crystalline, tight, white crystalline calcite filling vugs and fractures, bitumen coated stylolites.

1610-1615 LIMESTONE: light to dark brown, trace argillaceous, locally bitumen specks, stylolites, part vague pellets and intraclasts, blocky, hard, tight, trace vugs and fractures with crystalline secondary calcite. Also lighter brown, soft, microcrystalline beds.

1615-1620 LIMESTONE: light to dark brown, cryptocrystalline, part with pellets and intraclasts, part lighter brown, microcrystalline, soft, very clean, increasing secondary calcite filling fractures, trace microscopic quartz needles, tight, no stain or cut.

1620-1625 LIMESTONE: predominantly light brown, cryptocrystalline, clean, bitumen specks locally, few stylolites, crystalline calcite filling fractures and trace vugs, no stain or cut.

1625-1630 LIMESTONE: darker, cryptocrystalline, increasing intraclast texture, bitumen coatings, only trace argillaceous, trace pyrite, tight.

1630-1635 LIMESTONE: light-medium-dark brown, increasing lighter beds, increasing black bitumen coated stylolites and partings, secondary white calcite fracture filling, tight, no stain or cut.

1635-1640 LIMESTONE: as above, cryptocrystalline, locally pellets, decreasing bitumen, tight.

1640-1645 LIMESTONE: light to dark brown, cryptocrystalline, part microcrystalline, slight bitumen specks, trace stylolites, tight, no stain or cut, slight secondary calcite filling fractures.

1645-1650 LIMESTONE: generally lighter, cryptocrystalline, bitumen specks, vague pellets, fragments/breccia, intraclasts, bitumen coatings, tight, no stain or cut, slight secondary calcite filling fractures.

1650-1655 LIMESTONE: predominantly dark brown, cryptocrystalline, part lighter brown, microcrystalline, pellets, in part pellets in clear sparry calcite, increasing bitumen coated stylolites, bitumen coating fragments, tight, secondary white crystalline calcite filling fractures.

1655-1660 LIMESTONE: light to dark brown, cryptocrystalline, pellets common, in part pellets in clear sparry calcite, stylolites, bitumen rich streaks, trace pyrite blebs, tight, no stain or cut. Trace streaks pyritic argillaceous streaks. Trace dolomitization of matrix, trace tan, cryptocrystalline, clean dolomite.

1660-1665 LIMESTONE: predominantly medium brown, cryptocrystalline, clean to trace argillaceous, tight.

DOLOMITE: 20%, light brown, microcrystalline, very clean, blocky, tight, hard.

1665-1670 LIMESTONE: medium brown, cryptocrystalline, with pellets and vague fragments or breccia, part pellets in clear sparry calcite, tight.

DOLOMITE: very thin bed, 5%.

1670-1675 LIMESTONE: light-medium-dark brown, cryptocrystalline, lighter beds microcrystalline, softer, part vague pellets, clean, tight, trace cryptocrystalline dolomite.

1675-1680 LIMESTONE: light to dark brown, cryptocrystalline, very clean, lighter beds soft and chalky, locally vague pellets/intraclasts, trace siliceous needles, 1-2% tan, cryptocrystalline dolomite. Trace grey pyritic shale.

1680-1685 LIMESTONE: light to dark brown, cryptocrystalline, as above, trace tan cryptocrystalline dolomite.

#### **ARNICA 1686m (-1525.34m)**

1685-1690 LIMESTONE: as above.

DOLOMITE: 40%, very light brown, finely crystalline, some very finely crystalline, very clean, trace silt, trace pyrite, tight, hard.

1690-1695 DOLOMITE: light to medium brown, predominantly finely crystalline, part very fine to finely crystalline, thin bed microcrystalline, trace small vugs with white calcite.

LIMESTONE: 10%, cryptocrystalline as above, may be all cavings?

1695-1700 DOLOMITE: predominantly finely crystalline, part very fine to finely crystalline, tightly interlocking rhombs, locally slight intercrystalline dead organic residue, trace stylolites, tight, no stain or cut.

LIMESTONE: 15%, as above, probably all cavings.

1700-1705 DOLOMITE: light brown, increasing medium to dark brown, very fine to finely crystalline, part microcrystalline, clean, trace pyrite, trace anhydrite crystals, slight intercrystalline dead organic residue, trace bitumen specks, tight, secondary white calcite from vugs and fracture filling.

1705-1710 DOLOMITE: very light to medium brown, predominantly finely crystalline, part microcrystalline to very finely crystalline, clean, trace silt, trace pyrite, trace intercrystalline dead organic residue, trace stylolites, increasing secondary white calcite from vugs and fracture filling, trace anhydrite crystals.

1710-1715 DOLOMITE: light to dark brown, very fine to finely crystalline, some microcrystalline, trace isolated pin point vugs, with 5% white crystalline calcite fracture and vug filling, trace clear anhydrite crystals, no stain or cut.

1715-1720 DOLOMITE: generally as above, part medium brown, very finely sucrosic with pin point vugs, 6% porosity, streaks 10%, no stain or cut.

1720-1725 DOLOMITE: very fine to finely crystalline, part microcrystalline, clean, tight, 10% coarse, white, crystalline calcite fracture and vug filling, slight dead organic residue, trace pyrite, no stain or cut. Trace beds with poor pin point porosity.

1725-1730 DOLOMITE: light-medium-dark brown, part with remnant fossil fragments, predominantly tight, minor with pin point 3-4% porosity, no stain or cut, with 10% white, secondary calcite from vugs and fractures.

1730-1735 DOLOMITE: very fine to finely crystalline, some microcrystalline, interlocking rhombs, locally slightly pyritic, part with remnant fossil fragments, slight dead organic residue, few stylolites, rare anhydrite crystals, tight, minor poor pin point vugs, trace dull yellow mineral fluorescence on microcrystalline dolomite, no stain or cut. With 5% white secondary calcite.

1735-1740 DOLOMITE: as above, very fine to finely crystalline, predominantly tight, thin beds of poor pin point vuggy porosity, 3-5%, trace fair porosity, no stain or cut. With 5% coarse secondary calcite vug and fracture filling and veinlets.

1740-1745 DOLOMITE: as above, predominantly tight, isolated vugs, thin beds with poor sucrosic and pin point vuggy porosity, no stain or cut, decreasing crystalline calcite.

1745-1750 DOLOMITE: medium brown, very fine to finely crystalline, begin light brown, microcrystalline to very finely crystalline, poorly sucrosic, part with vague pellet/fragmental texture, predominantly tight, part with poor sucrosic and pin point vuggy porosity, no stain or cut, decrease secondary white calcite fracture and vug filling.

1750-1755 DOLOMITE: predominantly light brown, microcrystalline to very finely crystalline, poorly sucrosic, clean, slightly silty, small isolated vugs, part with poor sucrosic porosity, part pin point vugs and 4-5% porosity, no stain or cut. Also part darker brown, very fine to finely crystalline as above. Trace stylolites and bitumen specks.

1755-1760 DOLOMITE: light brown, microcrystalline to very finely crystalline, part sucrosic, 30% darker brown as above, increasing sucrosic, pin point and small vugs, 3-5% average with minor 6-9%, no stain or cut.

1760-1765 DOLOMITE: light to medium brown, predominantly very finely crystalline, very fine sucrosic, slight bitumen specks and stylolites, tight to scattered isolated vugs, part with poor sucrosic and pin point vugs, 3-4%, no stain or cut. Minor white calcite.

1765-1770 DOLOMITE: very finely crystalline and very fine to finely crystalline, decreasing sucrosic beds, part with vague remnant fragmental texture, isolated pin point vugs, decrease beds with poor sucrosic porosity.

1770-1775 DOLOMITE: very fine to finely crystalline, light to medium brown, scattered pin point vugs, decreasing porosity, trace bitumen specks and stylolites, no stain or cut.

1775-1780 DOLOMITE: part very fine to finely crystalline, trace vugs, begin very common lighter brown, microcrystalline, tight, no sucrosic beds, no stain or cut.

1780-1785 DOLOMITE: predominantly white and very light brown, slight grey tint, fine to medium crystalline, interlocking rhombs, very clean, trace pyrite, slight patchy silicification, slightly anhydritic, trace calcareous, with 5% secondary, coarse crystalline white calcite from veins, fractures and vugs, no stain or cut.

1785-1790 DOLOMITE: very variable, part very finely crystalline, light to medium brown, part fine to medium crystalline, very light brown as above, part microcrystalline to very finely crystalline, increasing silicification patches, trace light grey and light tan chert nodules, trace pyrite, no stain or cut.

1790-1797 \*SAMPLE CAUGHT AFTER TRIP and DEPTH CORRECTION, ACTUAL DEPTH 1797m\*

DOLOMITE: white and very light brown, finely crystalline and some medium crystalline, clean, trace anhydritic, trace green argillaceous streaks, with disseminated pyrite.

SHALE: laminae, light green, disseminated pyrite, slightly dolomitic, soft, part waxy, trace silty.

1797-1802 \*SAMPLE CAUGHT AT 1802m AFTER DEPTH CORRECTION\*

DOLOMITE: light brown, finely crystalline, tightly interlocking rhombs, locally pyrite blebs, few siliceous patches, green argillaceous streaks, tight, no stain or cut.

SHALE: 30%, very light green, part light grey, disseminated pyrite throughout, dolomitic, slightly silty, part waxy.

**TATSIETA 1799m (-1641.34m)**

1800-1805 SHALE: very light green, part light grey, disseminated pyrite, slightly silty, slightly dolomitic, trace anhydritic, waxy in part.

DOLOMITE: 30%, very light to medium brown, very fine and finely crystalline, clean, trace pyrite, trace green argillaceous laminae, tight, no stain or cut.

1805-1810 DOLOMITE: light to medium brown, predominantly finely crystalline, part very finely crystalline, pyrite blebs, slightly siliceous, trace chert nodules, trace green argillaceous streaks, tight, no stain or cut.

SHALE: 30%, light green, very pyritic, slightly dolomitic, waxy in part.

1810-1815 DOLOMITE: very light brown, part medium brown, finely crystalline, tightly interlocking rhombs, greenish argillaceous & pyritic streaks.

SHALE: 10%, generally as above, pyritic, dolomitic.

**MOUNT KINDLE 1812m (-1651.34m)**

1815-1820 DOLOMITE: lighter, very light brown, finely crystalline, tightly interlocking rhombs, clean, trace anhydritic, 15% darker brown, slight dead organic residue, trace stylolites, few siliceous and cherty dolomite nodules, trace pyrite, tight, no stain or cut.

1820-1825 DOLOMITE: very light brown, increasing light grey, also part darker brown as above, very fine to finely crystalline, part microcrystalline, tight, increasing siliceous patches, very slightly argillaceous in grey, microcrystalline beds.

1825-1830 DOLOMITE: slightly darker, light to medium brown and grey, finely crystalline, part medium crystalline, thin beds microcrystalline to very finely crystalline, clean, very slightly siliceous, hard, tight.

1830-1835 DOLOMITE: as above, finely crystalline, clean, tightly interlocking rhombs, minor darker brown, microcrystalline, very slightly silty, part light grey, silty, argillaceous and pyritic, trace anhydritic, increasing silicification, trace light grey cherty dolomite.  
Trace green shale laminae.

1835-1840 DOLOMITE: light brown and grey, finely crystalline, minor medium crystalline, slightly siliceous, hard, tight, no stain or cut, with thin beds slightly argillaceous and silty, microcrystalline to very finely crystalline dolomite, trace pyrite.  
Trace green shale laminae.

1840-1845 DOLOMITE: as above, with white to very light brown, microcrystalline to very finely crystalline dolomite, slightly silty, part slightly argillaceous, trace anhydritic, very slight mineral fluorescence, no stain or cut.  
Trace light green shale, disseminated pyrite, trace silty.

1845-1850 DOLOMITE: white, light brown, light grey, slightly finer, very fine to finely crystalline, clean, trace argillaceous streaks, trace anhydritic, rare pyrite, tight, no stain or cut.

1850-1855 DOLOMITE: white and very light grey, very finely crystalline, part poorly sucrosic, trace silty, trace anhydritic, tight, also light brown and grey, very fine to finely crystalline as above, trace siliceous, tight, no stain or cut.

1855-1860 DOLOMITE: darker, medium brown, very fine to finely crystalline, slightly silty, slightly siliceous, dead organic residue in acid, trace stylolites, hard, tight, trace isolated small vugs lined with dolomite crystals, slight dull yellow mineral fluorescence, no stain or cut.

1860-1865 DOLOMITE: light to medium brown, very fine to finely crystalline, slightly silty, tight, slight dull yellow fluorescence, very slight dead organic residue.

1865-1870 DOLOMITE: very fine to finely crystalline as above, tight, trace isolated vugs with dolomite and trace anhydrite crystals, also very finely crystalline, poorly sucrosic, very light brown, slightly silty, trace anhydritic, tight.

1870-1875 DOLOMITE: very fine to finely crystalline as above, isolated vugs, with very common very finely crystalline, poorly sucrosic, silty to very silty, trace sandy, anhydritic, siliceous, tight, no stain or cut, trace stylolites.

1875-1880 DOLOMITE: as above, very fine to finely crystalline, part poorly very fine sucrosic, silty to very silty, trace sandy, siliceous, slightly anhydritic, tight, trace white and light brown chert nodules.

1880-1885 DOLOMITE: very fine to finely crystalline, part poorly sucrosic, silty, siliceous, trace cherty, hard, tight, trace isolated vugs, no stain or cut, rare stylolites.

1885-1890 DOLOMITE: as above, minor poorly sucrosic, slightly silty and siliceous, trace anhydritic, scattered vugs, no stain or cut.

1890-1895 DOLOMITE: slightly darker, very fine to finely crystalline, tightly interlocking rhombs, increasing silty, slightly siliceous, trace vugs with white dolomite crystals, slight dead organic residue, no stain or cut. With 10% white, very finely crystalline, clean.

1895-1900 DOLOMITE: very fine to finely crystalline, tightly interlocking, minor vague pellet texture, scattered vugs, slightly silty, slightly siliceous, dead organic residue, no stain or cut.

1900-1905 DOLOMITE: very fine to finely crystalline, predominantly medium brown, slightly silty and siliceous, trace cherty dolomite, increase white dolomite and anhydrite crystals from scattered vugs, dull yellow mineral fluorescence, no stain or cut.

1905-1910 DOLOMITE: begin light brown, microcrystalline to very finely crystalline, clean, slightly silty, tight, minor poorly sucrosic. Also very fine to finely crystalline, light to medium brown, as above, tightly interlocking rhombs, siliceous and cherty nodules, scattered vugs, dull mineral fluorescence, no cut.

1910-1915 DOLOMITE: very light brown, very finely crystalline, minor poorly sucrosic, very poor sucrosic porosity best, trace stylolites, with medium brown, finely crystalline dolomite, tightly interlocking rhombs, trace vugs, no stain or cut.

1915-1920 DOLOMITE: very light brown as above, part barely finely crystalline, poorly sucrosic, part with very poor sucrosic at best, slightly silty, slightly siliceous, with 15% medium brown, finely crystalline with scattered vugs, no stain or cut.

1920-1925 DOLOMITE: predominantly light brown, very finely crystalline to barely finely crystalline, poorly sucrosic, clean, slightly silty, slightly siliceous.

1925-1930 DOLOMITE: light brown, very finely crystalline, very poorly sucrosic, with 10% darker, finely crystalline, increasing fine to medium dolomite and anhydrite crystals from scattered vugs, no intercrystalline porosity, trace siliceous, no stain or cut.

1930-1935 DOLOMITE: darker, light-medium-dark brown, very fine to finely crystalline, increase silicification, slight dead organic residue, trace pyrite, small vugs lined with dolomite and trace anhydrite crystals, no intercrystalline porosity, no stain or cut.

1935-1940 DOLOMITE: light brown, very fine to fine crystalline, tightly interlocking rhombs, with increasing vuggy porosity, dolomite, quartz and anhydrite lining vugs, increasing silicification, slightly silty, no intercrystalline porosity, with 20% very finely crystalline, very poor sucrosic porosity at best, no stain or cut.

1940-1945 DOLOMITE: light-medium-dark brown, as above, slightly siliceous and silty, vugs common, no stain or cut.

1945-1950 DOLOMITE: very fine to finely crystalline, tightly interlocking rhombs, scattered vugs throughout lined with dolomite and trace anhydrite crystals, silty, slightly siliceous, trace white chert nodules, no stain or cut.

1950-1955 DOLOMITE: finer, very finely crystalline predominantly, part very fine to barely finely crystalline, part poorly sucrosic, very poor sucrosic porosity at best, silty, increasing siliceous, trace anhydritic, 1% white chert nodules, no stain or cut. With 15% darker brown, very fine to finely crystalline, trace vugs, dead organic residue.

1955-1960 DOLOMITE: very fine to finely crystalline, as above, scattered vugs, trace white calcite filled fractures, few white chert nodules, begin very fine sucrosic dolomite, soft, slightly argillaceous and silty, trace pyrite, trace anhydritic, poor sucrosic porosity, no stain or cut.

1960-1965 DOLOMITE: light brown, very finely crystalline, poorly sucrosic, slightly silty, some barely fine grained quartz, very slightly argillaceous, trace pyrite, trace calcareous, poor sucrosic porosity 2-3%, minor finely sucrosic, light brown, trace streaks 6-8% probably recrystalline around vugs, no stain or cut. With 15% darker brown, very fine to finely crystalline, with scattered vugs, trace white chert.

1965-1970 DOLOMITE: very fine to barely finely crystalline, decreasing poor sucrosic porosity, slightly silty, slight dead organic residue, trace pyrite, trace calcareous, no stain or cut.

1970-1975 DOLOMITE: very fine to finely crystalline, light to medium brown, poorly sucrosic, poor sucrosic porosity, trace good sucrosic porosity probably recrystallization around vugs, slightly anhydritic, trace soft white anhydrite, no stain or cut.

1975-1980 DOLOMITE: very fine to finely crystalline, tightly interlocking rhombs, vugs common, dolomite and anhydrite and trace calcite on few fractures, trace stylolites, bitumen specks, silty, siliceous, as above, no stain or cut.

1980-1985 DOLOMITE: predominantly finely crystalline, light to medium brown, vugs common, dolomite and anhydrite crystals lining vugs, slightly siliceous, no intercrystalline porosity, no stain or cut.

1985-1990 DOLOMITE: finely crystalline, vugs lined with dolomite, anhydrite, trace quartz and pyrite, no intercrystalline porosity, slightly silty, slightly siliceous, 10% poorly sucrosic beds, no stain or cut.

1990-1995 DOLOMITE: coarser, finely crystalline and fine to medium crystalline, increasing vugs, poor to fair vuggy porosity, medium to coarse crystalline dolomite and anhydrite in vugs, no intercrystalline porosity, increase silification, siliceous nodules, 1% white chert, no stain or cut.

1995-2000 DOLOMITE: light brown, medium crystalline, part fine to medium crystalline, coarse crystalline around vugs, very common vugs, 4-6% vuggy porosity, predominantly no intercrystalline porosity, part poorly sucrosic, chalky calcite and anhydrite in porosity, increasing silification, increase clear silica and white chert nodules, trace quartz crystals, no stain or cut.

2000-2005 DOLOMITE: light to medium brown, finely crystalline, minor fine to medium crystalline, tightly interlocking rhombs, decreasing to scattered vugs, trace pin point vugs, anhydritic, slightly siliceous, white and light brown chert nodules, no stain or cut.

2005-2010 DOLOMITE: darker, predominantly medium brown, finely crystalline, minor fine to medium crystalline, tightly interlocking rhombs, vugs fairly common, 4-5% locally, anhydrite and quartz crystals in vugs, trace pyrite, 2% chert nodules, no stain or cut.

2010-2015 DOLOMITE: predominantly medium brown, finely crystalline, vugs common, very slight dead organic residue, rare bitumen specks, 5% white, light brown and clear chert and silica nodules.

2015-2020 DOLOMITE: finely crystalline, tightly interlocking, some poorly sucrosic, decreasing vugs, poor porosity at best, decreasing silicification and chert nodules, trace bitumen on stylolites, no stain or cut.

2020-2025 DOLOMITE: begin white to very light brown, very fine to finely crystalline, very poorly sucrosic, slightly silty, tight to very poor sucrosic porosity at best, also finely crystalline, darker brown, as above, scattered vugs, no stain or cut.

2025-2030 DOLOMITE: white, very light brown, very fine to finely crystalline, soft, very poorly sucrosic, silty, increasing siliceous nodules, anhydritic, tight, no stain or cut. With beds light to medium brown, finely crystalline, scattered vugs, as above.

2030-2035 DOLOMITE: white, light brown, very fine to finely crystalline, part poorly sucrosic, silty, siliceous patches, clear, white and light brown silica and chert nodules, tight, no stain or cut, with finely crystalline beds as above, scattered vugs.

2035-2040 DOLOMITE: white, very light brown, very finely crystalline, silty, becoming sandy, well rounded, very fine and fine, clear quartz, clean, slightly anhydritic, minor part trace calcareous, very poor sucrosic porosity at best, no stain or cut. With medium brown, slightly grey, very fine to finely crystalline, siliceous nodules.

2040-2045 DOLOMITE: as above, very finely crystalline, silty to very silty, sandy to stringers very sandy, very clean, tight to trace poor sucrosic porosity, also white, very fine to finely crystalline, tightly interlocking rhombs, trace vugs, no stain or cut.

2045-2050 DOLOMITE: white, very light brown, very finely crystalline, poorly sucrosic, silty, sandy to very sandy, anhydritic, very clean, tight to very poor sucrosic porosity, also white to light grey, very fine to finely crystalline, tightly interlocking rhombs, slightly silty and anhydritic, clean, tight, few scattered vugs, no stain or cut.

2050-2055 DOLOMITE: white, light brown, very finely crystalline and very fine to finely crystalline, silty, sandy, very poorly sucrosic, very fine and fine, well rounded quartz grains, rare medium grains, anhydritic, very clean, tight. White, very light grey and very light brown, tightly interlocking, slightly silty, slightly siliceous, trace vugs, no stain or cut.

CHEVRON SPERRY CREEK N58

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2055-2060 DOLOMITE: predominantly very light grey, tightly interlocking rhombs, finely crystalline, anhydritic, trace pyrite, trace vugs, decreasing very finely crystalline silty dolomite, only very slightly sandy.

2060-2065 DOLOMITE: finely crystalline, part fine to medium crystalline, decreasing anhydritic, trace silica and white chert nodules, tight, trace vugs. Only thin beds silty, very fine crystalline dolomite.

2065-2070 DOLOMITE: white, finely crystalline, very light brown, very light grey, part fine to medium crystalline, tightly interlocking rhombs, tight, trace vugs, anhydritic, increasing siliceous, increasing clear silica and white chert nodules to 10% locally.

2070-2075 DOLOMITE: very light, fine to medium crystalline, tightly interlocking rhombs, minor very poorly sucrosic, slightly silty, 5% siliceous and chert nodules, trace vugs, no stain or cut.

2075-2080 DOLOMITE: finely crystalline, fine to medium crystalline, clean, anhydritic, silty beds, locally siliceous, clear silica & white chert nodules, 5-10% locally, possibly vague pellets in clear silica, tight, trace vugs, with 10% medium brown, finely crystalline dolomite.

2080-2085 DOLOMITE: white, very light brownish grey, fine to medium crystalline, tightly interlocking rhombs, clean, silty, increasing siliceous throughout, 10% clear and white nodules, part vague pellets in clear silica, anhydritic, tight, trace vugs, dull yellow mineral fluorescence, no stain or cut.

2085-2090 DOLOMITE: as above, fine to medium crystalline, siliceous throughout, anhydritic, clean, tight, trace vugs, dull yellow mineral fluorescence, no stain or cut.

2090-2095 DOLOMITE: as above, fine to medium crystalline, siliceous throughout, white chert, scattered vugs lined with quartz crystals, no stain or cut.

2095-2100 DOLOMITE: fine to medium crystalline, siliceous throughout, white chert, trace vugs, no stain or cut

2100-2105 DOLOMITE: fine to medium crystalline, white, very light brownish grey in part, decreasing siliceous, siliceous nodules and white chert, slightly silty, slightly anhydritic, tight, quartz crystals in scattered vugs, no stain or cut, trace dull yellow mineral fluorescence.

2105-2110 DOLOMITE: fine to medium crystalline, very clean, white, very light grey, very light brown, slightly siliceous, clear siliceous nodules, trace pyrite, minor white, very fine to fine, poorly sucrosic, tight, scattered vugs, no stain or cut.

2110-2115 DOLOMITE: as above, siliceous nodules, quartz crystals in scattered vugs, no stain or cut.

2115-2120 DOLOMITE: white, very light grey, very fine to fine to medium crystalline, tightly interlocking rhombs, increasing siliceous throughout, clear silica nodules, quartz crystals common, (one quartz crystal to 1/2cm), increasing vugs but still poor porosity, no stain or cut.

2120-2125 DOLOMITE: fine to medium crystalline, minor very fine to fine crystalline, clean, siliceous throughout, clear silica and white chert nodules, quartz crystals fairly common, anhydritic, poor vuggy porosity, dull yellow mineral fluorescence, no stain or cut.

2125-2130 DOLOMITE: white, very light brown, very light grey, siliceous throughout, silica and chert nodules as above, slightly silty, anhydritic, tight, poor vuggy porosity with quartz crystals, no stain or cut.

2130-2135 DOLOMITE: fine to medium crystalline, with beds very fine to fine crystalline, clean, silica and white chert nodules, slightly silty and anhydritic, tight, poor vuggy porosity with quartz crystals lining vugs, part with dull yellow mineral fluorescence, no stain or cut.

2135-2140 DOLOMITE: fine to medium crystalline, siliceous throughout as above, poor vuggy porosity, also begin very light brownish grey, finely crystalline, poorly sucrosic, anhydritic, clean, very poor sucrosic porosity at best, minor very fine sucrosic, no stain or cut.

2140-2145 DOLOMITE: fine to medium crystalline, increasing medium crystalline, part tightly interlocking rhombs, part poorly sucrosic, siliceous, clear silica nodules and replacement, white chert, anhydritic, quartz crystals, poor vuggy porosity, thin beds white, very fine to finely crystalline, soft, poorly sucrosic, also thin bed, light to medium brown, finely crystalline, trace bitumen specks.

2145-2150 DOLOMITE: fine to medium crystalline, some medium to coarse crystalline, increasing to very siliceous, increasing white chert, clear silica nodules and replacement, quartz crystals in poor vuggy porosity, no stain or cut. With thin bed, 10%, brown, finely crystalline, siliceous, tight, trace bitumen specks.

2150-2155 DOLOMITE: white, very light brown, very light grey, fine to medium crystalline, very siliceous throughout, 50% clear silica, white chert, silt and quartz crystals left in acid, anhydritic, trace pyrite, poor vuggy porosity, also part very fine and fine crystalline, no stain or cut.

2155-2160 DOLOMITE: very light, as above, fine to medium crystalline, minor coarse crystalline, minor very fine to fine, poorly sucrosic, very siliceous, silica and chert nodules and replacement, quartz crystals, poor vuggy porosity at best, thin bed finely sucrosic with very slight bitumen specks, no stain or cut.

APPENDIX 4

CORE ANALYSIS

**AGAT Laboratories  
Core Services Division**

**CORE ANALYSIS REPORT**

**CHEVRON SPERRY CREEK N58  
65-37-56.07/129-25-24.73**

**Prepared for:**

**CHEVRON CANADA RESOURCES LTD.**

**RC3035  
Jan 1991**

**3801-21st Street NE  
Calgary, Alberta  
T2E 6T5  
Tel. 299-2000**

**4954-89th Street  
Edmonton, Alberta  
T6E 5K1  
Tel. 465-0265**

**9625-115th Street  
Grande Prairie  
T0J 0J0  
Tel. 362-5422**

AGAT LABORATORIES CORE SERVICES

SAMPLE HANDLING AND ANALYSIS INFORMATION

Company: CHEVRON CANADA RESOURCES  
Well: CHEVRON SPERRY CREEK N58  
Location: 65-37-56.07/129-25-24.73  
Field:

Coring Equipment: Diamond  
Coring Fluid: Water Base Mud  
Core Diameter: 0.10 m  
Total Cored: 18.00 m  
Total Recovered: 17.85 m

Job Number: RC3035  
Date: Jan. 29, 1991

HANDLING

Core Transported in: Boxes  
Cutting Solution:  
Cleaning solvent:  
Extraction:  
Cleaning time:  
Drying Equipment:  
Drying Time:

REMARKS

No analysis was requested.

COMPANY: CHEVRON CANADA RESOURCES LTD.

WELL: CHEVRON SPERRY CREEK

LOCATION: N-58

FIELD:

FORMATION(S):

W/O: RC3035

**AGAT**  **Labs**

RECOVERY: 17.85

CORED INTERVAL: 845.00 - 863.00

DRLG. FLD.:

ELEVATION: KB:

GRD:

TOTAL WATER  
(frac. P.V.)

GAMMA RAY  
(API)

0 75 150

GRAIN DENSITY  
(kg/m<sup>3</sup>)

DEPTH  
LITHO (m)

PERMEABILITY (K<sub>max</sub>)  
(mD)

POROSITY  
(fraction)

OIL  
SATURATION  
(frac. P.V.)

840

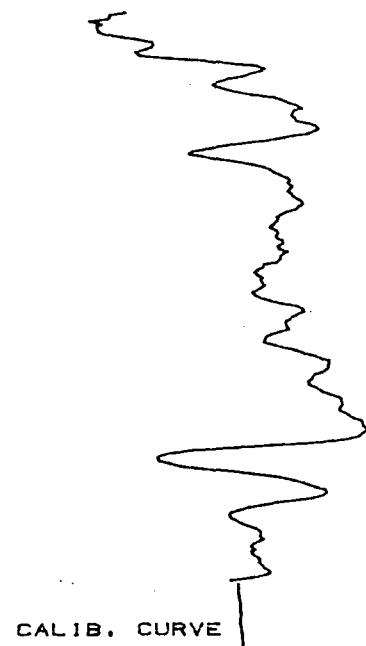
845

850

855

860

865



CORE #1 ARCTIC RED SANDSTONE/IMPERIAL SHALE

INTERVAL: 845-863m

CUT: 18m

RECOVERED: 16.85m

## CORING TIMES:

845m/15,12,11,6,3/4,3,1,1,1/2,1,1,1,1/1,1,1,2/2,2,2,2/2,2,2,2/851m

851m/2,2,3,3,2/3,2,2,2,3/2,3,3,2,2/2,2,2,3,2/\*5,5,5,5/4,4,6,6,5/857m

857m/4,4,3,5,6/4,4,3,4,2\*/1,1,1,1,1/1,2,2,1,2/2,2,2,1,2/1,1,1,1/863m

\*Roller bearings in kelly bushing hanging up and weight not getting to bit.\*

845.00-846.00 SANDSTONE: light brownish grey, very fine to fine grained, silty, (1.00m) clean, carbonaceous and bitumen specks, trace mica flakes, trace pyrite, locally slightly siliceous, subangular, poor to moderate sorting, tight, firm, no stain or cut. Minor rounded pyrite blebs. Carbonaceous coated tight discontinuous fractures throughout, one large vertical fracture coated with carbonaceous material and calcite.

846.00-846.45 SANDSTONE: patchy light grey and light brown, very fine to fine (0.45m) grained, occasional medium grains, increasing carbonaceous content, plant fragments, carbonaceous partings, streaks, patches, fracture coating, slickensides occasionally on partings, silty, quartz, mica, increasing siliceous cement, light brown patches are siliceous and slightly argillaceous, subangular, poor sorting, tight, hard, no stain or cut. Lower part has rip up clasts of shale and silty shale. Broken irregular laminae and colour banding suggest light bioturbation. Trace cut from coaly parting.

846.45-846.65 SHALE: medium brownish grey, silty, carbonaceous plant fragments (0.20m) throughout, few thin carbonaceous partings, pyrite blebs.

846.65-848.10 SANDSTONE: grey, patchy brownish, very fine grained with fine grains, (1.45m) silty, quartz, mica, carbonaceous specks, rare glauconite, slightly argillaceous, slightly dolomitic, with light brown, rounded, dolomite nodules to several mm, in thin bands, very common dolomite nodules over 30cm in middle of interval, massive, firm, tight, no stain or cut. Plant remains locally and carbonaceous coated tight sub-vertical fractures.

848.10-851.10 SHALE: laminated throughout, slightly silty, micromicaceous, (3.00m) carbonaceous specks, locally very common carbonaceous specks, with laminae and thin interbeds to 10cm of silty to very silty shale and siltstone, some with very fine quartz grains, mica, carbonaceous specked, tight, no stain or cut.

851.10-851.85 SILTSTONE: medium grey, argillaceous, carbonaceous specked, mica, (0.75m) part with barely very fine grained quartz, grading to very silty, very fine sandstone, quartz, mica, argillaceous, carbonaceous specked, dense, tight.

851.85-851.95 SANDSTONE: small broken lenses, in "remobilized" dark shale. (0.10m) Sandstone is very fine to fine grained with floating coarse to very coarse quartz, with silty and sandy shale and dolomite clasts, unrecognizable dolomitic fossil fragments, trace pyrite, carbonaceous debris, bitumen plugging poor primary porosity, slight patchy vuggy porosity to 4%, no effective permeability, no cut or fluorescence.

851.95-853.10 SILTSTONE: medium grey, argillaceous, micromicaceous, carbonaceous (1.15m) specked, dense, tight, with darker shale laminae, carbonaceous specked and micromicaceous. Increasing shale with depth.

853.10-857.60 SHALE: laminated, slightly silty, micromicaceous, carbonaceous specked, (4.50m)fissile, with very silty laminae to 1-2cm, grading to siltstone laminae, 1-2%.

857.60-858.35 SANDSTONE: medium grey, barely very fine grained, very silty, (0.75m)argillaceous, micromicaceous, carbonaceous specked, few patches very carbonaceous, slightly calcareous, massive, dense, tight, no stain or cut. Basal 10cm is CONGLOMERATE/PACKSTONE, rip up clasts of shale and siltstone, abundant crinoids, trace brachiopods, trace solitary corals, fine to medium grained light grey silicified oolites, in matrix of very fine to fine quartz sandstone, silty, slightly argillaceous, scattered medium to very coarse quartz grains, very calcareous, tight, carbonaceous/bitumen infill, trace pyrite, no stain or cut. Top and basal contact have small lenses and burrows filled with sandstone in dark shale.

858.35-859.20 SHALE: laminated, slightly silty, micromicaceous, slight carbonaceous (0.95m)specked, with very silty laminae grading to argillaceous siltstone.

859.20-859.30 CONGLOMERATE/PACKSTONE: finer fragments than above, both silicified and (0.10m)dolomitic, pellets, lumps, oolites? crinoids and brachiopods, shale and siltstone rip up clasts, in matrix of very fine to fine grained quartz with occasional medium grains, silty, slightly argillaceous, carbonaceous debris, trace pyrite, tight, no stain or cut.

859.30-859.43 SHALE: laminated, slightly silty to silty, as above, minor siltstone (0.13m)laminae.

859.43-859.50 CONGLOMERATE/PACKSTONE: pellets, lumps, oolites, brachipod and algal? (0.70m)fragments, shale rip up clasts, very fine to fine grained quartz, occasional medium to very coarse quartz, silty, slightly argillaceous, very calcareous, tight, carbonaceous specks and locally bitumen coating fragments, no stain or cut.

859.50-861.85 SANDSTONE: medium grey, laminated, barely very fine grained, very (2.35m)silty, grading to sandy siltstone, micromicaceous, carbonaceous specked, argillaceous to very argillaceous laminae, shale laminae. Lightly bioturbated, Increasing darker shale laminae to base. Calcite fossil fragments in thin laminae at base, brachiopods?

Lost 1.15m off base.

APPENDIX 5

TESTING RESULTS

REF#:C-76-999-82262-66

TEST DATE: 91/02/14

CHEVRON SPERRY CREEK 65.376/129.252

400/ 65.376 / 129.252 /00

DST#01

1412.50m to 1416.50m

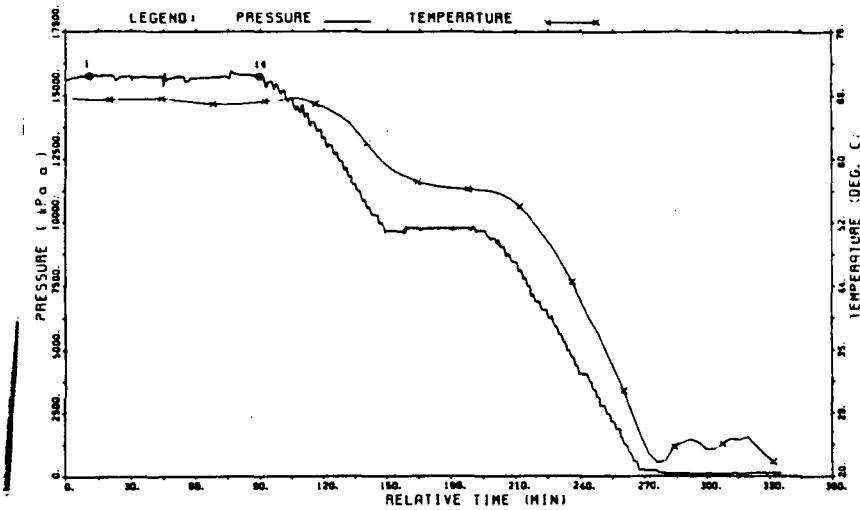
NAHANI

DEPTH: 1415.00m

RECORDER # 001749

PRESSURE  
kPa(a)

1) Initial Hydro : 15759.  
14) Final Hydro. : 15741.



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#### RECOVERY DATA

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NO FLUID RECOVERY DUE TO MISRUN. NO GAS TO SURFACE. CLOSED CHAMBER WITH EVALUATORS.

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#### REMARKS AND TEST SUMMARY

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Misrun - unable to obtain a packer seat.

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#### TABLE OF CONTENTS

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PAGE 1

General Data

Blow Description

Liquid Recovery

Gas Measurements

PAGE 2

Tool Sequence

Recorder Summary

Mud and Hole Data

PAGE 3

PRESSURE

-TIME

LISTING

PAGE 4

Plot Summary

Reservoir Calculations

-Parameters used

-Results

\*\*\*\*\* RECORDER PAGES & FIGURES \*\*\*\*\*

BAKER OIL TOOLS CANADA  
DST#01 REPORT

---

p.1

11 name : CHEVRON SPERRY CREEK 65.376/129.252 K.B.Elevation : 160.66m  
Location : 400/ 65.376 / 129.252 /00 Grd.Elevation : 154.50m  
Interval : 1412.50m to 1416.50m TD @ test Date: 2160.00m  
Test Date : 91/02/14 Ticket Number : 82262  
Test Type : INFLATE STRADDLE Unit Number : SKID  
Formation : NAHANI

Started in hole at : 2330 hrs  
Tool opened at :  
Reverse circulated?: NO  
Contractor & Rig No: SHEHTAH #1E  
Baker#1 : 1 of 1 on the same trip.

Operator: CHEVRON CANADA RESOURCES LIMITED

14TH FLOOR Company Rep : MEYER BILL  
500 - 5TH AVE. S.W. Testers : FORBES G  
CALGARY, ALBERTA  
T2POL7 5 REPORTS(S) TO: BRIAN GLOVER  
Company:

---

BLOW DESCRIPTION

---

Closed Chamber with Evaluators.

---

TOTAL LIQUID RECOVERY :

---

For DST# 1 through DST# 1

Btm. Hole Sampler #: 960  
Sent to: RERAN

.00m NO RECOVERY.

---

GAS MEASUREMENTS

---

No Gas Measurements

**\*TOOL SEQUENCE\***

SUB	LENGTH (m )
PUMP OUT SUB	.40
CROSSOVER SUB	.35
INSIDE RECORDER	1.38
CHOKE SUB	.31
HYDRAULIC TOOL	1.50
BTM. HOLE SAMPLER	1.03
INSIDE RECORDER	1.38
INSIDE RECORDER	2.14
HYDRAULIC JARS	2.22
SAFETY JOINT	.65
INFLATE PUMP	2.28
SCREEN	1.16
TOP INFLATE PACKER	1.78
PACKER STICK DOWN	.82
PORTED COMB SUB	.30
OUTSIDE RECORDER	2.06
SPACING	.32
PACKER STICK UP	.50
BTM. INFLATE PKR.	1.90
RECORDER CARRIER	2.74
BELLY SPRING	2.00
 ***** TOOL TOTAL	
DRILL COLLARS	27.22
ID= 70.0mm:	222.55
ID= :	
DRILL PIPE	
OD=114.0mm:	1175.31
OD= :	
 COLLAR-PIPE TOTAL 1397.86	

STICK UP ABOVE TABLE : 1.94  
 TOOL ABOVE INTERVAL : 16.58  
 TOTAL INTERVAL : 4.00  
 BOTTOM CHOKE SIZE: 12.70 mm

**\*\*\*RECORDER SUMMARY\*\*\***

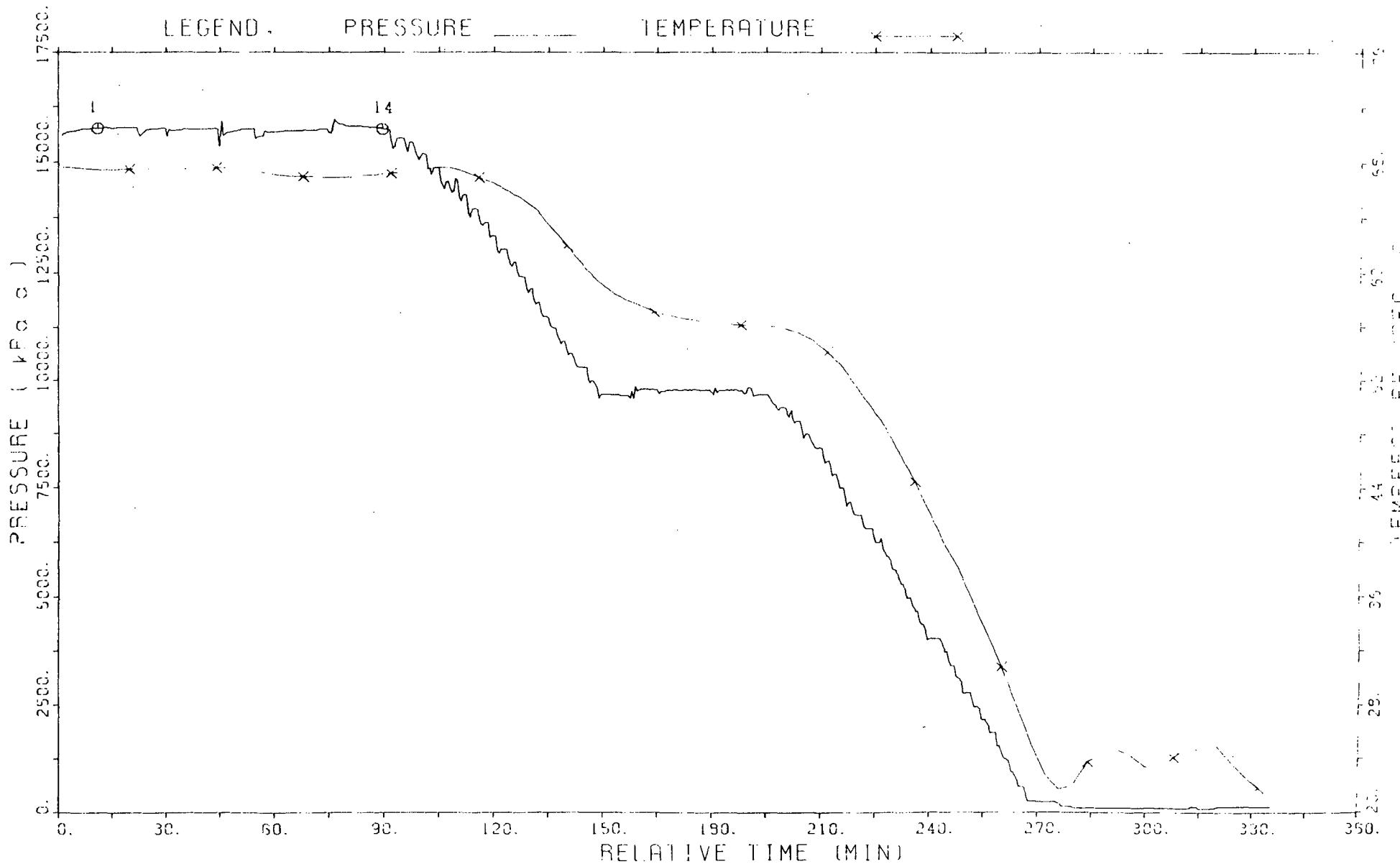
1)	NUMBER : 001749	ELECTRONIC GAUGE, PRESSURE AND TEMPERATURE.
	TYPE : DMRB	
	LOCATION: OUTSIDE	
	RANGE: 68900.00kPa(a)	
	DEPTH : 1415.00m	
2)	NUMBER : 001766	ELECTRONIC GAUGE, PRESSURE AND TEMPERATURE.
	TYPE : DMRB	
	LOCATION: INSIDE	
	RANGE: 68900.00kPa(a)	
	DEPTH : 1404.00m	
3)	NUMBER : 009496	
	TYPE : K-3	
	LOCATION: OUTSIDE	
	RANGE: 22100.00kPa	
	DEPTH : 1415.00m	
4)	NUMBER : 013129	ABOVE INTERVAL.
	TYPE : K-3	
	LOCATION: INSIDE	
	RANGE: 19700.00kPa	
	DEPTH : 1402.00m	
5)	NUMBER : 014103	ABOVE HYDRAULIC TOOL.
	TYPE : K-3	
	LOCATION: INSIDE	
	RANGE: 20000.00kPa	
	DEPTH : 1398.00m	
6)	NUMBER : 017024	BELOW INTERVAL.
	TYPE : K-3	CLOCK STOPPED, NO READINGS.
	LOCATION: INSIDE	
	CAPACITY: 20000.00kPa	
	DEPTH : 1420.00m	

**MUD AND HOLE DATA**

Caliper Hole Size @ Test Depth:	340.00mm	Water Loss : 10.8cc/s
Hole Condition at Test Time	: GOOD	Filter Cake: 1.5 mm
Hole Conditioned Prior to Test?	: NO	
Mud Weight :	1110.0 kg/m <sup>3</sup>	Main Hole Size: 311.00mm
Mud Type :	GEL / KELZAN	
Viscosity :	60.0s/1	Temperature @1415.00m = 67.5C

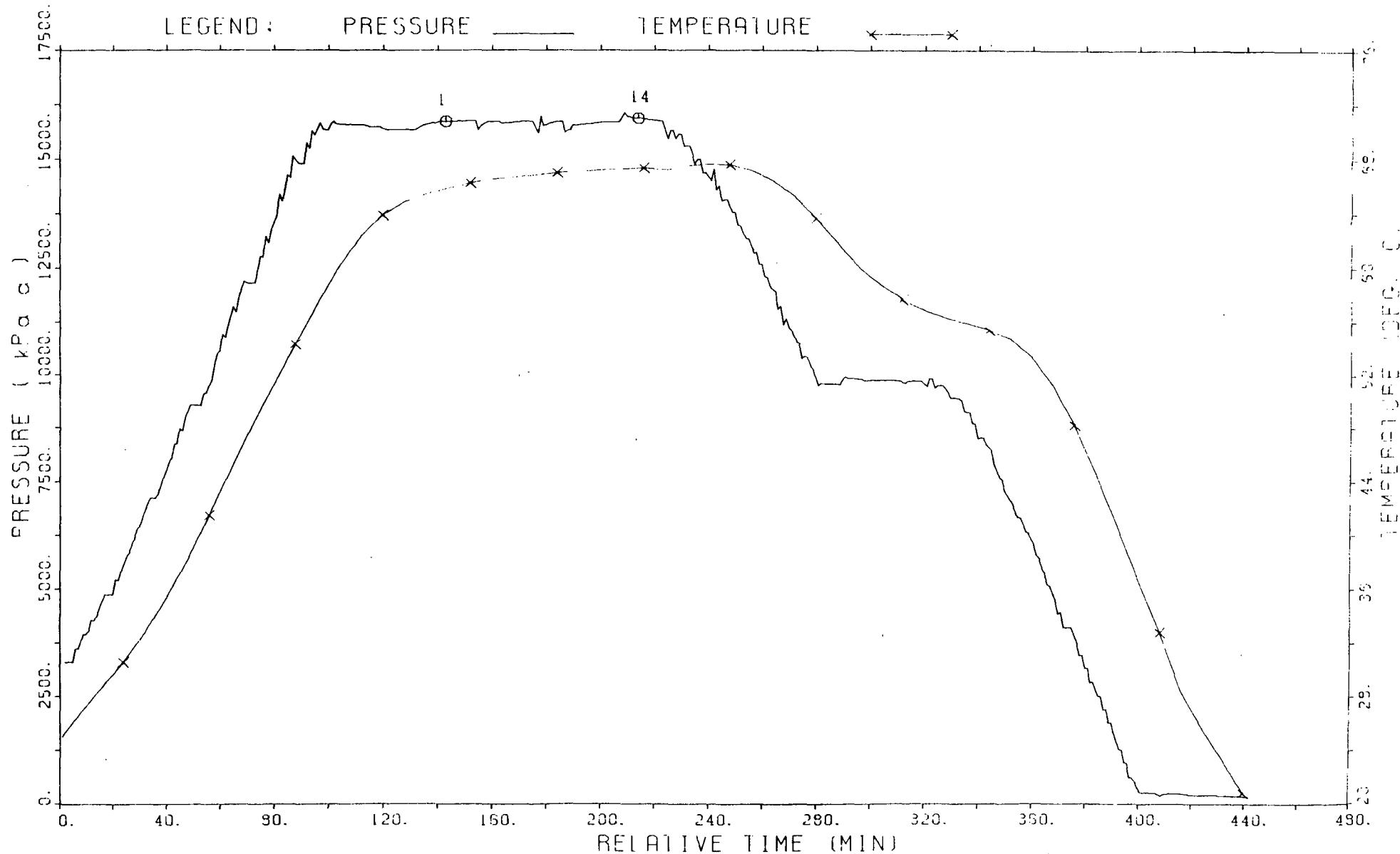
CHEVRON SPERRY CREEK N-58  
65.376/129.252 DST #1  
ELECTRONIC GAUGE #1749

LEGEND. 0 = 14. 15/50 = 14. 15/11 = 14.



CHEVRON SPERRY CREEK N-58  
65.376/129.252 DST #1  
ELECTRONIC GAUGE #1766

LEGEND:  $\odot$  = 15972 Rate  
X = 15949.



DST#01  
CHEVRON SPERRY CREEK 65.376/129.252  
1412.50m to 1416.50m

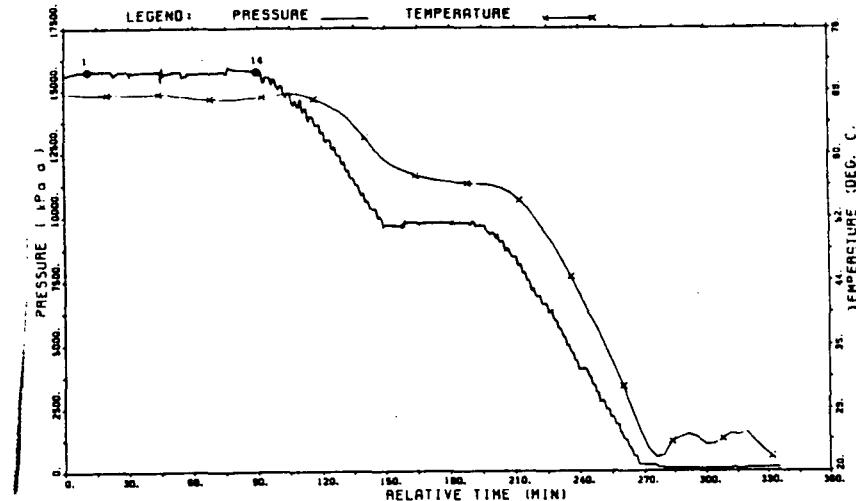
PRESSURE RECORDER NUMBER : 001749

DEPTH : 1415.00m LOCATION : OUTSIDE  
TYPE : DMRB CAPACITY : 68900.00kPa(a)

\*\*\*\*\* TEMPERATURE AT RECORDER DEPTH = 67.5 C

PRESSURE  
kPa(a)

1) Initial Hydro : 15759.  
14) Final Hydro. : 15741.



ELECTRONIC GAUGE,  
PRESSURE AND  
TEMPERATURE.

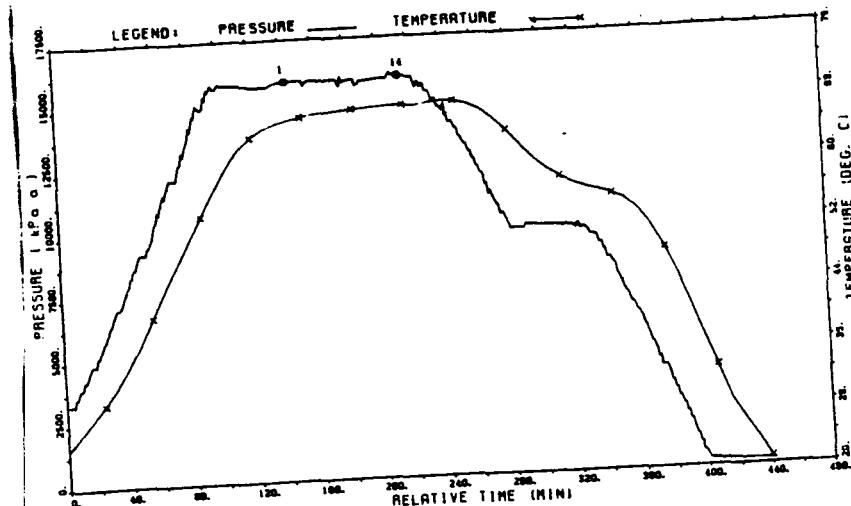
PRESSURE RECORDER NUMBER : 001766

DEPTH : 1404.00m LOCATION : INSIDE  
TYPE : DMRB CAPACITY : 68900.00kPa(a)

\*\*\*\*\* TEMPERATURE AT RECORDER DEPTH = 67.3 C

PRESSURE  
kPa(a)

1) Initial Hydro : 15879.  
14) Final Hydro. : 15948.



ELECTRONIC GAUGE,  
PRESSURE AND  
TEMPERATURE.

DST#01  
CHEVRON SPERRY CREEK 65.376/129.252  
1412.50m to 1416.50m

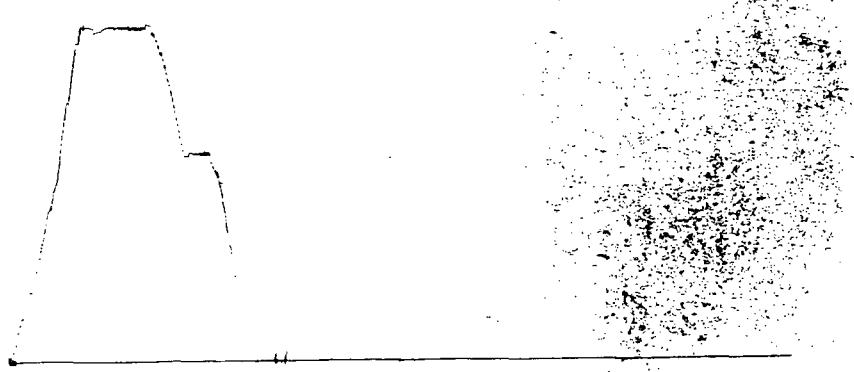
PRESSURE RECORDER NUMBER : 009496

DEPTH : 1415.00m  
TYPE : K-3

LOCATION : OUTSIDE  
CAPACITY : 22100.00 kPa

PRESSURE  
kPa

1) Initial Hydro :15772.  
14) Final Hydro. :15772.



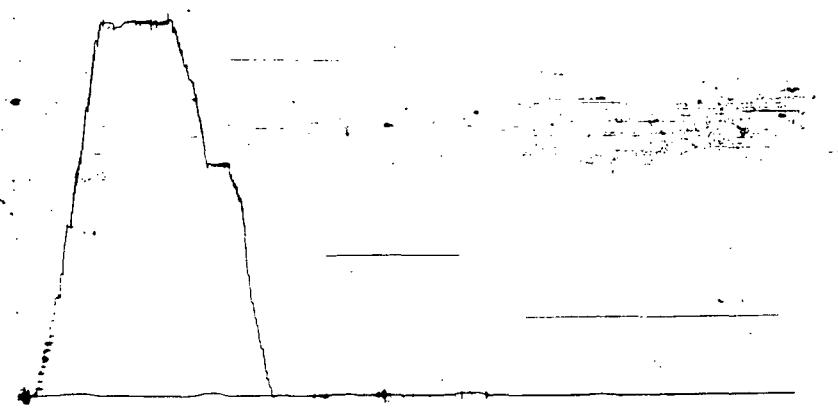
PRESSURE RECORDER NUMBER : 013129

DEPTH : 1402.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 19700.00 kPa

PRESSURE  
kPa

1) Initial Hydro :15608.  
14) Final Hydro. :15608.



ABOVE INTERVAL.

DST#01  
CHEVRON SPERRY CREEK 65.376/129.252  
1412.50m to 1416.50m

PRESSURE RECORDER NUMBER : 014103

DEPTH : 1398.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 20000.00 kPa

PRESSURE  
kPa

1) Initial Hydro :  
14) Final Hydro. : 101.

ABOVE HYDRAULIC  
TOOL.

PRESSURE RECORDER NUMBER : 017024

DEPTH : 1420.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 20000.00 kPa

PRESSURE  
kPa

1) Initial Hydro :  
14) Final Hydro. :

BELOW INTERVAL.  
CLOCK STOPPED,  
NO READINGS.

DST#03  
TOTAL HOME ET AL BENSON 14-9-6-8-W2  
2262.04m to 2274.01m

PRESSURE RECORDER NUMBER : 022440

DEPTH : 2255.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 43000.00 kPa

PRESSURE  
kPa

- 1) Initial Hydro : 27713.
- 2) 1st Flow Start: 472.
- 3) 1st Flow End : 1700.
- 4) END 1st Shutin: 22078.
- 5) 2nd Flow Start: 2096.
- 6) 2nd Flow End : 3336.
- 7) END 2nd Shutin: 21476.
- 14) Final Hydro. : 27462.

Above Interval



ABOVE INTERVAL.

TEST TIMES (MIN)

1st FLOW :	9.5
SHUTIN:	63.0
2nd FLOW :	86.5
SHUTIN:	189.0

REF#:C-76-999-82262-66

TEST DATE: 91/02/15

CHEVRON SPERRY CREEK 65.376/129.252

400/ 65.376 / 129.252 /00

DST#02

1412.50m to 1416.50m

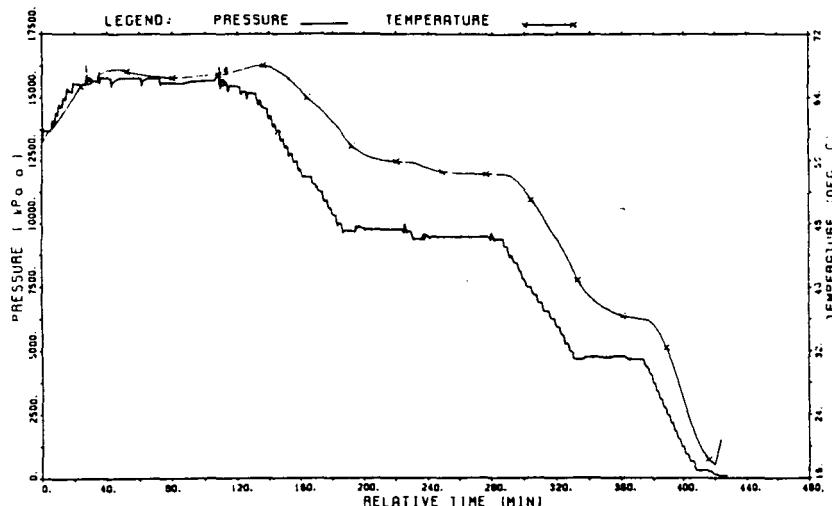
NAHANI

DEPTH: 1415.00m

PRESSURE  
kPa (a)

RECORDER # 001749

1) Initial Hydro : 15672.  
14) Final Hydro. : 15603.



---

#### RECOVERY DATA

---

NO FLUID RECOVERY DUE TO MISRUN. NO GAS TO SURFACE. CLOSED CHAMBER WITH EVALUATORS.

---

#### REMARKS AND TEST SUMMARY

---

Misrun - unable to obtain a packer seat.

---

#### TABLE OF CONTENTS

---

PAGE 1

General Data

Blow Description

Liquid Recovery

Gas Measurements

PAGE 2

Tool Sequence

Recorder Summary

Mud and Hole Data

PAGE 3

PRESSURE

-TIME

LISTING

PAGE 4

Plot Summary

Reservoir Calculations

-Parameters used

-Results

\*\*\*\*\* RECORDER PAGES & FIGURES \*\*\*\*\*

BAKER OIL TOOLS CANADA  
DST#02 REPORT

---

p.1

11 name : CHEVRON SPERRY CREEK 65.376/129.252      K.B.Elevation : 160.66m  
cation : 400/ 65.376 / 129.252 /00      Grd.Elevation : 154.50m  
Interval : 1412.50m to 1416.50m      TD @ test Date: 2160.00m  
Test Date : 91/02/15      Ticket Number : 82263  
Test Type : INFLATE STRADDLE      Unit Number : SKID  
Formation : NAHANI

Started in hole at : 1040 hrs  
Tool opened at :  
Reverse circulated?: NO  
Contractor & Rig No: SHEHTAH #1E  
Baker#2 : 1 of 1 on the same trip.

Operator: CHEVRON CANADA RESOURCES LIMITED  
14TH FLOOR      Company Rep : MEYER BILL  
500 - 5TH AVE. S.W.      Testers : FORBES G  
CALGARY, ALBERTA  
T2POL7      5 REPORTS(S) TO: BRIAN GLOVER  
Company:

---

BLOW DESCRIPTION

---

Closed Chamber with the Evaluators.

TOTAL LIQUID RECOVERY :      For DST# 2 through DST# 2

---

Btm. Hole Sampler #: 960  
Sent to: RERAN

.00m NO RECOVERY.

---

GAS MEASUREMENTS

---

No Gas Measurements

**\*TOOL SEQUENCE\***

SUB	LENGTH (m )
PUMP OUT SUB	.40
CROSSOVER SUB	.35
INSIDE RECORDER	1.38
CHOKE SUB	.31
HYDRAULIC TOOL	1.50
BTM. HOLE SAMPLER	1.03
INSIDE RECORDER	1.38
INSIDE RECORDER	2.14
HYDRAULIC JARS	2.22
SAFETY JOINT	.65
INFLATE PUMP	2.28
SCREEN	1.16
TOP INFLATE PACKER	1.78
PACKER STICK DOWN	.82
PORTED COMB SUB	.30
OUTSIDE RECORDER	2.06
SPACING	.32
PACKER STICK UP	.50
BTM. INFLATE PKR.	1.90
RECORDER CARRIER	2.74
BELLY SPRING	2.00
 -----	
<b>***** TOOL TOTAL</b>	<b>27.22</b>
DRILL COLLARS	
ID= 70.0mm:	222.55
ID= :	
DRILL PIPE	
OD=114.0mm:	1175.53
OD= :	
 -----	
<b>COLLAR-PIPE TOTAL</b>	<b>1398.08</b>

STICK UP ABOVE TABLE : 2.16  
 TOOL ABOVE INTERVAL : 16.58  
 TOTAL INTERVAL : 4.00  
 BOTTOM CHOKE SIZE: 12.70 mm

**\*\*\*RECORDER SUMMARY\*\*\***

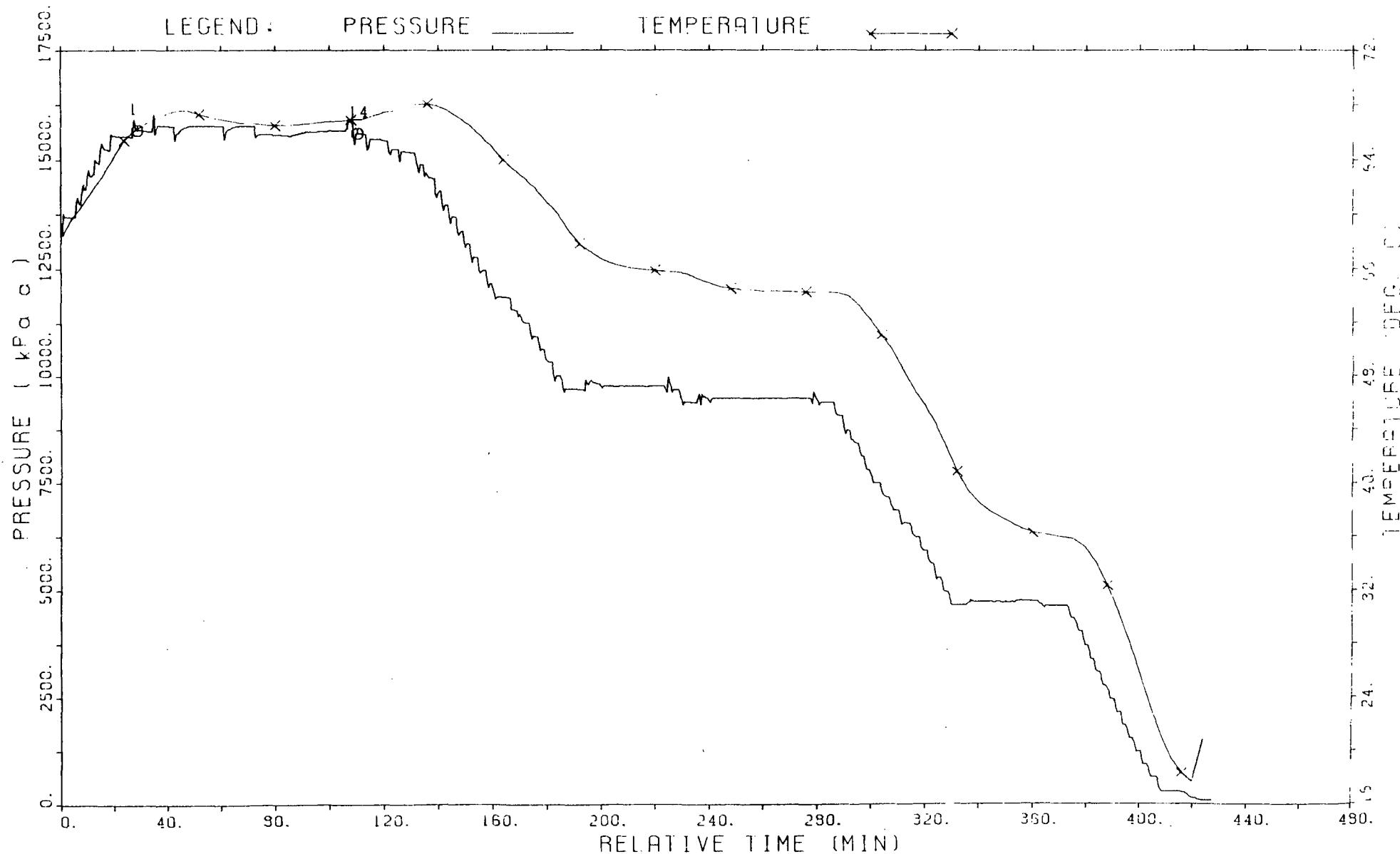
1)	NUMBER : 001749	ELECTRONIC GAUGE,
	TYPE : DMRB	PRESSURE AND
	LOCATION: OUTSIDE	TEMPERATURE.
	RANGE: 68900.00kPa(a)	
	DEPTH : 1415.00m	
2)	NUMBER : 001766	ELECTRONIC GAUGE,
	TYPE : DMRB	PRESSURE AND
	LOCATION: INSIDE	TEMPERATURE.
	RANGE: 68900.00kPa(a)	
	DEPTH : 1404.00m	
3)	NUMBER : 009496	
	TYPE : K-3	
	LOCATION: OUTSIDE	
	RANGE: 22100.00kPa	
	DEPTH : 1415.00m	
4)	NUMBER : 013129	ABOVE INTERVAL.
	TYPE : K-3	
	LOCATION: INSIDE	
	RANGE: 19700.00kPa	
	DEPTH : 1402.00m	
5)	NUMBER : 014103	ABOVE HYDRAULIC
	TYPE : K-3	TOOL.
	LOCATION: INSIDE	
	RANGE: 20000.00kPa	
	DEPTH : 1398.00m	
6)	NUMBER : 017024	BELOW INTERVAL.
	TYPE : K-3	
	LOCATION: INSIDE	
	CAPACITY: 20000.00kPa	
	DEPTH : 1420.00m	

**MUD AND HOLE DATA**

Caliper Hole Size @ Test Depth:	340.00mm	Water Loss :	10.8cc/s
Hole Condition at Test Time	: FAIR	Filter Cake:	1.5 mm
Hole Conditioned Prior to Test?	: NO		
Mud Weight :	1110.0 kg/m <sup>3</sup>	Main Hole Size:	311.00mm
Mud Type :	GEL / KELZAN		
Viscosity :	60.0s/1	Temperature @1415.00m	= 67.1C

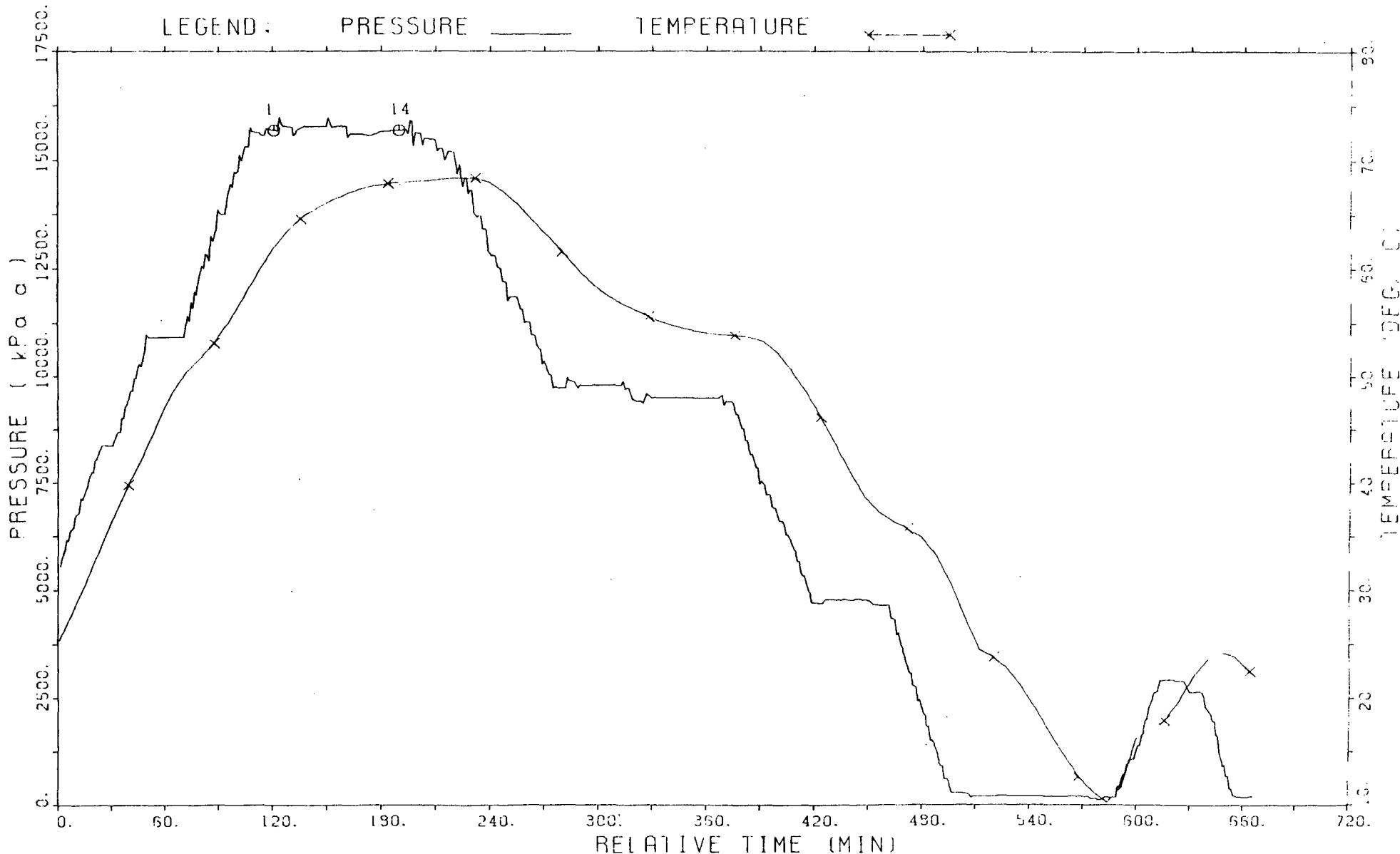
CHEVRON SPERRY CREEK N-58  
65.376/129.252 DST #2  
ELECTRONIC GAUGE #1749

LEGEND: O = 19672 (kPa) <sup>2</sup>  
X = 15603.



CHEVRON SPERRY CREEK N-58  
65.376/129.252 DST #2  
ELECTRONIC GAUGE #1766

LEGEND:  $\bigcirc$  = 15500  $\times$  = 15600  
 $\square$  = 14  $\times$  = 14



DST#02  
CHEVRON SPERRY CREEK 65.376/129.252  
1412.50m to 1416.50m

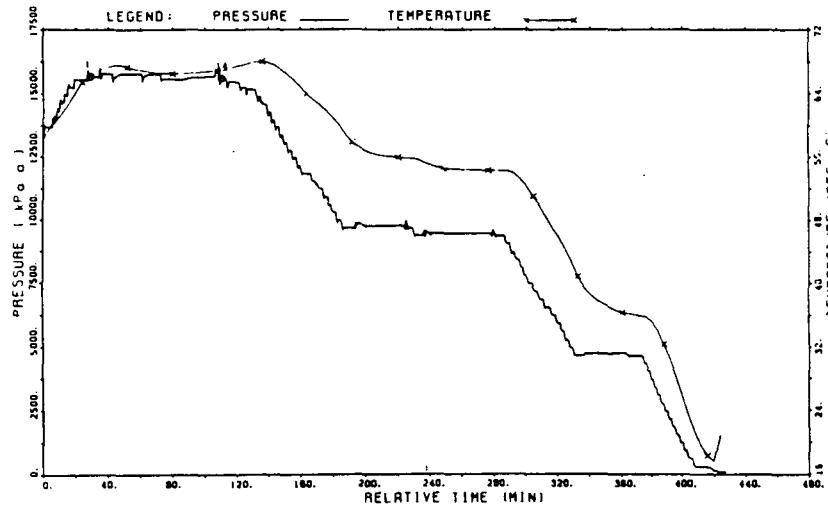
PRESSURE RECORDER NUMBER : 001749

DEPTH : 1415.00m LOCATION : OUTSIDE  
TYPE : DMRB CAPACITY : 68900.00kPa(a)

\*\*\*\*\* TEMPERATURE AT RECORDER DEPTH = 67.1 C

PRESSURE  
kPa(a)

1) Initial Hydro :15672.  
14) Final Hydro. :15603.



ELECTRONIC GAUGE,  
PRESSURE AND  
TEMPERATURE.

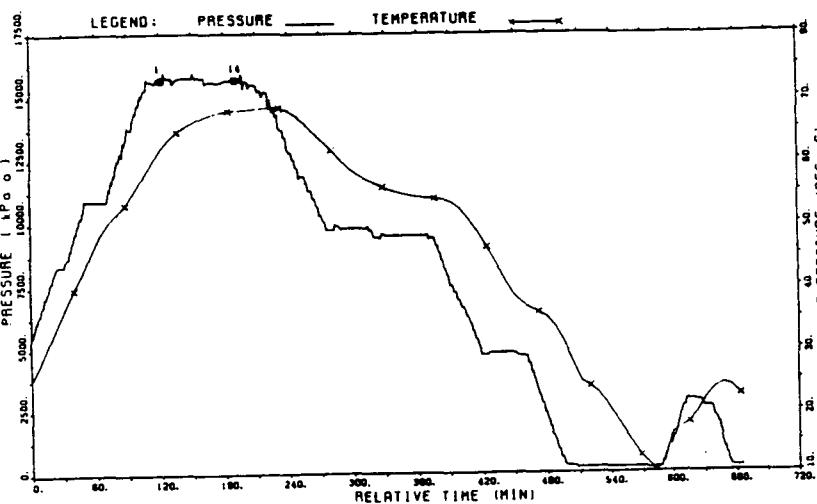
PRESSURE RECORDER NUMBER : 001766

DEPTH : 1404.00m LOCATION : INSIDE  
TYPE : DMRB CAPACITY : 68900.00kPa(a)

\*\*\*\*\* TEMPERATURE AT RECORDER DEPTH = 68.4 C

PRESSURE  
kPa(a)

1) Initial Hydro :15690.  
14) Final Hydro. :15690.



ELECTRONIC GAUGE,  
PRESSURE AND  
TEMPERATURE.

DST#02  
CHEVRON SPERRY CREEK 65.376/129.252  
1412.50m to 1416.50m

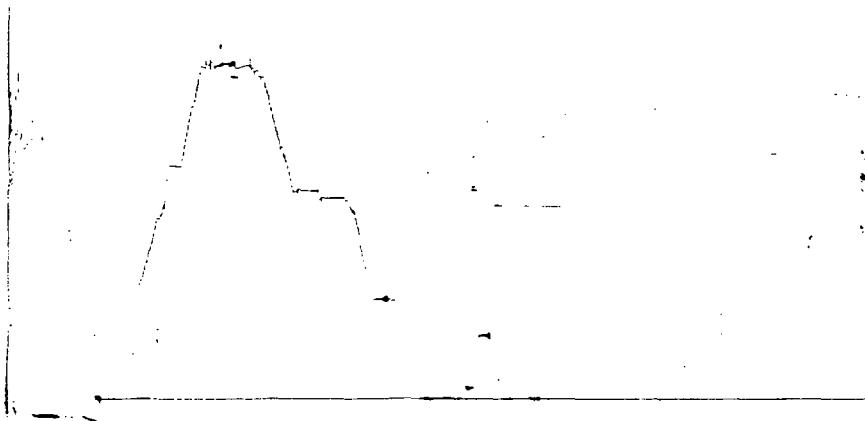
PRESSURE RECORDER NUMBER : 009496

DEPTH : 1415.00m  
TYPE : K-3

LOCATION : OUTSIDE  
CAPACITY : 22100.00 kPa

PRESSURE  
kPa

1) Initial Hydro : 15676.  
14) Final Hydro. : 15676.



PRESSURE RECORDER NUMBER : 013129

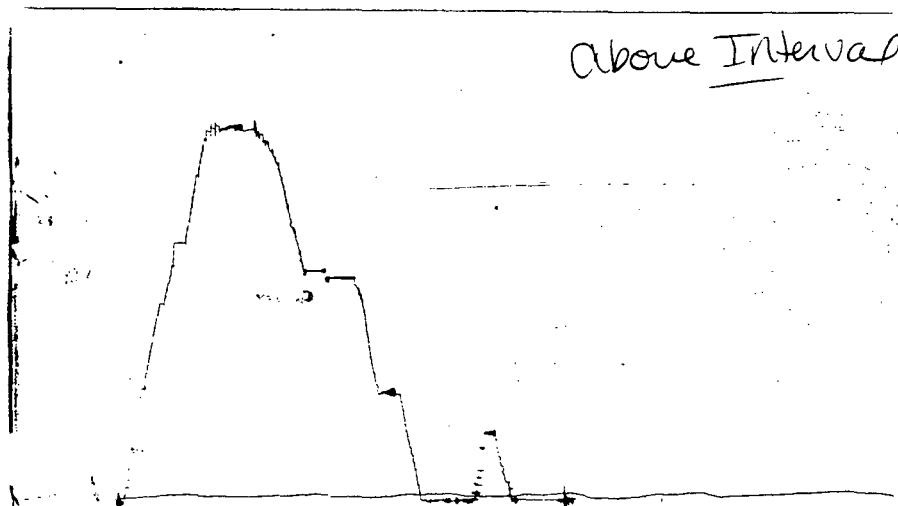
DEPTH : 1402.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 19700.00 kPa

PRESSURE  
kPa

1) Initial Hydro : 15594.  
14) Final Hydro. : 15594.

Above Interval



ABOVE INTERVAL.

DST#02  
CHEVRON SPERRY CREEK 65.376/129.252  
1412.50m to 1416.50m

PRESSURE RECORDER NUMBER : 014103

DEPTH : 1398.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 20000.00 kPa

PRESSURE  
kPa

1) Initial Hydro :  
14) Final Hydro. : 32.

Above Hydraulic Tool

ABOVE HYDRAULIC  
TOOL.

PRESSURE RECORDER NUMBER : 017024

DEPTH : 1420.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 20000.00 kPa

PRESSURE  
kPa

1) Initial Hydro :  
14) Final Hydro. :

Below Interval  
Clock Stopped +  
Started

BELOW INTERVAL.  
CLOCK STOPPED,  
NO READINGS.

CHEVRON SPERRY CREEK 65.376/129.252

400/ 65.376 / 129.252 /00

DST#03

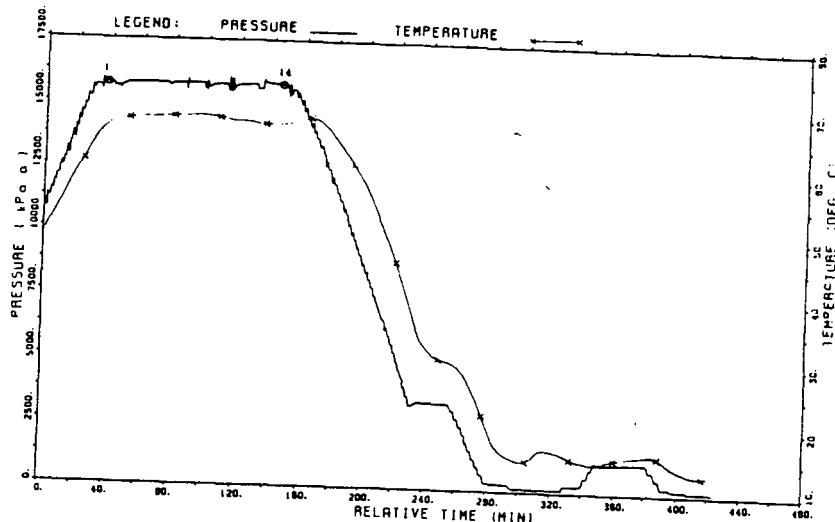
1412.50m to 1416.50m

NAHANI

DEPTH: 1415.00m

PRESSURE  
kPa(a)1) Initial Hydro : 15776.  
14) Final Hydro. : 15776.

RECORDER # 001749



## RECOVERY DATA

NO FLUID RECOVERY DUE TO MISRUN. NO GAS TO SURFACE. CLOSED CHAMBER WITH EVALUATORS.

## REMARKS AND TEST SUMMARY

Misrun - unable to obtain a packer seat.

## TABLE OF CONTENTS

PAGE 1	PAGE 2	PAGE 3	PAGE 4
General Data	Tool Sequence	PRESSURE	Plot Summary
Blow Description	Recorder Summary	-TIME	Reservoir Calculations
Liquid Recovery	Mud and Hole Data	LISTING	-Parameters used
Gas Measurements			-Results

\*\*\*\*\* RECORDER PAGES & FIGURES \*\*\*\*\*

BAKER OIL TOOLS CANADA  
DST#03 REPORT

---

p.1

ll name : CHEVRON SPERRY CREEK 65.376/129.252 K.B.Elevation : 160.66m  
Location : 400/ 65.376 / 129.252 /00 Grd.Elevation : 154.50m  
Interval : 1412.50m to 1416.50m TD @ test Date: 2160.00m  
Test Date : 91/02/16 Ticket Number : 82264  
Test Type : INFLATE STRADDLE Unit Number : SKID  
Formation : NAHANI

Started in hole at : 1230 hrs  
Tool opened at :  
Reverse circulated?: NO  
Contractor & Rig No: SHEHTAH #1E  
Baker#3 : 1 of 1 on the same trip.

Operator: CHEVRON CANADA RESOURCES LIMITED  
14TH FLOOR Company Rep : MEYER BILL  
500 - 5TH AVE. S.W. Testers : FORBES G  
CALGARY, ALBERTA  
T2P0L7 5 REPORTS(S) TO: BRIAN GLOVER  
Company:

---

BLOW DESCRIPTION

---

Closed Chamber with Evaluators.

---

TOTAL LIQUID RECOVERY :

---

For DST# 3 through DST# 3

Btm. Hole Sampler #: 960  
Sent to: RERAN

.00m NO RECOVERY.

---

GAS MEASUREMENTS

---

No Gas Measurements

**\*TOOL SEQUENCE\***

**\*\*\*RECORDER SUMMARY\*\*\***

SUB	LENGTH (m )			
PUMP OUT SUB	.40	1)	NUMBER : 001749	ELECTRONIC GAUGE,
CROSSOVER SUB	.35		TYPE : DMRB	PRESURES AND
INSIDE RECORDER	1.38		LOCATION: OUTSIDE	TEMPERATURE.
CHOKE SUB	.31		RANGE: 68900.00kPa(a)	
HYDRAULIC TOOL	1.50		DEPTH : 1415.00m	
BTM. HOLE SAMPLER	1.03	2)	NUMBER : 001766	ELECTRONIC GAUGE,
INSIDE RECORDER	1.38		TYPE : DMRB	PRESSURE AND
INSIDE RECORDER	2.14		LOCATION: INSIDE	TEMPERATURE.
HYDRAULIC JARS	2.22		RANGE: 68900.00kPa(a)	
SAFETY JOINT	.65		DEPTH : 1404.00m	
INFLATE PUMP	2.28			
SCREEN	1.16	3)	NUMBER : 009496	
TOP INFLATE PACKER	1.78		TYPE : K-3	
PACKER STICK DOWN	.82		LOCATION: OUTSIDE	
PORTED COMB SUB	.30		RANGE: 22100.00kPa	
OUTSIDE RECORDER	2.06		DEPTH : 1415.00m	
SPACING	.32			
PACKER STICK UP	.50	4)	NUMBER : 013129	ABOVE INTERVAL.
BTM. INFLATE PKR.	1.90		TYPE : K-3	
RECORDER CARRIER	2.74		LOCATION: INSIDE	
BELLY SPRING	2.00		RANGE: 19700.00kPa	
			DEPTH : 1402.00m	
		5)	NUMBER : 014103	ABOVE HYDRAULIC
			TYPE : K-3	TOOL.
			LOCATION: INSIDE	
			RANGE: 20000.00kPa	
			DEPTH : 1398.00m	
***** TOOL TOTAL	27.22			
DRILL COLLARS		6)	NUMBER : 017024	BELOW INTERVAL.
ID= 70.0mm: 222.55			TYPE : K-3	CLOCK STOPPED,
ID= :			LOCATION: INSIDE	NO READINGS.
DRILL PIPE				
OD=114.0mm: 1175.53			CAPACITY: 20000.00kPa	
OD= :			DEPTH : 1420.00m	
COLLAR-PIPE TOTAL	1398.08			

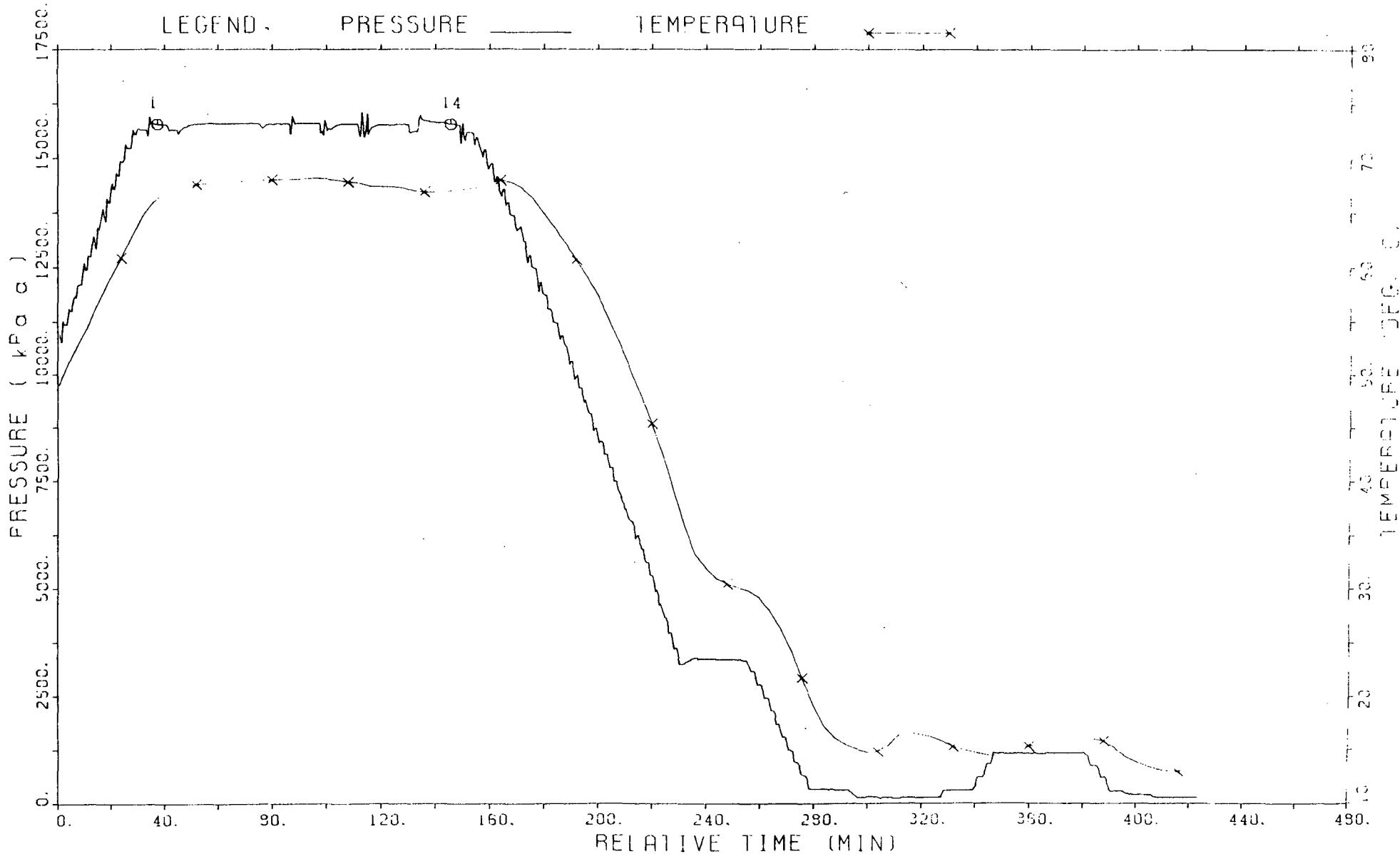
STICK UP ABOVE TABLE : 2.16  
TOOL ABOVE INTERVAL : 16.58  
TOTAL INTERVAL : 4.00  
BOTTOM CHOKE SIZE: 12.70 mm

**MUD AND HOLE DATA**

Caliper Hole Size @ Test Depth: 340.00mm Water Loss : 10.8cc/s  
Hole Condition at Test Time : POOR Filter Cake: 1.5 mm  
Hole Conditioned Prior to Test? : NO  
Mud Weight : 1110.0 kg/m<sup>3</sup> Main Hole Size: 311.00mm  
Mud Type : GEL / KELZAN  
Viscosity : 60.0s/l Temperature @1415.00m = 67.9C

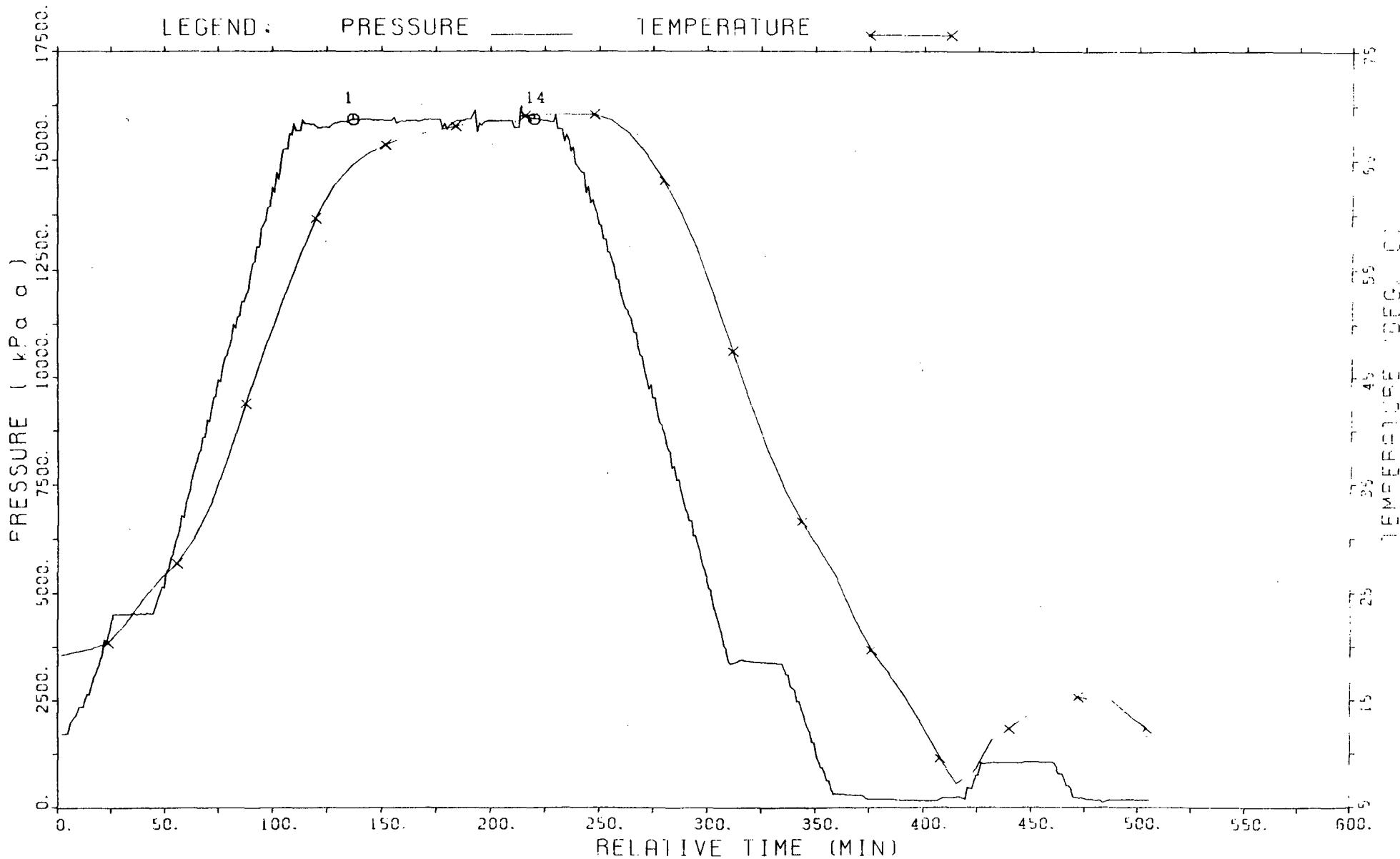
CHEVRON SPERRY CREEK N-58  
65.376/129.252 DST #3  
ELECTRONIC GAUGE #1749

LEGEND 0 14 15.726 15.726  
14 15.726



CHEVRON SPERRY CREEK N-58  
65.376/129.252 DST #3  
ELECTRONIC GAUGE #1766

LEGEND: 1 = 15249, 14 = 15249  
14 15249



DST#03  
CHEVRON SPERRY CREEK 65.376/129.252  
1412.50m to 1416.50m

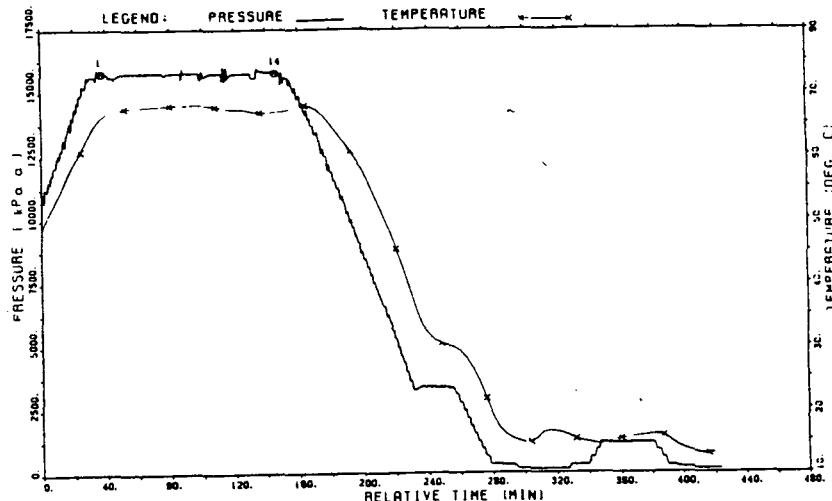
PRESSURE RECORDER NUMBER : 001749

DEPTH : 1415.00m LOCATION : OUTSIDE  
TYPE : DMRB CAPACITY : 68900.00kPa(a)

\*\*\*\*\* TEMPERATURE AT RECORDER DEPTH = 67.9 C

PRESSURE  
kPa(a)

1) Initial Hydro :15776.  
14) Final Hydro. :15776.



ELECTRONIC GAUGE,  
PRESSURES AND  
TEMPERATURE.

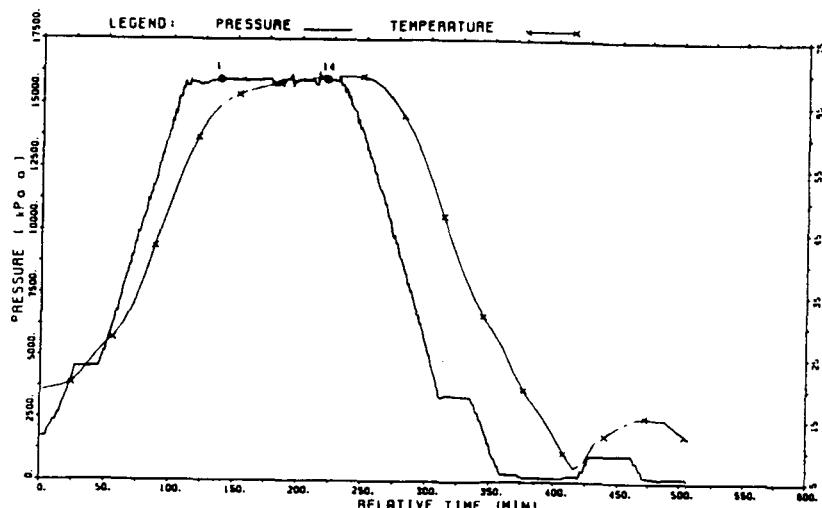
PRESSURE RECORDER NUMBER : 001766

DEPTH : 1404.00m LOCATION : INSIDE  
TYPE : DMRB CAPACITY : 68900.00kPa(a)

\*\*\*\*\* TEMPERATURE AT RECORDER DEPTH = 69.2 C

PRESSURE  
kPa(a)

1) Initial Hydro :15948.  
14) Final Hydro. :15948.



ELECTRONIC GAUGE,  
PRESSURE AND  
TEMPERATURE.

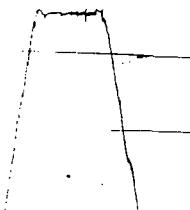
DST#03  
CHEVRON SPERRY CREEK 65.376/129.252  
1412.50m to 1416.50m

PRESSURE RECORDER NUMBER : 009496

DEPTH : 1415.00m LOCATION : OUTSIDE  
TYPE : K-3 CAPACITY : 22100.00 kPa

PRESSURE  
kPa

1) Initial Hydro : 15810.  
14) Final Hydro. : 15810.



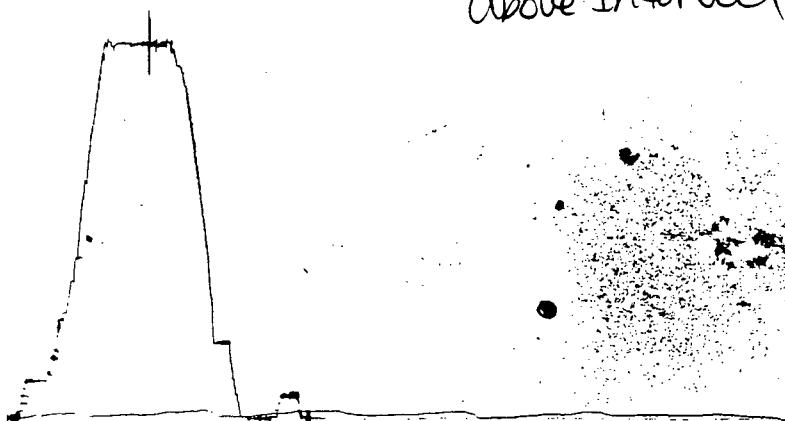
PRESSURE RECORDER NUMBER : 013129

DEPTH : 1402.00m LOCATION : INSIDE  
TYPE : K-3 CAPACITY : 19700.00 kPa

PRESSURE  
kPa

1) Initial Hydro : 15692.  
14) Final Hydro. : 15692.

Above Interval



ABOVE INTERVAL.

DST#03  
CHEVRON SPERRY CREEK 65.376/129.252  
1412.50m to 1416.50m

PRESSURE RECORDER NUMBER : 014103

DEPTH : 1398.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 20000.00 kPa

PRESSURE  
kPa

1) Initial Hydro :  
14) Final Hydro. : 21.

Above Hydraulic Tool

ABOVE HYDRAULIC  
TOOL.

PRESSURE RECORDER NUMBER : 017024

DEPTH : 1420.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 20000.00 kPa

PRESSURE  
kPa

1) Initial Hydro :  
14) Final Hydro. :

Below Interval  
Clock Stopped &  
Started

BELOW INTERVAL.  
CLOCK STOPPED,  
NO READINGS.

REF#: C-76-999-82262-66

TEST DATE: 91/02/17

CHEVRON SPERRY CREEK 65.376/129.252

400/ 65.376 / 129.252 /00

DST#04

869.00m to 876.00m

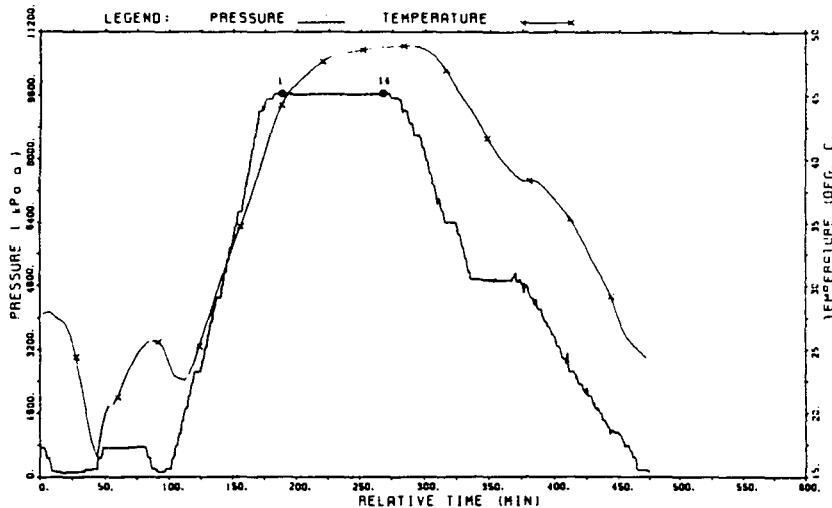
IMPERIAL

DEPTH: 872.00m

PRESSURE  
kPa(a)

RECORDER # 001749

1) Initial Hydro : 9638.  
14) Final Hydro. : 9655.



#### RECOVERY DATA

NO FLUID RECOVERY DUE TO MISRUN. NO GAS TO SURFACE. CLOSED CHAMBER WITH EVALUATORS.

#### REMARKS AND TEST SUMMARY

Misrun - unable to obtain a packer seat.

#### TABLE OF CONTENTS

PAGE 1	PAGE 2	PAGE 3	PAGE 4
General Data	Tool Sequence	PRESSURE	Plot Summary
Blow Description	Recorder Summary	-TIME	Reservoir Calculations
Liquid Recovery	Mud and Hole Data	LISTING	-Parameters used
Gas Measurements			-Results

\*\*\*\*\* RECORDER PAGES & FIGURES \*\*\*\*\*

BAKER OIL TOOLS CANADA  
DST#04 REPORT

---

p.1

11 name : CHEVRON SPERRY CREEK 65.376/129.252 K.B.Elevation : 160.66m  
Location : 400/ 65.376 / 129.252 /00 Grd.Elevation : 154.50m  
Interval : 869.00m to 876.00m TD @ test Date: 2160.00m  
Test Date : 91/02/17 Ticket Number : 82265  
Test Type : INFLATE STRADDLE Unit Number : SKID  
Formation : IMPERIAL

Started in hole at : 0045 hrs  
Tool opened at :  
Reverse circulated?: NO  
Contractor & Rig No: SHEHTAH #1E  
Baker#4 : 1 of 1 on the same trip.

Operator: CHEVRON CANADA RESOURCES LIMITED  
14TH FLOOR Company Rep : MEYER BILL  
500 - 5TH AVE. S.W. Testers : FORBES G  
CALGARY, ALBERTA  
T2POL7 5 REPORTS(S) TO: BRIAN GLOVER  
Company:

---

BLOW DESCRIPTION

---

Closed Chamber with Evaluators.

---

TOTAL LIQUID RECOVERY : For DST# 4 through DST# 4

---

Btm. Hole Sampler #: 960  
Sent to: NOT SENT IN.

.00m NO RECOVERY.

---

GAS MEASUREMENTS

---

No Gas Measurements

**\*TOOL SEQUENCE\***

SUB	LENGTH	
		(m )
PUMP OUT SUB	.40	
CROSSOVER SUB	.35	
INSIDE RECORDER	1.38	
CHOKE SUB	.31	
HYDRAULIC TOOL	1.50	
BTM. HOLE SAMPLER	1.03	
INSIDE RECORDER	1.38	
INSIDE RECORDER	1.84	
HYDRAULIC JARS	2.22	
SAFETY JOINT	.65	
INFLATE PUMP	2.28	
SCREEN	1.16	
TOP INFLATE PACKER	1.78	
PACKER STICK DOWN	.82	
PORTED COMB SUB	.30	
OUTSIDE RECORDER	2.06	
SPACING	.32	
PACKER STICK UP	.50	
BTM. INFLATE PKR.	1.90	
RECORDER CARRIER	2.74	
BELLY SPRING	2.00	
<b>***** TOOL TOTAL</b>	<b>26.92</b>	
DRILL COLLARS		
ID= 70.0mm:	222.55	
ID= :		
DRILL PIPE		
OD=114.0mm:	631.69	
OD= :		
<b>COLLAR-PIPE TOTAL</b>	<b>854.24</b>	

STICK UP ABOVE TABLE : 1.52  
 TOOL ABOVE INTERVAL : 16.28  
 TOTAL INTERVAL : 4.00  
 BOTTOM CHOKE SIZE: 12.70 mm

**\*\*\*RECORDER SUMMARY\*\*\***

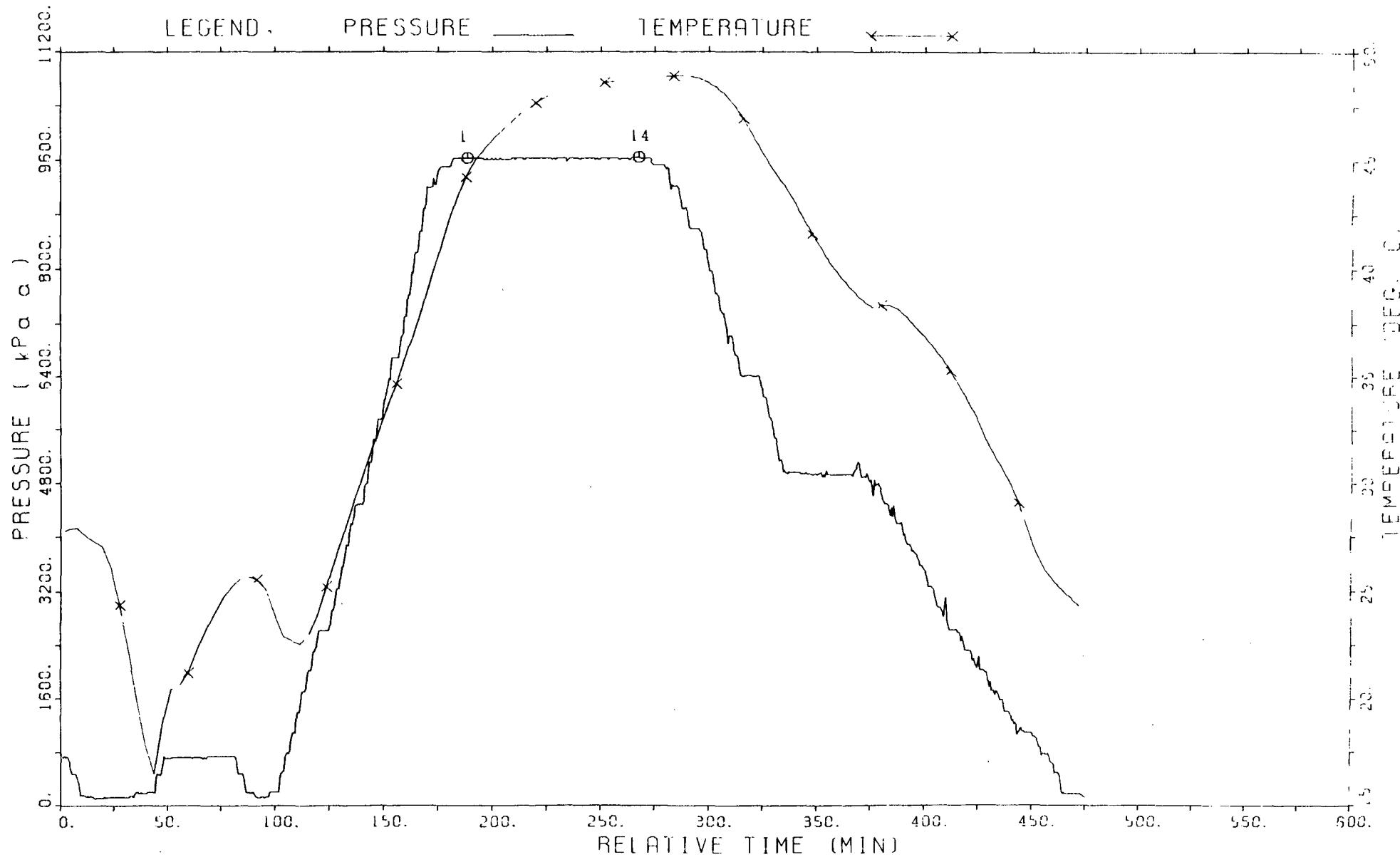
1) NUMBER	: 001749	ELECTRONIC GAUGE, PRESSURE AND TEMPERATURE.
TYPE	: DMRB	
LOCATION	: OUTSIDE	
RANGE	: 68900.00kPa(a)	
DEPTH	: 872.00m	
2) NUMBER	: 001766	ELECTRONIC GAUGE, PRESSURE AND TEMPERATURE.
TYPE	: DMRB	
LOCATION	: INSIDE	
RANGE	: 68900.00kPa(a)	
DEPTH	: 861.00m	
3) NUMBER	: 009496	
TYPE	: K-3	
LOCATION	: OUTSIDE	
RANGE	: 8722100.kPa	
DEPTH	: 872.00m	
4) NUMBER	: 013129	ABOVE INTERVAL.
TYPE	: K-3	
LOCATION	: INSIDE	
RANGE	: 19700.00kPa	
DEPTH	: 859.00m	
5) NUMBER	: 014103	ABOVE HYDRAULIC TOOL.
TYPE	: K-3	
LOCATION	: INSIDE	
RANGE	: 20000.00kPa	
DEPTH	: 855.00m	
6) NUMBER	: 017024	BELOW INTERVAL.
TYPE	: K-3	CLOCK STOPPED, NO READINGS.
LOCATION	: INSIDE	
CAPACITY	: 20000.00kPa	
DEPTH	: 880.00m	

**MUD AND HOLE DATA**

Caliper Hole Size @ Test Depth:	340.00mm	Water Loss :	10.8cc/s
Hole Condition at Test Time	: GOOD	Filter Cake:	1.5 mm
Hole Conditioned Prior to Test?	: YES		
Mud Weight :	1110.0 kg/m <sup>3</sup>	Main Hole Size:	311.00mm
Mud Type :	GEL / KELZAN		
Viscosity :	60.0s/1	Temperature @872.00m	= 48.9C

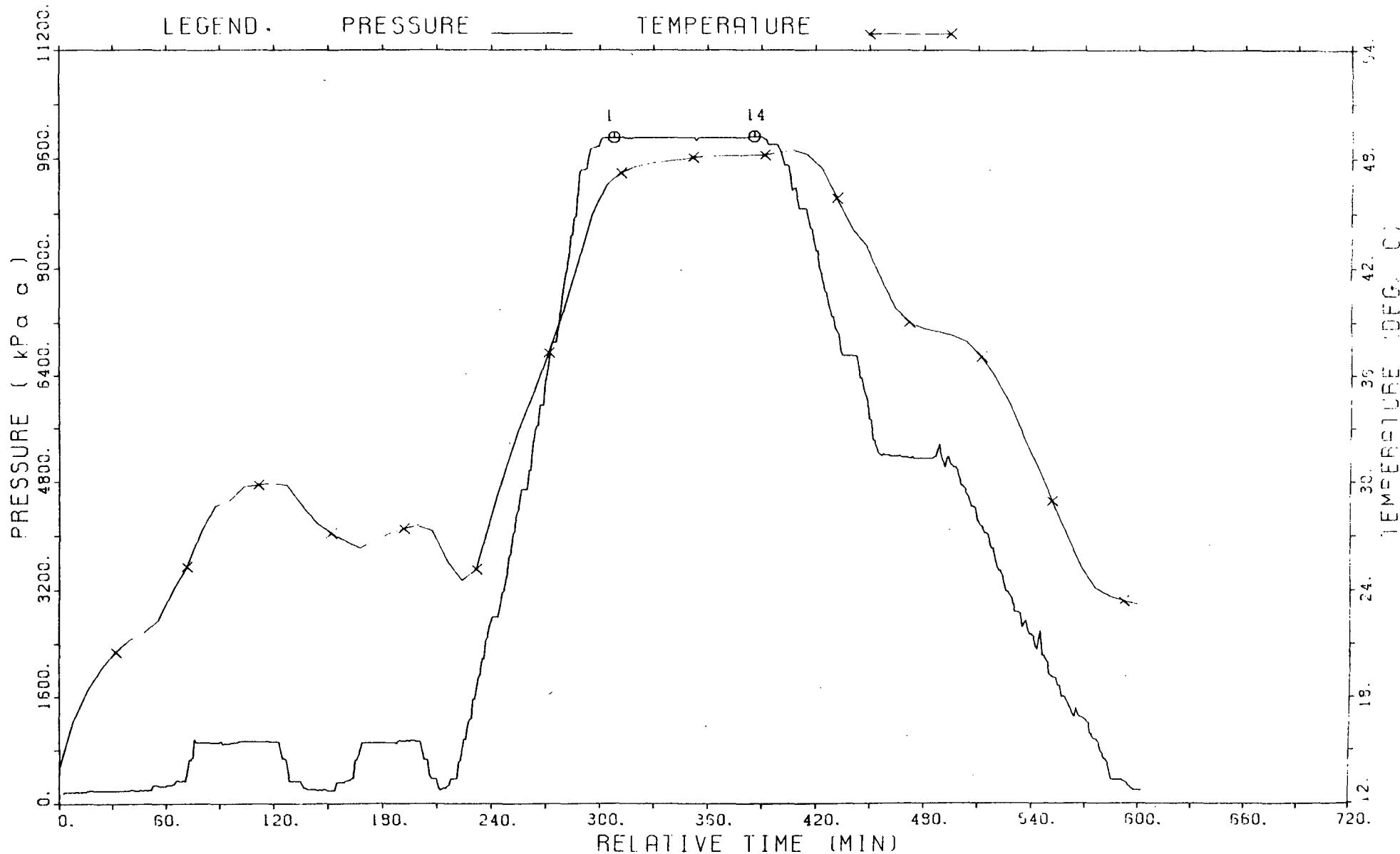
CHEVRON SPERRY CREEK N-58  
65.376/129.252 DST #4  
ELECTRONIC GAUGE #1749

LEGEND:  $\bigcirc$  = 9639.  $\times$  = 9655.  
14



LEGEND. 0 = 9014. P (psi)  
14 = 9031.

CHEVRON SPERRY CREEK N-58  
65. 376/129. 252 DST #4  
ELECTRONIC GAUGE #1766



DST#04  
CHEVRON SPERRY CREEK 65.376/129.252  
869.00m to 876.00m

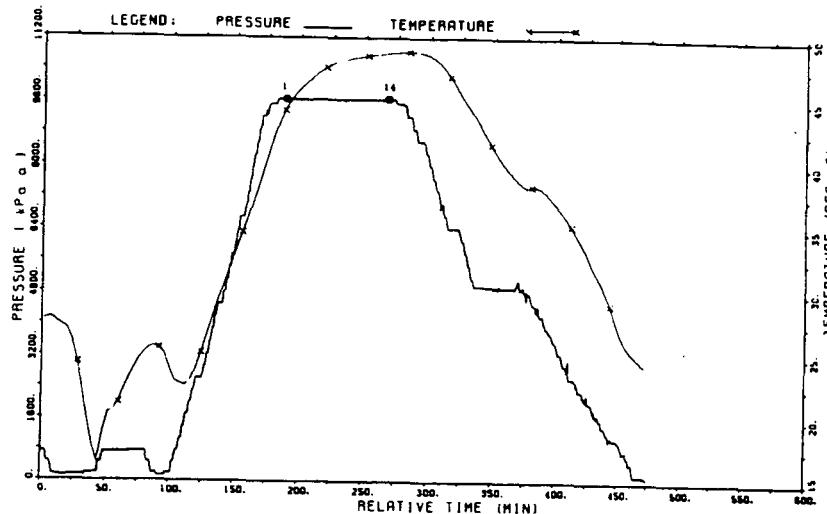
PRESSURE RECORDER NUMBER : 001749

DEPTH : 872.00m LOCATION : OUTSIDE  
TYPE : DMRB CAPACITY : 68900.00kPa(a)

\*\*\*\*\* TEMPERATURE AT RECORDER DEPTH = 48.9 C

PRESSURE  
kPa(a)

1) Initial Hydro : 9638.  
14) Final Hydro. : 9655.



ELECTRONIC GAUGE,  
PRESSURE AND  
TEMPERATURE.

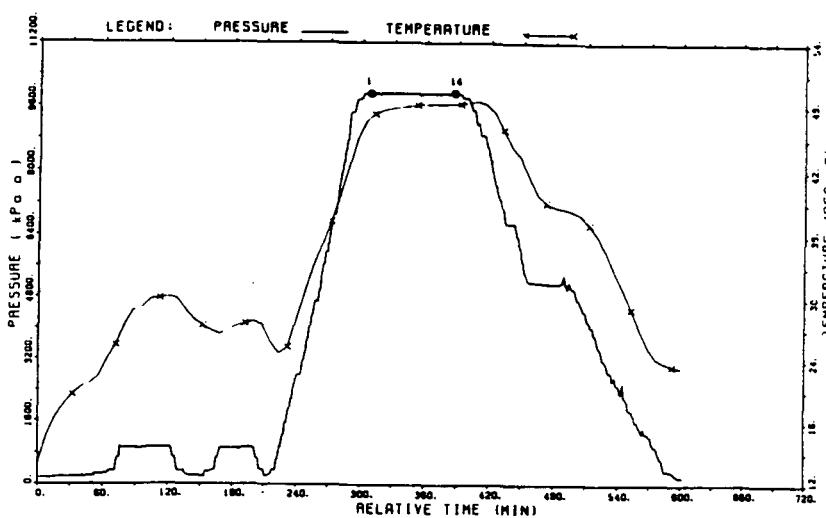
PRESSURE RECORDER NUMBER : 001766

DEPTH : 861.00m LOCATION : INSIDE  
TYPE : DMRB CAPACITY : 68900.00kPa(a)

\*\*\*\*\* TEMPERATURE AT RECORDER DEPTH = 48.1 C

PRESSURE  
kPa(a)

1) Initial Hydro : 9914.  
14) Final Hydro. : 9931.



ELECTRONIC GAUGE,  
PRESSURE AND  
TEMPERATURE.

DST#04  
CHEVRON SPERRY CREEK 65.376/129.252  
869.00m to 876.00m

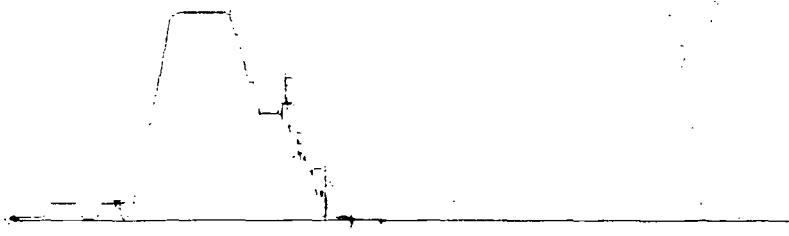
PRESSURE RECORDER NUMBER : 009496

DEPTH : 872.00m  
TYPE : K-3

LOCATION : OUTSIDE  
CAPACITY : 8722100. kPa

PRESSURE  
kPa

1) Initial Hydro : 9746.  
14) Final Hydro. : 9746.



PRESSURE RECORDER NUMBER : 013129

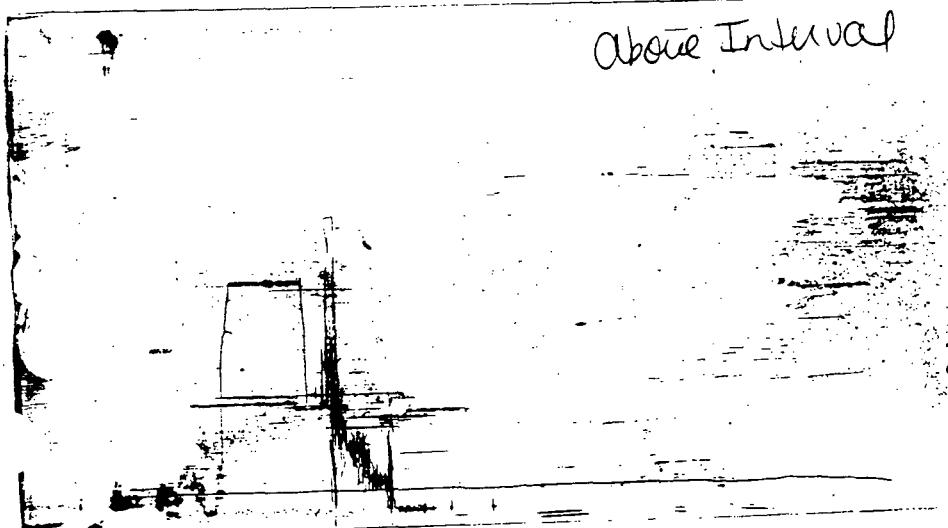
DEPTH : 859.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 19700.00 kPa

PRESSURE  
kPa

1) Initial Hydro : 9672.  
14) Final Hydro. : 9672.

Above Interval



ABOVE INTERVAL.

DST#04  
CHEVRON SPERRY CREEK 65.376/129.252  
869.00m to 876.00m

PRESSURE RECORDER NUMBER : 014103

DEPTH : 855.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 20000.00 kPa

PRESSURE  
kPa

1) Initial Hydro :  
14) Final Hydro. : 19.

Above Hydraulic Tool

ABOVE HYDRAULIC  
TOOL.

PRESSURE RECORDER NUMBER : 017024

DEPTH : 880.00m  
TYPE : K-3

LOCATION : INSIDE  
CAPACITY : 20000.00 kPa

PRESSURE  
kPa

1) Initial Hydro :  
14) Final Hydro. :

Below Interval  
Clock Stopped

BELOW INTERVAL.  
CLOCK STOPPED,  
NO READINGS.

APPENDIX 6

LOCALITY MAP

END

CANADA OIL AND GAS REGULATIONS  
NORTHWEST TERRITORIES  
GRID AREA 65°40'; 129°15'  
IN UNIT N, SECTION 58  
SPERRY CREEK  
IRY WELL

LOCALITY MAP

SES

FORT GOOD HOPE

SPERRY CREEK N-58



APPENDIX 7  
DRILLING FLUID REPORT

C

**Chevron Sperry Creek**  
**65°37'56.07"N**  
**129°25'24.73"W**  
**Well Recap**

M-I Drilling Fluids Canada, Inc.

**Chevron Sperry Creek**

**65°37'56.07"N**

**129°25'24.78"W**

**Well Recap**

<b>Spud Date:</b>	<b>January 4, 1991</b>
<b>Rig Release Date:</b>	<b>February 17, 1991</b>
<b>Total Days:</b>	<b>45</b>
<b>Total Depth:</b>	<b>2160</b>
<b>Total Cost:</b>	<b>\$63,665.82</b>
<b>Cost/Metre:</b>	<b>\$29.47</b>

**Sales Representative:** K. King

**Field Representative:** R. Birdsell

TABLE OF CONTENTS

1. Recap by Interval
2. Graphics Section
  - a. Days vs. Depth
  - b. Mud Costs - Daily/Total
  - c. Product Cost %
  - d. Product Cost % - by Interval
3. Summary of Daily Mud Checks

C

Chevron Sperry Creek  
65°37'56.07"N  
129°25'24.73"W

SURFACE HOLE SECTION:

Interval: 0 - 45 m  
Mud Type: Gel Chemical  
Hole Size: 660 mm  
Casing Size: 508 mm  
Total Days: 4 days  
Product Cost: \$2,355.24  
Cost/Meter: \$52.33

Comments: Spud and drilled 660 mm hole. Had loss circulation at 6 m and 25 m. Spot L.C.M. pills and regained circulation. Mud started channelling from wellbore to sump. Ran cement into wellbore twice to cure channelling. Drilled cement, dumped contaminated mud and drilled to 44.5 m, circulate, P.O.H. and ran 508 mm conductor. Cement conductor had good returns.

Material Usage:

<u>Product</u>	<u>Units</u>	<u>Cost</u>
Natural Gel	210	\$1,831.20
Soda Ash	7	145.60
Sawdust	41	190.24
Kwik Seal	2	46.48
CelloFlake	4	141.72
<b>TOTAL:</b>		<b>\$2,355.24</b>

Chevron Sperry Creek  
65°37'56.07"N  
129°25'24.73"W

INTERMEDIATE HOLE:

Interval: 45 - 458 m  
Mud Type: Gel/  
Hole Size: 445 mm  
Casing Size: 340 mm  
Total Days: 10  
Product Cost: \$21,263.78  
Cost/Meter: \$51.48

Comments: Install diverter and pressure test. Drilled out cement, had slight contamination problems. Drilled to 275m, P.O.H., hole very tight, had to pump singles out. Pumped SAPP wash, work out singles, pump high VIS sweep, work out of hole till collars were in casing. R.I.H., wash and reamed to 275 m, start drilling ahead. Large amounts of shale coming over shaker. Lower pump strokes due to pressure limitations. At 378 m had a very tight connection made a 4 std wiper trip and large amounts of shale to surface after trip. Drilled ahead, flow line temperature rising causing minor dehydration in mud. P.O.H. at 448 m for bit (larger nozzles) and stabilizer, hole was tight. Reamed 225 - 230 m, 360 - 448 m and drilled to 458.5 m, P.O.H. to log. Logged hole and ran 339.7 mm casing to 457 m. Cement casing with good returns. (Note: Last 200 m of hole was fanned slowing R.O.P. to 3m/hr, max deviation 2 3/4").

Material Usage:

<u>Product</u>	<u>Units</u>	<u>Cost</u>
Natural Gel	397	\$3,461.84
Soda Ash	7	145.60
Caustic Soda	5	172.00
Kelzan XCD	37	16,680.34
SAPP	6	804.00
<b>TOTAL:</b>		<b>\$21,263.78</b>

Chevron Sperry Creek  
65°37'56.07"N  
129°25'24.73"W

**MAIN HOLE:**

Interval: 458 - 2160 m  
Mud Type: Gel Chemical  
Hole Size: 311 mm  
Total Days: 31  
Product Cost: \$40,046.80  
Cost/Meter: \$23.52

**Comments:**

N/U and pressure test. Drilled out with 311.2 mm bit and water. Run P.I.T., displace to mud and drilled ahead. Connections were tight under the shoe but gradually improved. Viscosity started jumping around due to temperature. At 816 m P.O.H. for bit, reamers and stabilizers. R.I.H. with new assembly, wash and reamed 480 - 816 m. Drilled to 846 m, circulate, P.O.H. to core (some tight spots). R.I.H. and cut core #1, P.O.H. (pump out 2 singles). R.I.H. with bit, reamed rat hole and drilled ahead. At 1000 m had large shale splinters to surface and tight connections (low annular velocities DP 27m/min, DC 51 m/min). Drilled to 1044 m. P.O.H. to change jars. At 1144 m connections were tight, made a 4 stand wiper trip (hole improving). Drilled to 1197 m P.O.H. for bit, hole was good both ways. Drilled ahead, connections getting tight at 1285 m. Change pump liners and increased annular velocities to DP 32m/min, DC 61 m/min. Continue drilling ahead pumping high viscosity sweeps prior to connections, hole seems to be swelling. Drill to 1640 m with some tight connections, make 15 stand wiper trip, hole was good, 3m fill on bottom. Pretreat for Anhydrite at 1740 m. P.O.H. at 1795 m for bit and to pressure test B.O.P.'s R.I.H. with directional survey every 5 stands, hole was in good shape. Minor Anhydrite encountered so far. Drilled ahead to 1950 m and tripped for bit, hole good both ways. Drilled ahead to 1976 m and lost 6m<sup>3</sup> of fluid. Pumped L.C.M. pill, pumped pill #2 at 1980 m. Drilled ahead with 100% returns, R.O.P. slowing down. Drilled to 2160 m (T.D.) make 10 stand wiper trip, hole good with no fill. P.O.H. to log. Ran in to log, hole good but

C

Chevron Sperry Creek  
65°37'56.07"N  
129°25'24.73"W

MAIN HOLE CONT'D....

had problems with logging tool. Calliper log showed hole enlarged 34% for average hole size of 360 mm. After 78 hours of logging ran in for clean out trip, mud was very dehydrated but hole was in good shape. P.O.H. and ran in with logs, finish logging. Ran in with DST #1 (Avg. nitrate concentration 68 mg/l over interval) packers would not seat. P.O.H. modify belly spring, R.I.H. could not seat packer. P.O.H. check tool, R.I.H. with test tool, P.O.H., R.I.H. 1500 m and condition mud. P.O.H., R.I.H. to 800 m could not seat packer. P.O.H. R.I.H. and begin plug and abandonment procedure.

Material Usage:

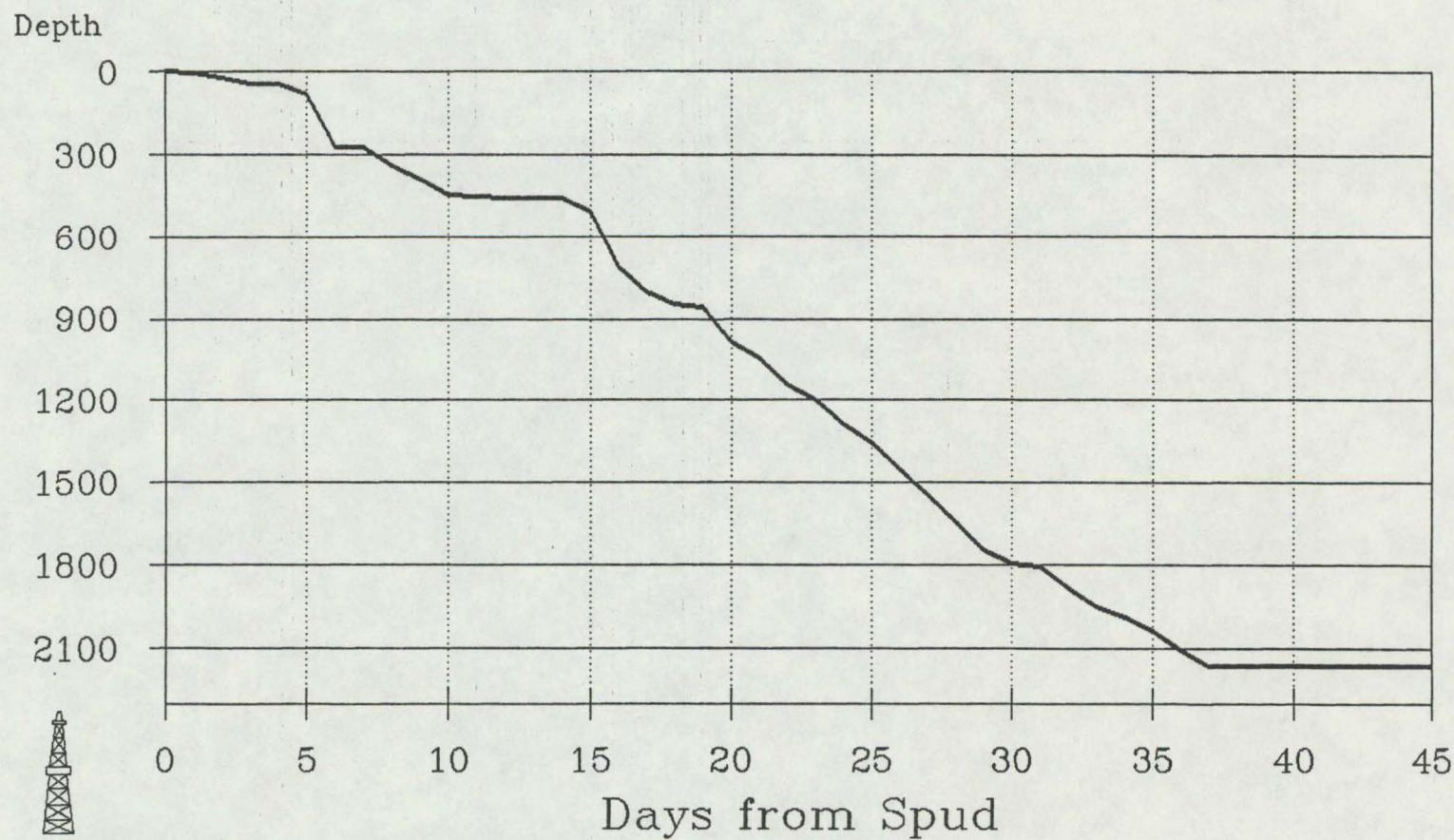
<u>Product</u>	<u>Units</u>	<u>Cost</u>
Natural Gel	397	\$7,446.88
Soda Ash	17	353.60
Sawdust	97	450.08
Caustic Soda	84	2,889.60
Kelzan XCD	42	18,934.44
Barite	154	1,841.84
Drispac	36	6,947.64
Ammonium Nitrate	12	171.48
Peltex	21	777.84
Milfibre	10	233.40
<hr/>		
<b>TOTAL:</b>		<b>\$40,046.80</b>

### DRILLING MUD COST SUMMARY

PRODUCT	SIZE	QUANTITY	COST
M-I Bar	40 .36 kg	154	\$1,841.84
Natural Gel	40 kg	571	12,739.92
Soda Ash	40 kg	31	644.80
Sawdust	sacks	138	640.32
Kwik Seal	18.14 kg	2	46.48
CelloFlake	11.34 kg	4	141.72
Caustic Soda	22.68 kg	89	3,061.60
Kelzan XCD	25 kg	79	35,614.78
SAPP	40 kg	6	804.00
Drispac	22.68 kg	36	6,947.64
Ammonium Nitrate	25 kg	12	171.48
Peltex	25 kg	21	777.84
Milfibre	18.14 kg	10	233.40
TOTAL:			\$63,665.82
COST/METER:			\$29.47

# Days vs. Depth

Chevron Sperry Creek 65°37'56.07"N  
129°25'24.73"W



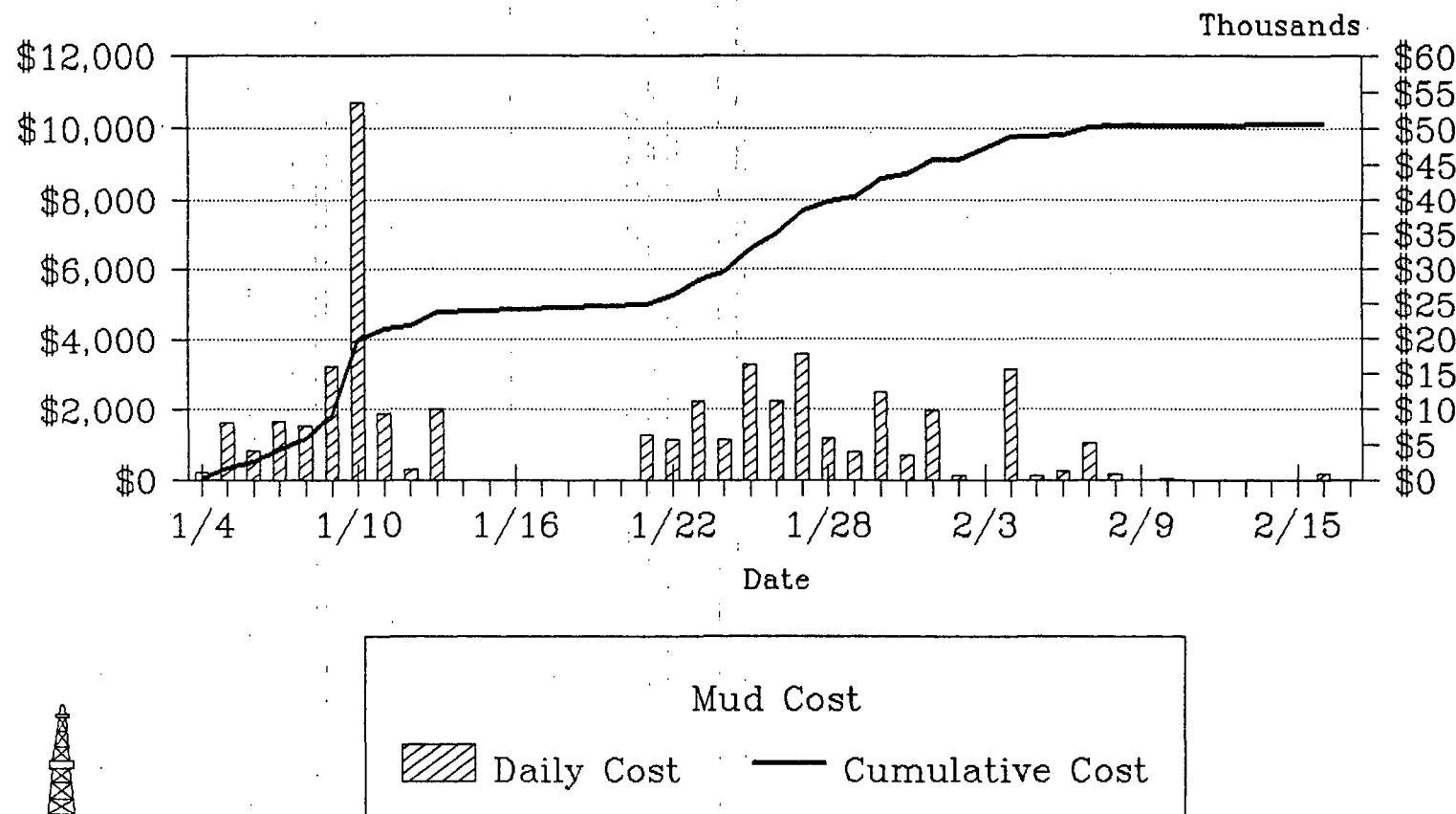
M - I Drilling Fluids Canada, Inc.

X Data              Days from Spud

0	0
5	1
45	2
45	3
86	4
275	5
275	6
342	7
392	8
448	9
453	10
458	11
458	12
458	13
458	14
505	15
715	16
804	17
846	18
860	19
986	20
1040	21
1144	22
1200	23
1285	24
1352	25
1640	26
1640	27
1740	28
1795	29
1805	30
1882	31
1950	32
1986	33
2037	34
2107	35
2160	36
2160	37
2160	38
2160	39
2160	40
2160	41
2160	42
2160	43
2160	44
2160	45

# Mud Costs - Daily/Total

Chevron Sperry Creek 65°37'56.07"N  
129°25'24.73"W

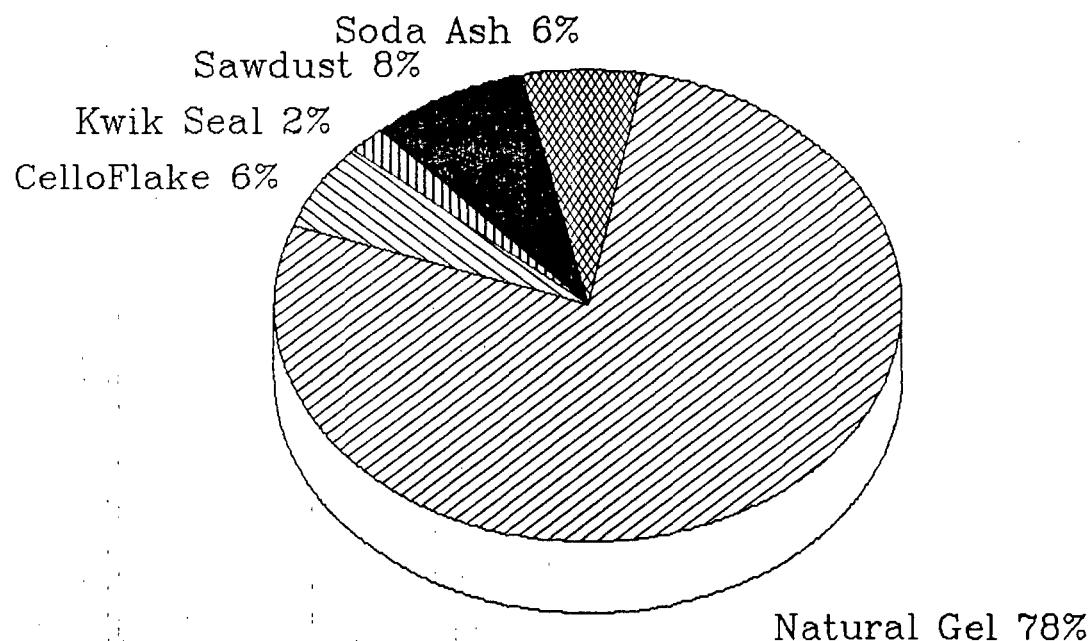


M-I Drilling Fluids Canada, Inc.

X Data	Daily Cost	Cumulative Cos
1/4	196	196
1/5	1590	1786
	805.6	2591.6
1/7	1655	4246.6
1/8	1535	5781.6
1/9	3227	9008.6
1/10	10695	19703.6
1/11	1884	21587.6
1/12	277.6	21865.199
1/13	1988	23853.199
1/14		
1/15		
1/16		
1/17		
1/18		
1/19		
1/20		
1/21	1234.81	25088.01
1/22	1138	26226.01
1/23	2236	28462.01
1/24	1110	29572.01
1/25	3247	32819.008
1/26	2236	35055.008
1/27	3544	38599.008
1/28	1165	39764.008
1/29	779.03	40543.039
1/30	2492	43035.039
	686	43721.039
	1964	45685.039
2/2	106	45791.039
2/3		
2/4	3122	48913.039
2/5	130.8	49043.84
2/6	261.6	49305.441
2/7	1048	50353.441
2/8	165.68	50519.121
2/9		
2/10	33	50552.121
2/11		
2/12		
2/13		
2/14		
2/15		
2/16	179.4	50731.52
2/17		

# Product Cost %

Chevron Sperry Creek 65°37'56.07''N  
129°25'24.73''N/SURFACE HOLE



## Products % of Total Cost

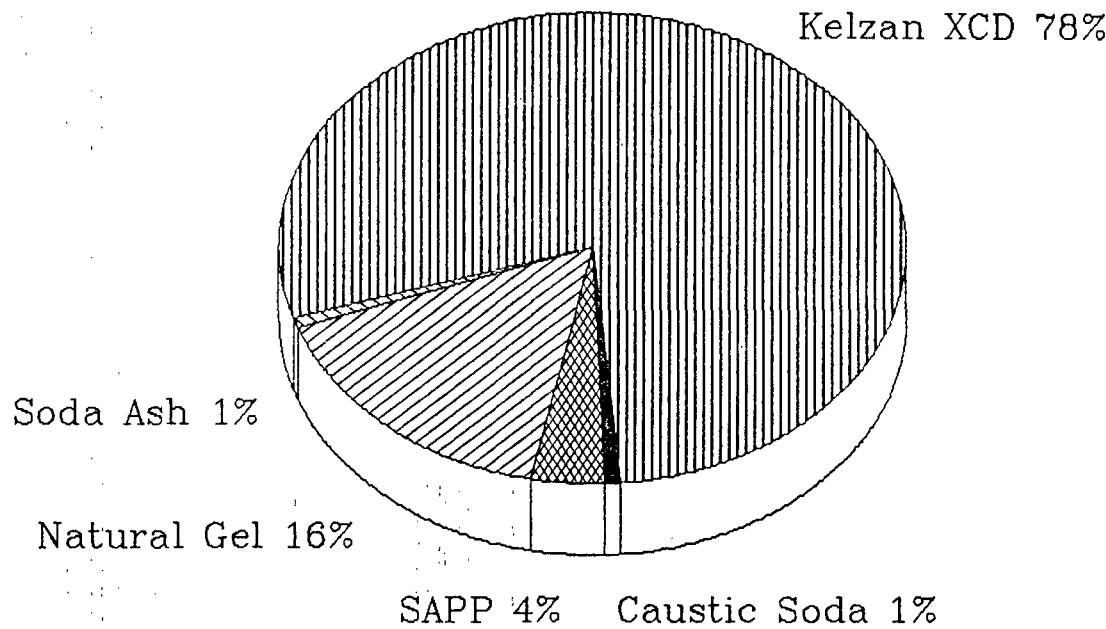
M - I Drilling Fluids Canada, Inc.

X Data Series 1

Natural Gel	1831.2
a Ash	145.6
Sawdust	190.24
Kwik Seal	46.48
CelloFlake	141.72

# Product Cost %

Chevron Sperry Creek 65°37'56.07"N  
129°25'24.73"N/INTERMEDIATE HOLE



Products % of Total Cost

M - I Drilling Fluids Canada, Inc.

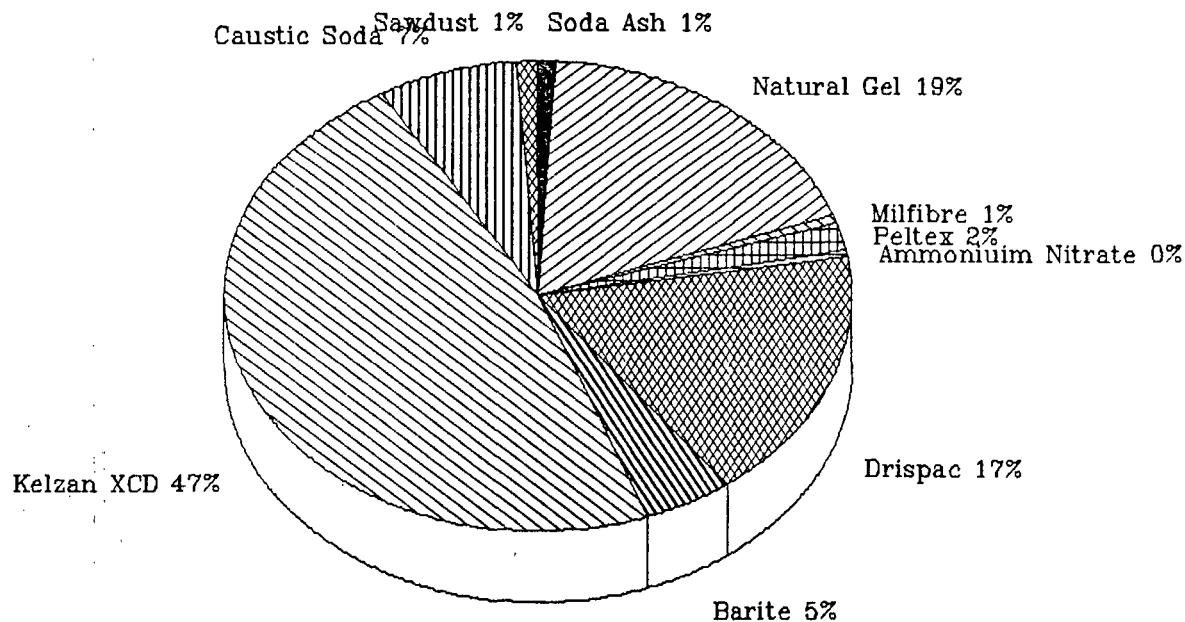


X Data Series 1

Ural Gel	3461.84
,	804
Caustic Soda	172
Kelzan XCD	16680.34
Soda Ash	145

# Product Cost %

Chevron Sperry Creek 65°37'56.07"N  
129°25'24.73"W / MAIN HOLE



Products % of Total Cost

M - I Drilling Fluids Canada, Inc.

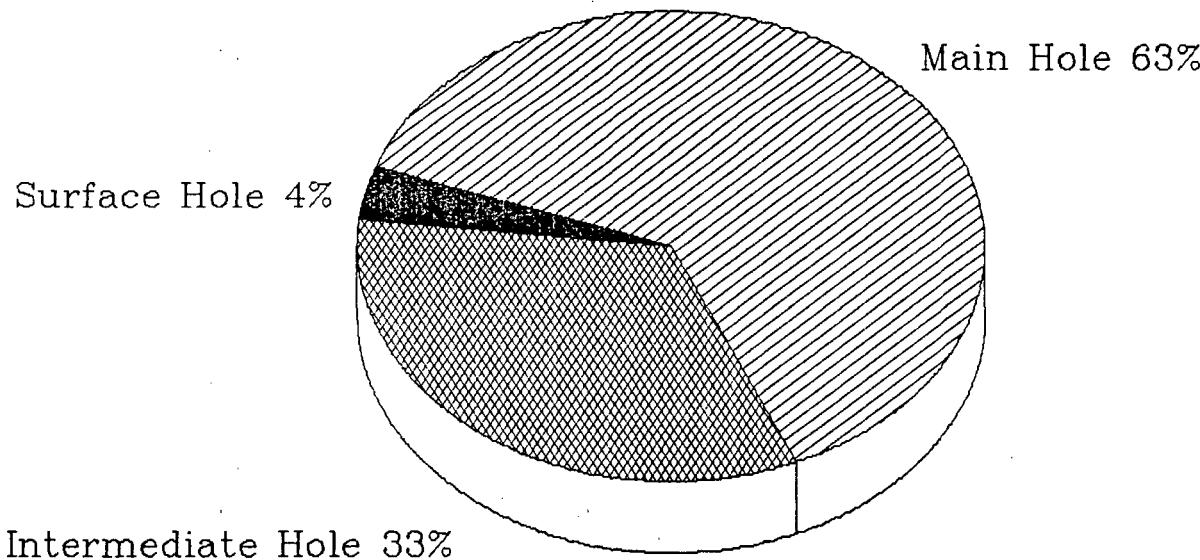
## X Data

## Series 1

Natural Gel	7446.88
Soda Ash	353.6
Just	450.08
Plastic Soda	2889.6
Kelzan XCD	18934.439
Barite	1841.84
Drispac	6947.64
Ammonium Nitrate	171.48
Peltex	777.84
Milfibre	233.4

# Product Cost %

Chevron Sperry Creek 65°37'56.07"N  
129°25'24.73"N



## Products % of Total Cost

M - I Drilling Fluids Canada, Inc.

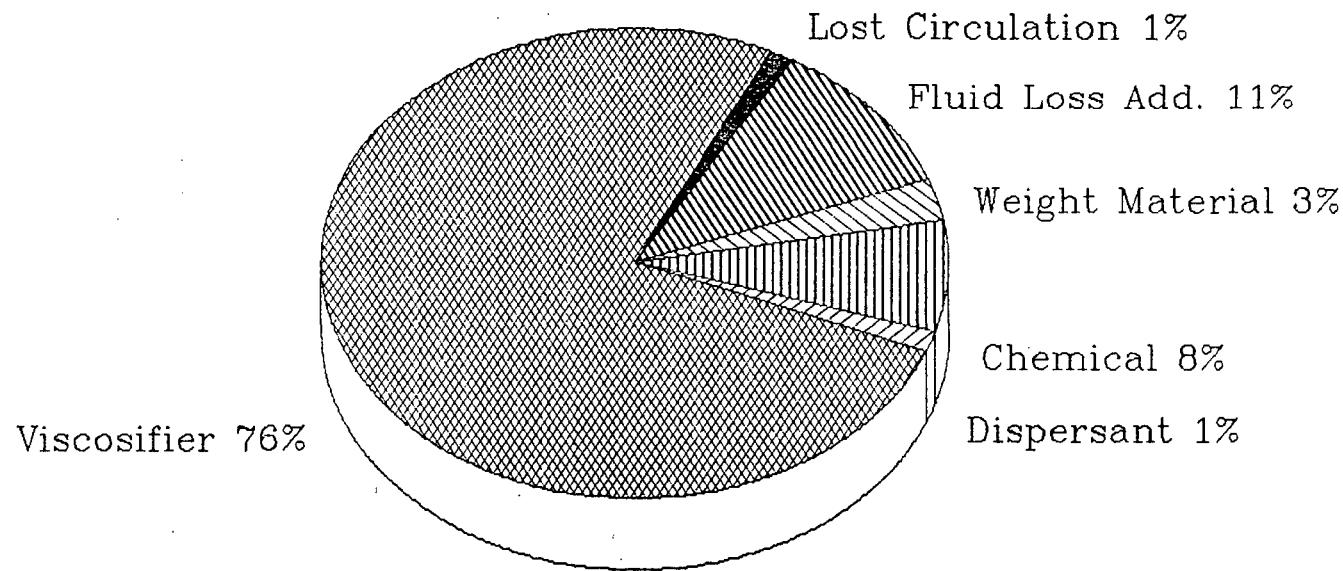
X Data Series 1

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Surface Hole 2355.24  
Intermediate Hole 21263.779  
    7 Hole 40046.801

# Product Cost %

Chevron Sperry Creek 65°37'56.07"N  
129°25'24.73"N



Products % of Total Cost

## X Data

## Series 1

Lost Circulation	828.52
Viscosifier	48354.711
persant	804
Chemical	4889.12
Weight Material	1841.84
Fluid Loss Add.	6947.64



## WEEKLY SUMMARY

WELL NAME CHEVRON SPERRY CREEK N-58  
65° 37' 56.07" N  
LEGAL 129 25 24.73" W N. W. T.

MUD TYPE GEL / KELZAN MUD ENGINEER Russ Birdsall

MUD ENGINEER Russ Birdsell

CONTRACTOR SIEMENS KIGIE PAGE 1 OF 1



-58

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## WEEKLY SUMMARY

MUD TYPE GEL / KELZAN MUD ENGINEER Russ BIRDSELL

WELL NAME CHEVRON SPERRY CREEK N-58  
65° 37' 56.07" N  
LEGAL 129° 25' 24.73" W N.W.T.

CONTRACTOR SHEIKH RIG IE PAGE 2 OF

## CALGARY OFFICE



WEEKLY SUMMARY

WELL NAME PIEVON SPARRY CREEK N-58  
65° 37' 56.07" N  
 LEGAL 129 25' 24.73" W

CONTRACTOR SHEATH RIG #1C

PAGE 3 OF 1

MUD TYPE GEL/ICELZAN

MUD ENGINEER RUSS BIRDSEY

DATE	DEPTH m	MUD DENSITY Kg/m <sup>3</sup>	FUN VIS s/l	FANN READINGS		P.V. mPas	Y.P. Pa	GEL STRENGTH Pa		FLUID LOSS cm <sup>3</sup> /30 min		pH	ALKALINITY		CHLORIDES mg/L	Ca mg/L	CO <sub>3</sub> mg/L	HCO <sub>3</sub> mg/L	K+ ion mg/L	POLYMER kg/m <sup>3</sup>	MBT kg/m <sup>3</sup>	VOLUME FRACTION			D/B ratio	TEMP °C	ESTIMATED DAILY COST \$	ESTIMATED ACCUM. COST \$		
				0 600	0 300			10 sec	10 min	Std. API	HTHP		FILT CAKE mm	EXC. SULF. mg/L	PI	MI						OIL	SOLIDS	SAND						
9/01-11	453	1115	65	77	52	23	13.3	3	5	9.0	-	1.0	-	9.0	.02	.2	180	0	24	195	-	-	71	0	.073,001	11	80			
DAYS FROM SPUD	FINISH IN W/ NEW BHA. 11	BRIDGE	225	230m	REIN	360m	TO BOTTOM.	DRILL	TO	458.5m.	POOH	TO	LUG.																	
11	FIRST SET TIGHT.	LUG	W/ COMPATLOG.	RIG	TO	RUN	CASING.																							
01-16	458.5																													
	FINISH RIGGING UP.	RUN	340mm	CASING	LINC.	CSC.	CEMENT.	GOOD	RETURNS.	CASING																				
12	SET ON Bottom.	WOC	+ HEAD	UP.																										
01-16	458.5																													
	FINISH NIPPLING UP.	AND	PRESSURE	TEST																										
13																														
01-17	458.5																													
	PRESSURE	TESTING																												
14																														
01-18	505	1115	52	53	36	17	7.5	2.5	5.5	100	1.0	-	9.5	.3	.7	180	20	360	122	-	-	67	0	.073,002	11	46				
	FINISH	PRESSURE	TESTING.	DRILL	OUT	COLLAR	CEMENT	SHOE	W/	WATER																				
15	@ 462m	CONNECTIONS	VERY	TIGHT	UNDER	SHOCK.	DRILL	TO	627m.																					
01-19	715	1120	85	96	67	29	19	5	13	44.0	-	1.5	-	9.5	.2	.5	180	20	240	122	-	-	78	0	.076,001	11	55			
	DRILL	AHEAD	TO	744m.	CONNECTIONS	GOOD.	VISCO	SITY	VERY	UNSTABLE																				
16	To	TEMPERATURE.																												
01-20	804	1110	52	52	37	15	11	2	4.5	11.5	-	1.5	-	9.5	.15	.53	180	20	180	280	-	-	74	0	.071,001	11	55			
	DRILL	AHEAD	TO	816m.	TRIP	FOR	BIT.	PICKUP	REMMERS	&	STABILIZERS.	R111																		
17	72cm	IN	NEW	BHA.																										



WEEKLY SUMMARY

WELL NAME CHEVRON SPERRY CREEK N-58  
65° 37' 56.07" N  
129° 25' 24.73" W  
 LEGAL

MUD TYPE GEL/KCLZAN MUD ENGINEER Russ Birdsell CONTRACTOR SIEMENS RIG # IE PAGE 4 OF 1

DATE	DEPTH m	MUD DENSITY Kg/m <sup>3</sup>	FUN VIS s/l	FANN READINGS		P.V. mPa.s	Y.P. Pa	GEL STRENGTH Pa	FLUID LOSS cm <sup>3</sup> /30 min	FILT CAKE mm	EXC. SULF. mg/L	pH	ALKALINITY		CHLORIDES mg/L	Ca mg/L	CO <sub>3</sub> mg/L	HCO <sub>3</sub> mg/L	K+ mg/L	POLYMER kg/m <sup>3</sup>	MBT kg/m <sup>3</sup>	VOLUME FRACTION			D/B ratio	FL TEMP °C	ESTIMATED DAILY COST \$	ESTIMATED ACCUM. COST \$							
				0	600								PI	MF																					
91-01-21	846	1115	65	69	48	21	13.5	3.5	8	9.4	-	1.0	-	10.0	.5	62	180	0	600	244	-	-	71	0	.073	.002	11	45							
DAYS FROM SPUD	REAM IN NEW BHA	480	816m.	DRILL AHEAD TO	846m.	CIRC.	TO CORE.	POUR	TO CORE.																				1364	25088.	32				
18	HOLE TIGHT IN SNAPS.	PULL UP CORE BBL.	121H.																																
01-22	860	1115	48	50	33	17	8	2.5	4	9.3	-	1.0	-	140	.35	.8	180	0	956	48	-	-	74	0	.073	.001	11	38							
	CUR CONG #1, 18m.	POOH W/ CORE PUMP	2	SINGLES	OFF BOTTOM.	RECOVER	CORE.	121H																											
19	REAM PLATOLE.	DRILL TO	882m																												1176	28,266.	52		
01-23	986	1140	54	65	45	23	11	3.5	6	8.5	-	1.0	-	140	3	.9	180	0	180	34	-	-	71	0	.085	.001	21	79							
	DRILL AHEAD TO 1000m.	LARGE 5,200	SNARE SPLINTER	AT SWINGER.	120L TIGHT																														
20	ON CONNECTIONS.	LOW ANNULAR	VELOCITIES																												2236	25,502.	65		
01-24	1040	1150	55	77	45	29	9.5	3.5	5	8.8	-	1.5	-	10.0	.51	1.1	180	0	600	122	-	-	74	0	.095	.002	21	53							
	DRILL TO 1044m.	CIRCULATE SAMPLE.	POOH TO CHANGE JAR.	121H.	DRILL TO 1048m.																														
21																															1176	29,613.	51		
01-25	1144	1160	53	85	56	29	13.5	4	5	8.2	-	1.0	-	9.5	.24	.52	180	0	288	46	-	-	78	0	.102	.002	21	81							
	DRILL AHEAD TO 1144m.	CONNECTIONS TIGHT.	MAKE 4 SPO.	WATER TRIP.	WIC.																													47	
22	DRILL TO 1150m																														319.5	32,809.			
01-26	1200	1140	61	96	65	31	17	5	7.5	8.5	-	1.0	-	9.0	.15	.6	180	20	180	366	-	-	82	0	.089	.001	11	44							
	DRILL AHEAD TO 1197m.	TRIP FOR 13.5	120L	GOOD OUT AND IN.																															
23	DRILL TO 1220m																														2236	35,045.	60		
01-27	1285	1125	60	69	46	23	11.5	4	5	8.8	-	1.0	-	9.5	.32	.85	180	0	384	292	-	-	75	0	.079	.001	11	51							
	DRILL AHEAD TIGHT CONNECTIONS.	CHANGE PUMP LINERS	TO 140m.	INCREAS	ED																										3544	36,599	93		
24	ANNULAR VEL.	DRILL TO 1297m.																																	



WEEKLY SUMMARY

MUD TYPE GEL/ICLZAN MUD ENGINEER Russ Birdsell

WELL NAME CHEVRON SPERRY CREEK N-58  
 65° 37' 56.07" N  
 LEGAL 129° 25' 24.73" W

CONTRACTOR SUMMITAH RIG #16 PAGE 5 OF 1

DATE	DEPTH m	MUD DENSITY Kg/m <sup>3</sup>	FUN VIS s/l	FANN READINGS		P.V. mPas	Y.P. Pa	GEL STRENGTH Pa	FLUID LOSS cm <sup>3</sup> /30 min	FILT CAKE mm	EXC. SULF. mg/L	pH	ALKALINITY		CHLORIDES mg/L	Ca mg/L	CO <sub>2</sub> mg/L	HCO <sub>3</sub> mg/L	K+ ion mg/L	POLYMER kg/m <sup>3</sup>	MBT kg/m <sup>3</sup>	VOLUME FRACTION			D/B ratio	FL PCA VC	ESTIMATED DAILY COST \$	ESTIMATED ACCUM. COST \$
				0	600								PI	MF														
01-01-28	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-01	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-02	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-03	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-04	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-05	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-06	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-07	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-08	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-09	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-10	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-11	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-12	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-13	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-14	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-15	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-16	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-17	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-18	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-19	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-20	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-21	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-22	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-23	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-24	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-25	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-26	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-27	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-28	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-29	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-30	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-02-31	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-01	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-02	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-03	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-04	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-05	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-06	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-07	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-08	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-09	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-10	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-11	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-12	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	180	38.84	180	0	456	97	-	-	67	0	.07	.001	1/1	53	
01-03-13	1352	1110	61	68	46	22	12	3	4	10.2	-	1.0	-	18														



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WEEKLY SUMMARY

WELL NAME CHEVRON SPERRY CREEK N-58  
 68° 37' 56.07" N  
 129° 25' 24.73" W  
 LEGAL

CONTRACTOR SHEHATA 1210 12-15 PAGE 6 OF 6

MUD TYPE

GEL/ICELZAN

MUD ENGINEER

Russ Birdsell

DATE	DEPTH m	MUD DENSITY Kg/m <sup>3</sup>	FANN VIS s/L	FANN READINGS		P.V. mPa.s	Y.P. Pa	GEL STRENGTH Pa		FLUID LOSS cm <sup>3</sup> /30 min		FILT CAKE mm	EXC. SULF. mg/L	pH	ALKALINITY		CHLORIDES mg/L	Ca mg/L	CO <sub>2</sub> mg/L	HCO <sub>3</sub> mg/L	K+ mg/L	POLYMER kg/m <sup>3</sup>	MBT kg/m <sup>3</sup>	VOLUME FRACTION			D/B ratio	FL TEMP °C	ESTIMATED DAILY COST \$	ESTIMATED ACCUM COST \$
				0 600	0 300			10 sec	10 min	Std. API	HTHP				PI	MI							OIL	SOLIDS	SAND					
02-04	1882	1115	62	74	52	22	15	3.5	7	9.6	-	1.0	-	105	.77	183	180	0	724	353	-	-	64	0	.073	.001	1/1	54		
DAYS FROM SPUD				DRILL	AHEAD	No	PROBLEMS.				DRILL	TO	1901 m.																45	
32																													330.63	481.913
02-05	1950	1225	57	68	46	22	12	3	7.5	9.4	-	1.0	-	105	.86	182	180	0	792	610	-	-	64	0	.073	.001	1/1	55		
33				DRILL	TO	1950 m.					TRIP	ON	1315.																25	
																													130.80	490.446
02-06	1982	1100	57	72	48	24	12	3.5	7	9.6	-	1.0	-	105	.67	172	180	0	804	463	-	-	57	0	.063	.001	1/1	56		
34				DRILL	AHEAD	Lost	PARTIAL	REWORKS	(6m <sup>3</sup> )		AT	1972 m.																	85	
																													261.68	491.345
02-07	2037	1090	61	72	51	21	15	3.6	6	9.6	-	1.5	-	100	.64	188	180	0	768	988	-	-	60	0	.057	.001	1/1	58		
35				DRILL	AHEAD.	SLOW	NO P.	CONNECTIONS	Good.		DRILL	TO	2000 m.															40	25	
																													104.8	503.352
02-08	2107	1110	68	103	70	33	18.5	6	13	9.6	-	1.5	-	10.0	.62	157	180	0	744	902	-	-	64	0	.07	.002	1/1	59		
36				DRILLING	AHEAD.	CONNECTIONS	Good.				DRILL	TO	2132 m.																93	
																													185.68	505.517
02-09	2160	1115	75	90	61	29	16	7.3	13	9.5	-	1.0	-	10.5	.6	152	180	0	720	390	-	-	64	0	.073	.001	1/1	61		
37				DRILL	TO	T.D.	2160 m.	CIRCULATE.	MAKE	10	STD.	WIPER	TRIP.	1106	Good	No	Fill.												93	
																													- 50.517	
02-10	2160																													
38				LOGGING.																										81
																													34.88	50.552

CALGARY OFFICE

APPENDIX 8

DEVIATION SURVEYS

EASTMAN CHRISTENSEN

Canada District

WELL DEFLECTION SURVEY

for

CHEVRON CANADA RESOURCES LIMITED

FORT GOOD HOPE

Site : SPERRY CREEK

Well : SPERRY CK N-58

Survey Reference : S03062.0CH

CHEVRON CANADA RESOURCES LIMITED  
FORT GOOD HOPE

Slot : SPERRY CREEK Date Printed : 15-MAY-91  
Well : SPERRY CK N-58 Our Ref : 603062.0CH  
PRHL : 0.00

Page : 2

Measured Depth	Drift Angle	Drift Direction	Course Length	Vertical Depth	Vertical Section	R E C T A N G U L A R C O O R D I N A T E S	Dogleg Severity
457.00	0.00	0.00	0.00	457.00	0.00	0.00 N	0.00 E
520.00	1.50	0.00	63.00	519.99	0.82	0.82 N	0.00 E
803.00	1.00	5.00	283.00	802.92	6.99	6.99 N	0.22 E
943.00	1.25	15.00	140.00	942.90	9.68	9.68 N	0.72 E
1084.00	1.25	105.00	141.00	1083.88	10.77	10.77 N	2.60 E
1225.00	2.00	170.00	141.00	1224.83	7.95	7.95 N	4.51 E
1429.00	1.75	240.00	204.00	1428.74	2.88	2.88 N	2.43 E
1569.00	1.00	274.00	140.00	1568.70	1.90	1.90 N	0.64 W
1708.00	1.00	263.00	139.00	1707.68	1.84	1.84 N	3.05 W
1859.00	1.00	260.00	151.00	1858.66	1.45	1.45 N	5.66 W
2010.00	1.75	287.00	151.00	2009.62	1.89	1.89 N	9.16 W
2142.00	2.75	305.00	132.00	2141.51	4.30	4.30 N	13.68 W

CALCULATION METHOD : Minimum curvature

Report Units : Meters

SLOT COORDINATES : 0.00 N 0.00 E

Accepted by :

BOTTOM HOLE LOCATION : Referenced to SLOT

Checked by :

DISTANCE : 14.34

DIRECTION : 287.44

#### SURVEY RUN INFORMATION

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SURVEY FILE COMPLETE: 09-FEB-91 (MD 2142)

APPENDIX 9

WELLSITE ROCK LOG

APPENDIX 10

WELLSITE HYDROCARBON REPORT

# DATALOG

TECHNOLOGY INC.

## HYDROCARBON REPORT

for

CHEVRON SPERRY CREEK N-58

Lat 65°37'66.07"N/Long 129°25'66.07"W

reported by

Dean Bird

Chevron Sperry Creek N-58 was spudded on January 4 1991. A 660mm conductor hole was drilled to a depth of 43.5m . A 508mm surface hole was then drilled to 458m, at which point surface casing was then set

For logging services Datalog used an MTI chromatograph and a Datalog Geologger total gas detector.

Logging services commenced January 8 1991 at a depth of 44m. The following is the summary of the gas analysis for this well.

#### TREVOR FORMATION

44m-639m

This interval was characterized by medium to dark grey shales, with at times minor interbedded siltstone.

The background gas was very low in this formation. It ranged from 0 to 10 units, consisting mainly of C1 with traces of C2. The oil indicator fluctuated considerably, it ranged from .01 to .219.

It should be noted at these low gas levels, it only takes a very small amount of C3 or C4 to effect the oil indicator. Thus the oil indicator did not suggest any hydrocarbons of any significance.

The carbon dioxide elvel for most of this interval ranged from .027% to .045%, however, from 276m to 381m it ranged from .058% to .151%.

One show was encountered in this formation, it eas as follows.

C1 And  
Oil Ind.

623-624m 10 units/5 units .051

This show was very short in duration, it also demonstrated a lack of heavies suggesting it was the result of dry gas or possibly gas charged water.

TREVOR SANDSTONE640m-834m

This interval was characterized by a very fine grained sandstone with interbedded shales in the upper and lower sections of the interval and predominantly occupied by shale in the mid sections.

From 640m to 820m the background gas ranged from 8 to 10 units, with the higher levels showing an oil indicator of .053. From 821 to 834m the background gas displayed a gradual increase. It started from 4 units and rose to 21 units. As the background increased the oil indicator decreased, showing .021 at the highest gas level. These backgrounds consisted of C1 with traces of C2 and C3.

The carbon dioxide level ranged from .028% to .035%.

No significant gas responses were encountered within this interval.

ARCTIC RED SANDSTONE835m-847m

This interval was characterized by a light to dark grey, very fine grained tight sandstone.

The background level ranged from 17 to 52 units. This background consisted of C1 with minor amounts of C2 and traces of C3. The oil indicator ranged from .01 to .024.

The carbon dioxide level ranged .027% to .062%, with the higher levels appearing at the very bottom of the interval.

The last 2 meters of this interval were cored, there gas readings were as follows.

DEPTH (TOTAL (units))	C1(%)	C2(%)	C3(%)	C4(%)	C5(%)	CO2(%)	Oil Ind.
846m 17	.152	.014	.004	-----	-----	.046	.025
847m 15	.126	.012	.003	-----	-----	.062	.024

One significant gas response was encountered in this interval, it was as follows.

Oil Ind.

844-845m 139 units/52 units .010

This show suggests it was the result of dry gas.

IMPERIAL

848m-1143m

Coring continued from the bottom of the Arctic Red SS, into the Imperial. The following is the background gas recorded while coring.

DEPTH	TOTAL(units)	C1(%)	C2(%)	C3(%)	C4(%)	C5(%)	CO2(%)	Oil Ind.
848m	14	.122	.012	.003	-----	-----	.064	.024
849m	14	.121	.012	.003	-----	-----	.055	.026
850m	12	.104	.013	.003	-----	-----	.053	.032
851m	13	.105	.013	.003	-----	-----	.05	.033
952m	11	.092	.011	.003	-----	-----	.064	.038
953m	11	.091	.013	.003	-----	-----	.066	.038
954m	9	.075	.011	.003	-----	-----	.082	.044
955m	12	.099	.011	.003	-----	-----	.083	.031
956m	11	.086	.011	.003	-----	-----	.085	.036
957m	7	.056	.009	.003	-----	-----	.08	.054
958m	7	.05	.009	.003	-----	-----	.09	.058
959m	6	.044	.009	.003	-----	-----	.091	.061
960m	8	.062	.007	.002	-----	-----	.029	.031
961m	7	.059	.007	.002	-----	-----	.029	.033
962m	5	.04	.006	.002	-----	-----	.029	.045
963m	7	.052	.008	.002	-----	-----	.045	.039

Throughout the rest of this interval the background gas fluctuated considerably. From 864m to 1088m the background gas ranged from 6 to 92 units. It consisted mostly of C1, with traces of C2 and C3. Carbon dioxide ranged from .028% to .108%, although there was an increase from 1021m to 1032m, where it ranged from .157% to .476%.

From 1089m to 1143m the background gas demonstrated a steady increase, it ranged from 92 to 237 units. It consisted of C1, with minor amounts of C2, and traces of C3 and C4. The carbon dioxide also demonstrated a slow increase, ranging from .044% to .183%.

The oil indicator for this interval ranged from .01 to .049. The lower readings coincided with the higher gas readings.

Three shows were encountered within this interval, they were as follows.

		Oil Ind.
870-871.2m	51 units/14 units	.01
906-907m	145 units/31 units	.01
1062.4-1064.4m	100 units/25 units	.01

The low oil indicator and short duration of these shows suggest they were the result of dry gas.

#### CANOL

1144m-1160m

The Canol was characterized by a dark grey and black shale. This shale was often bituminous and carbonaceous, thus the formation demonstrated a higher background than the previous interval.

The background gas for this interval started at 398 units, then quickly rose to a range of 586 to 820 units. The oil indicator remained at .01 for the entire interval. The background consisted of

Oil Ind.

1174-1175m	187 units/72 units	.01
1329-1330m	88 units/30 units	.01
1335-136m	64 units/36 units	.01
1341-1342m	2356 units/43 units	.01
1345-1346m	1035 units/740 units	.01
1394-1395m	466 units/250 units	.01

The shows encountered in the Hare Indian all lacked heavies, creating a very low oil indicator, thus suggesting they were the result of dry gas.

BLUEFISH

1401m-1412m

The Bluefish was characterized by very calcareous marlstone, which graded very close to a limestone, with interbedded shales and minor limestine stringers.

The background gas started at 281 units and demonstrated a steady increase to 784 units by the end of the interval. This background consisted of C1, with traces of C2 and C3. The oil indicator remained at .01 for the entire interval.

The carbon dioxide level ranged from .03% to .04%.

No significant gas responses were encountered within this interval.

NAHANNI

1413m-1463m

This formation was characterized predominantly by a light to dark brown dense limestone.

The background gas quickly declined from levels seen in the Bluefish formation. By 1418m the background had declined to a range that remained fairly constant throughout the rest of the formation. This range was from 185 to 296 units, consisting of C1, with traces

of C2 and C3. The oil indicator remained at .01 throughout the interval.

The carbon dioxide level also remained fairly constant, ranging from .025% to .034%.

There was one significant gas response within the Nahanni, it was as follows.

	Oil Ind.
1442-1443m	.01
540 units/253 units	

This show consisted of C1, with traces of C2 and C3. Demonstrating this lack of heavies, which resulted in a very low oil indicator, suggests it was the result of dry gas.

#### HEADLESS

#### 1464m-1510m

This interval was characterized by a light to medium grey limestone, interbedded by a dark grey and black shale, often having a slight carbonaceous content.

The background gas for this interval changed very little, compared to that which was seen in the previous formation. From 1464m to 1480m it ranged from 146 to 228 units. From 1481m to 1560m it increased it's range to 193 to 323 units. By 1501m the background had declined back to a range of 172 to 230 units. Throughout this formation the gas consisted of C1, with traces of C2 and C3. The oil indicator remained at .01 throughout this formation.

The carbon dioxide level also showed very little change for this interval, ranging from .023% to .037%.

One significant gas response was encountered within this interval, it was as follows.

Oil Ind.

1469.6-1470m 668 units/147 units .01

This show consisted of C1 with traces of C2 to C5. This show suggests it was the result of dry gas or possibly gas charged water.

LANDRY

1511m-1685m

This interval was characterized by a predominantly clean limestone, showing occasional traces of pinpoint vugs.

The background gas for this interval ranged from 170 to 375 units. There was however a decline, caused by rig power problems at the trap, resulting in a background from 1559m to 1567m ranging from 54 to 116 units. Throughout this formation the gas consisted of C1 with traces of C2 and occasional traces of C3. The oil indicator remained at .01 throughout the formation.

The carbon dioxide level throughout this interval ranged from .025% to .045%.

One significant gas response was encountered within the Landry, it was as follows.

Oil Ind.

1535.8-1536.8m 1451 units/170 units .01

Demonstrating a lack of heavies, this show suggests it was the result of dry gas.

ARNICA

1686m-1799m

This formation was characterized by brown, very fine to medium crystalline dolomite. This dolomite demonstrated occasional pinpoint vugs, and occasional traces of inter crystalline porosity.

The background gas for this interval ranged from 190 to 365 units. This background consisted of C1, with traces of C2 and C3.

The oil indicator remained at .01 throughout this interval.

The carbon dioxide level for the Arnica formation ranged from .03% to .056%.

There were two significant gas responses encountered within this interval, they were as follows.

	Oil Ind.
1742-1743m	558 units/250 units .01
1771-1772m	427 units/240 units .01

Both of these shows consisted of C1, with traces of C2 and C3, suggesting they were the result of dry gas.

#### TATSIETA

1799m-1811m

The Tetsieta was characterized by a very fine to medium crystalline dolomite, interbedded by a light green shale.

The background gas for this interval started high, due to trip gas that took a while to completely circulate out of the well bore.

At 1799m the background gas level was at 510 units, and by 1803m the gas was down to 222 units. From 1804 to 1811m the background gas level ranged from 212 to 295 units. The background gas for this interval consisted of C1 with very minor amounts of C2 and an occasional trace of C3. The oil indicator remained at .01 throughout this interval.

The carbon dioxide level for this interval ranged from .041% to .07%, with the higher levels occurring at the begining of the formation.

There were no significant gas responses for this interval.

This formation was characterized by a brown dolomite, with scattered chert present throughout most of the formation. This dolomite was predominantly very tight, there was however scattered vugs present throughout this entire interval giving a very minor amount of vugular porosity at times.

The background gas for this interval fluctuated considerably at times. One of the major factors for this was due to a very inconsistent rate of penetration. There was a bit trip within this formation at 1950m. Following this trip, for about the next 100m some of the drilling parameters (F.O.B & RPM) were continually being altered, thus helping to create the inconsistent rate of penetration.

The following is a breakdown of the background gas for this formation.

<u>DEPTH</u>	<u>BACKGROUND GAS</u>
1812-1836m	160-239 units
1837-1993m	152-467 units
1994-2076m	122-241 units
2077-2096m	189-316 units
2097-2099m	66-131 units
2100-2160m	122-423 units

All of the above ranges of background gas consisted of C1, with traces of C2 and occasional traces of C3. The oil indicator remained at .01 throughout this formation.

The carbon dioxide level ranged from .041% to .145%.

There were six significant gas responses within this formation, they were as follows.

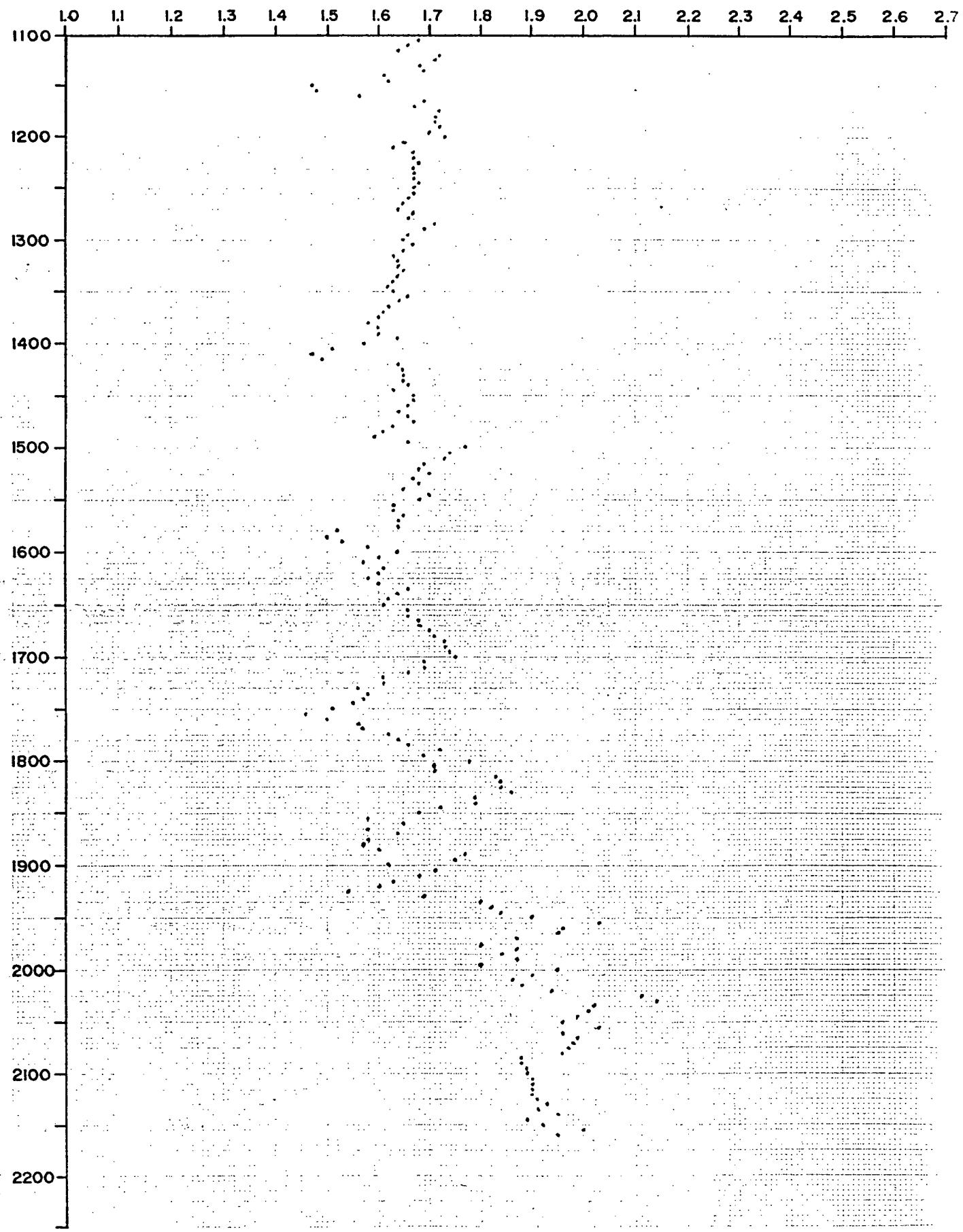
Oil Ind.

1889-1890m	486 units/256 units	.01
1895-1896m	440 units/277 units	.01
1935.2-1935.4m	434 units/304 units	.01
1944.8-1945m	299 units/266 units	.01
2131.4-2131.8m	311 units/177 units	.01
2102.6-2102.8m	363 units/260 units	.01

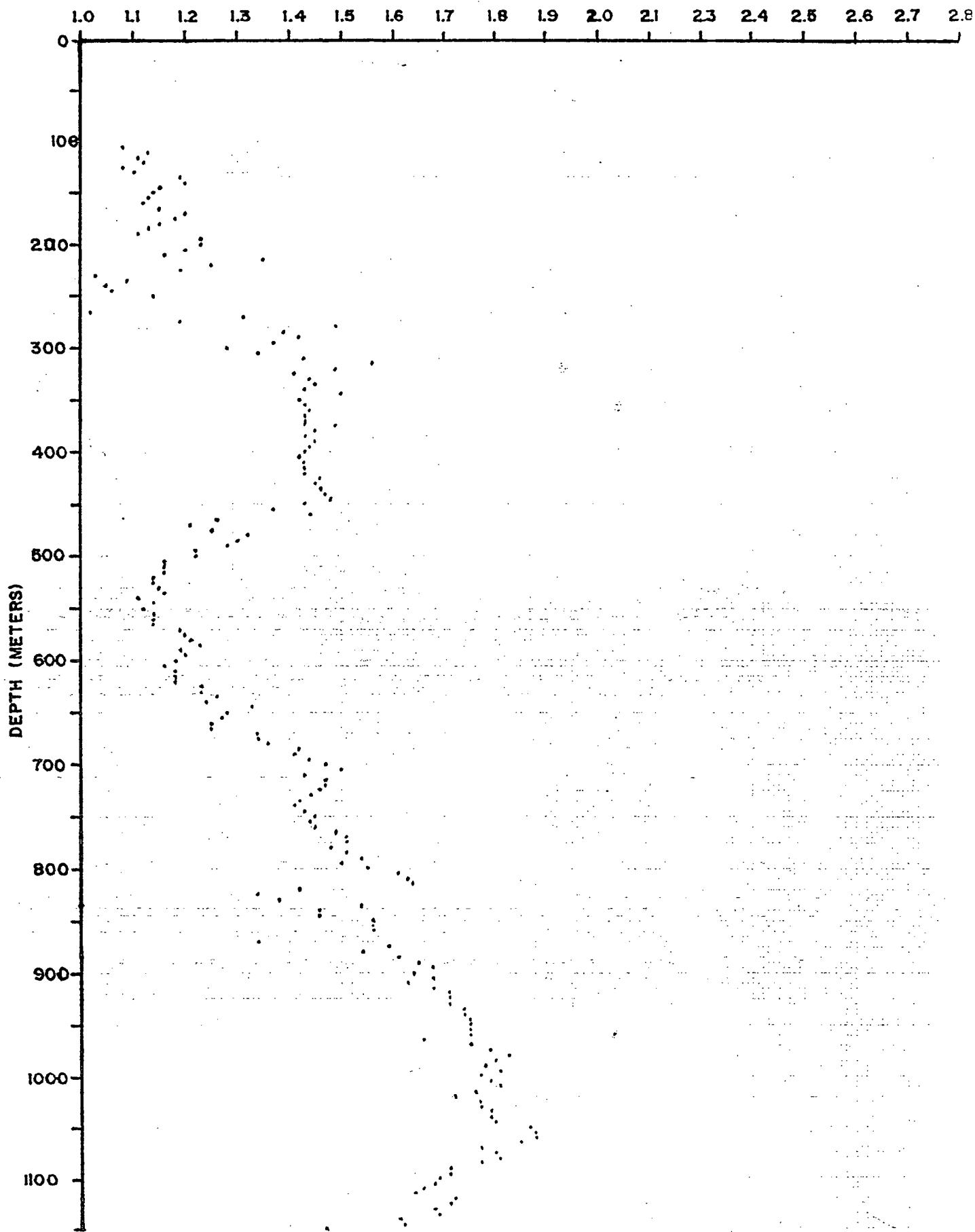
All of the above shows demonstrated a lack of heavies, suggesting they were the result of dry gas or possibly gas charged water.

On February 9 1991 Chevron Sperry Creek reached a total depth of 2160m in the Mount Kindle formation. At this point Datalog services were released.

DC EXPONENT-CHEVRON SPERRY CREEK N-58 (5m PLOTS)



DC EXPONENT - CHEVRON SPERRY CREEK N-58 (5m. PLOTS)



APPENDIX 11

WATER ANALYSIS

**Water Analysis: N/A**