NORTHCOR

ET AL

LIARD F-25/F-25A

9211-N10-6-1

D.A.# 1308
E.A.# 229

Canada Oil and Gas Lands Administration / Administration du pétrole et du gaz des terres du Canada

Nova Scotia	☐	West Coast	☐	Exploratory	☒
Newfoundland	☐	Northern	☒	Development	☐
Gulf of St. Lawrence	☐	Hudson Bay	☐	Delineation	☐
				Service	☐

AUTHORITY TO DRILL A WELL

APPLICATION

This application is submitted with Section 32 of the Canada Oil and Gas Drilling Regulations. When approved under Section 83 of the Regulations, it is the requisite authority for the commencement of drilling operations.

Well Name in Full: Northcor et al Liard F-25

Operator: Northcor Energy Ltd. — Drilling Program No.: ---

Contractor: Peter Bawden — Permit or Lease No.: E.A.#'s 229 & 219

Drilling Rig or Unit: 33 — Estimated Well Cost: $12,400,000

Location-Unit: F — Section: 25 — Grid Area: 60-30-123-30

Coordinates: Lat.: 60° 24' 22.25" N — Long.: 123° 35' 07.58" W

Area: Ft. Liard (N.W.T.) — Field/Pool: Liard Exploratory

Elevation ~~RT~~/KB: 723.0m (ASL) ~~Ground~~ 717 m (ASL)

Approx. Spud Date: January 20, 1986 — Estimated Days on Location: 180

Anticipated Total Depth: 3400m KB — Target Horizon(s): Nahanni

UWI: 300F255030123300

EVALUATION PROGRAM

Ten-metre sample intervals: N.A.

Five-metre sample intervals: Surface to Total Depth

Canned sample intervals: Every 10m, surface bedrock to T. D.

Conventional cores at: No cores planned at this time.

Logs and Tests: - See attached sheet.

CASING AND CEMENTING PROGRAM

O.D.	Weight:	Grade:	Setting Depth m KB ~~Below Seabed~~	Cementing Program (Volumes):
762mm	Conductor pipe		10m	To surface.
508mm	140 kg/m	H-40	190m	To surface with 39.8m³
340mm	90.77 kg/m	K-55	762m	To surface with 73.2m³
244mm	64.74 kg/m	L-80	3048m	*350m above 244mm shoe with 13.3m³
178mm	34.22, 38.69, 43.15 kg/m	L-80	3300m	*into 244m shoe with 4.46m³

B.O.P. Equipment: See attached spec. sheet from Bawden Rig #33.

Other Information:

* minimum; additional cement will be used as logs and conditions dictate.

Signed: (David V. Sells) — Title: President

Date: January 2, 1986 — Company: Northcor Energy Ltd. (Operating Licence No. 507)

APPROVAL

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

Signed: [signature]
Engineering Branch

Date: 24 Jan 86

File: 9211-N10-6-1

Department of Energy, Mines and Resources / Ministère de l'Énergie, des Mines et des Ressources

Department of Indian Affairs and Northern Development / Ministère des Affaires indiennes et du Nord Canadien

Canada

Canada Oil and Gas Lands Administration / Administration du pétrole et du gaz des terres du Canada

D.A. 1308
E.A. 229

				Well Status	
Nova Scotia	☐	West Coast	☐	Suspended	☐
Newfoundland	☐	Northern	■	Completed	☐
Gulf of St. Lawrence	☐	Hudson Bay	☐	Abandoned	■

WELL TERMINATION RECORD

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

WELL DATA

Well Name: Northcor et al Liard F-25 Area: Ft. Liard

Grid Area: 60-30-123-30 Field/Pool: Liard Exploratory

Permit or Lease No.: EA # 229 Final Coordinates: Lat.: 60° 24' 22.25"N Long: 123°35' 7.58"W

Drilling Unit: Bawden Rig #33 Elevations-~~RT~~KB: 723.0m ~~DF~~/GL: 716.6m

Spud Date: 86-01-25 Rig Released: 86-08-05 Total Depth: 3149m (MD)

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
762mm	Conductor Pipe		10m	0-1-0 "G" to surface
508mm	140 kg/m	H-40	196.5m	60T 0-1-0 "G" to surface
340mm	90.77 kg/m	K-55	765.4m	85T 0-1-0 "G" to surface

PLUGGING PROGRAM

Approval of the following program was obtained by (person) Terence G. Dexter from (person) Kem Singh of the Canada Oil and Gas Lands Administration by means of verbal on August 1, 1986.

Type of Plug:	Interval:	Felt:	Cement and Additives:
Cement	3149-3049m	--	12T 0-1-0 "G" +.5% CFR-2 +.5% HR-12
Cement (Whipstock)	2150-2050m	Tagged at 2048m	13T 0-1-0 "G" +.5% CFR-2 +.1% HR-12
		polished to 2056m	
		start side track operations	

Lost Circulation/Overpressure Zones: slight fresh water flow at 58m

Equipment left on Seafloor (Describe): N/A

Provision for Re-entry (Describe and attach sketch): None

Cores: Type: None Intervals: ---

Other Downhole Completion/Suspension Equipment: None

CERTIFICATION

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

Signed Terence G. Dexter P. Eng. Title: Vice President & Operations Manager

Name: Terence G. Dexter Date: March 31, 1987

Acknowledged by: _____
Engineering Branch

Date: May 26, 1987

File: 9211-N10-6-1

Department of Energy, Mines and Resources / Ministère de l'Énergie, des Mines et des Ressources

Department of Indian Affairs and Northern Development / Ministère des Affaires indiennes et du Nord canadien

Canada

Canada Oil and Gas Lands Administration | Administration du pétrole et du gaz des terres du Canada

DA # 1320

EA # 229, XXX

Nova Scotia	☐	West Coast	☐	Exploratory	☒
Newfoundland	☐	Northern	☒	Development	☐
Gulf of St. Lawrence	☐	Hudson Bay	☐	Delineation	☐
				Service	☐

AUTHORITY TO DRILL A WELL

APPLICATION

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

Well Name in Full: Northcor et al Liard F-25 A

Operator: Northcor Energy Ltd. | Drilling Program No.:

Contractor: Peter Bawden Drilling Ltd | Permit or Lease No.: EA # 229 XXXX

Drilling Rig or Unit: #33 | Estimated Well Cost: $ 1,500,000.00 * *

Location-Unit: F Section: 25 | Grid Area: 60-30-123-30

Coordinates: Lat.: 60° 24' 22.25" N | Long.: 123° 35' 07.58" W

Area: Ft. Liard (N.W.T.) | Field/Pool: Liard Exploratory

Elevation-RT/KB: 723 m KB (ASL) | Ground: 717m (BRT)

Approx. Spud Date: 86-08-05 | Estimated Days on Location: 60

Anticipated Total Depth: 3250m | Target Horizon(s): Nahanni

EVALUATION PROGRAM

Ten-metre sample intervals: NA

Five-metre sample intervals: 2080 to total depth

Canned sample intervals: Every 10m 2080 to total depth

Conventional cores at: No cores planned at this time

Logs and Tests: See attached sheet

CASING AND CEMENTING PROGRAM

O.D.	Weight:	Grade:	Setting Depth KB ~~Below Seabox~~	Cementing Program (Volumes):
762mm *	Conductor pipe		17m	to surface
508mm *	140 kg/m	H-40	196.45m	to surface
340mm *	90.77 kg/m	K-55	765m	to surface
244mm	64.74 kg/m	L-80	2885m ±	350m above 244mm shoe w/ 13.3m³
178mm	34.23, 38.69, 43.16 kg/m	L-80	3250m ±	Into 244mm shoe w/ 6.15m³

B.O.P. Equipment:

Other Information: * Previously set

** In addition to original F-25 $ 13,500,000.00 Total $ 15,000,000.00

+ Minimum; additional cement will be used as logs & conditions dictate.

Signed: (David V. Sells) Title: President

Date: August 19, 1986 Company: Northcor Energy Ltd.

(operating licence ~~XXXX~~ # 657

APPROVAL

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

Signed:
Engineering Branch

Date: 28 Aug 86

File: 9211-N10-6-1

Department of Energy, Mines and Resources | Ministère de l'Énergie, des Mines et des Ressources

Department of Indian Affairs and Northern Development | Ministère des Affaires indiennes et du Nord Canadien

Canada

Canada Oil and Gas Lands Administration / Administration du pétrole et du gaz des terres du Canada

D.A. 1320
E.A. 229

				Well Status	
Nova Scotia	☐	West Coast	☐	Suspended	■
Newfoundland	☐	Northern	■	Completed	☐
Gulf of St. Lawrence	☐	Hudson Bay	☐	Abandoned	☐

WELL TERMINATION RECORD

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

WELL DATA

Well Name: Northcor et al Liard F-25A Area: Ft. Liard

Grid Area: 60-30-123-30 Field/Pool: Liard Exploratory

Permit or Lease No.: EA # 229 Final Coordinates: Lat.: 60°24'22.25"N Long: 123°35'7.58"W

Drilling Unit: Bawden Rig #33 Elevations: RKB: 723.0m GL: 716.6m

Spud Date: 86-08-05 Rig Released: 87-02-25 Total Depth: 3478m (MD) 3433m (TVD)

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
244mm	64.74 kg/m	L-80	3187	0-1-0 "G" + .3% Halad -22A + .75% CFR-2 + 1% HR-12 (25 T, 19m³)
Production Liner 178mm	38.69, 43.15 kg/m	L-80	3477-3165	0-1-0 "G" (12 T, 9.12m³) 0-1-0 "G" + .35% SSA + 1.2% HR-12 + .75% CFR-2 + .2% Halad-22A (10 T, 9.8m³)
Production String (tie back) 178mm	34.22, 38.69 43.15 kg/m	L-80	3165	1-1-2"G"+.5%CFR-2+.1%HR-12(31.9T,34.45m³) 0-1-0"G"+35%SSA-1+.5%CFR-2(8.5T,8.67m³) 0-1-0"G"+3%SSA-1+.2%HR-12(4.7T,3.57m³)

PLUGGING PROGRAM

Approval of the following program was obtained by (person) Terence G. Dexter from (person) Kem Singh of the Canada Oil and Gas Lands Administration by means of verbal on February 13, 19 87

Type of Plug:	Interval:	Felt:	Cement and Additives:
Drillable Bridge Plug	3447.7m	--	
Drillable Bridge Plug	3315m	--	
Drillable Bridge Plug	3238m	--	
Cement	3238-3171m	--	1.3T 0-1-0"G"+35%SSA-1+.5%CFR-2+1.3%HR-12
Drillable Bridge Plug	700m	--	
Cement	700-667m	--	9T 0-1-0 "G" + .5% CFR-2

Lost Circulation/Overpressure Zones: lost 7m³ slowly at 2978m - 2985m, lost 9m³ slowly at 3370m

Equipment left on Seafloor (Describe): N/A

Provision for Re-entry (Describe and attach sketch): See attached sketch.

Cores: Type: None Intervals: ---

None

Other Downhole Completion/Suspension Equipment:

CERTIFICATION

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

Signed: Terence G. Dexter P. Eng. Title: Vice President & Operations Manager

Name: Terence G. Dexter Date: March 31, 1987

Acknowledged by: Engineering Branch

Date: May 26, 1987

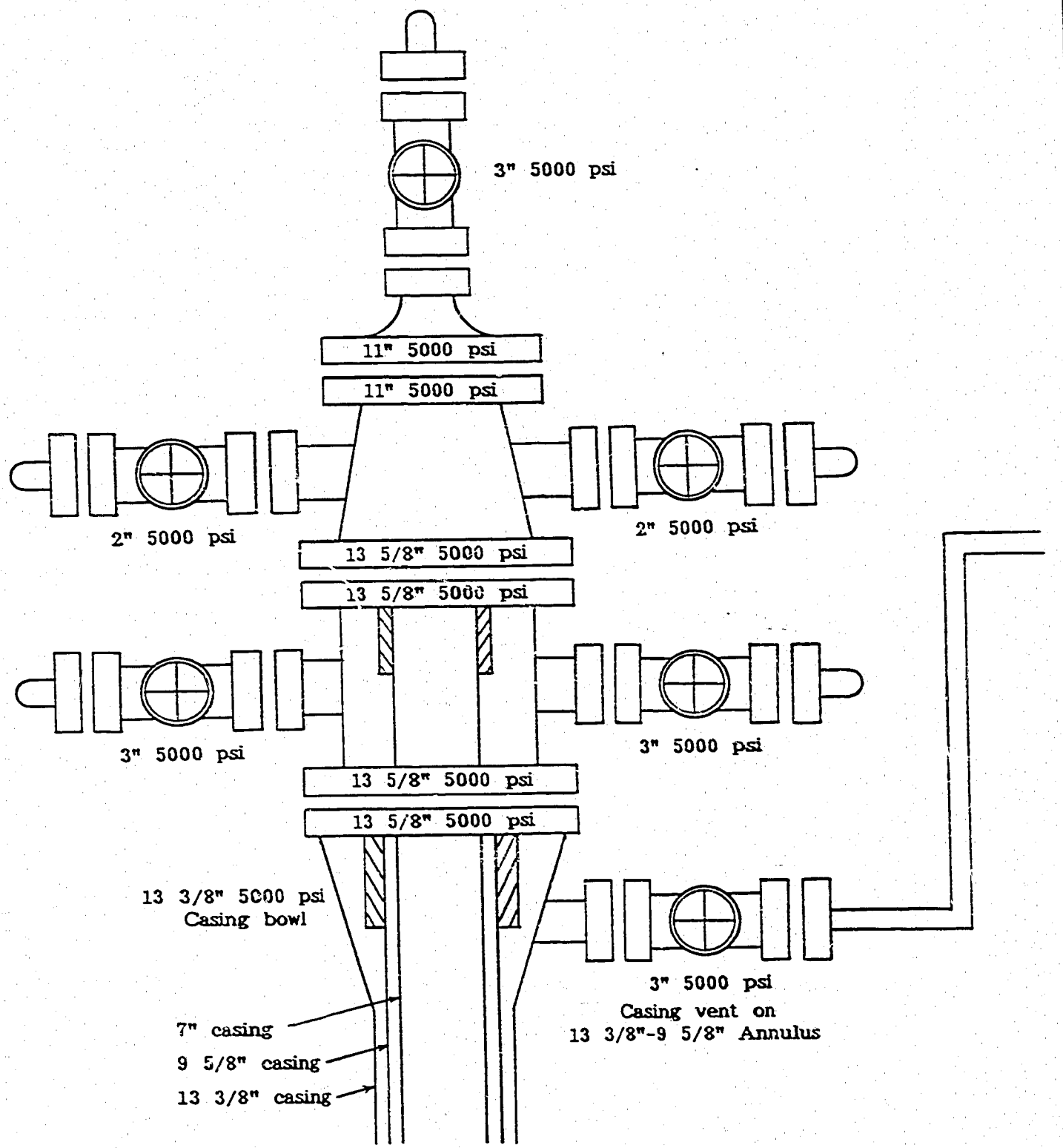
File: 9211-N10-6-1

Department of Energy, Mines and Resources / Ministère de l'Énergie, des Mines et des Ressources

Department of Indian Affairs and Northern Development / Ministère des Affaires indiennes et du Nord canadien

Canada

NORTHCOR et al LIARD F-25A
Existing Wellhead Configuration



PAJAK ENGINEERING LTD.
OILFIELD SUPERVISION &
PROJECT MANAGEMENT

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CANADA OIL AND GAS LANDS
ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU
GAZ DES TERRES DU CANADA
JUIN JUNE 29 1987
ENGINEERING AND CONTROL
BRANCH
TECHNIQUE ET DU CONTROLE

Final Report

Northcor et al Liard F-25
60° 25' N F-25A
123° 35' W

Bawden Drilling Rig #33

prepared for

Northcor Energy Ltd.

April, 1987

by

Dan Dexter - Drilling Engineer

Pajak Engineering Ltd.
1660 Elveden House, Calgary

NORTHCOR et al LIARD F-25 & F-25A

INTRODUCTION

Northcor Energy Ltd. engaged Peter Bawden Drilling Ltd.'s Rig #33 to drill the subject well known as Northcor et al Liard F-25 & F-25A, 60° 24' 22.25" N 123° 35' 07.58" W., some 22 km NNW of Ft. Liard. The well was spudded 86-01-25 - 2300 hrs.

A surface hole of 660mm was drilled to 197.5m and 508mm casing was landed and cemented at 196.5m. Next a 445mm hole was drilled to 767m and 340mm casing was landed and cemented at 765.4m. A 311mm hole was then drilled to 3149m MD. (3149m was reached 86-07-22.) The hole was logged and a decision was made to plug back to 2045m and whipstock at that point.

A 311mm hole was then drilled to 3187m MD and 244.5mm casing was landed and cemented at 3187m MD. Then a 216mm hole was drilled to 3478m MD and a 177.8mm liner was set and cemented at 3477m MD. The well was then suspended for production testing until an ice bridge could be built across the Liard River to bring more equipment to the wellsite.

The objective was to obtain dry gas from the Middle Devonian Carbonates (Nahanni formation) in the first section (F-25) (before plug back and whipstock operations) the Nahanni was not encountered. In the second section (F-25A) the top of the Nahanni was encountered at 3177m MD.

Total depth of 3478m MD (3433m TVD) was reached 86-11-25.

No cores were cut and two DST's were run. DST #1 3414.1-3378.8m recovered 356m mud and water (including 304m water cushion). DST #2 3227-3263m, Preflow - 304m water cushion to surface in 2 min. and G.T.S. in 2 1/2 min. V.O. G.T.S. immediately with approximate flow rate of 362.5 10^3m^3/day of slightly sour gas with some salt water. 244m of 124000 ppm salt water was also recovered.

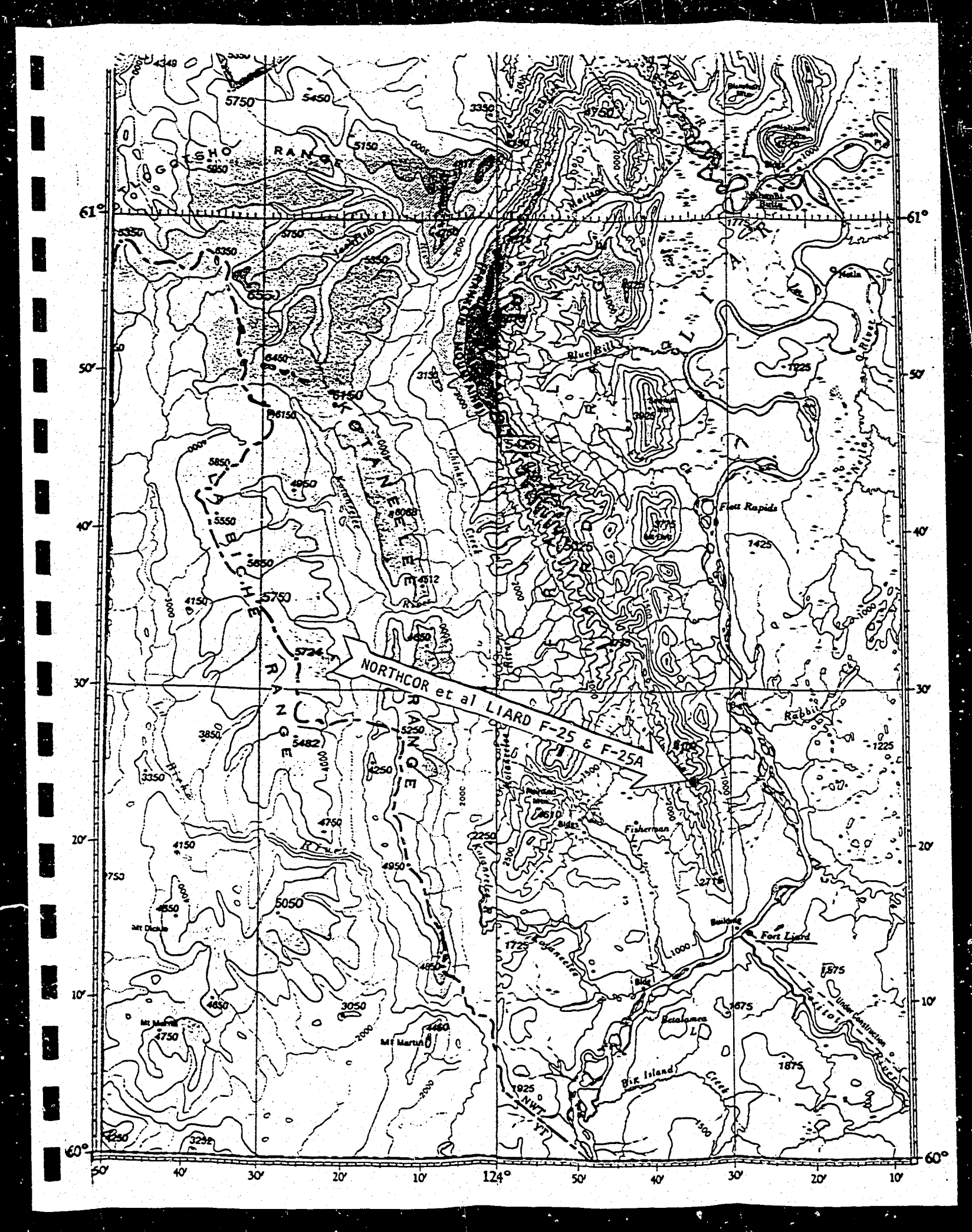
The formations encountered were as follows:

F-25	MD (m)	TVD (m)
Mississippian Carbonates/Sandstones	Surface	Surface
Besa River Shale	238	238
T. D.	3149	3140.8
F-25A		
Kick Off Point	2059	2057.5
Basal Black Shale	2918	2892.7
Middle Devonian Carbonates	3177	3145.1
T. D.	3478	3433.1

NOTE:

For the remainder of this report all depths reported are measured depth unless otherwise stated.

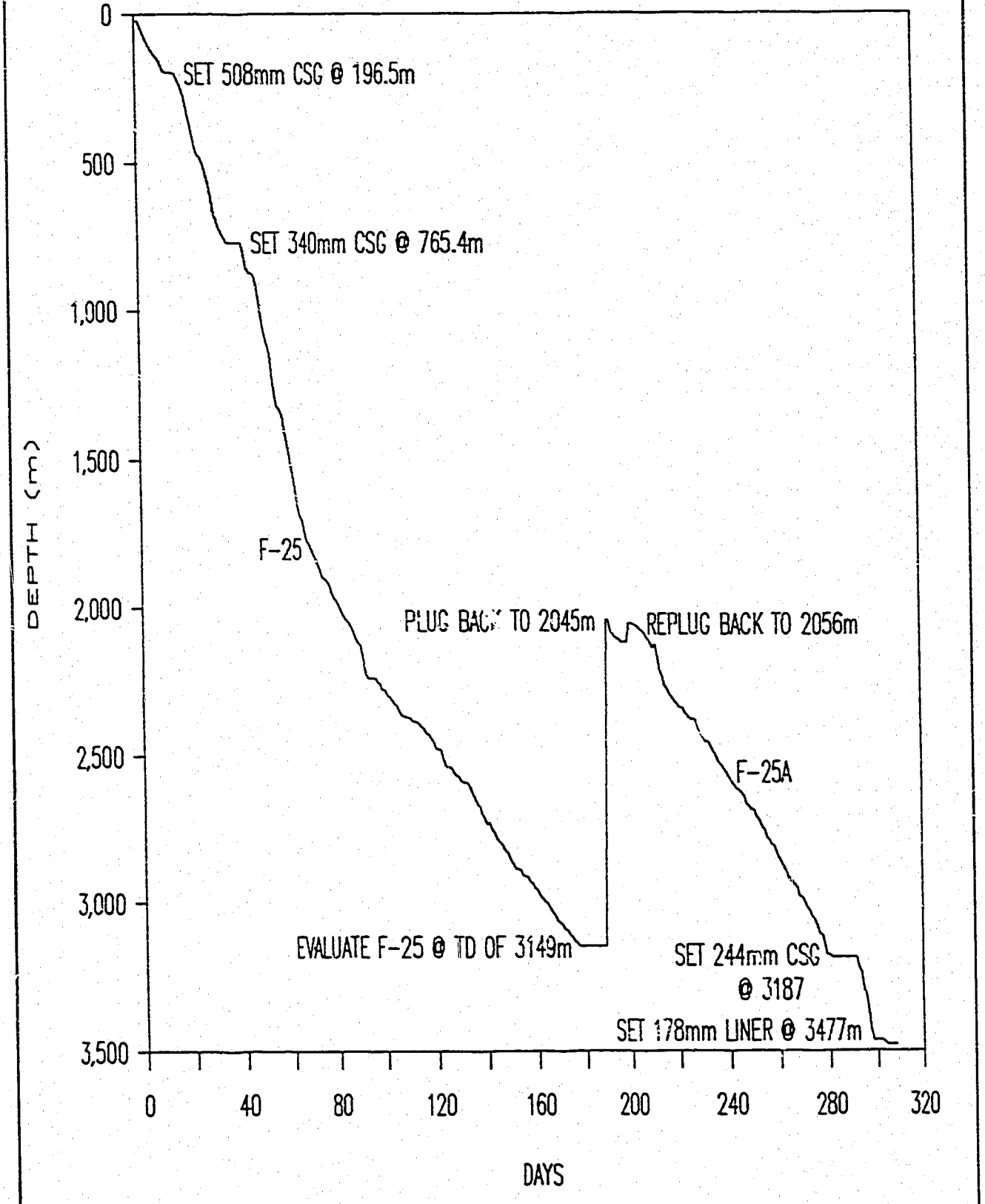
TOPOGRAPHICAL
LOCATION


NORTHCOR et al LIARD F-25 & F-25A
MACKENZIE MOUNTAINS
LOUISHO RANGE
MACKENZIE RANGE
MACKENZIE RIVER
KOTANELEE MOUNTAINS
LIARD PLAIN
LIARD RIVER
Fort Liard
Fisherman
Rabbit
Blue Hill
Flett Rapids
Petitot
Bistcho Lake
Mt Martin
Mt Dickie
Kotaneelee
Kotaneelee River
Blue Hill Creek
Bik Island Creek
Petitot River
Liard River
NWT
YT
61°
60°
50'
40'
30'
20'
10'
124°

PENETRATION
CURVE

NORTHCOR et al LIARD F-25, F-25A

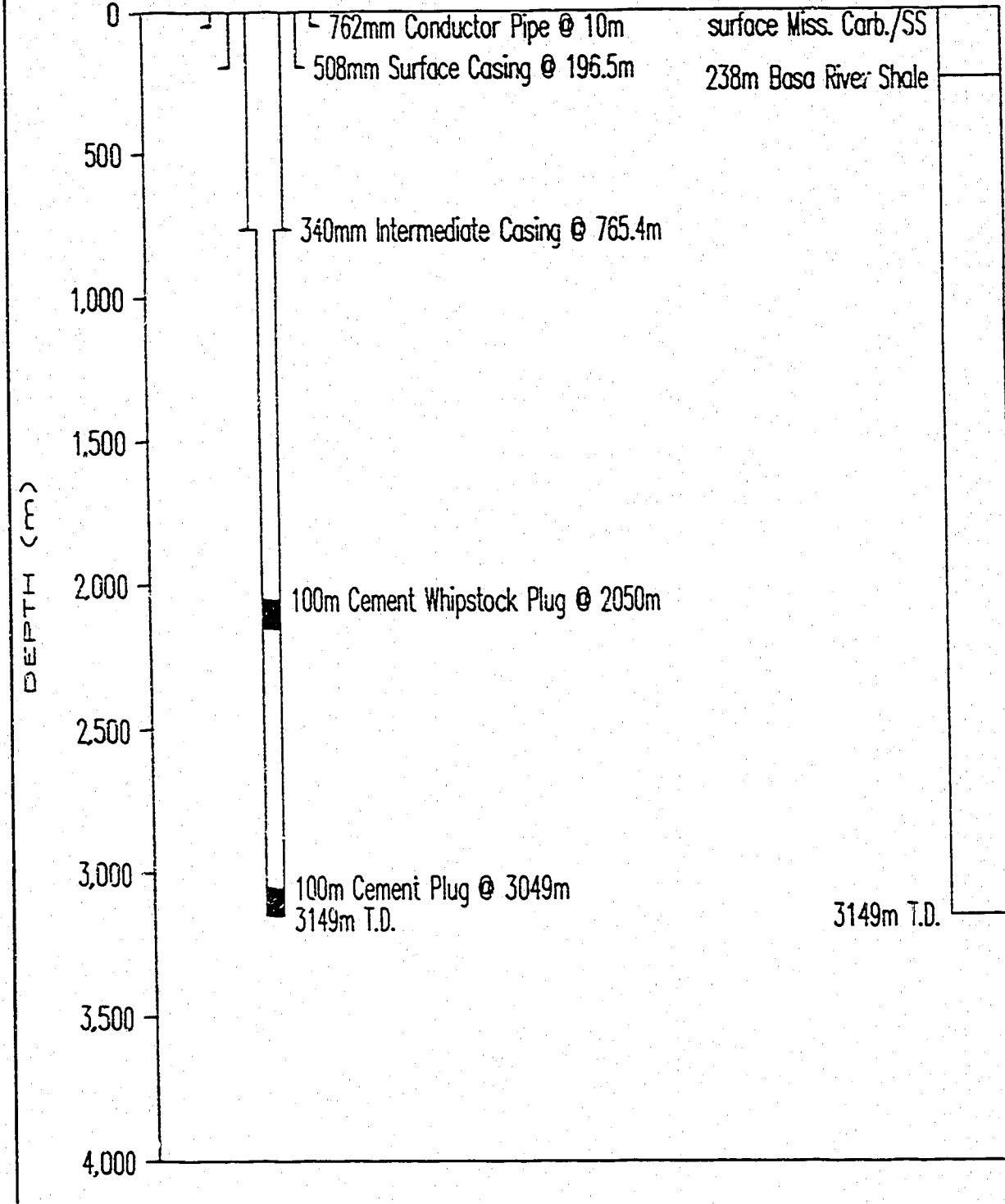
PENETRATION CURVE 86-11-27



PAJAK ENGINEERING LTD.

NORTHCOR et al LIARD F-25

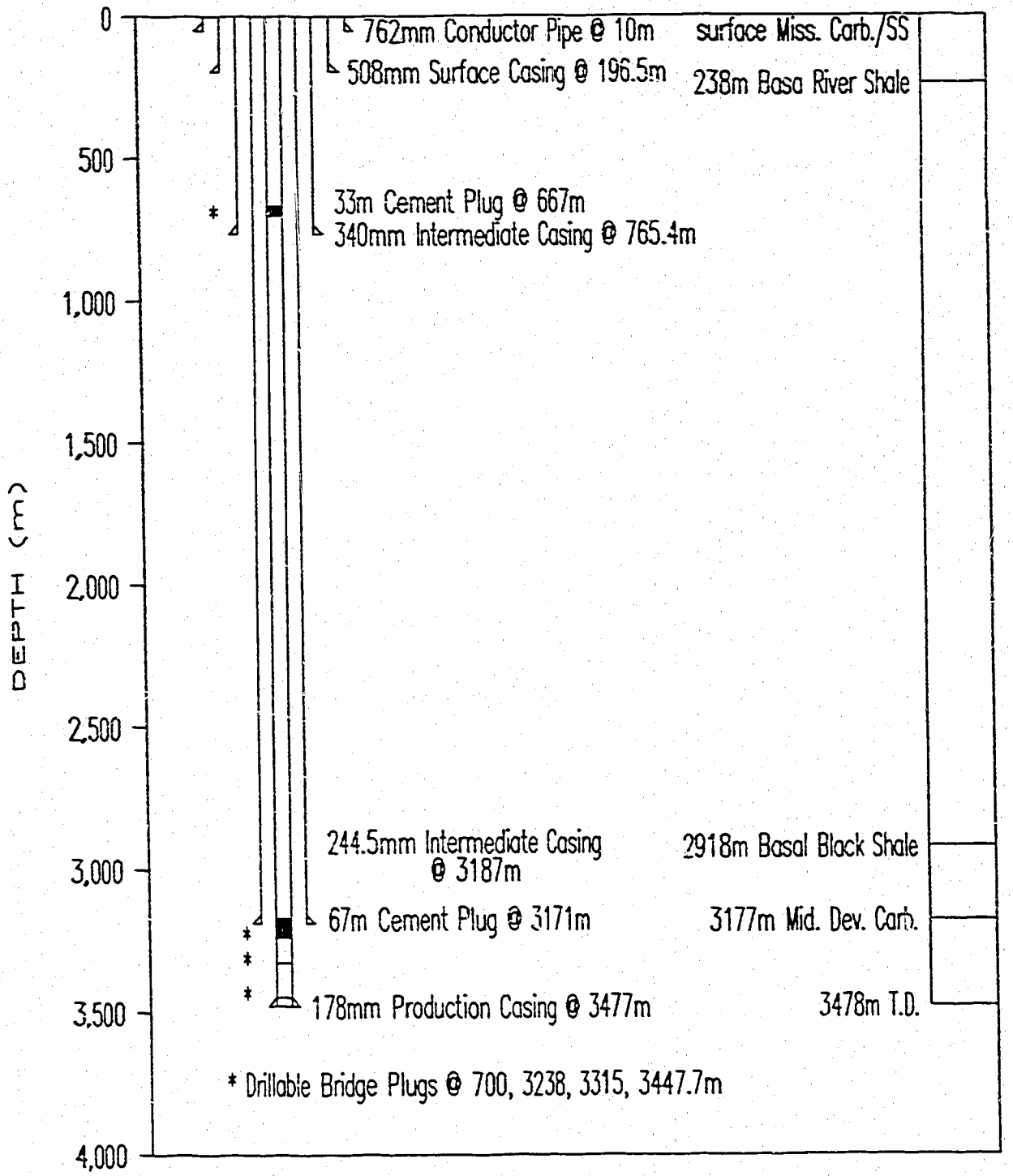
PLUGS, CASING & FM TOPS 86-08-05



PAJAK ENGINEERING LTD.

NORTHCOR et al LIARD F-25A

PLUGS, CASING & FM TOPS 87-02-25



GENERAL DATA

Well Name:	Northcor et al Liard F-25 Northcor et al Liard F-25A
Exploration Agreement #:	229
Location:	60° 24' 22.25" N 123° 35' 07.58" W
Unique Well Identifier:	300F256030123300
Operator:	Northcor Energy Ltd. #880, 555 - Fourth Avenue S. W. Calgary, Alberta T2P 3E7
Project Management:	Pajak Engineering Ltd. #1660, 717 - Seventh Avenue S. W. Calgary, Alberta T2P 0Z3
Geological Management:	Terqua Exploration Management Inc. #800, 555 - Fourth Avenue S. W. Calgary, Alberta T2P 3E7
Drilling Contractor:	Peter Bawden Drilling Ltd. #2900, 300 - Fifth Avenue S. W. Calgary, Alberta T2P 3C4
Drilling Unit:	Rig #33
Position Keeping:	N/A
Support Craft:	N/A
Drilling Unit Performance:	N/A
Difficulties & Delays:	None.

DRILLING
SUMMARY

SUMMARY OF DRILLING OPERATIONS

Elevation:	723m K.B. 716.6m GRD.
T. D.:	3149m F-25 3478m F-25A
Logged Depth:	3149m F-25 3471m F-25A
Spud Date:	86-01-25 - 2300 hrs. F-25 86-08-05 F-25A
Drilling Completed:	86-07-22 F-25 86-11-25 F-25A
Rig Released:	February 25, 1987
Well Status:	Abandoned F-25 Suspended F-25A
Hole Sizes:	660mm to 197.5m 445mm to 767m 311mm to 3149m F-25 311mm to 3187m F-25A 216mm to 3478m F-25A
Surface Casing:	508mm, 139.9 kg/m, H-40, ST&C, 8rd seamless 16 jts. USS. set 86-02-06 at 196.45m. 46.6m³ (60T) 0-1-0 "G" with no additives. Centralizers on joints 1 & 2.
First Intermediate Casing:	340mm, 91 kg/m, K-55, BT&C 65 joints Nippon steel. Set 86-03-02 at 765.4m 64.5m³ 85T 0-1-0 "G" with no additives. Full returns to surface. Centralizers on joints 1, 2, 4, and 6. 346 x 340mm OCT Slip Lock Casing Bowl.

Second Intermediate Casing:	
F-25A	244.5mm, 64.74 kg/m, L-80, 8rd, LT&C, 268 joints Nippon steel. Set 86-11-07 at 3187m. Halliburton stage tool at 770m. Centralizers on joints 1, 2, 3, 4, 5 and 6. 346.1mm x 244.5mm OCT C-29 casing hanger (automatic slips and seals). Cement - First Stage - 19m³ (25T) 0-1-0 "G" with .3% Halad-22 + .75% CFR-2 + 1% HR-12 cemented from 3187 - 2400m. Second Stage - 9.12m³ (12T) 0-1-0 "G" with no additives. Cemented from 770m - 480m.
Production Liner:	
F-25A	177.8mm 43.16 kg/m and 38.69 kg/m L-80, 8rd, LT&C. 21 jts. 43.16 kg/m and 5 jts. 38.69 kg/m Nippon steel. Set 86-11-15 at 3477m - 3165m. 9.8m³ (10T) 0-1-0 "G" + 35% SSA + 1.2% HR-12 + .75% CFR-2 + .2% Halad-22A. One centralizer on shoe jt. and 16 stand off bands.
Production String (Tie back):	
F-25A	177.8mm 43.16, 38.69, 34.23 kg/m, L-80, 8rd, LT&C, 25 jts. 43.16 kg/m, 86 jts. 38.69 kg/m, 155 jts. 34.23 kg/m and 1 jt. 43.16 kg/m Nippon steel. Set 87-01-04 in top of liner (3165m). Cemented to surface with 34.45m³ (31.9T) 1-1-2 "G" +5% CFR-2 + 0.1% HR-12, 8.67m³ (8.5T) 0-1-0 "G" + 35% SSA-1 + 0.5% HR-12, 3.57m³ (4.7T) 0-1-0 "G" + 3% SSA-1 + 0.2% HR-12. 2.0m³ returns to surface. Centralizers on joints 2, 4, 6, and 8. 346.1 x 177.8mm Crown CC-22 casing hanger (automatic slips and seals).

Sidetrack Hole:

After a T. D. of 3149m was reached and after logging, it was determined that the target formation had been missed, and that it would be advantageous to plug back to approximately 2080m and drill a new hole in another direction. Abandonment plugs were set in the lower portion of the hole and a whipstock plug set at 2045m. Cement was drilled out to 2080m. A mud motor with 1 1/2° kick sub was used initially, then a 2° kick sub was used to drill to 2122m. This attempt to kick off was unsuccessful, the plug was drilled up and no new hole was made. Another plug was set at 2056m. the plug was polished off to 2059m and a bent housing mud motor with 0° kick sub was used to drill 2059-2079m. The kick sub was changed to a 2° sub and this attempt was successful. Drilling continued with the mud motor to 2115m at which point conventional rotary drilling was resumed. At several other depths the mud motor was used to adjust the direction.

Drilling Fluid

Presented here are the average fluid properties for each section of hole, a more detailed summary is included in the Appendix.

Surface Hole (666mm)

Wt (kg/m^3)	Vis (s/L)	PV (MPa)	YP (Pa)	pH	Solids (%)	K+Ion (mg/L)
1203	40	6	14.8	10.2	12	16,800

1st Intermediate Hole (444mm)

Wt (kg/m^3)	Vis (s/L)	PV (MPa)	YP (Pa)	pH	WL (cm^3)	Solids (%)	K+Ion (mg/L)
1117	43	6	16.8	11	72	6.6	22,000

2nd Intermediate Hole (311mm) both F-25 & F-25A

Wt (kg/m^3)	Vis (s/L)	PV (MPa)	YP (Pa)	pH	WL (cm^3)	Solids (%)	K+Ion (mg/L)
1548	88	25	20	10.6	10.6	19.4	27,300

Main Hole (216.9mm)

Wt (kg/m^3)	Vis (s/L)	PV (MPa)	YP (Pa)	pH	WL (cm^3)	Solids (%)
1100	52	15	10	9.9	5.3	4.6

Fishing Operations

One fishing operation was necessary at a depth of 2341m in F-25A on 87-09-03. This was caused by the pin end of a stabilizer breaking off. The entire fish was recovered with an overshot. 4 1/2 hrs. were spent fishing, 33 hrs. lost total including trips and inspection of drill collars.

Kicks

No kicks were encountered.

Formation Leak Off Tests

	Depth (m)	Mud Wt. (kg/m^3)	Applied Pressure (kPa)	EMD (kg/m^3)	Last Csg. Depth (m)
FLOT #1	197.86	1180	1200	1800	196.45
FLOT #2	769	1100	7610	2114	765
FLOT #3	3188	1080	15000	1559	3187

Time Distribution		Hours
1.	Rig Up & Down	274.75
2.	Drilling	3978.5
3.	Reaming	384.75
4.	Coring	0
5.	Circ. & Cond. Mud	258.75
6.	Trip	1321.25
7.	Rig Service	100.5
8.	Repairs	97.25
9.	Slip & Cut	51.0
10.	Surveys	184.25
11.	Wireline Logs	126.25
12.	Run Csg. & Cement	111.75
13.	Wait on Cement	67.0
14.	Nipple Up B.O.P.'s	134.25
15.	Test B.O.P.'s	133.25
16.	DST	35.0
17.	Plug Back	8.0
18.	Squeeze Cement	0
19.	Fishing	4.5
20.	Directional Work	166.75
21.	Misc.	162.25

Abandonment Plugs

F-25 (Abandoned)

Type of Plug	Interval	Fluid
Cement	3149 - 3049m	KCl drilling mud
Cement (Whipstock)	2150 - 2050m	

F-25A (Suspended)

Type of Plug	Interval	Fluid
(T.D.)		Inhibited water
Drillable Bridge Plug	3447.7m	Inhibited water
Drillable Bridge Plug	3315m	Inhibited water
Drillable Bridge Plug	3238m	
Cement	3238m - 3178m	Inhibited water
Drillable Bridge Plug	700m	
Cement	700m - 667m	Inhibited water
(Surface)	0m - 10m	Diesel fuel

FORMATION
TOPS F-25

FORMATION TOPS
F25

NORTHCOR ENERGY LIMITED

NORTHCOR ET AL LIARD F-25

60 - 24' - 22.25" N 123 - 35' - 07.58" W

FORMATION TOPS

FORMATION TOP	MD RKB (m)	TVD RKB (m)	LOGGERS DEPTH (m)	SUBSEA (m)
Mississippian Carbonates/ Sandstones	Surface	-----		+ 723
Besa River Shale	238	238	236.8	+ 486.2
Basal Black Shale	Not encountered			
Middle Devonian Carbonate	Not encountered			
T.D.	3149	3134.9	3148	- 2411.9

FORMATION TOPS
F25A

NORTHCOR ENERGY LIMITED

NORTHCOR ET AL LIARD F-25 A

60 - 24' - 22.25" N 123 - 35' - 07.58" W

FORMATION TOP	MD RKB (m)	TVD RKB (m)	LOGGERS DEPTH (m)	SUBSEA (m)
Kick off Point Besa River Shale	2059	2057.5	------	- 1334.5
Basal Black Shale	2918	2894.5	2921.5	- 2198.5
Middle Devonian Carbonate	3177	3146.4	3177.5	- 2423.4
T.D.				

GEOLOGICAL & GAS SYNOPSIS
F25

NORTHCOR ENERGY LIMITED

NORTHCOR ET AL LIARD F-25

60 - 24' - 22.25" N 123 - 35' - 07.58" W

GEOLOGICAL & GAS SYNOPSIS

MISSISSIPIAN CARBONATES / SANDSTONES Surface - 238.0 m

General Lithology: Predominantly limestone with thin to massive interbedded shale and sandstone, occasional chert.

Limestone: light to medium gray, light to medium brown, buff to off-white, dense to very fine crystalline, occasionally chalky, argillaceous, occasionally fragment and pelletoidal, fossiliferous, Crinoid, Ostracod, Coral, Bryozoan, common angular chert fragments, minor shale partings, trace carbonaceous, tight to poor intercrystalline porosity, occasional trace fracture porosity.

Shale: medium to dark gray, firm to hard, blocky, calcareous to very calcareous, micromicaceous, slightly carbonaceous.

Sandstone: light gray, clear, fine grain, occasionally medium to coarse grain, angular to subangular, well sorted, clean, predominantly unconsolidated, trace silica cement, quartzose, trace carbonaceous, fair to good intergranular porosity.

Chert: milky white, translucent, angular fragments.

Hydrocarbons:

Depth (m)	Background Gas (Units)	Hydrocarbons (kppm)				
		C1	C2	C3	C4	C5+
196.5 - 238.0	5 - 10	.3 - .6				

No gas shows were encountered through the Mississippian Carbonate/Sandstone sequence. Background gas is comprised of methane only.

NORTHCOR ENERGY LIMITED

NORTHCOR ET AL LIARD F-25

60 - 24' - 22.25" N 123 - 35' - 07.58" W

GEOLOGICAL & GAS SYNOPSIS

BESA RIVER SHALE 238.0 m - 3149.0 m

General Lithology: Shale with thin to massive interbedded limestone, occasionally sandstone.

Shale: medium to dark gray, light gray in part, blocky to subfissile firm to hard, silty, micromicaceous, slightly calcareous to calcareous in part, slightly to moderately dolomitic in part, microlaminated, occasionally fractured, trace calcite veining trace quartz veining, trace carbonaceous, trace pyrite.

Limestone: medium to dark brown gray, light to medium brown, dense cryptocrystalline, occasionally microcrystalline, argillaceous to very argillaceous, slightly silty, grading to very calcareous shale in part.

Sandstone: light to dark gray, occasionally white, very fine grain, subangular to subrounded, moderately to well sorted, quartzose, calcareous cement, argillaceous.

Hydrocarbons:

Depth (m)	Background Gas (Units)	Hydrocarbons (kppm) C1	C2	C3	C4	C5+
238.0 - 740.0	10 - 30	0.6 - 1.8				
740.0 - 860.0	20 - 50	1.2 - 3.0				
860.0 - 960.0	10 - 20	0.6 - 1.2				
960.0 - 1070.0	20 - 40	1.2 - 2.4				
1070.0 - 1410.0	10 - 15	0.6 - 0.9				
1410.0 - 1555.0	90 - 180	5.4 - 10.8				
1555.0 - 1809.0	30 - 60	1.8 - 3.6				
1809.0 - 1903.0	750 - 1000	45.0 - 60.0				
1903.0 - 1967.0	50 - 100	3.0 - 6.0				
1967.0 - 2108.0	150 - 200	9.0 - 12.0				
2108.0 - 2247.0	100 - 150	6.0 - 9.0				
2247.0 - 2308.0	50 - 100	3.0 - 6.0				
2308.0 - 2475.0	20 - 40	1.2 - 2.4				
2475.0 - 2589.0	60 - 100	3.6 - 6.0				
2589.0 - 2695.0	120 - 180	7.2 - 10.8				
2695.0 - 2795.0	60 - 80	3.6 - 4.8				
2795.0 - 2875.0	20 - 40	1.2 - 2.4				
2875.0 - 3044.0	10 - 20	0.6 - 1.2				
3044.0 - 3149.0	40 - 80	2.4 - 4.8				

NORTHCOR ENERGY LIMITED

NORTHCOR ET AL LIARD F-25

60 - 24' - 22.25" N 123 - 35' - 07.58" W

GEOLOGICAL & GAS SYNOPSIS

BESA RIVER SHALE Continued

Hydrocarbons:

Depth (m)	Maximum Gas (Units)	Hydrocarbons (kppm) C1	C2	C3	C4	C5+
PEAKS						
1809.0	10,000	600.0				
1817.0	8,200	492.0				
1855.0	6,500	390.0				
1876.0	7,500	450.0				
1974.0	1,050	63.0				
2021.0	4,000	240.0				

All background gas and gas peaks are comprised of Methane only. Gas peaks are associated with fractured zone within the Besa River Shale.

GEOLOGICAL
F-25A

GEOLOGICAL & GAS SYNOPSIS
F25A

NORTHCOR ENERGY LIMITED

NORTHCOR ET AL LIARD F-25 A

60 - 24' - 22.25" N 123 - 35' - 07.58" W

GEOLOGICAL & GAS SYNOPSIS

BESA RIVER SHALE — Kick off point - 2921.5 m

General Lithology: Shale with minor thin limestone stringers.

Shale: medium to light gray, blocky to subfissile, firm to moderately hard, micromicaceous, microlaminated in part, slightly calcareous in part, dark gray, blocky, moderately hard to hard, slightly dolomitic to dolomitic, siliceous, trace calcite veining, trace quartz fragments, trace pyrite.

Hydrocarbons:

Depth (m)	Background Gas (Units)	Hydrocarbons (kppm) C1	C2	C3	C4	C5+
2059.0 - 2145.0	50 - 150	3.9 - 9.0				
2145.0 - 2275.0	375 - 425	22.5 - 25.5				
2275.0 - 2320.0	100 - 150	6.0 - 9.0				
2320.0 - 2487.0	20 - 50	1.2 - 3.0				
2487.0 - 2568.0	75 - 150	4.5 - 9.0				
2568.0 - 2918.0	20 - 50	1.2 - 3.0				

Hydrocarbons:

Depth (m)	Maximum Gas (Units)	Hydrocarbons (kppm) C1	C2	C3	C4	C5+
PEAKS						
2185.0	760	45.6				
2258.0	600	36.0				

All background gas and gas peaks are comprised of Methane only. Gas peaks are associated with fractured zones within the Besa River Shale.

NORTHCOR ENERGY LIMITED

NORTHCOR ET AL LIARD F-25 A

60 - 24' - 22.25" N 123 - 35' - 07.58" W

GEOLOGICAL & GAS SYNOPSIS

BASAL BLACK SHALE 2918.0 m - 3177.0 m

General Lithology: Shale with occasional limestone stringers.

Shale: black to very dark gray, blocky, hard to very hard, siliceous, carbonaceous in part, occasionally slightly calcareous, occasionally slightly dolomitic, common to abundant very fine disseminated pyrite, trace fracturing, becoming very calcareous at base.

Limestone: light gray, white gray, soft, chalky, argillaceous to very argillaceous.

Hydrocarbons:

Depth (m)	Background Gas (Units)	Hydrocarbons (kppm) C1	C2	C3	C4	C5+
2918.0 - 3177.0	25 - 100	1.5 - 6.0				

Hydrocarbons:

Depth (m)	Maximum Gas (Units)	Hydrocarbons (kppm) C1	C2	C3	C4	C5+
PEAKS						
3058.0	390	23.4				

All background gas and gas peaks are comprised of Methane only. Gas peaks are associated with fractured zones within the Basal Black Shale.

NORTHCOR ENERGY LIMITED

NORTHCOR ET AL LIARD F-25 A

60 - 24' - 22.25" N 123 - 35' - 07.58" W

GEOLOGICAL & GAS SYNOPSIS

MIDDLE DEVONIAN CARBONATE 3177.0 m - T.D. (NAHANNI FORMATION)

General Lithology: Massive dolomite overlain by several meters thick limestone bed.

Dolomite: white, translucent, cryptocrystalline, dense, soft, massive predominantly clean, occasionally fine to medium crystalline at top of sequence, friable, unconsolidated in part, interstitial bitumen, predominantly tight with occasional fair to good porosity.

Limestone: off white, light gray, soft to firm, chalky, occasionally microcrystalline, medium brown dense in part, slightly argillaceous to argiliaceous, no visible porosity.

Hydrocarbons:

Depth (m)	Background Gas (Units)	Hydrocarbons (kppm) C1	C2	C3	C4	C5+
3177.0 - 3193.0	40	2.2				
3193.0 - 3236.0	160	9.6				
3236.0 - 3255.0	40 - 60	1.0				
3255.0 - 3380.0	10 - 20	1.2				
3380.0 - 3403.0	160 - 180	10.0	TR			
3403.0 - 3450.0	30 - 50	3.0				
3450.0 - 3478.0	30	1.8				

Hydrocarbons:

Depth (m)	Maximum Gas (Units)	Hydrocarbons (kppm) C1	C2	C3	C4	C5+
PEAKS						
3192.0	160	9.6				
3234.0	100	5.9	TR			
3356.0	130	7.2				
3386.0	350	19.4	TR			
3395.0	400	24.0	TR			
3402.0	1200	68.0	.4			
3413.0	280	17.5	TR			
3434.0	400	23.0	TR			
3441.0	360	21.0				

LITHOLOGIC
DESCRIPTION F-25

LITHOLOGIC DESCRIPTIONS
F25

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

CONDUCTOR PIPE SET AT 20 m KB
SAMPLE POINT AT 25 m KB

20 - 25 m	90 SS:	clear to light gray, loose, clean, quartzitic, clear quartz and trace light gray chert and red feldspar, fine grained, trace medium grained and rare coarse grained, angular to sub angular, well sorted, unconsolidated, trace silica cement, trace kaolinite matric, rarely carbonaceous, good inter granular porosity (12 - 15%), no shows.
	10 LS:	light to medium gray, "dirty", dense, slightly dolomitic and slightly argillaceous, tight intercrystalline porosity, no shows.
	TR SH:	very dark gray, blocky, hard, micromicaceous, carbonaceous.
25 - 30 m	100 SS:	clear to light gray, trace red, loose, clean, quartzitic, excellent intergranular porosity (25%), a/a
	TR LS:	light to medium gray, dense, a/a
	TR SH:	very dark gray, blocky, hard, a/a
30 - 35 m	60 SS:	clear to light gray, loose, clean, quartzitic, clear quartz and light gray chert, rare relict red feldspar, good intergranular porosity (12 - 15%), a/a
	30 SH:	very dark gray, blocky, waxy, firm, slightly micromicaceous, carbonaceous and micaceous in part.
	10 LS:	light gray to buff, mottled in part, dense, trace microcrystalline in part, pelletoidal in part, trace <u>crinoids</u>, trace fossils, tight intercrystalline porosity, no shows.
35 - 40 m	50 SH:	medium to very dark gray, blocky, hard, sub-fissile, slightly micromicaceous, slightly carbonaceous.
	30 LS:	buff to light gray, mottled in part, dense to very finely crystalline in part, dolomitic, slightly chalky and rarely pyritic in part, trace <u>corals</u>, tight intercrystalline porosity, no shows.
	20 SS:	clear to light gray, clean, quartzitic, clear quartz and light gray chert, fine grained, rare trace very coarse grained, angular to sub-angular, well sorted, silica cement, rarely carbonaceous, fair intergranular porosity (8 - 10%), no shows.

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

40 - 45 m	10 SH:	medium to very dark gray, blocky, hard, a/a
	90 LS:	medium gray to medium brown, "dirty" in part, mottled in part, dense to microcrystalline, pelletoidal in part, slightly dolomitic, trace gastropods, slight trace white calcite veining, rarely pyritic, rare crinoids, tight intercrystalline porosity, no shows.
45 - 50 m	10 SH:	medium dark gray, platy, waxy, slightly micromicaceous, slightly carbonaceous.
	90 LS:	medium brown to light gray, trace off white, mottled, "dirty in part", dense, slight trace finely crystalline argillaceous, slightly chalky in part, trace fossils, rarely carbonaceous/bituminous, rarely pyritic, tight intercrystalline porosity, poor fracture porosity (1%) in part, no shows.
50 - 55 m	100 LS:	light medium brown, trace off white, mottled, dense to finely crystalline, slightly dolomitic, slightly chalky, a/a
	TR SH:	medium to very dark gray, a/a
55 - 60 m	100 LS:	light medium brown to light gray, trace off white, mottled, "dirty" in part, dense to finely crystalline, chalky, slightly argillaceous in part, trace angular chert fragments, rare trace glauconite, trace crinoids, trace corals, rare trace ostracods, rarely pyritic in part, tight intercrystalline porosity poor fracture porosity (1 - 2 %), no shows.
	TR SH:	medium to very dark gray, platy, firm, fissile, carbonaceous, slightly micromicaceous.
60 - 65 m	100 LS:	off white to light medium brown, mottled, "dirty" in part, dense to very finely crystalline, slight trace finely crystalline, chalky, slightly argillaceous in part, rarely pyritic in part, rare glauconite, tight intercrystalline porosity, no shows.
	TR SH:	medium to very dark gray, platy, firm, a/a
65 - 70 m	100 LS:	off white to light medium brown, mottled, dense to finely crystalline, rarely pelletoidal in part, rare trace ostracods, rare trace slickensides, tight intercrystalline porosity, poor fracture porosity, no shows, a/a

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

	TR SH:	medium to very dark gray, a/a
70 - 75 m	100 LS:	off white to light medium brown, mottled, a/a
	TR SH:	medium to very dark gray, a/a
75 - 80 m	100 LS:	light medium brown to off white, mottled, fine to medium crystalline in part, slightly dolomitic, chalky, slight trace anguiar milky white chert fragments, rarely pyritic, slight trace very dark gray, carbonaceous shale, poor intercrystalline porosity (3%), no shows.
80 - 85 m	100 LS:	light medium brown to buff to light gray in part, mottled, "dirty" in part, dense to fine crystalline chalky, slightly dolomitic, slight trace light gray chert fragments, slightly argillaceous in light gray fraction, trace crinoids, slight trace white calcite veining, slight trace very dark gray carbonaceous shale poor intercrystalline porosity (2 - 3%), poor fracture porosity in part (1%), no shows.
85 - 90 m	100 LS:	light medium brown to light gray, mottled, dense to very finely crystalline, a/a
90 - 95 m	80 LS:	light medium brown to off white, mottled, dense, trace very fine to finely crystalline in part, chalky, tight intercrystalline porosity, a/a
	20 CHT:	milky white, opalescent angular, very coarse fragments.
95 - 100 m	100 LS:	light medium brown to light gray to off white, mottled dense to very finely crystalline, rarely pyritic, a/a
100 - 105 m	20 LS:	light medium brown to off white, mottled, dense to very finely crystalline, slight traces of crinoids, ostracods, and gastropods, a/a
	80 SH:	medium dark gray, blocky, firm to hard, calcareous, slightly mircomicaceous.
105 - 110 m	20 LS:	light medium brown to buff, mottled, a/a
	80 SH:	medium dark gray, blocky, hard, very calcareous.

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

110 - 115 m	20 SH:	medium dark gray, blocky, hard, very calcareous
	80 LS:	medium dark gray, "dirty", dense, argillaceous, trace light medium brown, mottled, a/a
115 - 120 m	10 SH:	medium dark gray, blocky, hard, very calcareous.
	90 LS:	buff to light medium brown, trace off white, mottled, dense to very finely crystalline, slightly dolomitic, chalky, trace angular chert fragments, argillaceous in part, trace ostracods, rarely pyritic in part, tight intercrystalline porosity, no shows.
120 - 125 m	100 LS:	buff to light medium brown, trace off white, mottled, dense to very finely crystalline in part, dolomitic, chalky, argillaceous, trace light gray angular chert fragments, slight trace angular fine grained clear quartz crystals, rare loose pyrite, tight intercrystalline porosity, no shows.
	TR SH:	medium dark gray, blocky, hard, very calcareous, carbonaceous in part.
125 - 130 m	100 LS:	buff to light medium brown, trace off white, mottled, fragmental, dense, trace microcrystalline to very finely crystalline, chalky, slight trace slickensides, slight trace white calcite veining, a/a
	TR SH:	medium to very dark gray, a/a
130 - 135 m	100 LS:	light medium brown to off white, mottled, fragmental, chalky, dense, trace microcrystalline to very finely crystalline, trace chert fragments and slight trace clear quartz crystals, a/a
135 - 140 m	100 LS:	buff to light medium brown, trace light gray to off white, mottled, fragmental in part, chalky, a/a
	TR SH:	medium to very dark gray, a/a
140 - 145 m	100 LS:	buff to light medium brown, trace light gray to off white, mottled, fragmental in part, chalky, a/a
	TR SH:	medium to very dark gray, a/a

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

145 - 150 m	100 LS:	buff to light gray, slight trace off white and light medium brown, mottled, "dirty" in part, fragmental, dense to microcrystalline, slight trace finely crystalline, slightly dolomitic in part, chalky, argillaceous in part, slight trace slickensided white calcite veining, trace crinoids, trace very dark gray carbonaceous /bituminous shale, rare trace light gray angular chert fragments, poor intercrystalline porosity (2%), no shows.
150 - 155 m	100 LS:	buff to light gray, slight trace off white and light medium brown, mottled, "dirty" in part, fragmental, rarely dolomitic in part, a/a
155 - 160 m	40 LS:	buff to light gray, slight trace off white and light medium brown, slight trace corals (amphipora), a/a
	60 SH:	medium dark gray, blocky, hard, very calcareous, slightly micromicaceous.
160 - 165 m	20 SH:	medium dark gray, blocky, hard, very calcareous, a/a
	80 LS:	buff to medium dark gray, slight trace off white, mottled to "dirty", fragmental, dense to very finely crystalline argillaceous, rare trace clear, sub-angular, fine grained clear quartz crystals, tight intercrystalline porosity, no shows.
165 - 170 m	10 SH:	medium dark gray, blocky, hard, very calcareous, a/a
	90 LS:	medium dark gray, "dirty, dense, very argillaceous, trace white calcite veining, good trace corals (amphipora), trace ostracods, slight trace crinoids, rarely pyritic in part, tight intercrystalline porosity, no shows.
170 - 175 m	100 LS:	buff to medium dark gray, mottled to "dirty" lithographic and chalky in buff part, dense to very finely crystalline very argillaceous in medium dark gray part, slight trace white slickensided calcite veining, slight trace medium grained sub-rounded clear quartz grains, slight trace crinoids, rare bryozoans, tight intercrystalline porosity, no shows.
175 - 180 m	100 LS:	medium dark gray to light medium brown to white, "dirty" to mottled to clean, dense to very finely crystalline, fragmental in medium brown part, abundant white calcite veining, trace angular clear quartz crystals and light gray chert fragments, slight trace slickensides, very argillaceous in medium dark gray part, trace crinoids tight intercrystalline porosity, no shows.

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

180 - 185 m	100 LS:	light medium brown to off white, trace medium dark gray, mottled to clear, trace "dirty", dense to very finely crystalline, pelletoidal and fragmental in part, rarely pyritic in part, a/a
185 - 190 m	100 LS:	light to medium dark brown, slight trace light gray, mottled, trace "dirty" in part, a/a
190 - 195 m	100 LS:	medium dark gray to light medium brown, "dirty" to mottled, dense to cryptocrystalline, very argillaceous, slightly chalky in part, good trace orange casing metal, a/a
195 - 200 m	100 LS:	medium dark gray, trace buff to light medium brown, "dirty" to mottled, dense to very finely crystalline slight trace finely crystalline, fragmental and micropelletoidal in part, slight trace pelletoidal, argillaceous, chalky in part, trace ostracods, slight trace corals, slight trace crinoids, slight trace drill bit metal, poor intercrystalline porosity (2-3%), no shows
200 - 205 m	100 LS:	light to medium dark gray, slight trace light to medium brown, mottled, "dirty" in part, very fine to finely crystalline, trace dense, micropelletoidal to pelletoidal in part, chalky, argillaceous in part, rarely pyritic, slight trace medium to very dark gray carbonaceous/bituminous shale, trace ostracods, slight trace crinoids, poor intercrystalline porosity (2-3%), no shows.
205 - 210 m	100 LS:	off white to light medium brown, clean to mottled, dense to very finely crystalline, chalky, rarely pyritic, slight trace white slickensided calcite veining, slight trace angular light gray chert fragments, tight intercrystalline porosity, no shows.
210 - 215 m	100 LS:	light medium brown to off white, mottled to clean, dense to finely crystalline in part, chalky, a/a
215 - 220 m	100 LS:	off white to light medium brown, clean to mottled, dense to very finely crystalline, a/a
220 - 225 m	100 LS:	buff to light medium brown to light gray, trace off white mottled to clean, very fine to finely crystalline, fragmental and pelletoidal, trace dense, slightly dolomitic chalky slightly argillaceous in light gray part, trace white calcite veining, trace crinoids, slight trace very dark gray bituminous shale, slight trace light gray clear to light gray chert fragments, poor intercrystalline porosity (2%), no shows.

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

225 - 230 m	100 LS:	buff to light medium brown, mottled to clean, a/a
230 - 235 m	100 LS:	buff to light medium brown, mottled to clean, a/a, good trace very dark gray carbonaceous, bituminous shale
235 - 240 m	90 LS:	buff to light medium brown to medium dark gray, "dirty" to mottled, fragmental in part, trace dense, micropelletoidal, fossiliferous, argillaceous, abundant trace crinoids, corals, and bryozaons, poor intercrystalline porosity (2-3%), in ofssileferous part, no shows.
	20 SH:	medium dark gray, blocky, hard, calcareous, slightly bituminous
240 - 245 m	60 SH:	medium dark gray, blocky, hard, a/a
	40 LS:	medium dark gray to light medium brown, mottled, a/a
245 - 250 m	100 LS:	light to medium dark gray, trace light medium brown, "dirty", fragmental, rarely dolomitic, very argillaceous, slightly chalky in light gray part, carbonaceous/bituminous, tight intercrystalline porosity, no shows
250 - 255 m	100 LS:	medium dark gray, trace light gray, "dirty" fragmental, very argillaceous, rarely dolomitic, carbonaceous/bituminous, slightly chalky in light gray part, slight trace light medium brown dense to tight intercrystalline porosity, no shows
255 - 260 m	100 LS:	medium dark gray, trace light gray, "dirty", tight, a/a
260 - 265 m	100 LS:	medium dark gray, trace light gray, "dirty", trace ostracods, trace crinoids, tight, a/a

SAMPLE TOP OF;

265 - 270 m	80 LS:	medium dark gray, slight trace light gray, "dirty" slight trace corals, slight trace light gray chert fragments, slight trace white calcite veining, tight, a/a
	20 SH:	medium dark gray to very dark gray, platy, hard, calcareous
270 - 275 m	100 LS:	buff to light gray, trace light medium brown, mottled, fragmental, slight trace micropelletoidal, microcrystalline to very finely crystalline, slight trace dense, slight trace white slickensided calcite veining, slight angular, clear quartz crystal fragments, slight trace bryozoans, slight trace crinoids, rare trace very dark gray, carbonaceous/bituminous shale

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

SAMPLE TOP OF BESA RIVER SHALES AT 279 m KB

275 - 280 m	80 LS;	buff to light gray, trace light medium brown, a/a
	20 SH:	medium to dark gray, platy, hard, calcareous, very slightly carbonaceous/bituminous

FAULT BACK TO MISSISSIPPIAN CARBONATES/SANDSTONES AT 284 m KB

280 - 285 m	90 SH:	medium to dark gray, blocky, hard, calcareous, very slightly carbonaceous/bituminous, trace ostracods, trace bryozoans, slight trace crinoids, rarely pyritic
	10 LS:	buff to light to medium brown, trace medium gray, mottled, trace "dirty", very finely crystalline, trace fossils, trace slickensides, slightly chalky in part, tight intercrystalline porosity, no shows
285 - 290 m	60 LS:	buff to light medium brown to light gray, a/a
	40 SH:	medium dark gray, blocky, hard, calcareous, a/a
290 - 295 m	70 LS:	buff to light medium brown to light gray, a/a
	30 SH:	medium dark gray, blocky, hard, calcareous, a/a
295 - 300 m	80 LS:	buff to light gray to medium dark gray, "dirty", slightly mottled, dense to microcrystalline, rarely pelletoidal in part, trace slickensides, slightly chalky, slightly argillaceous, rare ostracods, rare crinoids, poor intercrystalline porosity, no shows
	20 SH:	medium to very dark gray, blocky, hard, calcareous
300 - 305 m	60 LS:	buff to light gray to medium dark gray, a/a
	40 SH:	medium to dark gray, trace very dark gray, a/a
305 - 310 m	60 LS:	buff to light gray to medium dark gray, a/a
	40 SH:	medium to dark gray, trace very dark gray, a/a
310 - 315 m	90 LS:	buff to off white to light medium brown, mottled, dense to very finely crystalline, fragmental and pelletoidal in part, rarely pyritic, a/a
	10 SH:	medium to very dark gray, blocky, hard, a/a

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

315 - 320 m	70 LS:	off white to light medium brown to medium gray clean to "dirty", mottled in part, dense to very finely crystalline, slightly chalky, slightly dolomitic, trace white slickensided calcite veining, slight trace clear quartz veining, rarely pyritic, trace crinoids, trace bryozoans, tight intercrystalline and fracture porosity no shows
	30 SH:	medium to very dark gray, blocky to platy, hard calcareous
325 - 330 m	80 LS:	off white to light gray, trace light medium brown, trace medium brown, trace medium gray, clean to "dirty" slightly mottled in part, dense to microcrystalline, slightly chalky, trace white slickensided calcite veining, trace opalescent light gray angular chert fragments, rare trace glauconite, trace corals, trace crinoids, tight intercrystalline and fracture porosity
	20 SH:	medium to very dark gray, carbonaceous/bituminous, a/a
330 - 335 m	80 LS:	off white to light gray, trace light medium brown, a/a
	20 SH:	medium to very dark gray, a/a
335 - 340 m	90 LS:	buff to light medium brown, a/a
	10 SH:	medium to very dark gray, a/a
340 - 345 m	90 LS:	buff to light gray, trace light to medium brown, trace medium gray, mottled, "dirty" in part, fragmental very fine to finely crystalline, trace dense, a/a
	10 SH:	medium to very dark gray, a/a
345 - 350 m	90 LS:	buff to light medium brown, trace light gray, a/a
	10 SH:	medium to very dark gray, a/a
350 - 355 m		NO SAMPLE CAUGHT.
355 - 360 m	50 LS:	medium dark gray, "dirty", mottled, fragmental, dense to very finely crystlaline, trace finely crystalline, slightly chalky, trace bryozoans, very argillaceous, slight trace white calcite veining, poor to tight intercrystalline porosity
	50 SH:	medium dark gray, hard, blocky, calcareous, slight trace crinoids

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.59" W

360 - 365 m	50 LS:	buff to light medium brown, trace medium brown, trace clear to light gray slickensided calcite veining, slight trace ostracods, slight trace corals, a/a
	50 SH:	medium to very dark gray, a/a
365 - 370 m	40 LS:	buff to light gray, trace clear, a/a
	60 SH:	medium dark gray, blocky, hard, calcareous
370 - 375 m	30 LS:	buff to light medium brown, a/a
	70 SH:	medium dark gray, blocky, hard, calcareous

FAULT BACK TO MISSISSIPPIAN CARBONATES/SANDSTONES AT 375 m KB

375 - 380 m	70 LS:	buff to light medium brown, a/a
	30 SH:	light to medium gray, a/a
380 - 385 m	80 LS:	buff to light medium brown, trace medium brown, dense trace very fine to finely crystalline, fragmental in part, trace angular light gray chert fragments
	20 SH:	light to medium gray, a/a
385 - 390 m	60 LS:	light medium brown, trace buff to off white, a/a
	40 SH:	medium dark gray, trace light gray, blocky, hard, calcareous, a/a
390 - 395 m	60 LS:	buff to medium brown, trace clear to off white, a/a
	40 SH:	medium to very dark gray, a/a
395 - 400 m	50 LS:	buff, trace medium brown, slightly mottled, dense to very finely crystalline, trace finely crystalline, rarely pyritic in part, slightly ostracods, slightly chalky, rarely dolomitic, argillaceous in part, rare trace clear to white calcite veining, tight intercrystalline porosity
	50 SH:	medium to very dark gray, hard, blocky, calcareous
400 - 405 m	70 LS:	buff to light medium brown, trace medium brown dense to very finely crystalline, rare trace glauconite, slight trace crinoids, slight trace drill bit metal, a/a
	30 SH:	light medium dark gray, blocky, hard, calcareous

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

405 - 410 m	40 SH:	light medium gray, blocky, hard, calcareous
	60 LS:	light medium brown to buff, trace medium brown, dense to very finely crystalline, trace crinoids, rarely pyritic, trace clear to white calcite veining, a/a
410 - 415 m	70 LS:	light medium brown to off white, trace light to medium gray, slightly mottled, dense to very finely crystalline, slightly chalky, trace white calcite veining, a/a
	30 SH:	medium to very dark gray, blocky, hard, calcareous
415 - 420 m	60 LS:	light to medium brown, trace off white, slightly mottled, dense to cryptocrystalline, slightly chalky, rare trace glauconite, trace crinoids, trace light gray angular chert fragments, trace bryozoans, trace corals, rare trace glauconite, tight intercrystalline porosity, no shows
	40 SH:	light medium gray, trace very dark gray, hard carbonaceous, blocky, a/a
420 - 425 m	60 LS:	buff to light medium brown, a/a
	40 SH:	medium to light gray, blocky, hard, calcareous
425 - 430 m	60 LS:	a/a
	40 SH:	a/a
430 - 435 m	50 LS:	a/a
	50 SH:	a/a
435 - 440 m	50 LS:	a/a
	50 SH:	a/a
440 - 445 m	60 LS:	light to medium brown, buff, brown gray, dense to microcrystalline, moderately hard, slightly argillaceous in part, trace fossil remains, crinoid, bryozoan, common chert fragments, trace disseminated pyrite, tight
	40 SH:	medium gray, blocky, moderately hard, micromicaceous

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

445 - 450 m	70 LS:	light to medium brown, buff, brown gray, dense to microcrystalline, moderately hard, slightly argillaceous in part, trace fossil remains, crinoid, bryozoan, common chert fragments, trace disseminated pyrite, tight
	30 SH:	medium gray, blocky, moderately hard, micromicaceous
450 - 460 m	60 LS:	light to medium brown, light to medium brown gray, buff, dense to microcrystalline, slightly argillaceous in part, occasionally dolomitic, trace chert fragments, trace fossil remains crinoid, pelecypod
	40 SH:	a/a
460 - 465 m	80 LS:	buff, light to medium brown, brown gray, a/a, trace chert fragments
	20 SH:	a/a
465 - 475 m	80 LS:	light to medium brown, medium gray brown, buff, dense to microcrystalline, firm, slightly argillaceous in part, grading to very calcareous shale in part, occasionally slightly dolomitic, trace chert fragments, trace fossil remains, crinoid, pelecypod, no visible porosity
	20 SH:	medium gray occasionally dark gray, blocky calcareous, micromicaceous, trace disseminated pyrite
475 - 480 m	60 LS:	light to medium gray brown, medium gray, light to medium brown, buff, dense to microcrystalline, slightly argillaceous in part, grading to very calcareous shale in part occasionally slightly dolomitic, trace fossil remains, trace chert fragments, no visible porosity
	40 SH:	medium gray occasionally dark gray, blocky, calcareous, slightly dolomitic, micromicaceous, trace pyrite
480 - 485 m	60 SH:	a/a
	40 LS:	a/a
485 - 490 m	80 SH:	medium gray, occasionally dark gray, blocky, calcareous slightly dolomitic in part, micromicaceous, grading to very argillaceous limestone in part
	20 LS:	a/a, trace fossil remains, crinoid, pelecypod

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

490 - 500 m	70 LS:	light to dark gray brown, medium brown, buff, dense to microcrystalline, argillaceous in part, slightly silty, trace fossil remains, crinoid, trace disseminated pyrite, no visible porosity
	30 SH:	medium gray, blocky, calcareous, micromicaceous, slightly silty
500 - 510 m	60 LS:	light to medium brown gray, light to medium brown, a/a, common fossil remains, crinoid, bryozoan, pelecypod
	40 SH:	a/a
510 - 515 m	80 LS:	light to dark brown gray, medium brown, buff, dense to microcrystalline, argillaceous to very argillaceous in part, slightly silty, trace fossil remains, crinoid, pelecypod, no visible porosity
	20 SH:	a/a.
515 - 520 m	60 SH:	medium to dark gray, blocky, calcareous, slightly silty micromicaceous, grading to very argillaceous limestone in part, trace calcite veining.
	40 LS:	a/a, trace disseminated pyrite.
520 - 525 m	60 LS:	a/a
	40 SH:	a/a
525 - 530 m	50 LS:	light to dark brown gray, microcrystalline, dense in part, argillaceous to very argillaceous, slightly silty trace fossil remains, crinoid, pelecypod, grading to limey shale in part
	50 SH:	medium to dark brown gray, medium gray, blocky hard, calcareous to limey, micromicaceous, slightly silty, grading to very argillaceous limestone in part.
530 - 540 m	60 SH:	a/a, trace calcite veining, trace pyrite.
	40 LS:	a/a, occasionally slightly dolomitic, trace fossil remain.
540 - 545 m	50 SH:	a/a
	50 LS:	a/a, trace disseminated pyrite

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

545 - 550 m	60 SH:	medium to dark brown gray, blocky, hard, calcareous to limey, micromicaceous, slightly silty, grading to very argillaceous limestone in part, trace calcite veining.
	40 LS:	light to medium brown gray, occasionally dark brown gray, medium brown, chalky, dense, argillaceous to very argillaceous, slightly silty, fossiliferous, trace disseminated pyrite.
550 - 555 m	50 SH:	a/a
	50 LS:	a/a
555 - 560 m	70 SH:	dark brown gray, a/a
	30 LS:	a/a
560 - 565 m	70 SH:	dark brown gray, blocky, hard, calcareous to very limey grading to very argillaceous limestone in part, micromicaceous, very slightly silty, trace calcite veining.
	30 LS:	medium to light brown gray, occasionally medium brown chalky, dense, argillaceous to very argillaceous, slightly silty, trace white - buff calcite crystals, trace fossil fragments, trace disseminated pyrite, no visible porosity.
565 - 570 m	60 SH:	medium to dark brown gray, a/a
	40 LS:	a/a
570 - 580 m	70 SH:	a/a
	30 LS:	a/a, trace disseminated pyrite.
580 - 585 m	60 SH:	dark brown gray, blocky, hard, calcareous to very limey grading to very argillaceous limestone in part, micromicaceous, slightly silty, trace calcite veining.
	40 LS:	medium to light brown gray, occasionally medium to dark brown, predominantely chalky, dense, argillaceous, to very argillaceous, abundant white translucent calcite crystals, trace fossil remains, trace carbonaceous trace pyrite, no visible porosity, very poor fracture porosity, trace chert.

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

585 - 595 m	70 SH:	a/a
	30 LS:	a/a
595 - 600 m	60 SH:	dark brown gray, blocky, hard, calcareous to very limey, grading to very argillaceous limestone in part, slightly silty, micromicaceous.
	40 LS:	medium to light brown gray, occasionally medium brown, predominantely chalky, dense argillaceous to very argillaceous, trace white - translucent calcite crystals, trace fossil remains, crinoid.
600 - 605 m	80 SH:	medium gray, medium to dark brown gray, blocky, calcareous to very limey in part, moderately hard to hard micromicaceous, slightly silty.
	20 LS:	a/a, trace microcrystailine, trace white dolomite trace chert fragments.
605 - 610 m	100 SH:	a/a
610 - 615 m	90 SH:	medium gray, medium - dark brown gray, blocky, calcareous to very calcareous, moderately hard to hard, micromicaceous, slightly silty, trace calcite veining.
	10 LS:	a/a, rarely white, buff, trace dolomite.
615 - 625 m	100 SH:	a/a, with minor limestone stringers, trace dolomitic infill, trace fossil remains, crinoid trace pyrite.
625 - 630 m	80 SH:	a/a, common disseminated pyrite, pyrite nodules, trace calcite veining.
	20 LS:	light to medium brown, light to occasionally dark gray brown, dense, chalky in part, rarely microcrystalline, argillaceous in part, trace fossil remains, crinoids trace dolomite.
630 - 635 m	90 SH:	a/a, trace very fine disseminated pyrite.
	10 LS:	a/a

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

635 - 640 m	70 SH:	medium to dark gray, a/a, trace very fine disseminated pyrite, trace pyrite nodules.
	30 LS:	light to medium brown, buff, cream, dense. chalky in part, occasionally microcrystalline, occasionally fragmental in part, argillaceous in part, slightly silty, trace dolomite, trace fossil remains, crinoid trace chert, no visible porosity.
640 - 650 m	100 SH:	medium to dark gray, blocky, hard, calcareous to very calcareous, micromicaceous, slightly silty, minor medium to dark brown, buff limestone lenses, trace loose quartz grains, trace pyrite, trace calcite veining.
650 - 655 m	100 SH:	a/a, with minor medium to dark brown, buff to cream limestone lenses, common loose angular to subrounded quartz grains, trace fossil remains, crinoid trace pyrite.
655 - 660 m	100 SH:	a/a, trace loose quartz grains, rare trace very fine grain sandstone, trace slightly carbonaceous siltstone trace chert.
660 - 665 m	100 SH:	medium to dark gray, hard, calcareous to very calcareous, micromicaceous, silty, trace carbonaceous minor medium to dark brown, buff, limestone lenses, slight trace loose quartz grains, trace disseminated pyrite.
665 - 670 m	100 SH:	medium to dark gray, hard, calcareous to very calcareous, micromicaceous, silty, trace chert fragments trace calcareous inclusions, trace pyrite.
670 - 695 m	100 SH:	medium to dark gray, occasionally black, blocky, firm to hard, calcareous to very calcareous in part, rarely carbonaceous, minor limestone lenses, trace translucent angular quartz fragments, trace chert, trace fossil remains, crinoids, ostracod, trace pyrite, trace very fine grain red brown sandstone.
695 - 705 m	100 SH:	medium gray, occasionally dark gray, moderately hard to hard, calcareous to very calcareous in part, slightly silty, slightly micromicaceous, trace very fine disseminated pyrite, rarely carbonaceous, trace fossil remains, crinoid, minor medium to dark gray brown buff limestone lenses, trace loose quartz grains trace very fine grain sandstone.

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

705 - 710 m	100 SH:	medium to dark gray, dark brown gray, blocky moderately hard to hard, calcareous to very calcareous in part, silty, slightly micromicaceous, trace very fine disseminated pyrite, trace pyrite nodules, minor limestone lenses, trace loose quartz fragments.
710 - 720 m	100 SH:	a/a, trace fossil remains, crinoid, ostracod, grading to very argillaceous limestone in part, trace disseminated pyrite.
720 - 730 m	100 SH:	medium to dark gray, blocky, firm to hard, calcareous to very calcareous, silty, abundant translucent - white calcite crystals, trace very fine disseminated pyrite trace pellet, minor limestone lenses, trace loose quartz grains.
730 - 735 m	60 SH:	medium to dark gray, dark brown gray, blocky, calcareous, becoming very limey in part, grading to very argillaceous limestone, silty, trace disseminated pyrite, trace pellets.
	40 LS:	medium to dark gray brown, medium brown, buff, predominantly chalky, dense in part, argillaceous to very argillaceous, slightly silty, trace bryozoan, no visible porosity.
735 - 740 m	70 LS:	medium to dark gray brown, dense, hard, brittle, light to medium brown in part, firm to friable, microcrystalline, chalky in part, no visible porosity.
	30 SH:	predominantly medium gray, occasionally dark gray brown, blocky, firm to hard, micromicaceous in part, very calcareous, silty, trace pyrite nodule.
740 - 745 m	70 LS:	medium to dark gray brown, occasionally buff, microcrystalline, dense in part, hard to brittle, chalky and firm in part, very argillaceous, grading to very limey shale in part, tight, no visible porosity, trace disseminated pyrite.
	30 SH:	medium to dark gray, dark brown gray, a/a.
745 - 750 m	80 LS:	medium - dark gray brown, light to medium brown, microcrystlline, dense in part, chalky in part, hard, brittle, very argillaceous in part, no visible porosity.
	20 SH:	a/a

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

750 - 755 m	60 LS:	a/a, abundant cream, translucent, light brown calcite crystals, trace dolomite, trace fossil remains, crinoids.
	40 SH:	medium to dark gray brown, medium to dark gray firm to moderately hard, calcareous to very limey, grading to very argillaceous limestone, slightly micromicaceous, fractured, trace calcite veining, trace light brown calcite crystals.
755 - 765 m	60 SH:	a/a, common loose fine subrounded to subangular quartz grains, trace pyrite.
	40 LS:	a/a
765 - 775 m	70 SH:	medium to dark gray, blocky, firm to moderately hard, calcareous, micromicaceous, trace chert, trace pyrite.
	30 LS:	light gray, chalky, microcrystalline in part, argillaceous, silty, no visible porosity.
775 - 785 m	80 SH:	medium to dark gray, firm to moderately hard, calcareous to very calcareous in part, micromicaceous, silty calcareous laminations, trace chert, trace pyrite, trace loose quartz grains.
	20 LS:	buff, light brown, white dense to microcrystalline, argillaceous, no visible porosity.
785 - 790 m	90 SH:	medium to dark gray, blocky, occasionally platy, firm to moderately hard, slightly to non calcareous micromicaceous, silty, grading to siltstone in part.
	10 LS:	white, medium brown, generally calcite, rhombic in part, microcrystalline in part, trace pyrite.
790 - 795 m	70 SH:	medium to dark gray, blocky, occasionally platy, firm to moderately hard, slightly non calcareous, moderately micromicaceous, silty in part, grading to siltstone in part.
	30 LS:	clear, white, medium brown, generally calcite, rhombic in part, occasionally chalky, trace fossil fragments, no visible porosity.
795 - 800 m	80 SH:	a/a, abundant slickensides, trace pyrite.
	20 LS:	a/a

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

800 - 805 m	90 SH:	a/a, abundant slickensides, trace pyrite grading to argillaceous limestone in part.
	10 LS:	a/a
805 - 820 m	100 SH:	medium to dark gray, gray brown, blocky to platy, firm slightly to very calcareous in part, abundant slickensides, grading to very argillaceous limestone in part, trace calcite veining, trace pyrite and pyritic nodules.
820 - 830 m	100 SH:	medium gray, dark gray, firm to hard, platy, blocky in part, micromicaceous, calcareous in part, abundant calcite crystals, trace pyrite.
830 - 835 m	100 SH:	medium gray, dark gray, firm to hard blocky to platy, micromicaceous, very slightly calcareous, trace pyrite.
835 - 845 m	100 SH:	medium to dark gray, blocky to platy, moderately hard to hard, micromicaceous, slightly silty, slightly calcareous in part, slickensides, occasional thin laminations, abundant pyrite, trace calcite crystals.
845 - 855 m	100 SH:	medium to dark gray, platy to blocky, moderately hard to hard, occasionally calcareous in part, good trace calcite fragments, thin laminations in part, abundant massive pyrite.
855 - 860 m	100 SH:	a/a, abundant calcite, trace very fine grain sandstone, trace pyrite.
860 - 870 m	90 SH:	a/a, trace fracture and slickensides, slightly to non calcareous, trace fossil fragments.
	20 SS:	white, light to medium gray, gray brown, very fine grain, angular to subrounded, well sorted, calcite cement, trace pyrite, poor porosity, no show.
870 - 880 m	80 SH:	a/a
	20 LS:	a/a
880 - 885 m	80 SH:	medium to dark gray, blocky to platy, fissile in part, firm to moderately hard, slightly silty, moderately calcareous, micromicaceous, trace slickensides, trace pyrite, trace fossil remains, ostracod

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

880 - 885 m	20 SS:	white, light to medium gray brown, very fine grain, angular to subrounded, calcite cement, silty pyritic in part, poor visible porosity.
885 - 890 m	80 SH:	medium to dark gray, platy - blocky, firm to hard, micromicaceous in part, calcareous in part occasionally slightly carbonaceous, trace pyrite.
	20 SS:	white, light to medium brown, very fine to fine grain, angular to subrounded, moderately sorted, calcite cement argillaceous, poor visible porosity no show.
890 - 895 m	90 SH:	medium to dark gray, soft to firm, blocky to platy, micromicaceous, slightly to non calcareous, trace slickensides, trace pyrite, trace calcite crystals.
	10 SS:	a/a
895 - 905 m	80 SH:	a/a
	20 SS:	a/a
905 - 910 m	70 SH:	a/a
	30 SS:	a/a
910 - 915 m	80 SH:	light to dark gray, occasional light brown firm to hard non to very calcareous, blocky to platy, micromicaceous slickensides trace pyrite, minor calcite crystals.
	20 SS:	a/a
915 - 920 m	90 SH:	medium to dark gray, firm to hard generally blocky, occasional platy, micromicaceous, slightly silty, occasional slickensides, occasional pyrite in part.
	10 LS:	white to brown gray, microcrystalline occasional calcite rhombes, trace fossil fragments, minor chert, argillaceous in part.
920 - 925 m	100 SH:	a/a, with minor limestone and chert, a/a
925 - 930 m	90 SH:	a/a
	10 SS:	white to light to dark gray, fine to very fine grain, angular to sub rounded, moderately sorted, calcite cement, poor visible porosity, trace pyrite, occasional calcite rhombs and minor chert.

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

930 - 945 m	90 SH:	a/a
	10 SS:	a/a
945 - 950 m	80 SH:	medium to dark gray, firm to hard, generally blocky, occasional platy, micromicaceous, non to slightly calcareous, occasional pyrite.
	20 SS:	white to light grey, fine to very fine, moderately sorted calcite cement, poor visible porosity angular subrounded argillaceous in part, trace pyrite, minor chert.
955 - 970 m	80 SH:	a/a
	20 SS:	a/a
970 - 975 m	70 SH:	medium ot dark gray, firm to hard, micromicaceous predominantly blocky, occasional platy, non to slightly calcareous, trace pyrite.
	30 SS:	light to dark gray, quartzose, very fine grain angular to sub angular, modertely sorted calcareous cement, argillaceous, poor visible porosity.
975 - 980 m	60 SH:	a/a
	40 SS:	a/a
980 - 985 m	70 SH:	a/a
	30 SS:	a/a
985 - 990 m	70 SH:	a/a, becoming more platy, occasional pyrite crystals.
	30 SS:	a/a, grading to siltstone.
990 - 995 m	90 SH:	light to dark gray, medium brown, firm to hard, blocky to platy, micromicaceous, pyritic in part, occasional calcareous laminations.
	10 SS:	medium to light gray, quartzose, very fine grain, angular to sub angular, moderately sorted.
995 - 1000 m	100 SH:	light to dark gray to gray brown, moderately soft - hard, blocky to platy, micromicaceous, trace pyrite, abundant sandstone a/a.

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WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

1000 - 1005 m	90 SH:	a/a
	10 SS:	a/a
1005 - 1010 m	100 SH:	a/a, with abundant sandstone a/a.
1010 - 1030 m	100 SH:	light to dark gray, blocky to platy micromicaceous, firm to hard, iron stone croncertions, trace slick-ensides.
1030 - 1040 m	100 SH:	light to dark gray, firm to hard, fissile to platy micromicaceous, slightly silty, trace pyrite, trace ironstone concretions.
1040 - 1050 m	100 SH:	light to dark gray, platy to blocky, firm to hard, micromicaceous, occasionally slightly calcareous, slightly silty, good trace pyrite, trace sandstone.
1050 - 1065 m	100 SH:	light to medium gray, occasionally dark gray, platy to blocky, trace fissile, moderately micromicaceous occasinally slightly calcareous trace pyrite, good trace very fine grain sandstone, trace loose calcite.
1065 - 1075 m	100 SH:	medium to dark gray, blocky to fissile, firm to hard micromicaceous, slightly silty, trace yrite, trace ironstone concretions.
1075 - 1080 m	100 SH:	light to medium gray, dark gray in part, blocky firm to hard, occasionally slightly silty, trace loose calcite, trace fossiliferous.
1080 - 1085 m	100 SH:	light to dark gray, blocky to fissile, firm to hard slightly silty, occasional trace very fine grain sandstone, trace calcite, trace fossiliferous.
1085 - 1090 m	100 SH:	a/a, good trace very fine grain sandstone, trace calcite.
1090 - 1105 m	100 SH:	light to dark gray, blocky to fissile, firm to hard micromicaceous, slightly calcareous, slightly silty, trace iron stain.
1105 - 1115 m	100 SH:	light to medium gray, occasionally dark gray, blocky to fissile, firm to hard, micromicaceous, slightly silty, good trace sandstone, trace pyrite, trace calcite.

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WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

1115 - 1130 m	100 SH:	light to dark gray, occasionally brown, blocky to fissile, firm to hard, slightly micromicaceous, slightly silty, trace pyrite, trace fossil remains ostracod, trace fracture fill.
1130 - 1140 m	100 SH:	medium gray, blocky to fissile, firm to hard micromicaceous, slightly silty in part.
1140 - 1150 m	100 SH:	medium to dark gray, blocky to fissile in part, firm to hard, slightly micromicaceous, trace fossiliferous, trace kaolin.
1150 - 1155 m	100 SH:	predominantely medium gray, occasionally dark gray, a/a.
1155 - 1160 m	100 SH:	a/a.
1160 - 1165 m	100 SH:	a/a, good trace calcareous siltstone.
1165 - 1180 m	100 SH:	medium to dark gray, blocky to fissile, firm to hard, micromicaceous, silty, trace calcite, trace pyrite, trace fossil fragments.
1180 - 1195 m	100 SH:	medium to dark gray, blocky to fissile, firm to hard micromicaceous, silty, loose calcite fragments, trace pyrite, trace iron staining.
1195 - 1200 m	100 SH:	medium gray, blocky to fissile, firm to hard, micromicaceous, loose calcite fragments, trace pyrite, trace fossil fragments.
1200 - 1210 m	100 SH:	a/a.
1210 - 1230 m	100 SH:	medium to dark gray, blocky to subfissile firm, to hard micromicaceous, slightly silty, calcite laminations, trace pyrite.
1230 - 1235 m	100 SH:	medium to dark gray, blocky to platy, firm to hard micromicaceous, very slightly calcareous.
1235 - 1240 m	100 SH:	medium to dark gray, blocky to platy, firm to hard, slightly calcareous, micromicaceous, slight trace white calcite veining, rare loose, clear, coarse grain, subrounded quartz.
1240 - 1245 m	100 SH:	medium to dark gray, blocky to platy, a/a.
1245 - 1250 m	100 SH:	medium to dark gray, blocky to platy, subfissile in part, slight trace loose pyrite, a/a.

NORTHCOR ET AL LIARD F-25
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

1250 - 1255 m	100 SH:	medium to dark gray, a/a.
1255 - 1260 m	100 SH:	medium to dark gray, platy to blocky, slightly calcareous, micromicaceous, trace clear to white calcite veining.
1260 - 1265 m	100 SH:	medium to dark gray, platy to blocky, a/a.
1265 - 1270 m	100 SH:	medium to dark gray, trace brownish, blocky to subfissile, firm to hard, micromicaceous, slightly calcareous, trace calcite crystals.
1270 1275 m	100 SH:	a/a, trace off white calcite veining.
1275 - 1280 m	100 SH:	a/a.
1280 - 1285 m	100 SH:	medium dark gray, trace very dark gray, blocky to platy, slightly calcareous, micromicaceous, trace off white calcite veining, rare trace clear, fine grained subangular, floating quartz crystals.
1285 - 1290 m	100 SH:	medium dark gray, trace very dark gray, a/a.
1290 - 1295 m	100 SH:	medium to dark gray, platy, blocky in part, a/a.
1295 - 1300 m	100 SH:	medium to dark gray, a/a, good trace drill bit metal.
1300 - 1305 m	100 SH:	medium dark gray, trace very dark gray, platy to blocky, firm, subfissile in part, slight trace off white calcite veining, trace drill bit metal.
1305 - 1310 m	100 SH:	medium dark gray, trace very dark gray, a/a.
1310 - 1315 m	100 SH:	a/a.
1315 - 1320 m	100 SH:	slightly silty, a/a.
1320 - 1325 m	100 SH:	medium gray, blocky to subfissile, firm to hard, micro micaceous, slightly calcareous, trace calcite veining.
1325 - 1330 m	100 SH:	medium dark gray, trace dark gray, blocky to platy, subfissile in part, micromicaceous occasionally pyritic, slightly calcareous, slight trace dark brownish gray siltstone, slight trace clear to ff white calcite veining, trace drill bit metal.
1330 - 1335 m	100 SH:	medium dark gray, trace dark gray, a/a.

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1335 - 1340 m	100 SH:	medium dark gray, slight trace dark gray, a/a.
1340 - 1345 m	100 SH:	medium to dark gray, blocky to platy, subfissile in part, micromicaceous, slightly calcareous, trace loose pyrite, trace clear, white calcite veining.
1345 - 1350 m	100 SH:	medium to dark gray, very dark gray, blocky to subfissile, firm to hard, micromicaceous, slightly calcareous, trace calcite veining.
1350 - 1360 m	100 SH:	a/a, abundant cavings, good trace off white, clear calcite veining.
1360 - 1365 m	100 SH:	medium dark gray, trace very dark gray, blocky, firm slightly calcareous, micromicaceous, good trace off white calcite veining, trace clear quartz crystals.
1365 - 1370 m	100 SH:	medium dark gray, trace very dark gray, trace shale cavings, a/a.
1370 - 1375 m	100 SH:	medium dark gray, trace very dark gray, a/a.
1375 - 1380 m	100 SH:	medium dark gray, trace very dark gray, a/a.
1380 - 1385 m	100 SH:	medium dark gray, to very dark gray, abundant cavings slight trace white sucrosic anhydrite, a/a.
1385 - 1390 m	100 SH:	medium to dark gray, very dark gray, blocky to platy, subfissile in part, firm to hard, micomicaceous, slightly to very calcareous in part, slightly silty in part, trace pyrite, trace slickensides, slight trace calcite veining, trace fossiliferous.
1390 - 1395 m	100 SH:	a/a, trace fine quartz grains.
1395 - 1400 m	100 SH:	medium to dark gray, blocky to subfissile, firm to hard, micromicaceous, slightly silty, slightly to moderately calcareous, trace calcite crystals.
1400 - 1405 m	100 SH:	a/a, trace massive pyrite, trace dark brown calcite trace fossiliferous.
1405 - 1410 m	100 SH:	medium to dark gray, blocky to platy, firm to hard, micromicaceous, slightly calcareous.

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1410 - 1415 m	100 SH:	medium dark gray, slight trace very dark gray, blocky to platy, subfissile in part, firm to hard, calcareous slightly micromicaceous, good trace off white to clear calcitic dolomite veining, slight trace opalescent angular chert fragments, slight trace slickensides, abundant shale cavings, slight trace drill bit metal.
1415 - 1420 m	100 SH:	medium dark gray, blocky to platy firm to hard, calcareous, slightly micromicaceous, lsight trace off white to clear calcite veining, trace drill bit metal.
1420 - 1425 m	100 SH:	medium dark gray, trace very dark gray, blocky to platy, subfissile in part, hard, very calcareous, slightly micromicaceous, trace off white calcite veining.
1425 - 1430 m	100 SH:	medium dark gray, blocky, hard, very calcareous, silty trace off white calcite veining.
1430 - 1435 m	100 SH;	medium dark gray, blocky, hard, very calcareous, a/a.
1435 - 1440 m	100 SH:	medium dark gray, trace dark gray, blocky, hard very calcareous, carbonaceous/bituminous in part, a/a.
1440 - 1445 m	100 SH:	medium dark gray, trace dark gray, a/a.
1445 - 1450 m	100 SH:	medium dark gray, trace light gray, platy to blocky, trace cavings, trace off white calcite veining, a/a.
1450 - 1455 m	100 SH:	medium dark gray, trace light gray, slight trace crinoids, a/a.
1455 - 1460 m	100 SH:	medium dark gray, trace light gray, and very dark gray blocky, hard, very calcareous, slightly micromicaceous slight trace slickensides, trace off white calcite veining.
1460 - 1465 m	100 SH:	medium dark gray, trace light and very dark gray, blocky to platy, hard, subfissile in part, very calcareous, slightly micromicaceous, trace loose pyrite, trace off white calcite veining, trace shale cavings, slight trace drill bit metal.
1465 - 1470 m	100 SH:	medium dark gray, trace light and dark gray abundant platy shale cavings, a/a.

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1470 - 1475 m	100 SH:	medium dark to dark gray, slight trace crinoids, slight trace platy shale cavings, a/a.
1475 - 1480 m	100 SH:	medium dark gray, trace very dark gray, blocky slightly carbonaceous/bituminous, a/a.
1480 - 1485 m	100 SH:	medium dark gray, trace very dark gray, a/a.
1485 - 1490 m	100 SH:	medium dark gray,trace very dark gray, a/a.
1490 - 1495 m	100 SH:	medium dark gray, blocky, a/a.
1495 - 1500 m	100 SH:	medium dark gray, blocky, hard, very calcareous slightly micromicaceous, trace slickensides, slight trace off white calcite veining.
1500 - 1505 m	100 SH:	medium dark gray, blocky, hard, very calcareous, a/a.
1505 - 1520 m	100 SH:	medium to dark gray, blocky, firm to hard, very calcareous, slightly micromicaceous, occasional trace slickensides, trace calcite veining, trace calcite rhombs, trace pyrite.
1520 - 1530 m	100 SH:	medium to dark gray, blocky, firm to hard, very calcareous, slightly micromicaceous, occasionally pyritic, slightly carbonanceous in part, occasional calcite veining, trace calcite fragments, trace fossil remains, crinoids.
1530 - 1535 m	100 SH:	medium dark gray, blocky, hard, very calcareous silty, slightly micromicaceous, rarely carbonaceous/bituminous, slight trace loose pyrite, trace off white calcite veining, slight trace white sucrosic very finely crystalline anhydrite, rare trace loose clear fine grained subrounded floating quartz crystals, slight trace drill bit metal.
1535 - 1540 m	100 SH:	medium dark gray, blocky, hard, very calcareous a/a.
1540 - 1545 m	100 SH:	medium dark gray, blocky, hard, very calcareous a/a.
1545 - 1550 m	100 SH:	medium dark gray, trace very dark gray, blocky firm to hard, a/a.
1550 - 1555 m	100 SH:	medium to dark gray, blocky, firm to hard, slightly to very calcareous in part, slightly micromicaceous, trace loose pyrite, occasional calcite veining, loose calcite fragments.

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1555 - 1560 m	100 SH:	medium dark gray, blocky, firm to hard, subfissile in part, silty, very calcareous, slightly micromicaceous, trace loose clear fine grained subrounded floating quartz grains, rare trace drill bit metal.
1560 - 1565 m	100 SH:	medium dark gray, slight trace slickensides, a/a.
1565 - 1570 m	100 SH:	medium dark gray, blocky, good trace off white calcite veining, good trace loose quartz grains, trace loose pyrite, trace loose mic flakes in part, a/a.
1570 - 1575 m	100 SH:	medium dark gray, trace very dark gray, a/a.
	100 SH:	medium gray, trace medium dark and very dark gray, rare trace ostracods, a/a.
1575 - 1580 m	100 SH:	medium gray, occasionally dark gray, non to very calcareous in part, good trace calcite veining.
1580 - 1585 m	100 SH:	medium to dark gray, blocky, firm to hard, very calcareous, silty, slightly micromicaceous, good trace clear-white, subangular to subrounded quartz grains, trace calcite veining, slight trace white sucrosic anhydrite.
1585 - 1590 m	100 SH:	medium to dark gray, slight trace white calcite veining trace slickensides, a/a.
1590 - 1605 m	100 SH:	medium to dark gray, trace light gray, blocky to platy very calcareous, silty, sligthly micromicaceous occasionally calcite veining, trace loose pyrite, slight trace slickensides, slight trace buff dense limestone stringers, slight trace loose clear fine grain subangular quartz crystals.
1605 - 1610 m	100 SH:	medium to dark gray, trace light gray, blocky, firm to hard, very calcareous, slightly micromicaceous, occasional slickensides, occasional calcite veining trace loose pyrite.
1610 - 1620 m	100 SH:	a/a, trace loose clear quartz crystals, trace carbonaceous, occasionally pyritic.
1620 - 1625 m	100 SH:	medium to dark gray, a/a, trace buff to light brown micropelletoidal limestone stringer.
1625 - 1630 m	100 SH:	medium to dark gray, trace light gray, a/a, abundant shale cavings.

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1630 - 1635 m	80 SH:	medium to dark gray, trace light gray, blocky, hard very calcareous, silty, slightly micromicaceous, slight trace white calcite veining.
	20 LS:	light gray, "dirty", dense, very argillaceous, tight intercrystalline porosity, no show.
1635 - 1640 m	80 SH:	medium dark gray, trace light gray, a/a.
	20 LS:	light to medium dark gray, "dirty", cryptocrystalline very argillaceous, tight.
1640 - 1645 m	80 SH:	medium dark gary, trace light gray, a/a.
	20 LS:	light to medium gray, "dirty", trace crinoids, a/a.
1645 - 1650 m	10 LS:	light to medium dark gray, "dirty", cryptocrystailine trace dense, very argillaceous, tight intercrystalline porosity.
	90 SH:	medium dark gray, blocky to platy, very calcareous, slightly micromicaceous, trace off white calcite veining, slight trace loose, clear subrounded, fine grained quartz crystals, rarely carbonaceous/bituminous.
1650 - 1655 m	60 LS:	light to medium dark gray, "dirty", cryptocrystalline a/a.
	40 SH:	medium dark gray, a/a.
1655 - 1660 m	60 LS:	light to medium dark gray, a/a.
	40 SH:	medium to dark gray, a/a.
1660 - 1665 m	60 LS:	medium dark gray, "dirty", cryptocrystalline, very argillaceous, tight intercrystalline porosity.
	40 SH:	medium dark gray, blocky, hard, very calcareous, slightly micromicaceous, carbonaceous/bituminous in part, trace off white calcite veining, trace loose clear quartz crystals.
1665 - 1670 m	10 LS:	medium dark gray, "dirty", cryptocrystalline, a/a.
	90 SH:	medium gray, trace very dark gray, slight trace massive pyrite, a/a.

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1670 - 1675 m	20 LS:	medium dark gray, trace light brownish gray, a/a.
	80 SH:	light to medium dark gray, a/a.
1680 - 1685 m	100 SH:	medium to very dark gray, platy, hard, subfissile in part, calcareous, carbonaceous/bituminous, slightly micromicaceous, slightly silty, trace off white calcite veining, rare trace white sucrosic anhydrite.
1685 - 1690 m	100 SH:	light to medium dark gray, trace very dark gray, blocky, micaceous in part, a/a.
	TR LS:	buff to ligh gray, "dirty", cryptocrystalline, tight, a/a.
1690 - 1695 m	100 SH:	medium dark gray to very dark gray, blocky to platy, calcareous, slightly micromicaceous, slight trace off white calcite veining.
1695 - 1700 m	90 SH:	medium gray, trace dark gray, blocky, subfissile in part, silty, calcareous, carbonaceous/bituminous in part, slightly micromicaceous, trace off white calcite veining, abundant cavings.
	10 LS:	light gray, "dirty", dense to cryptocrystalline, very argillaceous, tight intercrystalline porosity.
1700 - 1705 m	100 SH:	medium to dark gray, trace clear, fine grained sub-rounded quartz grains, trace loose massive pyrite, a/a.
	TR SL:	light gray, "dirty", a/a.
1705 - 1710 m	100 SH:	medium to dark gray, blocky, calcareous, silty, slight trace carbonaceous/bituminous fragments, a/a.
	TR LS:	light gray, "dirty", tight a/a.
1710 - 1715 m	100 SH:	light to medium gray, blocky, a/a, good trace cavings, very slight trace limestone a/a.
1715 - 1720 m	90 SH:	medium to dark gray, blocky, a/a.
	10 LS:	light gray to light brownish gray, "dirty", a/a.
1720 - 1725 m	100 SH:	light to medium dark gray, blocky, a/a.

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1725 - 1730 m	80 SH:	light to medium dark gray, hard, blocky, subfissile in part, very calcareous, silty, trace loose medium grained subrounded quartz grains, rare trace fossils and loose pyrite, trace off white calcite veining.
	20 LS:	dark gray, "dirty", cryptocrystalline, very argillaceous, silty, tight intercrystalline porosity.
1730 - 1735 m	100 SH:	light to medium dark gray, hard, blocky, a/a.
	TR LS:	dark gray, "dirty", cryptocrystalline, very argillaceous, a/a.
1735 - 1740 m	60 SH:	light to medium dark gray, hard, blocky, a/a.
	40 LS:	dark gray, "dirty", dense to cryptocrystalline, very argillaceous, tight inercrystalline porosity.
1740 - 1745 m	60 SH:	light to medium dark gray, hard, blocky, subfissile in part, very calcareous, trace carbonaceous/bituminous fragments, slight trace off white calcite veining good trace cavings.
	40 LS:	dark gray, "dirty", dense to cryptocrystalline, a/a.
1745 - 1750 m	60 SH:	light to medium dark gray, hard, blocky, a/a.
	40 LS:	dark gray, "dirty", a/a.
1750 - 1755 m	60 SH:	light to medium dark gray, hard, blocky.
	40 LS:	light to dark gray, "dirty", dense to cryptocrystalline, very argillaceous, a/a.
1755 - 1760 m	80 SH:	medium to dark gray, hard, blocky, very calcareous, silty, slightly micromicaceous, trace off white calcite veining, trace clear quartz crystals, trace coal.
	20 LS:	dark gray to black, "dirty", dense to cryptocrystalline very argillaceous, tight intercrystalline porosity.
1760 - 1765 m	40 SH:	medium to dark gray, hard, blocky, rare trace ostracods, a/a.
	60 LS:	dark gray, "dirty" dense to cryptocrystalline, a/a.

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1765 - 1770 m	40 SH:	light to medium gray, occasionally dark gray, blocky to platy, firm to hard, slightly calcareous, slightly micromicaceous, trace clear quartz good trace calcite veining.
	60 LS:	light to dark gray, dense, very argillaceous, blocky tight intercrystalline porosity, no show.
1770 - 1775 m	50 SH:	a/a.
	50 LS:	a/a.
1775 - 1780 m	30 SH:	light to medium gray, blocky to platy, firm to hard occasionally fissile, slightly micromicaceous, trace calcite veining, trace fossil remains, coral, trace pyrite.
	70 LS:	light to dark gray, very argillaceous, a/a, tight intercrystalline porosity, no show.
1780 - 1785 m	40 SH:	a/a, trace fossil remains, ostracod, crinoid.
	60 LS:	a/a
1785 - 1790 m	60 SH:	light to medium gray, platy to blocky, firm to hard, calcite veining, micromicaceous, slight trace sucrosic anhydrite, occasionally pyritic, trace fossil remains ostracod.
	40 LS:	light to dark gray, microcrystalline to dense, hard, tight to poor intercrystalline porosity, no show.
1790 - 1795 m	70 SH:	light to medium gray, occasionally dark gray, subfissile to blocky, firm to moderately hard, micromicaceous, occasionaly slightly calcareous, trace calcite veining trace very fine disseminated pyrite, trace fossil remains, ostracod.
	30 LS:	light to dark brown gray, dense, argillaceous to very argillaceous, slightly silty, occasional white, translucent calcite crystals, no visible porosity, lignite contamination.
1795 - 1800 m	60 SH:	a/a.
	40 LS:	a/a.

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1800 - 1805 m	60 SH:	light to medium gray, a/a.
	40 LS:	light to dark brown gray, occasionally white, dense to microcrystalline, argillaceous to very argillaceous, slightly silty, no visible porosity.
1805 - 1810 m	70 SH:	a/a, trace pyrite, trace calcite veining.
	30 LS:	medium gray brown, light to dark brown gray, dense, argillaceous to very argillaceous, slightly silty, common white buff translucent calcite crystals, no visible porosity, trace dolomite.
1810 - 1815 m	70 SH:	light to dark gray, subfissile to blocky, firm to moderately hard, micromicaceous, occasionally slightly calcareous, trace calcite veining, trace pyrite, trace fossil remains, crinoid, trace loose quartz crystals, trace carbonaceous.
	30 LS:	light to dark gray brown, occasionally white, dense to microcrystalline, argillaceous to very argillaceous, slightly silty, no visible porosity.
1815 - 1820 m	70 SH:	a/a, abundant quartz crystals.
	30 LS:	a/a.
1820 - 1825 m	70 SH:	light to dark gray, subfissile to blocky, firm to moderately hard, silty, micromicaceous, slightly calcareous in part, pyritic in part, trace calcite veining.
	30 LS:	light to dark gray brown, occasionally white, a/a, grading to very calcareous shale in part, trace fossil remains, coral, crinoid (barite contamination).
1825 - 1835 m	80 SH:	light to dark gray, medium gray brown, subfissile to blocky, firm, micromicaceous, calcareous in part, slightly dolomitic, slightly silty, trace disseminated pyrite, trace calcite veining, grading to very argillaceous limestone in part.
	20 LS:	light to dark gray brown, dense, argillaceous to very argillaceous in part, grading to very calcareous shale slightly silty, occasional white, translucent calcite crystals, no visible porosity, (barite contamination).

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1835 - 1840 m	80 SH:	light to dark gray, subfissile to blocky, firm, micromicaceous, occasionally slightly calcareous, slightly silty, trace pyrite.
	20 LS:	a/a, grading to very calcareous shale.
1840 - 1845 m	70 SH:	a/a.
	30 LS:	a/a.
1845 - 1850 m	80 SH:	a/a, trace calcite veining, trace slickensides, trace carbonaceous in part.
	20 LS:	a/a.
1850 - 1860 m	80 SH:	light to dark gray, subfissile to blocky, firm to moderately hard, calcareous in part, grading to argillaceous limestone in part, micromicaceous, occasional slickensides, trace calcite veining, trace loose calcite rhombs, trace disseminated pyrite, trace carbonaceous material.
	20 LS:	light to dark gray brown, occasionally white, dense to microcrystalline, argillaceous to very argillaceous.
1860 - 1865 m	70 SH:	light to medium gray, medium brown gray, moderately hard, subfissile to blocky, calcareous, grading to very argillaceous limestone in part, micromicaceous, trace calcite veining, trace pyrite.
	30 LS:	a/a, slightly silty.
1865 - 1870 m	80 SH:	a/a, slightly silty in part.
	20 LS:	a/a.
1870 - 1875 m	50 SH:	light to medium gray, occasionally dark gray, subfissile to blocky, firm to moderately hard, micromicaceous occasionally pyritic in part, trace calcite veining, rare trace fossil remains, ostracod.
	50 LS:	light to dark gray brown, dense to microcrystalline, occasionally white, argillaceous to very argillaceous grading to calcareous shale in part, no show.

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1875 - 1880 m	60 SH:	a/a.
	40 LS:	a/a.
1880 - 1885 m	60 SH:	medium gray, subfissile to blocky, moderately hard, micromicaceous, slightly calcareous in part, slightly dolomitic in part.
	40 LS:	light to dark gray brown, dense to microcrystalline, occasionally chalky, argillaceous to very argillaceous silty, grading to calcareous shale in part, becoming more crystalline, occasional white, translucent calcite crystals, trace pyrite, trace carbonaceous, no visible porosity, no show.
1885 - 1890 m	60 SH:	a/a.
	40 LS:	medium to dark gray, light gray brown, dense to microcrystalline, occasionally chalky, a/a.
1890 - 1900 m	70 SH:	medium gray, gray green, subfissile to platy, moderately hard, micromicaceous, slightly calcareous.
	30 LS:	medium to dark gray, gray brown, microcrystalline, very argillaceous, grading to calcareous shale.
1900 - 1905 m	80 SH:	a/a.
	20 LS:	medium to dark gray, gray brown in part, microcrystalline, very silty in part, abundant pyrite, trace fossil fragments (crinoid), no visible porosity.
1905 - 1910 m	70 SH:	medium to dark gray, occasional light gray, fissile to platy, blocky in part moderately hard to hard, micromicaceous, slightly calcareous, slightly dolomitic in part, trace loose quartz grains.
	30 LS:	a/a, occasionally white, translucent calcite crystals trace carbonaceous material.
1910 - 1915 m	70 SH:	a/a, with a trace of calcite veining and trace very fine grain sandstone.
	30 LS:	a/a, occasionally dense.

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1915 - 1920 m	80 SH:	medium gray to gray brown, occasionally dark gray, subfissile to blocky, firm to moderate hard, micromicaceous, calcareous in part, slightly dolomitic in part slightly carbonaceous in part, trace pyrite, trace loose sub rounded quartz grains, trace chert.
	20 LS:	light to medium gray brown, dense to microcrystalline, moderately argillaceous, silty, occasionally slightly carbonaceous, trace light brown dolomite.
1920 - 1925 m	80 SH:	a/a, predominantly medium to dark gray.
	20 LS:	a/a, trace pyrite.
1925 - 1930 m	80 SH:	medium to dark gray, gray brown, subfissile, blocky moderately hard, micromicaceous, slighlty calcareous, carbonaceous in part, common pyrite.
	20 LS:	gray brown to dark gray brown, dense to microcrystalline, very argillaceous, silty, grading to calcareous siltstone in part, occasional slightly carbonaceous, trace light brown dolomite, trace pyrite.
1930 - 1935 m	100 SH:	medium to dark gray, firm, blocky to subfissile, micromicaceous, very calcareous in part, slightly dolomitic in part, carbonaceous in part, grading to very argillaceous limestone in part, minor limestone stringers, trace calcite veining trace pyrite, trace loose quartz, grains trace light brown dolomite.
1935 - 1940 m	100 SH:	a/a.
1940 - 1945 m	90 SH:	a/a, increasing amount of limestone.
	10 LS:	a/a.
1945 - 1950 m	80 SH:	a/a.
	20 LS:	brown gray, cream to buff, dense to microcrystalline, slightly argillaceous, silty in part, slightly carbonaceous, trace pyrite.
1950 - 1955 m	100 SH:	medium gray, firm to hard, subfissile blocky, micromicaceous, slightly calcareous in part, slightly dolomitic, dark gray to occasional black in part, carbonaceous, silty, minor limestone stringers, trace pyrite trace loose quartz grains.

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1955 - 1960 m	90 SH:	a/a.
	10 LS:	a/a.
1960 - 1965 m	100 SH:	a/a.
1965 - 1970	90 SH:	a/a, silty in part.
	10 LS:	cream to buff, dense to microcrystalline, very argillaceous in part, slightly silty, occasionally carbonaceous, trace pyrite.
1970 - 1975 m	100 SH:	medium gray, moderately hard to hard, subfissile to blocky, micromicaceous, very slightly calcareous, slightly dolomitic, dark gray to occasionally black in part, firm, silty, slightly carbonaceous, minor brown grey to medium brown limestone stringers, trace white to translucent calcite crystals, trace loose quartz grains, trace pyrite.
1975 - 1985 m	100 SH:	medium to dark gray, brown gray, sub fissile to blocky firm to moderately hard, micromicaceous, slightly calcareous, slightly dolomitic, silty, trace calcite veining, grading to very argillaceous limestone in part, trace pyrite, trace dolomite.
1985 - 1990 m	100 SH:	a/a, but moderately hard to hard with occasional translucent calcite crystals, trace slickensides, trace loose quartz grains, trace disseminated pyrite, trace dolomite.
1990 - 2015 m	100 SH:	a/a.
2015 - 2020 m	100 SH:	medium to dark gray, blocky to fissile, moderately hard to hard, micromicaceous in part, calcareous in part, trace calcite veining, trace pyrite, slightly dolomitic, common white to translucent calcite crystals, trace loose quartz grains.
2020 - 2030 m	100 SH:	a/a, with common disseminated pyrite.
2030 - 2035 m	100 SH:	medium to dark gray, subfissile to blocky, firm to moderately hard, calcareous in part, slightly dolomitic, trace dolomitic inclusions, slightly silty, minor limestone stringers, occasional white translucent calcite crystals, trace disseminated pyrite.

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2035 - 2045 m	100 SH:	predominantly a/a, trace loose quartz grains, trace pyrite, trace light brown, dolomite.
2045 - 2050 m	100 SH:	a/a, trace calcite veining, common to abundant off white light to dark brown limestone stringers, dense to microcrystalline, argillaceous.
2050 - 2055 m	100 SH:	medium to very dark gray, blocky to subfissile, firm to hard, micromicaceous in part, vitreous lustre in part, trace calcite crystals, trace pyrite.
2055 - 2060 m	100 SH:	medium gray, brown gray, subfissile to blocky, moderately hard, micromicaceous, calcareous to very calcareous in part, slightly dolomitic, grading to very argillaceous limestone in part, slightly silty, trace calcite veining, dark gray in part, firm slightly silty, disseminated pyrite, minor off white, light brown limestone stringers, trace loose quartz grains.
2060 - 2065 m	100 SH:	predominantly a/a, trace fine grain, quartzose, sandstone, trace carbonaceous flakes, abundant light grey brown gray, light brown limestone, dense to microcrystalline, slightly argillaceous to argillaceous, slightly silty, occasionally very slightly carbonaceous.
2065 - 2070 m	100 SH:	medium gray, brown gray, blocky to subfissile moderately hard to hard, calcareous to very calcareous in part, occasionally grading to very argillaceous limestone, dolomitic, slightly silty, dark gray in part, firm, slightly silty, slightly carbonaceous, abundant disseminated pyrite, minor light brown, cream limestone, stringers, trace fine grain quartzose sandstone, trace loose quartz grains, trace chert.
2070 - 2080 m	100 SH:	a/a, fractured, abundant clear, frosted, translucent micromicaceous, vitreous lustre, slightly silty, slightly calcareous in part, disseminated pyrite, slickensides fractured, abundant secondary quartz fragments, trace quartz veining.
2085 - 2090 m	100 SH:	a/a, good trace slickensides, fractured.
2090 - 2105 m	100 SH:	dark gray, gray brown, occasionally light to medium gray, blocky to subfissile, firm to hard, very micromicaceous, silty in part, pyritic in part, carbonaceous slickensides, fractured, abundant angular to subangular quartz grains and crystals, trace quartzose sandstone.

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2110 - 2120 m	100 SH:	dark to very dark gray, occasionally light to medium gray, blocky to subfissile, micromicaceous, carbonaceous slightly silty, pyritic in part, abundant quartz veining abundant clear, opaque quartz grains.
2120 - 2125 m		NO SAMPLE.
2125 - 2130 m	100 SH:	very dark gray, blocky to subfissile, firm to hard, very micromicaceous, slightly carbonaceous, silty in part, occasionally pyritic, minor trace quartz fragments, light to medium gray in part, a/a, occasionally slightly calcareous.
2130 - 2140 m	100 SH:	very dark gray, light to medium gray in part, blocky to subfissile, firm to hard, very micormicaceous slightly silty in part, occasionally slightly carbonaceous, slightly to moderately calcareous in part, slightly dolomitic in part, good trace quartz veining, minor limestone fragments, trace pyrite.
2140 - 2155 m	100 SH:	very dark gray, blocky to subfissile, firm to hard, micromicaceous, vitreous lustre, slightly carbonaceous, trace quartz veining, trace clear opaque angular quartz grains, trace pyrite, minor medium gray shale, a/a, slightly calcareous.
2155 - 2160 m	100 SH:	a/a, trace medium grey shale.
2160 - 2175 m	100 SH:	very dark gray, blocky to subfissile, firm to hard, micromicaceous, slightly carbonaceous, slightly silty, carbonaceous, trace slickensides, trace quartz veining trace pyrite, minor light to medium gray shale, predominantly a/a, slightly calcareous.
2175 - 2180 m	100 SH:	dark to very dark gray, blocky to subfissile, firm to hard very micromicaceous, silty in part, pyritic in part, occasional slickensides, rare light to medium gray shale, rare quartz grains.
2180 - 2195 m	100 SH:	a/a, trace slickensides, rare light to medium gray shale.
2195 - 2210 m	100 SH:	very dark gray, blackish in part, blocky to subfissile, firm to hard, vitreous lustre, carbonaceous, micromicaceous, pyritic in part.

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2210 - 2220 m	100 SH:	a/a, with massive and disseminated pyrite.
2220 - 2230 m	100 SH:	very dark gray, blackish, blocky to subfissile, firm to hard, vitreous lustre, micromicaceous, carbonaceous, disseminated pyrite.
2230 - 2235 m	100 SH:	very dark gray, blackish, blocky to subfissile, firm to hard, micromicaceous, carbonaceous, vitreous lustre, disseminated pyrite, occasional slickensides, trace clear angular quartz grains.
2235 - 2240 m	100 SH:	a/a, trace light to medium gray shale, trace limestone.
2240 - 2245 m	100 SH:	a/a, light gray in part, waxy lustre, soft, trace dolomite, dark gray, microcrystalline, argillaceous silty.
2245 - 2255 m	90 SH:	dark gray, blackish, hard, blocky, silty, siliceous, micromicaceous, carbonaceous, pyritic, trace fracturing trace calcite veining, occasional chert fragments, light gray in part, soft to firm, platy to blocky, very microcrystalline, dolomitic.
	10 LS:	light to dark gray, microcrystalline, dolomitic, argillaceous, silty, no vivisble porosity, grading to calcareous shale in part.
2255 - 2260 m	100 SH:	dark gray, dark gray brown, blocky, hard, silty, micromicaceous, slightly calcareous in part, trace calcite veining, trace limesone, a/a.
2260 - 2270 m	100 SH:	dark gray, dark gray brown, blocky, hard, silty, micromicaceous, slightly calcareous in part, slightly dolomitic in part, trace pyrite, trace calcite veining.
2270 - 2275 m	100 SH:	dark gray, dark gray brown, blocky, hard micromicaceous silty, slightly calcareous in part, slightly dolomitic in part, trace calcite veining, trace pyrite.
2275 - 2285 m	100 SH:	a/a, abundant light gray shale, waxy, slightly silty (cavings).
2285 - 2290 m	100 SH:	dark gray, dark gray brown, blocky, hard, silty in part micromicaceous, slightly calcareous in part, slightly dolomitic in part, pyritic, trace calcite veining.
2290 - 2295 m	100 SH:	a/a, occasionally medium gray, trace pyrite.

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2295 - 2300 m	100 SH:	medium to dark gray, blocky hard, micromicaceous, silty in part, slightly calcareous in part, slightly dolomitic in part, occasional calcite veining, abundant pyrite.
2300 - 2305 m	100 SH:	a/a, trip sample, abundant cavings.
2305 - 2310 m	100 SH:	predominantly medium to dark gray, blocky, hard slightly micromicaceous, very slightly dolomitic, minor light gray in part, trace pyrite.
2310 - 2315 m	100 SH:	a/a, minor limestone, trace white dolomite trace loose quartz grains.
2315 - 2330 m	100 SH:	medium to dark gray, blocky to platy, hard, slightly calcareous, slightly micromicaceous, slightly dolomitic in part, minor light gray shale a/a, abundant limestone very light gray, microcrystalline, slightly silty, very argillaceous, trace pyrite, trace loose quartz grains.
2330 - 2335 m	60 SH:	a/a, abundant limestone, buff, microcrystalline, pyritic.
	40 SS:	clear, white, cream, pink, coarse grain, well rounded, well sorted, unconsolidated, no show.
2335 - 2340 m	100 SH:	medium to dark gray, platy to blocky, laminated in part hard, slightly calcareous, trace loose quartz grains, trace limestone.
2340 - 2345 m	100 SH:	medium gray, platy to blocky in part, hard, slightly calcareous, trace pyrite.
2345 - 2350 m	100 SH:	a/a, trace white cryptocrystalline limestone, trace pyrite, trace loose quartz grains.
2350 - 2355 m	100 SH:	a/a, abundant clear angular quartz grains, trace white, buff limestone, argillaceous, occasional calcite crystals, trace ironstone, rare trace pyrite.
2355 - 2360 m	100 SH:	medium to dark gray, blocky to platy, laminated in part, hard, slightly micromicaceous, slightly silty, trace pyrite, trace limestone a/a.
2360 - 2370 m	100 SH:	medium to dark gray, light gray in part, a/a.
2370 - 2375 m	100 SH:	medium to dark gray, blocky, moderately hard, slightly silty in part, very slightly micromicaceous trace calcite crystals.

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2375 - 2395 m	100 SH:	medium to dark gray, blocky to subfissile, firm to moderately hard, occasionally slightly calcareous, very slightly silty, micromicaceous, trace calcite veining trace disseminated pyrite.
2395 - 2405 m	100 SH;	light to medium gray, blocky to subfissile, firm to brittle, slightly micromicaceous, occasionally slightly calcareous, trace calcite crystals, common clear white, rose, unconsolidated grains, barite contamination.
2405 - 2410 m	100 SH:	a/a, trace calcite veining, trace pyrite.
2410 - 2415 m	100 SH:	light to dark gray, blocky to subfissile, firm to hard slightly micromicaceous, slightly dolomitic, very slightly calcareous, trace limestone, trace pyrite.
2415 - 2420 m	100 SH:	light to medium gray, brown gray, blocky to subfissile firm, becoming softer, calcareous in part, slightly silty, slightly dolomitic, slightly micromicaceous, trace calcite veining, trace calcite crystals, trace pyrite, trace argillaceous limestone, trace loose quartz grains.
2420 - 2425 m	100 SH:	a/a, trace fossil fragments.
2425 - 2435 m	100 SH:	predominantly light gray, medium gray, blocky to subfissile, firm slightly calcareous, slightly dolomitic in part, micromicaceous, slightly silty, occasional clacite veining, occasional calcite crystals - sparry calcite, trace pyrite, trace loose quartz grains.
2435 - 2440 m	100 SH:	light to dark gray, a/a.
2440 - 2445 m	90 SH:	medium to dark gray, firm to moderately hard, blocky to subfissile, slightly dolomitic, very slightly calcareous in part, slightly silty, occasionally carbonaceous, slightly micromicaceous, trace calcite veining trace pyrite, trace fossil remains, ostracod, trace medium to coarse, rounded, quartz grains, trace quartzose sandstone.
	10 LS:	buff, light brown, dense to microcrystalline, argillaceous, trace fossil remains, crinoid, no visible porosity, predominantly stringers.

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2445 - 2460 m	100 SH:	a/a, with minor limestone stringers, trace sparry calcite.
2460 - 2465 m	90 SH:	medium to dark gray, occasionally black, blocky to subfissile, firm to moderately hard, hard in part, micromicaceous, slightly dolomitic to dolomitic in part, slightly silty, trace pyrite, trace fine to medium grain quartzose sandstone, iron staining in part, trace varicolored chert.
	20 LS:	light brown, buff, dense to microcrystalline, silty argillaceous, no visible porosity.
2465 - 2470 m	90 SH:	medium to dark gray, blocky, moderately hard, slightly dolomitic in part, very slightly calcareous in part, slightly micromicaceous trace chert, trace pyrite.
	10 LS:	a/a.
2470 - 2475 m	100 SH:	a/a, abundant limestone a/a, trace loose, coarse quartz grains.
2475 - 2485 m	100 SH;	predominantly medium to dark gray, occasionally blackish, blocky to subfissile, moderately hard, micromicaceous, trace carbonaceous laminations, trace pyrite, trace light brown dolomite, trace sparry calcite.
2485 - 2490 m	100 SH:	a/a, slight dolomitic in part.
2490 - 2500 m	100 SH:	medium to dark gray, occasionally blackish, blocky to subfissile, moderately hard, micromicaceous, very slightly dolomitic in part, trace carbonaceous microlaminations, trace pyrite, trace sparry calcite, rare phosphatic nodules, trace light brown dolomite.
2500 - 2505 m	100 SH:	medium to dark gray, blackish, a/a, trace pyrite, trace medium brown dolomite.
2505 - 2510 m	100 SH:	a/a, trace pyrite, trace loose rounded quartz grains, slight trace sparry calcite.
2510 - 2515 m	100 SH:	medium to dark gray, blocky to subfissile, firm to moderately hard, very slightly dolomitic in part, slightly silty, microlaminated in part, trace very fine grain sandstone, trace disseminated pyrite.

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2515 - 2520 m	100 SH:	medium to dark gray, occasionally blackish, a/a, trace carbonanceous, trace disseminated pyrite, trace fossil remains, crinoid, trace quartzose sandstone.
2520 - 2525 m	100 SH:	predominantly medium to dark gray, occasionally brown gray, blackish, a/a, trace calcite veining, trace pyrite trace limestone.
2525 - 2530 m	100 SH:	medium to dark gray, occasionally brown gray, blackish firm to moderately hard, blocky to subfissile, dolomitic in part, slightly silty, microlaminated in part, micromicaceous, trace pyrite, slight trace sparry calcite.
2530 - 2535 m	100 SH:	medium to dark gray, blackish in part, a/a, trace limestone - sparry calcite, trace calcite veining, barite contamination.
2535 - 2540 m	100 SH:	a/a, abundant cavings.
2540 - 2545 m	100 SH:	medium to dark gray, firm to hard, blocky to subfissile micromicaceous, microlaminated, silty, dolomitic in part, trace pyrite, trace limestone.
2545 - 2550 m	100 SH:	medium to dark gray, firm to brittle, subfissile, micromicaceous, slightly silty, microlaminated, dolomitic in part, trace pyrite, trace sparry calcite.
2550 - 2555 m	100 SH:	medium to dark gray, occasionally blackish brown gray, subfissile to blocky, firm to moderately hard, brittle in part, slightly dolomitic, slightly silty to silty in part, microlaminated in part, micromicaceous, trace pyrite, trace chert fragments, trace carbonaceous laminations, trace limestone, barite contamination.
2555 - 2560 m	100 SH:	medium to dark gray, brown gray in part, a/a, common pyrite, trace chert fragments.
2560 - 2565 m	100 SH:	medium to dark gray, subfissile, blocky in part, firm to moderately hard, slightly dolomitic, slightly silty, microlaminated in part, micromicaceous, light gray in part firm, slightly calcareous, slightly silty, trace pyrite, trace chert fragments.

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2565 - 2570 m	100 SH:	predominantly dark to very dark gray, occasionally blackish, blocky, firm, silty, common very fine disseminated pyrite, light to medium gray in part, blocky to subfissile, firm, micromicaceous, slightly dolomitic in part, trace microlaminations, trace sparry calcite, trace light brown dolomite.
2570 - 2575 m	100 SH:	dark to very dark gray, occasionally blackish, blocky moderately hard to hard, siliceous, slightly dolomitic in part, silty, common very fine disseminated pyrite, light to medium gray in part, a/a, trace sparry calcite, trace brown dolomite, trace calcite veining.
2575 - 2580 m	100 SH:	dark to very dark gray, occasionally blackish, moderately hard to hard, blocky, silty, slightly dolomitic in part, light to medium gray in part, a/a.
2580 - 2585 m	100 SH:	a/a, trace pyrite, trace clear quartz fragments.
2585 - 2590 m	100 SH:	a/a, abundant cavings, trip sample.
2590 - 2595 m	100 SH:	a/a.
2595 - 2600 m	100 SH:	dark to very dark gray, blackish in part, blocky, moderately hard to hard, slightly silty, dolomitic light to medium gray, medium gray brown in part, firm to moderately hard, subfissile to blocky, slightly silty, microlaminated, trace pyrite.
2600 - 2615 m	100 SH:	a/a, occasionally carbonaceous in part.
2615 - 2620 m	100 SH:	dark to very dark gray, blackish in part, blocky moderately hard to hard, slightly silty, very dolomitic light gray, medium gray brown in part, subfissile to blocky, firm to moderately hard, slightly silty, micromicaceous in part, trace limestone, cream, light gray, microcrystalline, slightly silty, slightly dolomitic argillaceous.
2620 - 2625 m	100 SH:	a/a, occasional clear quartz fragments, trace carbonaceous material.
2625 - 2640 m	100 SH:	a/a.

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2640 - 2645 m	100 SH:	predominantly dark to medium gray, light gray in part, blocky to subfissile, moderately hard to hard, slightly dolomitic, slightly silty, siliceous in part, trace limestone, cream, gray brown, microcrystalline, slightly argillaceous, slightly dolomitic, trace pyrite, occasional trace carbonaceous material (lignite).
2645 - 2660 m	100 SH:	a/a, increasing light gray shale.
2660 - 2665 m	100 SH;	light to medium gray, dark gray in part, blocky to subfissile, moderately hard, to hard, slightly silty, siliceous in part, dolomitic, micromaceous in part, trace limestone lenses, cream, light gray brown, microcrystalline, slightly dolomitic, slightly argillaceous.
2665 - 2670 m	100 SH:	a/a, abundant cavings.
2670 - 2680 m	100 SH:	a/a.
2680 - 2690 m	100 SH:	predominantly light to medium gray, occasionally dark gray, blocky to subfissile, moderately hard to hard, slightly silty, micromicaceous, siliceous in part, dolomitic, trace limestone lenses, a/a.
2690 - 2695 m	100 SH:	a/a, trace pyrite.
2695 - 2715 m	100 SH:	light to medium gray, occasionally dark gray, blocky to subfissile, moderately hard to hard, slightly silty, micromicaceous, dolomitic, trace brownish shale, trace limestone lenses.
2715 - 2725 m	100 SH:	a/a, trace dolomite, medium gray, medium brown, fine crystalline, clean, trace sparry calcite.
2725 - 2745 m	100 SH:	medium gray, blocky, moderately hard, silty in part, micromicaceous, moderately dolomitic, waxy lustre, trace limestone, white, dense, trace pyrite.
2745 - 2755 m	100 SH:	medium gray, dark gray in part, blocky, subfissile in part, dolomitic in part, silty in part, trace pyrite, trace light brown dense limestone, trace microcrystalline dolomitic veining, trace clear, opaque quartz.
2755 - 2760 m	100 SH:	a/a, minor white limestone, trace pyrite.
2760 - 2765 m	100 SH:	medium gray, dark gray, black in part, a/a.

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2765 - 2785 m	100 SH:	predominantly medium gray, light and dark gray in part, blocky to subfissile, silty in part, dolomitic in part, micromicaceous in part, trace carbonaceous material, trace pyrite, trace dolomite, white gray, brown, micro to very fine crystalline.
2785 - 2795 m	100 SH:	medium gray, light and dark gray in part, blocky, subfissile in part, micromicaceous, dolomitic in part, silty in part, trace pyrite, scattered white gray, micro to very fine crystalline limestone, trace clear opaque quartz grains.
2795 - 2805 m	100 SH:	medium gray, light gray, trace dark gray, a/a, trace chalky white limestone.
2805 - 2810 m	100 SH:	medium to dark gray, a/a, microlaminated in part, trace sparry calcite, trace pyrite, trace limestone.
2810 - 2815 m	100 SH:	medium gray, occasionally dark gray, firm, blocky to subfissile, micromicaceous, slightly silty in part, slightly dolomitic in part, trace pyrite, trace medium brown limestone, common sparry calcite, trace calcite veining.
2815 - 2820 m	100 SH:	medium gray, blocky to subfissile, slightly micromicaceous waxy lustre in part, occasional calcite crystals, trace limestone a/a.
2820 - 2825 m	100 SH:	light to medium gray, occasionally dark gray, blocky to subfissile, firm, microlaminated in part, waxy lustre in part, micromicaceous, slightly silty in part, slightly dolomitic in part, trace limestone, trace sparry calcite crystals, trace pyrite.
2825 - 2835 m	100 SH:	predominantly medium gray, occasionally light to dark gray moderately hard, blocky to subfissile, occasionally fissile microlaminated in part, slightly silty, slightly dolomitic in part, trace pyrite, trace sparry calcite.
2835 - 2840 m	100 SH:	medium to light gray, blocky, subfissile in part, slightly micromicaceous, moderately hard, slightly dolomitic in part trace sparry calcite crystals, slight trace pyrite.
2840 - 2845 m	100 SH:	medium to dark gray, occasionally light gray, blocky to sub fissile, moderately hard, slightly dolomitic to dolomitic in part, slightly silty, slightly micromicaceous, waxy lustre in part, microlaminated in part, trace disseminated pyrite, trace sparry calcite crystals, trace calcite veining.

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2845 - 2855 m	100 SH:	predominantly medium gray, dark gray, occasionally light gray, a/a.
2855 - 2860 m	100 SH:	medium to dark gray, occasional brown gray, moderately hard, blocky to subfissile micromicaceous, slightly more dolomitic, slightly silty, microlaminations in part, trace limestone.
2860 - 2865 m	100 SH:	a/a, trace medium brown, microcrystalline, dolomite.
2865 - 2870 m	100 SH:	medium gray, blocky to subfissile, microlaminations in part slightly to moderately dolomitic, trace medium brown limestone, trace calcite crystals.
2870 - 2875 m	100 SH:	medium gray, blocky, occasional subfissile, micromicaceous in part, slightly dolomitic trace calcite crystals, trace medium gray dolomite, fine crystalline, very argillaceous.
2875 - 2880 m	100 SH:	medium gray, occasional dark gray, blocky to subfissile, moderately hard, moderately dolomitic, slightly silty in part, micromicaceous, microlaminations in part, trace disseminated pyrite, trace medium gray, very fine crystalline dolomite, very argillaceous.
2880 - 2885 m	100 SH:	a/a, dark gray in part, trace pyrite, slight trace limestone.
2885 - 2890 m	100 SH:	medium dark gray, blocky to subfissile, moderately hard to hard, siliceous, slightly calcareous in part, occasional slightly dolomitic, micromicaceous, fracturing, common white angular quartz fragments, trace pyrite.
2895 - 2910 m	100 SH:	medium gray, dark gray in part, blocky to subfissile, moderately hard to hard in part, slightly micromicaceous, slightly micromicaceous, slightly dolomitic in part, microlaminations in part, trace calcite veining, trace very fine disseminated pyrite, trace quartz fragments, trace sparry calcite.
2910 - 2915 m	100 SH:	a/a, slightly to moderately dolomitic, waxy lustre in part, microlaminations in part, trace veining, trace sparry calcite.
2915 - 2930 m	100 SH:	medium gray, subfissile to blocky, moderately hard, micromicaceous in part, slightly silty, dolomitic in part, waxy microlaminations in part, trace quartz veining.

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2930 - 2935 m	100 SH:	predominantly medium gray, dark gray in part, subfissile to blocky, moderately hard, slightly dolomitic in part, micromicaceous, microlaminated in part, trace gray brown very calcareous shale, trace light brown limestone, trace white quartz fragments.
2935 - 2945 m	100 SH:	medium to dark gray, subfissile to blocky, moderately hard to hard, slightly silty, slightly dolomitic, microlaminations in part, trace pyrite, occasional medium gray brown dolomite, micro to fine crystalline, silty.
2945 - 2950 m	100 SH:	medium to dark gray, subfissile to blocky, moderately hard to hard, dolomitic, silty in part, micromicaceous, microlaminations in part, trace angular quartz grains.
2950 - 2955 m	100 SH:	a/a, trace light gray to brown limestone.
2955 - 2970 m	100 SH:	medium to dark gray, subfissile to blocky moderately hard to hard, dolomitic, silty in part, micromicaceous, microlaminations in part, trace marly, trace medium to dark gray brown limestone, trace pyrite.
2970 - 2995 m	100 SH:	medium gray, dark gray in part, subfissile to blocky, moderately hard to hard, slightly silty, dolomitic, micromicaceous, microlaminations in part, slight trace pyrite.
2995 - 3000 m	100 SH:	medium gray, dark gray in part, subfissile to blocky, silty in part, micromicaceous in part, dolomitic in part, trace clear white quartz.
3000 - 3015 m	100 SH:	a/a, with shale slightly more dolomitic, scattered clear to opaque euhedral dolomite and quartz crystals.
3015 - 3020 m	100 SH:	medium gray, dark gray in part, subfissile to blocky, silty in part, micromicaceous in part, slightly dolomitic in part trace pyrite, trace clear and opaque quartz crystals, trace white dolomite.
3020 - 3025 m	100 SH:	a/a, scattered light gray dolomite, siliceous in part.
3025 - 3030 m	100 SH:	medium gray, subfissile to blocky, silty in part, micromicaceous in part, slightly dolomitic, trace pyrite, trace loose quartz grains, trace dolomite, light gray, micro to crypto-crystalline, siliceous, slightly argillaceous, slightly silty.

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3030 - 3040 m	100 SH:	light to medium to dark gray, subfissile to blocky, moderately hard to hard, slightly silty in part, dolomitic in part, trace loose quartz grains, trace dolomite, light gray silty, slightly argillaceous, microcrystalline.
3040 - 3055 m	100 SH:	medium to dark gray, subfissile to blocky, siliceous, hard very dolomitic, trace pyrite, trace dolomite, medium gray silty, slightly argillaceous, siliceous, sucrosic.
3055 - 3065 m	100 SH:	medium to dark gray, subfissile to blocky, moderately hard to hard, micromicaceous in part, slightly silty, dolomitic microlaminations in part, occasional dark gray brown, blocky, silty, moderately hard, very dolomitic, trace pyrite.
3065 - 3080 m	100 SH:	medium gray, dark gray in part, subfissile to blocky, moderately hard to hard, micromicaceous in part, microlaminations in part, slightly silty, slightly dolomitic, trace pyrite, trace clear quartz crystals.
3080 - 3085 m	100 SH:	a/a, trace dolomite, light brown, brown gray, dense to microcrystalline, calcareous, argillaceous in part, trace chert.
3085 - 3090 m	100 SH:	a/a, trace dark gray shale with calcareous spicules, abundant cavings, (trip sample).
3090 - 3100 m	100 SH:	medium gray, dark gray in part, subfissile to blocky, moderately hard, micromicaceous, slightly silty, slightly to very dolomitic in part, calcareous in part, scattered dolomite a/a, trace clear, opaque quartz grains, lignite contamination.
3100 - 3105 m	100 SH:	a/a, trace pyrite.
3105 - 3115 m	100 SH:	medium gray, dark gray in part, subfissile to blocky, moderately hard to hard, slightly silty, micromicaceous, microlaminated in part, dolomitic, trace dolomite, medium to light gray, microcrystalline, slightly argillaceous, trace pyrite.
3115 - 3125 m	100 SH:	a/a, becoming slightly siltier.
3125 - 3130 m	100 SH:	medium to dark gray, light gray in part, blocky, subfissile in part, micromicaceous, dolomitic in part, silty, occasionally grading to argillaceous siltstone in part, trace dolomite, white, white gray, microcrystalline, argillaceous trace clear, opaque quartz grains.

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3130 - 3135 m	100 SH:	medium to dark gray, minor light gray, blocky to subfissile silty in part, micromicaceous in part, trace limestone, white, light gray, dolomitic, trace disseminated pyrite.
3135 - 3140 m	100 SH:	a/a, trace microlaminations.
3140 - 3145 m	100 SH:	medium to dark gray, minor light gray, subfissile to blocky micromicaceous in part, silty in part, trace pyrite, trace limestone, trace dolomite, a/a.

LITHOLOGIC
DESCRIPTION F-25A

LITHOLOGIC DESCRIPTIONS
F25A

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2065 - 2070 m	60 SH:	light to medium gray, occasional dark gray, blocky to subfissile, occasional microlaminations, trace calcite veining trace pyrite.
	40	CEMENT.
2070 - 2075 m	80 SH:	a/a, light gray to slightly calcareous and dolomitic, predominantly blocky, moderately hard, trace pyrite, trace loose angular quartz grains.
	20	CEMENT.
2075 - 2080 m	100 SH:	medium to dark gray, occasional very dark gray, silty, moderately hard subfissile to blocky, micromicaceous in part, slightly calcareous and dolomitic in part, trace pyrite, trace loose angular quartz grains, trace cement contamination.
2080 - 2085 m	100 SH:	a/a.
2085 - 2090 m	100 SH:	a/a, becoming darker gray.
2090 - 2095 m	100 SH:	dark gray, blocky to subfissile, firm to hard, micromicaceous, slightly silty in part, non calcareous, slightly to moderately dolomitic, trace limestone, white to light gray argillaceous, microcrystalline, trace angular loose quartz grains, trace cement contamination, trace quartz veining.
2095 - 2100 m	100 SH:	a/a, trip sample with a trace to minor cement contamination.
2100 - 2105 m	100 SH:	a/a, interbedded with light to medium gray shale, trace loose quartz grains a/a, limestone a/a, trace pyrite.
2105 - 2110 m	100 SH:	a/a, being rotary drilling at 2115 m.
2110 - 2115 m	100 SH:	a/a, (abundant cement contamination).
2115 - 2120 m	100 SH:	dark gray, blocky to subfissile, micromicaceous, silty, non-calcareous, interbedded with light to medium gray shale, trace white to light gray limestone, trace angular loose quartz grains, trace pyrite, scattered cement contamination.
2120 - 2125 m	100 SH:	a/a.

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2125 - 2130 m	100 SH:	dark gray, blocky to subfissile, micromicaceous, silty, non-calcareous, interbedded with medium gray shale, minor white to light gray limestone fragments, trace quartz veining, trace clear and opaque, angular quartz grains, trace pyrite, scattered cement contamination.
2130 - 2135 m	100 SH:	a/a.
2135 - 2140 m	100 SH:	a/a.
2140 - 2145 m	100 SH:	a/a, dark gray to very dark gray, slightly carbonaceous in part.
2145 - 2150 m	100 SH:	predominantly very dark gray to black, interbedded with light to medium gray shale, blocky to sbufissile micromicaceous in part, silty, slightly calcareous in part, minor white to light gray limestone fragments, trace clear and opaque quartz grains, trace pyrite, trace cement contamination.
2150 - 2155 m	100 SH:	a/a.
2155 - 2160 m	100 SH:	a/a.
2160 - 2165 m	100 SH:	a/a.
2165 - 2170 m	100 SH:	predominantly very dark gray to black, increasing amount of light to medium gray shale, blocky, subfissile in part non-calcareous, minor white to light gray limestone, fragments, trace quartz grains, trace pyrite.
2170 - 2175 m	100 SH:	a/a.
2175 - 2180 m	100 SH:	a/a, slightly carbonaceous in part.
2180 - 2185 m	100 SH:	very dark gray to black, minor light to medium gray shale, blocky to subfissile, micromicaceous in part, silty in part non calcareous, carbonanceous in part, scattered quartz grains, trace pyrite.
2185 - 2190 m	100 SH:	a/a.
2190 - 2195 m	100 SH:	a/a.
2195 - 2200 m	100 SH:	a/a.
2200 - 2205 m	100 SH:	a/a, increase in scattered quartz grains.

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2205 - 2210 m	100 SH:	very dark gray to black, scattered medium gray shale, blocky to subfissile, micromicaceous, slightly silty in part, non-calcareous, carbonaceous in part, trace angular quartz grains, trace pyrite.
2210 - 2215 m	100 SH:	a/a.
2215 - 2220 m	100 SH:	a/a, scattered medium to dark gray slightly calcareous shale.
2220 - 2225 m	100 SH:	very dark gray to black, scattered calcareous shale, blocky subfissile in part, micromicaceous, silty in part, non-calcareous, carbonaceous in part, trace white calcite, trace pyrite.
2225 - 2230 m	100 SH:	a/a.
2230 - 2235 m	100 SH:	a/a, increasing amount of white calcite, trace white gray argillaceous limestone.
2235 - 2240 m	100 SH:	a/a, abundant cavings.
2240 - 2245 m	100 SH:	very dark gray to black, blocky, subfissile in part, slightly silty, moderately hard, micromicaceous, slightly calcareous in part, trace pyrite, trace loose quartz grains.
2245 - 2250 m	100 SH:	a/a.
2250 - 2255 m	100 SH:	a/a.
2255 - 2260 m	100 SH:	very dark gray to black, blocky, subfissile in part, occasional light to medium gray shale, moderately hard, slightly silty, micromicaceous, calcareous in part, trace pyrite, trace white angular quartz fragments, trace white gray limestone fragments.
2260 - 2265 m	100 SH:	a/a.
2265 - 2270 m	100 SH:	a/a.
2270 - 2275 m	100 SH:	a/a.
2275 - 2280 m	100 SH:	very dark gray, blocky, occasional light to medium gray shale, silty in part, micromicaceous, slightly calcareous in part, trace white gray argillaceous limestone fragments, trace angular quartz grains, trace pyrite.

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2280 - 2285 m	100 SH:	a/a, rare trace quartz, pyrite.
2285 - 2290 m	100 SH:	a/a, trace light to medium gray, slightly calcareous shale.
2290 - 2295 m	100 SH:	dark gray, blocky, moderately hard to hard, slightly silty micromicaceous, calcareous in part, occasional medium gray shale, abundant pyrite, trace quartz grains.
2295 - 2305 m	100 SH:	dark to very dark gray, blocky, hard, silty to very silty in part, calcareous, micromicaceous, trace medium gray soft very calcareous.
2305 - 2315 m	100 SH:	medium to dark gray, blocky, moderately hard, silty to very silty in part, micromicaceous, occasionally slightly calcareous, trace medium to light gray, soft shale, rare pyrite, trace limestone.
2315 - 2320 m	100 SH:	medium to dark gray, occasionally light gray, blocky, moderately hard, silty, micromicaceous, occasionally slightly calcareous, trace buff, marlstone, trace pyrite.
2320 - 2325 m	100 SH:	predominantely a/a, occasionally slightly calcareous, minor quartz fragments.
2325 - 2330 m	90 CLYST:	gray brown, soft to very soft, slightly calcareous, occasionally grading to marlstone.
	10 SH:	a/a.
2330 - 2335 m		NO SAMPLE.
2335 - 2340 m	100 SH:	dark gray, blocky to subfissile, moderately hard to brittle micromicaceous, slightly calcareous in part, silty, medium to light gray, gray green, soft to firm, trace buff limestone, trace quartz fragments.
2340 - 2350 m	100 SH:	medium to light gray, soft to firm, subfissile to blocky, slightly dolomitic in part, microlaminated in part.
2350 - 2355 m	100 SH:	a/a.
2355 - 2360 m	100 SH:	medium to light gray, moderately soft to firm, subfissile to blocky, slightly silty in part, microlaminated in part, micromicaceous, occasionally dark gray, black silty, slightly dolomitic, brown shale in part sideritic, trace pyrite, trace sparry calcite crystals.

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2360 - 2365 m	100 SH:	medium to light gray, firm, a/a, dark gray, moderately hard to hard, blocky, slightly dolomitic in part, silty, slight trace disseminated pyrite.
2365 - 2370 m	100 SH:	a/a.
2370 - 2375 m	100 SH:	light to medium gray, firm to moderately hard, blocky to subfissile, micromicaceous, very slightly silty, slightly dolomitic, dark gray to black in part, blocky, hard, resinous lustre, silty, dolomitic to very dolomitic, grading to very argillaceous dolomitic in part, trace slickensides, trace pyrite.
2375 - 2380 m	100 SH:	predominantly medium gray, light gray, a/a, microlaminated in part, dark to very dark gray in part, a/a, trace medium brown, dense limestone.
2380 - 2395 m	100 SH:	medium gray, light gray in part, subfissile to blocky, fissile in part, occasionally dark gray to blackish, hard, blocky, dolomitic, trace very fine disseminated pyrite, trace sparry calcite crystals, trace light brown dolomite.
2395 - 2400 m	100 SH:	a/a.
2400 - 2405 m	100 SH:	medium gray, light gray in part, predominantly a/a, becoming slightly dolomitic in part, occasionally dark gray to very dark gray a/a, trace calcite crystals, trace pyrite.
2405 - 2415 m	100 SH:	medium gray, light gray, subfissile to blocky, fissile in part, firm to moderately hard, silty, micromicaceous, microlaminated in part, slightly calcareous in part, minor dark gray to very dark gray, blocky, hard, dolomitic, slightly calcareous trace pyrite, trace calcite.
2415 - 2420 m	100 SH:	a/a, abundant translucent frosted, rosy quartz grains, barite contamination.
2420 - 2425 m	100 SH:	medium to light gray, a/a, slightly calcareous in part, becoming slightly dolomitic, minor dark to very dark gray, a/a, very slightly dolomitic trace pyrite, rare calcite.
2425 - 2440 m	100 SH:	light gray, subfissile, soft, very calcareous, grading to marlstone, medium gray, firm, silty, microlaminated in part occasionally dark to very dark gray, blocky, hard, slightly dolomitic, trace calcite, trace pyrite.

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2440 - 2445 m	100 sh:	medium gray, light gray in part, fissile to blocky, firm to hard, calcareous in part, microlaminated in part, silty dark gray to black in part, hard, blocky, very slightly dolomitic, trace pyrite, trace angular quartz fragments, (barite contamination).
2445 - 2450 m	100 SH:	a/a, trace dark brown limestone, trace sparry calcite crystals.
2450 - 2455 m	100 SH:	medium gray, occasionally dark, soft to medium hard, subfissile, blocky in part, light gray in part, slightly calcareous, dark is non calcareous, trace white and translucent calcite.
2455 - 2460 m	100 SH:	a/a, trace light gray, very calcareous, limey.
2460 - 2465 m	100 SH:	medium gray, light gray in part, subfissile to blocky, firm to moderately hard, calcareous in part, slightly dolomitic, micromicaceous, microlaminated in part, occasionally dark gray, blocky, hard, very slightly dolomitic, siliceous trace sparry calcite.
2465 - 2470 m	100 SH:	a/a, trace pyrite, trace sparry calcite.
2470 - 2475 m	100 SH:	predominantly medium gray, light gray in part, a/a, occasionally microlaminated, occasionally dark gray, a/a, trace sparry calcite.
2475 - 2485 m	100 SH:	medium gray, light gray in part, subfissile to blocky, firm to moderately hard, calcareous to very calcareous in part, becoming marly in part, micromicaceous, microlaminated in part, occasionally dark gray, blocky, hard, siliceous, trace angular quartz fragments, (abundant lignite contaminations).
2485 - 2490 m	100 SH:	a/a, brown gray in part, trace angular quartz fragments, trace sparry calcite, trace calcite veining.
2490 - 2495 m	100 SH:	a/a, trace pyrite.
2495 - 2500 m	100 SH:	medium gray, occasionally brown gray, blocky to subfissile, moderately hard, to hard, micromicaceous, calcareous in part, slightly dolomitic, microlaminated in part, dark gray to blackish, blocky, hard, siliceous, slightly dolomitic, trace quartz fragments, trace sparry calcite, rare trace dark brown limestone.

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2500 - 2505 m	100 SH:	a/a, trace pyrite, trace calcite, trace dark brown microcrystalline limestone.
2505 - 2510 m	100 SH:	a/a, medium gray etc., trace pyrite, abudnant lignite, rare trace brownish gray dolomite, cryptocrystalline, slightly argillaceous.
2510 - 2515 m	100 SH:	medium gray, light gray brown gray in part, blocky to subfissile, firm to hard, occasionally soft, micromicaceous, microlaminated in part, calcareous in part, occasionally grading to marl, silty, dark to very dark gray in part, blocky, hard, siliceous, very slightly dolomitic, trace quartz fragments, trace pyrite, trace calcite.
2515 - 2520 m	100 SH:	predominantly medium to light gray, brown gray in part, soft to moderately hard, mottled in part, a/a, dark gray to black in part, moderately hard to hard, a/a, trace sparry calcite, trace pyrite, trace calcite veining, trace quartz fragments.
2520 - 2530 m	100 SH:	medium to light gray, brown gray in part a/a, dark gray, a/a.
2530 - 2535 m	100 SH:	dark to very dark gray, blocky, moderately hard to hard, dolomitic, silty, common very fine disseminated and massive pyrite, medium to light gray, brown gray, a/a, becoming dolomitic, trace light to medium brown limestone.
2535 - 2540 m	100 SH:	dark gray, blocky to fissile, thin splinters and flakes, brittle, friable, soft to hard non-calcareous, medium to light gray, micromicaceous, blocky, occasional thin flakes or sections, firm to very soft, slightly calcareous, trace clear quartz, trace brown microcrystalline limestone.
2540 - 2545 m	100 SH:	dark gray, blocky to fissile, moderately hard to brittle, dolomitic, silty, siliceous in part, common very fine disseminated pyrite, medium gray, brown gray, blocky to subfissile, moderately hard to hard, calcareous in part, slightly dolomitic, silty, trace quartz fragments, trace dark brown limestone, trace calcite veining.
2545 - 2550 m	100 SH:	medium to dark gray, blocky to subfissile, brittle to very hard, non-calcareous, slightly dolomitic, light gray, blocky, subfissile in part, occasionally microlaminated, firm to medium hard, slightly calcareous, trace light brown microcrystalline limestone, trace massive pyrite.

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2550 - 2565 m	100 SH:	dark gray, blocky, firm to hard, slightly dolomitic, trace siliceous, pyritic, trace carbonaceous flakes, medium gray, occasionally light gray, blocky to subfissile, firm to moderately hard, slightly calcareous in part, slightly silty, micromicaceous, microlaminated in part, trace sparry calcite, trace massive pyrite, trace white chert, (cement contamination).
2565 - 2570 m	100 SH:	a/a, trace medium dolomite, trace white, buff chalky limestone, trace chert, trace pyrite.
2570 - 2585 m	100 SH:	medium to light gray, firm to moderately hard, blocky, occasionally subfissile, calcareous to very calcareous in part, occasionally limey, microlaminated in part, dark gray limestone, chalky, microcrystalline in part, very argillaceous, trace pyrite, (lignite contamination).
2585 - 2595 m	100 SH:	medium gray, blocky to subfissile, firm to hard, calcareous in part, very slightly dolomitic, micromicaceous, microlaminated in part, dark gray to black, blocky, hard siliceous trace pyrite, trace sparry calcite.
2595 - 2605 m	100 SH:	a/a, trace quartz veining, trace pyrite.
2605 - 2610 m	100 SH:	a/a.
2610 - 2615 m	100 SH:	medium to dark gray, hard, fissile, blocky in part, micromicaceous, non-calcareous to slightly calcareous, trace light gray, microcrystalline limestone, trace pyrite, trace sparry calcite.
2615 - 2620 m	100 SH:	medium to light gray, blocky to subfissile, slightly calcareous, slightly dolomitic, micromicaceous, microlaminated in part, occasional dark gray to black, blocky, hard siliceous, trace pyrite, trace coal.
2620 - 2635 m	100 SH:	medium to dark gray, very soft to hard, brittle in part, slightly calcareous, subfissile, flaky in part, occasional trace round quartz, trace light brown limestone, microcrystalline, trace lignite.
2635 - 2640 m	100 SH:	a/a.
2640 - 2645 m	100 SH:	medium to light gray, firm to moderately hard, blocky to subfissile, slightly calcareous, slightly dolomitic, slightly silty, micromicaceous, microlaminated, occasional dark gray to black, hard, blocky, siliceous, trace pyrite.

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2645 - 2650 m	100 SH:	a/a.
2650 - 2655 m	100 SH:	medium to light gray, blocky to subfissile, firm to moderately hard, slightly calcareous, slightly dolomitic, slightly silty, siliceous in part, microlaminated in part occasional dark gray to black, blocky, hard, trace pyrite trace very argillaceous gray limestone, trace coal flakes.
2655 - 2665	100 SH:	medium to dark gray, blocky, hard, microlaminated in part, micromicaceous, non-calcareous, subfissile, occasionally gray, slightly calcareous.
2665 - 2670 m	100 SH:	a/a.
2670 - 2675 m	100 SH:	medium to dark gray, light gray in part, blocky, hard siliceous, slightly calcareous, microlaminated in part, abundant calcite in filling of fractures, very argillaceous, trace gray brown limestone.
2675 - 2690 m	100 SH:	medium to dark gray, soft to hard, subfissile to blocky, flaky in part, occasionally microlaminated, non to slightly calcareous, micromicaceous, occasional black shale, blocky hard, non-calcareous, micromicaceous, abundant translucent and white calcareous fracture fill/sparry calcite.
2690 - 2705 m	100 SH:	medium gray, light gray in part, blocky to subfissile, slightly silty in part, slightly calcareous, occasional dark gray shale, abudnant white calcite fracture filling / sparry calcite.
2705 - 2715 m	100 SH:	medium to dark gray, blocky, subfissile in part, firm to hard, non-calcareous, trace calcite vein, abundant loose calcite fracture fill, trace massive pyrite, trace light brown limestone.
2715 - 2720 m	100 SH:	predominantly light to medium gray, subfissile to blocky, moderately hard, slightly silty, slightly calcareous in part, occasional dark gray, blocky, hard,siliceous, trace pyrite, trace cream to gray brown limestone, trace white calcite infilling fractures.
2720 - 2730 m	100 SH:	a/a, slightly dolomitic, increase in dark gray shale.

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2730 - 2735 m	100 SH:	light to medium gray, subfissile to blocky, moderately hard, slightly silty in part, occasional rare pyrite, rare limestone occasional trace white calcite.
2735 - 2740 m	100 SH:	a/a.
2740 - 2745 m	100 SH:	light to medium gray, subfissile to blocky, moderately hard, slightly calcareous, slightly silty in part, occasional dark gray to black, blocky, hard, silaceous, slightly dolomitic, trace pyrite, trace rare gray brown limestone dense.
2745 - 2750 m	100 SH:	a/a.
2750 - 2760 m	100 SH:	medium to light gray, blocky, moderately hard to hard, slightly silty, slightly calcareous in part, slightly dolomitic, occasional light gray, subfissile, argillaceous non calcareous, trace pyrite, trace gray brown limestone.
2760 - 2765 m	100 SH:	a/a, trace lignite contamination.
2765 - 2770 m	100 SH:	a/a, rare pyrite, trace gray limestone.
2770 - 2775 m	100 SH:	medium to light gray, subfissile to blocky, moderately hard, slightly silty, slightly calcareous, slightly dolomitic, occasional light gray, firm, subfissile, waxy, argillaceous, non calcareous, trace pyrite, trace grey brown limestone.
2775 - 2780 m	100 SH:	a/a, light gray, subfissile, waxy, firm, slightly dolomitic, argillaceous, trace coal.
2780 - 2785 m	100 SH:	a/a.
2785 - 2795 m	100 SH:	medium to light gray, subfissile to blocky, moderately hard, silty in part, calcareous in part, occasional dolomite, light gray, waxy in part.
2795 - 2800 m	100 SH:	medium to light gray, occasionally gray brown, blocky to subfissile, moderately hard to hard, slightly silty, slightly dolomitic, microlaminated in part, micromicaceous in part, trace gray brown silty dolomite, trace pyrite, trace coal.
2800 - 2805 m	100 SH:	a/a, trace lignite contamination.
2805 - 2810 m	100 SH:	a/a.

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2810 - 2825 m	100 SH:	light to medium gray brown, blocky to hard, slightly silty to very silty in part, slightly calcareous in part, dolomitic in part, micromicaceous, microlaminated in part, trace cream limestone, trace quartz infilling fractures, rare pyrite.
2825 - 2835 m	100 SH:	light to medium gray, occasional light brown, blocky, occasionally subfissile, moderate to hard, slightly to very silty in part, occasionally slightly calcareous, occasionally very calcareous, micromicaceous, microlaminated in part, trace pyrite.
2835 - 2840 m	100 SH:	a/a.
2840 - 2845 m	100 SH:	light to medium gray, blocky to subfissile, moderately hard, slightly silty in part, slightly calcareous in part, occasionally dolomitic, micromicaceous in part, occasionally microlaminated, rare light gray chert, trace light grey siltstone, slightly dolomitic, trace quartz fracture filling.
2845 - 2860 m	100 SH:	a/a, light gray brown shale, blocky, slightly silty, calcareous, trace cream to buff limestone.
2860 - 2865 m	100 SH:	light to medium gray, gray brown in part, blocky to sub fissile, moderately hard to hard, silty to very silty in part, slightly calcareous to calcareous in part, slightly dolomitic, occasional gray brown limestone, very argillaceous, trace gray to gray brown siltstone, argillaceous, slightly dolomitic, trace quartz fragments, trace pyrite.
2865 - 2870 m	100 SH:	a/a.
2870 - 2875 m	100 SH:	a/a, abundant gray to gray brown silty shale, grading to siltstone.
2875 - 2885 m	100 SH:	medium to light gray, blocky to subfissile, moderately hard to hard, slightly silty to very silty in part, slightly calcareous, occasionally dolomitic, micromicaceous in part, microlaminated in part, trace dark gray brown limestone, trace gray brown silty shale grading to siltstone, trace pyrite, occasional quartz crystals.
2885 - 2890 m	100 SH:	a/a, trace clear to white, silty dolomite.

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2890 - 2900 m	100 SH:	a/a, 5 - 10% silty shale, grading to gray siltstone.
2900 - 2905 m	100 SH:	light to medium to dark gray, blocky to subfissile, silty in part, moderately hard, slightly calcareous in part, occasionally micromicaceous and micro laminated siltstone.
2905 - 2910 m	100 SH:	light to medium gray, blocky to subfissile, moderately hard, rarely silty, occasionally micromicaceous, micro laminated, occasionally calcareous, occasionally dolomitic in part, trace brown to red shale, calcareous, silty, trace gray to argillaceous dolomite, rare pyrite, rare white to buff calcite.
2910 - 2915 m	100 SH;	a/a, occasional fractures.
2915 - 2920 m	100 SH:	light to medium gray, blocky to subfissile, moderately hard to hard, silty to very silty in part, micromicaceous microlaminated in part, slightly calcareous, occasionally dolomitic, occasional dark gray, blocky, hard, silaceous, non calcareous, trace light gray to dark gray silty shale grading to argillaceous siltstone, slightly dolomitic, trace clear to buff white calcite fragments, trace pyrite, trace lignite contaminations.
2920 - 2925 m	100 SH:	black, blocky, subfissile, hard, carbonaceous, micromicaceous, dense.
2925 - 2930 m	100 SH:	50% black to very dark gray, blocky to subfissile, hard, firm in part, carbonaceous, dolomitic, white, calcareous inclusions, pyritic, 50% light to medium gray, a/a.
2930 - 2935 m	100 SH:	100% Shale, 60% black, subfissile, occasionally blocky, hard calcareous, 40% light gray, blocky, moderately hard occasionally calcareous.
2935 - 2940 m	50 SH: LAT.	gray shale, a/a 50% black shale, a/a
2940 - 2945 m	100 SH:	black to dark gray, blocky to subfissile, hard to firm, siliceous, carbonaceous, dolomitic in part, pyritic, 40% gray to medium gray, a/a, abundant gray very silty grading to siltstone, very calcareous, trace pyrite.
2945 - 2950 m	100 SH:	black to very dark gray, blocky to subfissile, hard to brittle, siliceous, carbonaceous, pyritic, occasionally dolomitic, trace quartz veining, light to medium gray in part, (20%) a/a

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2950 - 2955 m	100 SH:	black to very dark gray, a/a, minor light to medium gray, a/a
2955 - 2960 m	100 SH:	a/a
2960 - 2965 m	100 SH:	black to very dark gray, blocky to subfissile, hard, carbonaceous, pyritic, siliceous in part, dolomitic trace gray to light gray shale
2965 - 2970 m	100 SH:	a/a, very minor gray shale
2970 - 2975 m	100 SH:	LAT. a/a
2975 - 2980 m	100 SH:	90% black to dark gray, a/a, occasionally calcareous, 10% light to medium gray a/a, possible trip cont.
2980 - 2981 m	90 SH:	black shale
	<10 SH:	gray calcareous to very calcareous, occasionally silty, dolomitic in part
2980 - 2985 m	100 SH:	a/a, predominantly lost circulation material
2985 - 2990 m	100 SH:	black to very dark gray, blocky to subfissile, hard to very hard, brittle in part, siliceous, carbonaceous, pyritic, abundant very fine disseminated pyrite, trace quartz veining, light to medium gray in part (10%), firm calcareous in part
2990 - 2995 m	100 SH:	black to very dark gray, minor light to medium gray
2995 - 3000 m	100 SH:	a/a
3000 - 3005 m	100 SH:	black to very dark gray, blocky to subfissile, hard to very very hard, siliceous carbonaceous, calcareous in part, white calcareous inclusions, abundant very fine disseminated pyrite, occasional massive pyrite, trace quartz veining, minor light to medium gray, firm, calcareous
3005 - 3010 m	100 SH:	a/a
3010 - 3015 m	100 SH:	LCM a/a < calcareous inclusions > carbon, occasional cream calcite < disseminated pyrite, possible fractures > gas
3015 - 3020 m	100 SH:	black to very dark gray, blocky to subfissile, hard, brittle in part, siliceous carbonaceous, occasional white calcareous inclusions, becoming slightly dolomitic in part, abundant very fine disseminated pyrite, possible fractures minor light to medium gray shale

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3020 - 3025 m	100 SH:	a/a
3025 - 3030 m	100 SH:	a/a, becoming slightly calcareous in part
3030 - 3035 m	100 SH:	very dark gray to black, blocky to subfissile, hard siliceous, carbonaceous slightly calcareous in part, abundant very fine disseminated pyrite, trace to minor light to medium gray shale
3035 - 3045 m	100 SH:	very dark gray, blackish a/a
3045 - 3055 m	100 SH:	predominantly very dark gray, blackish, blocky, moderately hard to hard, slightly siliceous, calcareous, carbonaceous common very fine disseminated pyrite increasing light to medium gray, soft shale (10%)
3055 - 3060 m	100 SH:	very dark gray, blackish, blocky, hard, siliceous, fractured common sparry calcite, calcite fracture fill, common very fine disseminated pyrite, medium gray in part (15%), soft to firm calcareous, trace light gray, white gray limestone, soft chalky
3060 - 3065 m	100 SH:	a/a
3065 - 3070 m	100 SH:	very dark gray to black to blocky, hard occasionally very hard, frequent calcite veining as well as loose calcite, rare trace medium gray limestone, soft, chalky, very argillaceous trace disseminated pyrite
3070 - 3080 m	100 SH:	very dark gray, blackish, blocky, hard, slightly calcareous to very calcareous in part, occasionally grading to very argillaceous limestone, carbonaceous, abundant very fine disseminated pyrite, common calcite fracture fill, trace medium gray, microcrystalline limestone, minor light to medium gray shale
3080 - 3100 m	100 SH:	very dark gray, blocky, hard, firm in part, calcareous to very calcareous, abundant very fine disseminated pyrite, trace sparry calcite, occasionally soft marly
3100 - 3105 m	100 SH:	very dark gray, blocky, hard, firm in part, calcareous to very calcareous occasionally soft, limy, common very fine disseminated pyrite carbonaceous, trace light to medium gray shale
3105 - 3110 m	100 SH:	a/a, increasing light to medium gray shale (20%), trace calcareous fracture fill

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3110 - 3115 m	100 SH:	very dark gray, a/a, light to medium gray (40%), moderately hard to hard, blocky to subfissile, trace calcareous fracture fill
3115 - 3120 m	100 SH:	very dark gray, a/a, decreasing light to medium gray shale (10%), trace calcareous fracture fill
3120 - 3135 m	100 SH:	dark to very dark gray, hard, very hard in part, blocky, trace slickensides, micromicaceous, very to slightly calcareous in part, common calcite veining and fracture fill, rare trace pyrite occasionally disseminated
3135 - 3145 m	100 SH:	dark to very dark gray, hard, blocky calcareous to very very calcareous, common calcite veining, calcareous fracture fill, trace carbonaceous, very fine disseminated pyrite, trace clear quartz fragments, trace medium gray, white gray limestone, soft to firm, chalky, argillaceous
3145 - 3150 m	100 SH:	very dark gray, blocky, hard, calcareous to very calcareous abundant sparry calcite and fracture fill, trace carbonaceous, very fine disseminated pyrite, minor medium gray limestone, soft, chalky, trace microcrystalline, very argillaceous
3150 - 3160 m	20 LS:	medium to light gray, microcrystlline, friable, (30%) brittle, slightly argillaceous in part, occasionally white grading to cryptocrystalline
	80 SH:	a/a, becoming mostly very calcareous, 3163 spot sample 10% limestone a/a
3160 - 3170 m	20 LS:	a/a, occasionally dark gray
	80 SH:	medium to dark gray, occasionally very dark gray, predominately very calcareous
3170 - 3175 m	20 LS:	a/a, trace fossile remains
	80 SH:	a/a
3175 - 3180 m	40 LS:	medium to light gray, off white, soft to firm, chalky, trace microcrystalline, medium brown and dense in part slightly argillaceous to argillaceous, no visible porosity
	60 SH:	dark to very dark gray, a/a, becoming very limey

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WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

3180 - 3185 m	75 LS:	off white, medium to ligh gray, soft to firm, chalky, occasionally microcrystalline, medium brown and dense in part, slightly argillaceous to argillaceous, no visible porosity
	TR DOL:	white, translucent, fine to medium crystalline, friable, unconsolidated in part, bituminous, fair to good intercrystalline porosity
	25 SH:	dark to very dark gray a/a
3185 - 3187 m	85 DOL:	white, transcluscent, cryptocrystalline, soft, massive, bituminous, occasionally fine to medium crystalline, predominantely no visible porosity, no show, trace clear quartz
	15 LS:	off white, chalky, soft, argillaceous, medium brown in part, cryptocrystalline, no visible porosity
3185 - 3190 m	80 DOL:	white, translucent, cryptocrystalline, moderately hard, massive, bituminous occasionally fine to medium crystalline, no visible porosity, occasional gray to translucent, medium to fine crystalline, no to very poor intercrystalline porosity no show no fluorescence
	20 LS:	medium gray to salt and peper, soft, very argillaceous occasional loose translucent quartz grains, trace cement contamination, trace lignite contamination and LCM
3190 - 3195 m	80 DOL:	a/a, with medium gray, dolomite, fine to medium crystalline trace very poor intercrystalline porosity
	20 LS:	white to salt and pepper micro-cryptocrystalline, argillaceous, bitumnous, dolomitic, trace clear quartz grains, subangular, unconsolidated
3195 - 3200 m	80 DOL:	a/a, abundant cement
	20 LS:	very friable
3200 - 3205 m	70 DOL:	gray to salt and pepper, fine to microcrystalline, friable, argillaceous, bituminous, calcareous to very calcareous, grading to dolomitic limestone

NORTHCOR ET AL LIARD F-25 A
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

	30 DOL:	white to clear, cryptocrystalline, massive, hard, calcareous to very calcareous, grading to dolomitic limestone, brittle
3205 - 3210 m	60 DOL:	white - translucent, cryptocrystalline, hard, brittle, bituminous veining, calcareous to very calcareous, occasionally dolomitic limestone
	40 LS:	gray to salt & pepper, friable, very fine to medium crystalline, argillaceous, bituminous, calcareous to dolomitic limestone, trace 5% limestone - dark gray, very light crystalline friable, brown to light brown, earthy and soft
3210 - 3215 m	70 DOL:	a/a, white translucent, a/a - limy
	30 LS:	a/a.
3215 - 3220 m	100 SH:	a/a.
3220 - 3225 m	40 DOL:	white, translucent, clear massive, cryptocrystalline, to granular, brittle, occasionally bituminous and shaly, very calcareous to limy, grading to dolomitic limestone in part.
	60 DOL LS:	dolomitic limestone, gray, fine to microcrystalline, brittle argillaceous, dolomitic.
3225 - 3230 m	40 DOL:	white - clear
	60 DOL LS:	a/a, limy to gray to dark gray.
3230 - 3235 m	70 DOL:	white to translucent, cryptocrystalline, hard, brittle, calcareous to limy, grading to dolomitic limestone in part.
	30 DOL LS:	gray to dark gray, fine to medium crystalline, friable, argillaceous.
3235 - 3240 m	60 DOL:	white translucent, dense to cryptocrystalline, hard, brittle, calcareous to dolomitic limestone, tight.
	30 DOL:	gray to dark gray, fine to medium crystalline, moderately hard, friable, argillaceous, calcareous, predominantly no no porosity, occasional trace very poor intercrystalline porosity, no slow, no flo.
	10 LS:	cream to buff, dense to cryptocrystalline, moderately hard, slightly dolomitic light.

NORTHCOR ET AL LIARD F-25 A
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

3240 - 4250 m	60 DOL:	a/a.
	30 DOL:	a/a.
	10 LS:	a/a.
3250 - 3260 m	70 DOL:	white translucent a/a, becoming very brittle to unconsolidated in part.
	30 DOL:	gray to dark gray, a/a, trace limestone.
3260 - 3265 m	70 DOL:	a/a.
	20 DOL:	medium gray to dark gray, trace very poor intercrystalline porosity.
	10 LS:	a/a.
3265 - 3270 m	50 DOL:	white to clear, translucent, hard, brittle, calcareous, very calcareous, tight.
	50 DOL:	gray to dark gray, fine to medium crystalline, moderately hard, friable, argillaceous, occasionally very porous, intercrystalline porosity, grading to dolomitic limestone, no shows.
	TR LS:	cream to buff, a/a, less bituminous veining in white dolomite.
3270 - 3275 m	60 DOL:	gray to very dark gray, micro to fine to medium crystalline, friable, argillaceous very calcareous, grading to dolomitic limestone.
	40 DOL:	white to translucent, a/a.
3275 - 3280 m	70 DOL:	a/a, gray to dark gray.
	30 DOL:	a/a, white.
3280 - 3285 m	70 DOL:	a/a, slight trace visible porosity.
	30 DOL:	a/a.
3285 - 3286 m		increase in white dolomite.
3286 - 3295 m	60 DOL:	white dolomite, a/a.
	40 DOL:	dark gray dolomite, a/a.

NORTHCOR ET AL LIARD F-25 A
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

3295 - 3300 m	50 DOL:	light gray to dark gray, microcrystalline, medium crystalline, granular in part, hard, brittle, very poorly cemented occasional poor intercrystalline porosity, slight trace very dark gray dolomitic shale, trace loose clear quartz grains.
	50 DOL:	white cream, translucent, crypto to microcrystalline in part, hard, brittle, calcareous, no visible porosity.
3300 - 3305 m	50 DOL:	a/a.
	50 DOL:	a/a.
3305 - 3315 m	60 DOL:	gray dolomite.
	40 DOL:	white dolomite.
3315 - 3330 m	60 DOL:	white dolomite, a/a.
	40 DOL:	gray dolomitie a/a.
3330 - 3335 m	100 DOL:	white to clear, cryptocrystalline, hard, friable, very poorly cemented, tight, gray to dark gray, hard, micro to medium intercrystalline porosity, no shows, trace dark gray to black dolomitic shale.
3335 - 3340 m	50 DOL:	white a/a.
	50 DOL:	gray a/a.
3340 - 3345 m	50 DOL:	white to clear, translucent, hard, massive, brittle, cryptocrystalline, bituminous veining.
	50 DOL:	gray to dark gray, hard, micro to fine crystalline, poorly cemented, occasional slight trace intercrystalline porosity.
3345 - 3350 m	70 DOL:	white to clear, a/a.
	30 DOL:	gray to dark gray, a/a, slight trace, cream to buff limestone.
3350 - 3355 m	50 DOL:	white a/a.
	50 DOL:	gray, a/a, occasional slight trace visible porosity.
3355 - 3360 m	50 DOL:	a/a.
	50 DOL:	a/a

NORTHCOR ET AL LIARD F-25 A
WELL END SUMMARY
60 24' 22.25" N 123 35' 07.58" W

3360 - 3365 m	100 DOL:	60% gray dolomite a/a, 40% white dolomite, a/a.
3365 - 3375 m	100 DOL:	70% gray dolomite a/a, trace gray brown dolomite, fine crystalline, slightly calcareous, brittle, 30% white a/a, argillaceous.
3375 - 3385 m	100 DOL:	70% medium to dark gray, cryptocrystalline to medium crystalline, hard, argillaceous, poorly cemented, trace poor intercrystalline, 30% white, clear, translucent, hard, massive, brittle, cryptocrystalline, occasional bituminous cementing material.
3385 - 3395 m	100 DOL:	80% gray to dark gray, a/a, becoming granular in part, increase in intercrystalline and intergranular porosity, 20% white to clear dolomite, a/a, slight trace cream buff limestone.
3395 - 3400 m	100 DOL:	80% gray to dark gray, a/a, 20% white to clear dolomite, a/a, rare black shale.
3400 - 3405 m	100 DOL:	a/a.
3405 - 3410 m	100 DOL:	80% gray to dark gray, cryptocrystalline to medium crystalline, occasionally granular, hard, brittle, argillaceous in part, trace to poor porosity, 20% white dolomite, clear a/a.
3410 - 3415 m	100 DOL:	70% gray to dark gray dolomite, 30% white to translucent dolomite, trace cream limestone.
3415 - 3420 m	100 DOL:	80% medium to very dark gray, cryptocrystalline to medium crystalline, to granular, hard, brittle, poorly cemented, argillaceous to shaly, occasional trace porosity, 20% white translucent, cryptocrystalline, brittle, occasionally bituminous cementing materials.
3420 - 3425 m	100 DOL:	90% dolomite a/a, becoming more shaly, 10% white dolomite, a/a.
3425 - 3440 m	100 DOL:	a/a.
3440 - 3455 m	100 DOL:	80% medium to dark gray, crypto to medium crystalline, granular in part, argillaceous, hard, brittle, occasionally poor intergranular and intercrystalline porosity, no fluorescence, trace dark gray shaly dolomite, 20% white to translucent, cryptocrystalline, occasionally fine crystalline in part, hard, brittle, occasionally bituminous cementing material.
3455 - 3475 m	100 DOL:	a/a.

MUD LOGGING
EQUIPMENT

BAROID EQUIPMENT

NORTHCOR ENERGY LIMITED

NORTHCOR ET AL LIARD F-25

60 - 24' - 22.25" N 123 - 35' - 07.58" W

Baroid Logging Systems equipment was installed and operational on February 8, 1986 at 10:00 hours at a depth of 20 m. Operations continued to a total depth of 3478 m.

Mud gas was continuously monitored by Baroid's Gas Detector while hydrocarbon composition was recorded after analysis in Baroid's Gas Chromatograph.

The Gas Detector draw's six cubic feet of air/gas mixture per hour from the gas trap. A 100% reading indicates that the drilling mud contains approximately 25% gas.

Other significant values are: 100 units = 1% gas in air
6000 ppm = 1% gas in air

Selective automatic sampling of the air/gas mixture by the chromatograph yields a breakdown of the composition of any hydrocarbons present. This process is enhanced further by use of the Baroid Steam Still.

A sample of drilling mud is distilled and the hydrocarbons extracted. Through manual injection into the chromatograph, a quantitative analysis of a sample's hydrocarbon content is obtained. Using this information with the Baroid Show Evaluation, possible productivity of potential pay zones may be predicted. Thus drill stem tests of questionable zones can be eliminated.

For rig personnel safety, a continuous monitoring H2S Detector was present. Other equipment included pump stroke counters to aid in proper logging of gas cuttings samples.

Shale density, Modified "d" exponent and 100 / DC values were calculated and plotted every 5 meters to detect early signs of abnormally pressured zones.

WELL EVALUATION

Well Evaluation

The following downhole logs were run by Schlumberger of Canada:

1. F-25

Log	March 1/86	July 28/86
	depth (meters)	
Auxiliary Measurement Sonde		3149 - 1525
Lithology Density - Gamma Ray		3137 - 1525
LDT #2		3149 - 2727
Dipmeter (HDT) & Cluster		3149 - 763
Long Spacing Sonic - GR	759 - 196	3147 - 765
Dual Laterolog - GR	762 - 196	3143 - 763
Borehole Gravity Density Survey		1998 - 3142

2. F-25A

	Nov. 3/86	Nov. 21/86
Long Spacing Sonic	3183 - 1942	3456 - 3189
Dual Laterolog - GR		3457 - 3189
CNL-LDT-GR		3459 - 3189
HDT (Cluster)	3187 - 1950	
Check Shot Survey (SAT)	~~3185~~ 3184 - 1942	

Cement Bond Tool (CBT)	3457 - 2800 (Jan. 8/87)
Temperature Log	3259 - 2985 (Jan. 20/87)
Completion Records	1 for each test interval

Seismic Data

All existing data and reports have previously been submitted except for the Check Shot Survey log. This log has been included with the other logs accompanying this report.

FORMATION STIMULATION

87-01-29 - 3250m - 3258m, Nitrified 27% HCl squeeze. Halliburton Services Ltd. 7.5m^3 27% HCl (includes HAI-75 20.0 L/m^3 + Losurf 300 3.0 L/m^3 + HII - 124A 50.0 L/m^3 + HII-124B 10.5 kg/m^3 HC-2 2.0 L/m^3) + 13500m^3 N_2.

Results:

Increased deliverability from 82.72 10^3 m^3/d at 3500 kPa line pressure to 233.802 10^3 m^3/d at 3500 kPa line pressure.

87-02-06 - 3250m - 3258m, Nitrified 28% HCl squeeze. Halliburton Services Ltd. 16.0m^3 28% HCl (includes HAI-75 20.0 L/m^3 + Losurf-300 3.0 L/m^3 + HC-2 10.0 L/m^3 HII-124A 50.0 L/m^3 + HII-124-B 10.5 kg/m^3) + 12000m^3 N_2.

Results:

Increased deliverability from 233.802 10^3 m^3/d at 3500 kPa line pressure + 235.457 10^3 m^3/d at 3500 kPa line pressure.

FORMATION & PRODUCTION TEST RESULTS

Drill Stem Tests

86-11-19, DST #1 was run on the interval 3378.8 - 3414.1m K.B. Halliburton Services Ltd. conventional dual straddle tools were used. Results:

PF: Weak air blow, NGTS
VO: Weak to med. weak air blow, NGTS with a 304m water cushion, total recovery was 304m water (cushion) and 52m mud.

Pressures:

PF:	3276 kPa
ISI:	10704 kPa
IF:	3276 kPa
FF:	3276 kPa
FSI:	8035 kPa

86-11-23, DST #2 was run on the interval 3227 - 3263m K.B. Again Halliburton Services Ltd. conventional dual straddle tools were used. Results:

PF: Very strong air blow with water cushion to surface in 2 min. GTS in 2 1/2 min.
VO: GTS immediately with an estimated 6.0m flare. Flare would not stay lit due to water vapor content of the gas. Maximum rate calculated at 362.5 $10^3 m^3$/day measured with choke nipple on the manifold. Total recovery was 224m of 124000 ppm salt water.

Pressures:

PF:	21670 kPa
ISI:	28168 kPa
IF:	21966 kPa
FF:	21670 kPa
FSI:	27871 kPa

Production Tests

Production testing was conducted on the following Zones:

#1 3451.0m - 3456.0m K.B.
#3 3324.6m - 3340.1m K.B.

No recoverable hydrocarbons were encountered in these zones.

The results of these tests are represented in tabular and graphical form in the Appendix.

Zone #4 (3250.4m - 3258.4m K.B.) was tested as follows:

Test #1 was conducted between 87-01-25 and 87-01-29 inclusive. Two pressure recorders and one temperature recorder were used to obtain data. A deliverability of 82.720 10^3m^3/day at a specified pressure of 3500 kPa was attained.

Test #2 was conducted between 87-02-01 and 87-02-10 after the interval had been acidized with Nitrified 27% HCl. A deliverability of 233.802 10^3m^3/day at a specified pressure of 3500 kPa was attained.

After a second acidization with Nitrified 28% HCl. test #3 was conducted between 87-02-13 and 87-02-21. The second acidization did very little to improve the deliverability rate, 235.457 10^3m^3/day was attained at a specified pressure of 3500 kPa.

Zone #2 (3425m - 3442m) was not tested because water was found in Zone #1, and Zone #5 (3190m - 3210m) has not been tested yet because it could mechanically jeopardize Zone #4.

WELL TERMINATION
RECORD

Canada Oil and Gas Lands Administration | Administration du pétrole et du gaz des terres du Canada

D.A. 1308
E.A. 229

				Well Status	
Nova Scotia	☐	West Coast	☐	Suspended	☐
Newfoundland	☐	Northern	■	Completed	☐
Gulf of St. Lawrence	☐	Hudson Bay	☐	Abandoned	■

WELL TERMINATION RECORD

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

WELL DATA

Well Name: Northcor et al Liard F-25 Area: Ft. Liard

Grid Area: 60 30 123 30 Field/Pool: Liard Exploratory

Permit or Lease No.: EA # 229 Final Coordinates: Lat: 60° 24' 22.25"N Long: 123° 35' 7.58"W

Drilling Unit: Bawden Rig #33 Elevations-RKB: 723.0m GL: 716.6m

Spud Date: 86-01-25 Rig Released: 86-08-05 Total Depth: 3149m (MD)

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
762mm	Conductor Pipe		10m	0-1-0 "G" to surface
508mm	140 kg/m	H-40	196.5m	60T 0-1-0 "G" to surface
340mm	90.77 kg/m	K-55	765.4m	85T 0-1-0 "G" to surface

PLUGGING PROGRAM

Approval of the following program was obtained by (person) Terence G. Dexter from (person) Kem Singh of the Canada Oil and Gas Lands Administration by means of verbal on August 1, 1986.

Type of Plug:	Interval:	Felt:	Cement and Additives:
Cement	3149-3049m	--	12T 0-1-0 "G" +.5% CFR-2 +.5% HR-12
Cement (Whipstock)	2150-2050m	Tagged at 2048m	13T 0-1-0 "G" +.5% CFR-2 +.1% HR-12
		polished to 2056m	
		start side track operations	

Lost Circulation/Overpressure Zones: slight fresh water flow at 58m

~~Equipment~~ left on Seafloor (Describe): N/A

Provision for Re-entry (Describe and attach sketch): None

Cores: Type: None Intervals: ---

Other Downhole Completion/Suspension Equipment: None

CERTIFICATION

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

Signed: Terence G. Dexter, P. Eng. Title: Vice President & Operations Manager

Name: Terence G. Dexter Date: March 31, 1987

Acknowledged by: _____ Engineering Branch

Date: May 26, 1987

File: 9211-N10-6-1

Department of Energy, Mines and Resources | Ministère de l'Énergie, des Mines et des Ressources

Department of Indian Affairs and Northern Development | Ministère des Affaires indiennes et du Nord canadien

Canada

Canada Oil and Gas Lands Administration | Administration du pétrole et du gaz des terres du Canada

D.A. 1320
E.A. 229

				Well Status	
Nova Scotia	☐	West Coast	☐	Suspended	■
Newfoundland	☐	Northern	■	Completed	☐
Gulf of St. Lawrence	☐	Hudson Bay	☐	Abandoned	☐

WELL TERMINATION RECORD

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

WELL DATA

Well Name: Northcor et al Liard F-25A Area: Ft. Liard

Grid Area: 60-30-123-30 Field/Pool: Liard Exploratory

Permit or Lease No.: EA # 229 Final Coordinates: Lat: 60°24'22.25"N Long: 123°35'7.58"W

Drilling Unit: Bawden Rig #33 Elevations-RKB: 723.0m GSL: 716.6m

Spud Date: 86-08-05 Rig Released: 87-02-25 Total Depth: 3478m (MD) 3433m (TVD)

CASING AND CEMENTING

O.D.	Weight	Grade	Depth Set	Cement and Additives
244mm Production Liner	64.74 kg/m	L-80	3187	0-1-0 "G" + .3% Halad -22A + .75% CFR-2 + 1% HR-12 (25 T, 19m³) 0-1-0 "G" (12 T, 9.12m³)
178mm 38.69, Production String (tie back)	43.15 kg/m	L-80	3477-3165	0-1-0 "G" + 35% SSA + 1.2% HR-12 + .75% CFR-2 + 2% Halad-22A (10 T, 9.8m³)
178mm	34.22, 38.69 43.15 kg/m	L-80	3165	1-1-2"G"+.5%CFR-2+.1%HR-12(31.9T,34.45m³) 0-1-0"G"+35%SSA-1+.5%CFR-2(8.5T,8.67m³) 0-1-0"G"+3%SSA-1+.2%HR-12(4.7T,3.57m³)

PLUGGING PROGRAM

Approval of the following program was obtained by (person) Terence G. Dexter from (person) Kem Singh of the Canada Oil and Gas Lands Administration by means of verbal on February 13, 19 87

Type of Plug:	Interval:	Feet:	Cement and Additives:
Drillable Bridge Plug	3447.7m	--	
Drillable Bridge Plug	3315m	--	
Drillable Bridge Plug	3238m	--	
Cement	3238-3171m	--	1.3T 0-1-0"G"+35%SSA-1+.5%CFR-2+1.3%HR-12
Drillable Bridge Plug	700m	--	
Cement	700-667m	--	9T 0-1-0 "G" + .5% CFR-2

Lost Circulation/Overpressure Zones: lost 7m³ slowly at 2978m - 2985m, lost 9m³ slowly at 3370m

Equipment left on Seafloor (Describe): N/A

Provision for Re-entry (Describe and attach sketch): See attached sketch.

Cores: Type: None Intervals: ---

None

Other Downhole Completion/Suspension Equipment:

CERTIFICATION

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

Signed [signature] P. Eng. Title: Vice President & Operations Manager

Name: Terence G. Dexter Date: March 31, 1987

Acknowledged by: [signature]
Engineering Branch

Date: May 26, 1987

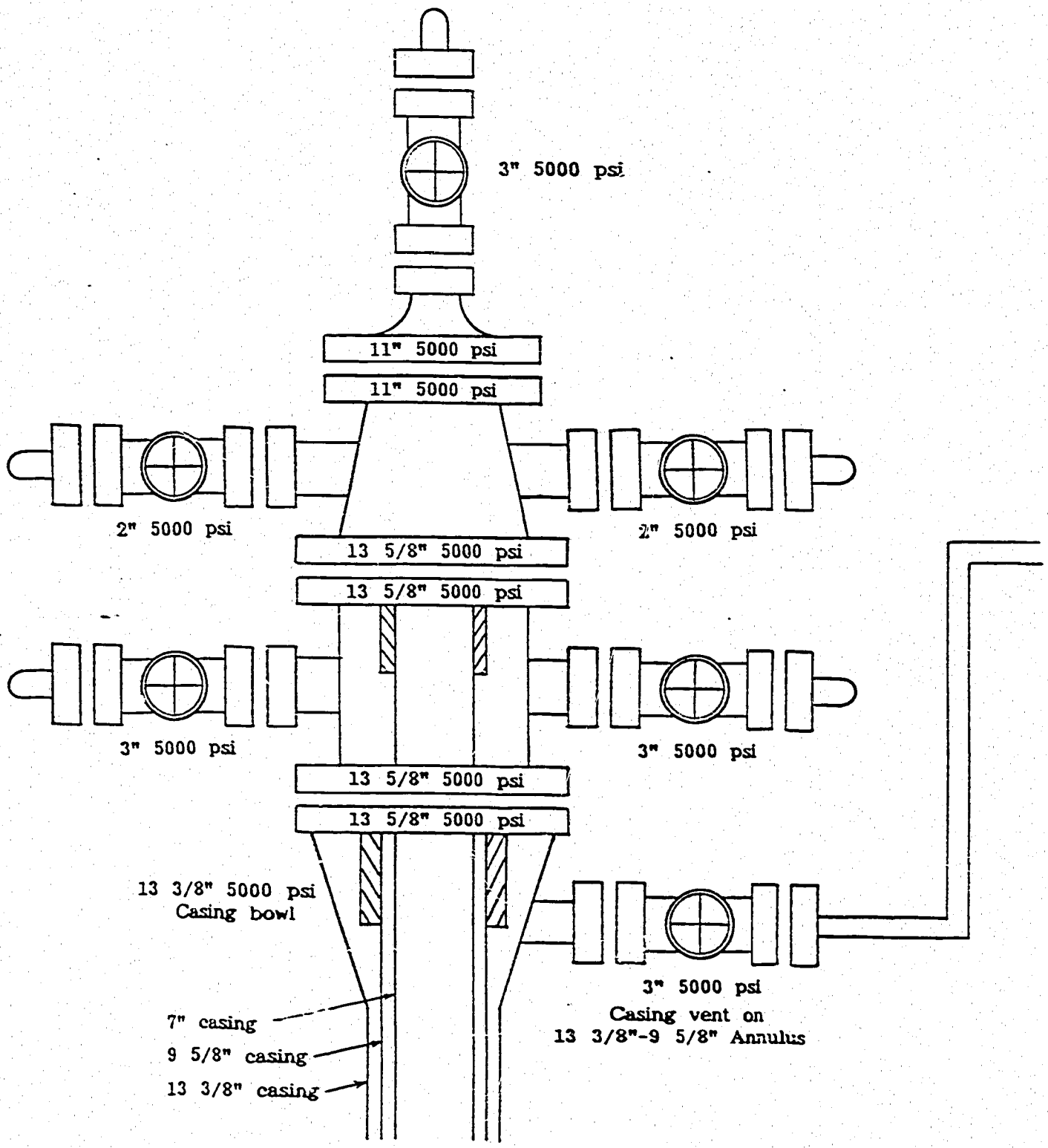
File: 9211-N10-6-1

Department of Energy, Mines and Resources | Ministère de l'Énergie, des Mines et des Ressources

Department of Indian Affairs and Northern Development | Ministère des Affaires indiennes et du Nord canadien

Canada

NORTHCOR et al LIARD F-25A
Existing Wellhead Configuration



APPENDIX

1. Drill Stem Tests
2. Mud Properties
3. Gravity Density Survey
4. Directional Survey Report
5. DST Gas Analysis
6. Production Test Data
7. Stimulation Reports
8. DC Plots
9. Shale Plot

TEST #1

TESTERS	R. McIntosh
WITNESS	D. Kilpatrick
DRILLING CONTRACTOR	Bawden 33

HALLIBURTON SERVICES LIMITED
FORMATION TESTING
DATA SHEET

REFER TO INVOICE NO.	75 806
DATE OF TEST	86-11-19
TEST No.	1
JOB TYPE	Dual Straddle

PRESSURE SUMMARY kPa

GAUGE NUMBER		2175	4477	763	3655		
GAUGE DEPTH		3365.01	3370.28	3381.83	3464.75		
BLANKED OFF		~~YES~~/NO	~~YES~~/NO	~~YES~~/NO	~~YES~~/NO	YES/NO	YES/NO
HOUR CLOCK TRAVEL		24	24	24	24		
INITIAL HYDROSTATIC			35 432	35 500	36 404		
FIRST FLOW	INITIAL	3 204	3 463	3 351			
	FINAL	3 204	3 360	3 329			
FIRST CLOSED IN		3 258	10 924	10 897			
SECOND FLOW	INITIAL	3 066	3 257	3 327			
	FINAL	3 266	*	3 456			
SECOND CLOSED IN		3 266	*	8 126			
THIRD FLOW	INITIAL						
	FINAL						
THIRD CLOSED IN							
FINAL HYDROSTATIC			*	35 507	35 804		

TIME PERIODS

	FIRST	SECOND	THIRD		TIME
FLOW	10	104		TESTER VALVE OPENED	16:10
CLOSED IN	45	240		PACKER UNSEATED	22:49

LIQUID RECOVERY DATA

MEASURED FROM TESTER VALVE

METRES	DESCRIPTION OF LIQUID
304	Gas cut water.
50	Gas cut drilling mud.
354	TOTAL LIQUID RECOVERY

EQUIPMENT AND WELL DATA

FORMATION TESTED	Nahanni	TEMP. REC. No.	TE38
		DEPTH	3383.08 m
		MAX. TEMP.	150 °C
NET PRODUCTIVE THICKNESS	m	MUD TYPE	Gel
K B ELEVATION	723 m	MUD DENSITY kg/m³	1100
		MUD VISC s/L	45
ALL DEPTHS MEASURED FROM:	☒ KB ☐ GROUND	CASING OR HOLE SIZE	216 mm
PACKER DEPTHS	TOP 3378.9 BOTTOM 3414.1 m	RATHOLE SIZE	N/A mm
DEPTH OF TESTER VALVE	m	DRILL PIPE OD mm	127 kg/m 29
CASING PERFORATED INTERVAL	N/A m	DRILL COLLARS ABOVE TESTER VALVE ID mm	73 LENGTH m 56.36
TOTAL DEPTH	3466 m	SURFACE CHOKE	25.4 mm
AMOUNT AND TYPE CUSHION	304 m Water	BOTTOM CHOKE	19.1 mm

SAMPLE DATA

OIL GRAVITY _____ @ _____ °C
GAS/OIL RATIO _____
REFRACTOMETER/RELATIVE DENSITY
RECOVERY WATER _____ @ _____ °C
CHLORIDE CONTENT _____ mg/L

SAMPLE SHIPPED TO LABORATORY	YES	NO
SAMPLER No. 503	☒	☐
GAS SAMPLE BOTTLE No.	☐	☐

LABORATORY Taken by Northor

REMARKS

* Clock ran out.

COMPANY: NORTHCOR ENERGY LTD.
LEGAL DESCRIPTION: 60-24-22 123-35-07
PROVINCE OR TERRITORY: N.W.T.
FIELD OR AREA: LIARD
TEST NUMBER: 1
WELL NAME AND NUMBER: NORTHCOR ET AL LIARD F-25A
TESTED INTERVAL: 3377.88 - 3414.09

TICKET NO. 75 806

DATES AND TIMES (00:00-24:00 HRS.)	CHOKE SIZE (mm)	SURFACE PRESSURE (kPa)	GAS RATE (m^3/day)	LIQUID RATE (m^3/day)	REMARKS
86-11-19					
03:00					Rig out out hole.
					Pull all tools onto floor.
					Steam off tools.
03:20					Load hydrostatic recorder.
04:51					Load temp. recorder.
04:54					Load outside recorder.
05:57					Load fluid recorder.
06:14					Load inside recorder with 12 hr. clock
					at engineer's request.
06:30					Tool built. Weight below hydrospring
					8000 daN.
					Run in 300 m of collars and pipe, add
					water cushion. Rig slip and cut line.
					Trip in.
14:12					On bottom, string weight 80 000 daN with
					15 000 drag. Head up.
14:40					Rig up flare line riser to floor.
16:09					Set 15 000 daN on tools.
16:10					Tool open. Very weak blow throughout
					Preflow.
16:20					Shut in tool.
16:47					While shut in blow to pail bottom. Vent
					to pit.
16:53					Return to pail and was dead.
17:05					Open tool. Strong blow to pail bottom in
					10 minutes. Vent to pit for 5 minutes.
					No gas. Return to pail. Increase to
					pail bottom in 20 minutes. Vent to pit
					for 5 minutes. No gas. Return to pail
					with a 4" blow through remainder.
18:49					Shut in tool.
22:49					Pull 100 000 to unset packers. Free for
					6 m then tight. Work and jar pulling to
					a maximum of 165 000. Find string
					84 000.
24:00					Tool free. Pull out of hole.

TICKET NO. 75 806

DATES AND TIMES (00:00-24:00 HRS.)	CHOKE SIZE (mm)	SURFACE PRESSURE (kPa)	GAS RATE (m^3/day)	LIQUID RATE (m^3/day)	REMARKS
09:30					On surface. Recover 354 m total.
					304 m water. 50 m drilling fluid. All
					gas cut.
					Obtain 4 samples.
					Break down tools.
					Bottom packer of the top set was damaged
					4 - 5" of rubber left down hole.
					Jars were damaged and no longer recock.
					Bottom packers both stripped off.
11:30					Job complete.

PRODUCTION TEST DATA

Form 225

HALLIBURTON SERVICES LIMITED

SPECIAL PRESSURE DATA

DATE: 86-11-19 TICKET # 75806

Gauge Number	:	763.	
Gauge Depth	:	3382.	m
Time of Flow	:	10.0	min.
Final Pressure	:	3329.1	kPa.

Initial Hydrostatic Pressure = 35499.7 kPa
Final Hydrostatic Pressure = 35507.1 kPa

GAUGE 1, FLOW 1

	Time Deflection (in)	Time (minutes)	Pressure (kPa)
1.	0.0000	0.0	3351.3
2.	0.0174	5.0	3329.1
3.	0.0350	10.0	3329.1

HALLIBU TON SERVICES L IITED

GAUGE 1, CIP 1

	Time Deflection (in)	Time (minutes)	T+dt Log ---- dt	Pressure (kPa)
1.	0.0067	2.0	0.7713	4477.3
2.	0.0131	4.0	0.5452	5223.0
3.	0.0198	6.0	0.4249	5828.2
4.	0.0262	8.0	0.3530	6420.0
5.	0.0330	10.0	0.3092	6909.8
6.	0.0395	12.0	0.2629	7412.5
7.	0.0493	15.0	0.2218	7999.7
8.	0.0657	20.0	0.1762	8895.3
9.	0.0822	25.0	0.1461	9504.7
10.	0.0985	30.0	0.1250	9994.0
11.	0.1150	35.0	0.1092	10349.9
12.	0.1315	40.0	0.0969	10646.5
13.	0.1479	45.0	0.0872	10897.1

HALLIBURTON SERVICES LIMITED

SPECIAL PRESSURE DATA

DATE: 86-11-19 TICKET # 75806

* Gauge Number	:	783.	*
* Gauge Depth	:	3382. m	*
* Time of Flow	:	104.0 min.	*
* Final Pressure	:	3456.4 kPa.	*

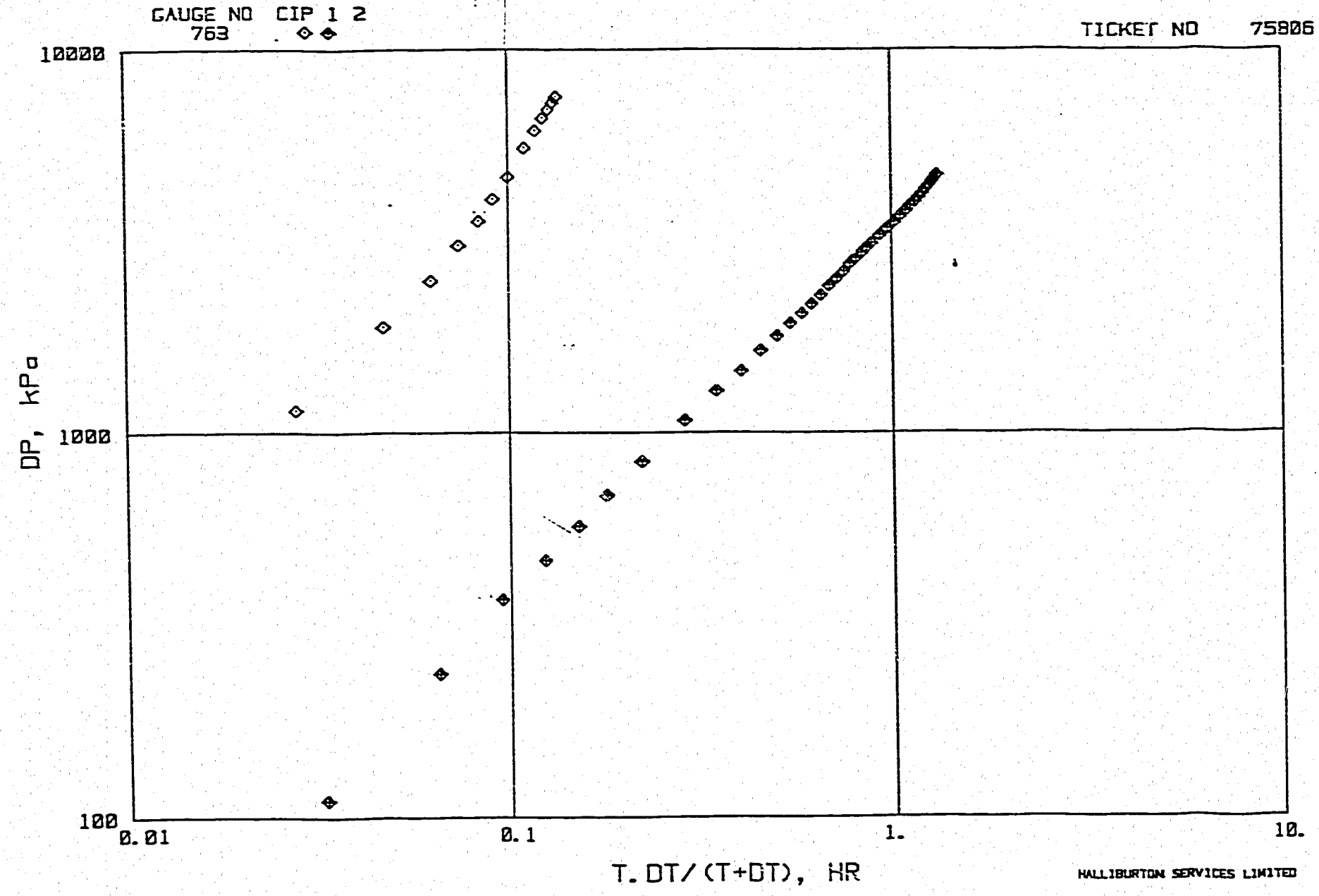
GAUGE 1, FLOW 2

	Time Deflection (in)	Time (minutes)	Pressure (kPa)
1.	0.0000	0.0	3327.7
2.	0.0332	10.0	3410.5
3.	0.0661	20.0	3432.7
4.	0.0994	30.0	3432.7
5.	0.1325	40.0	3447.5
6.	0.1654	50.0	3462.3
7.	0.1985	60.0	3462.3
8.	0.2317	70.0	3462.3
9.	0.2647	80.0	3462.3
10.	0.2975	89.9	3462.3
11.	0.3308	100.0	3462.3
12.	0.3441	104.0	3456.4

HALLIBURTON SERVICES LIMITED

GAUGE 1, CIP 2

	Time Deflection (in)	Time (minutes)	Log T+dt / dt	Pressure (kPa)
1.	0.0058	2.0	1.7547	3528.9
2.	0.0134	4.0	1.4675	3654.6
3.	0.0199	6.0	1.3028	3786.3
4.	0.0267	8.0	1.1825	3884.0
5.	0.0333	10.0	1.0936	3989.0
6.	0.0399	12.0	1.0219	4105.9
7.	0.0500	15.0	0.9343	4261.3
8.	0.0667	20.0	0.8257	4496.5
9.	0.0832	25.0	0.7454	4705.2
10.	0.0999	30.0	0.6814	4867.9
11.	0.1166	35.0	0.6291	5058.8
12.	0.1334	40.0	0.5851	5208.2
13.	0.1499	45.0	0.5482	5348.8
14.	0.1667	50.0	0.5156	5467.2
15.	0.1831	55.0	0.4877	5585.5
16.	0.2000	60.0	0.4622	5703.9
17.	0.2164	65.0	0.4401	5837.1
18.	0.2333	70.0	0.4196	5946.6
19.	0.2500	75.0	0.4012	6051.6
20.	0.2666	80.0	0.3846	6177.4
21.	0.2832	85.0	0.3694	6273.6
22.	0.2998	90.0	0.3554	6362.3
23.	0.3166	95.0	0.3423	6458.5
24.	0.3332	100.0	0.3304	6539.9
25.	0.3664	110.0	0.3089	6695.3
26.	0.3998	120.0	0.2900	6835.8
27.	0.4332	130.0	0.2734	6963.2
28.	0.4664	140.0	0.2587	7095.2
29.	0.4998	150.0	0.2455	7213.8
30.	0.5331	160.0	0.2336	7332.4
31.	0.5664	170.0	0.2228	7436.2
32.	0.5995	180.0	0.2131	7540.0
33.	0.6329	190.0	0.2041	7645.3
34.	0.6663	200.0	0.1959	7755.0
35.	0.6997	210.0	0.1883	7851.4
36.	0.7328	220.0	0.1813	7941.9
37.	0.7661	230.0	0.1748	8029.3
38.	0.7995	240.0	0.1688	8125.7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763
TICKET NO 75806
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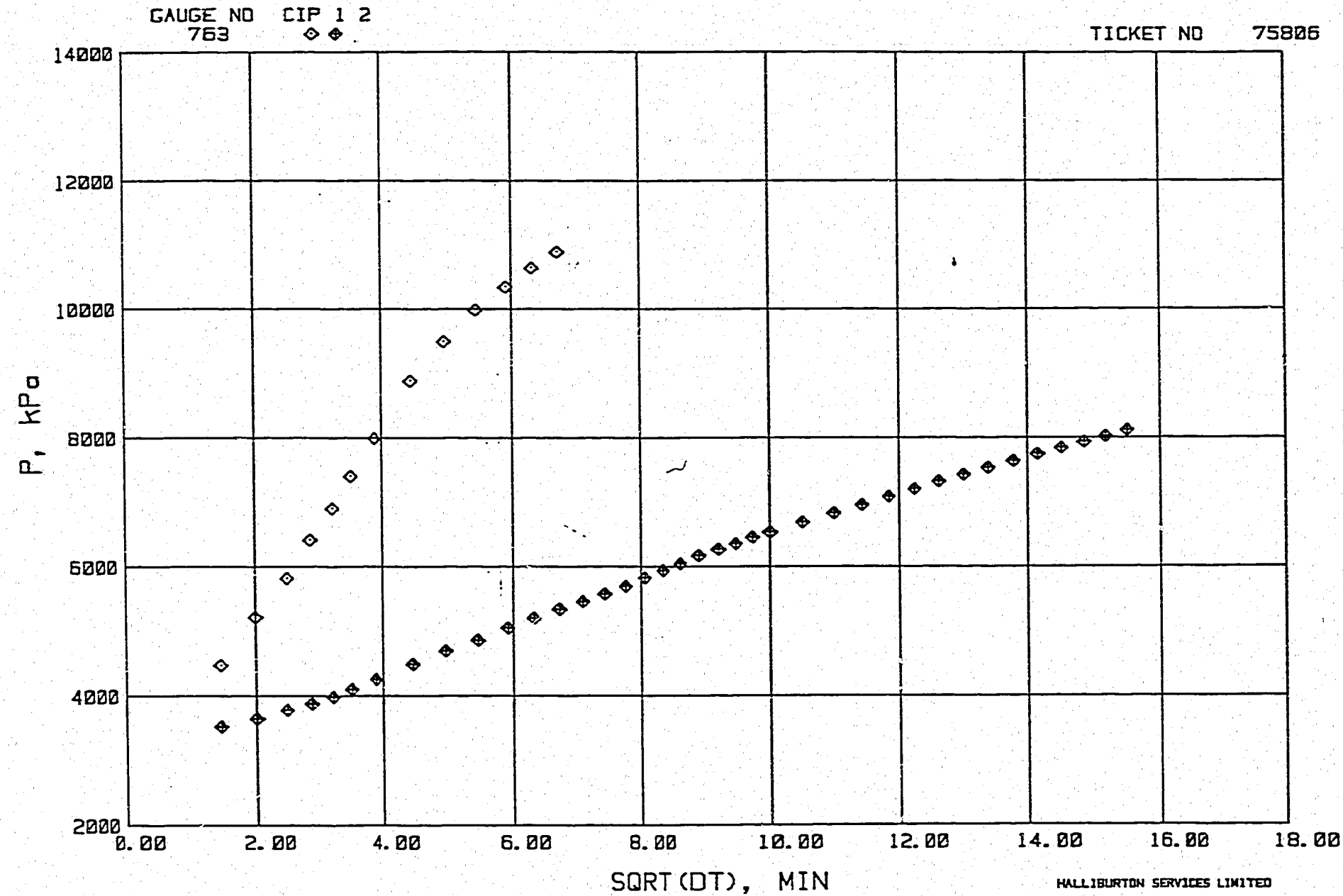
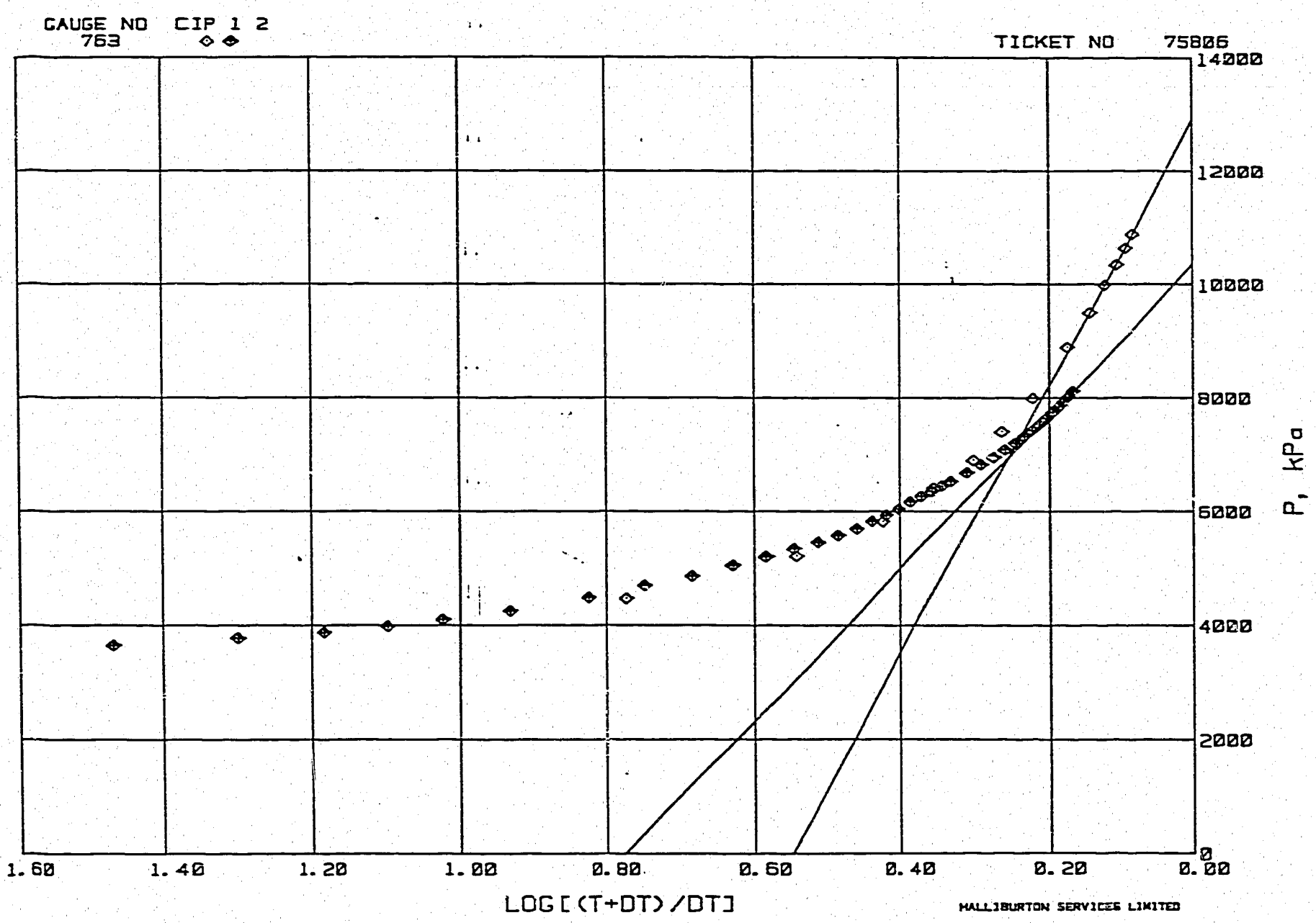
1000
100
DP, kPa
0.01
0.1
1.
10.
T. DT/(T+DT), HR
HALLIBURTON SERVICES LIMITED


GAUGE NO
763
CIP 1 2
TICKET NO 75806
14000
12000
10000
8000
6000
4000
2000
P, kPa
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
SQRT(DT), MIN
HALLIBURTON SERVICES LIMITED


GAUGE NO
763
CIP 1 2
TICKET NO 75806
14000
12000
10000
8000
6000
4000
2000
0
P, kPa
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
LOG [(T+DT)/DT]
HALLIBURTON SERVICES LIMITED

HALLIBURTON SERVI(LIMITED TICKET NO. 75895

		O.D.(mm)	I.D.(mm)	LENGTH(m)	DEPTH(m)
4	FLEX WEIGHT	166.0	80.0	28.30	
3	DRILL COLLARS	171.0	73.0	28.21	
50	IMPACT REVERSING SUB	171.0	73.0	0.30	
3	DRILL COLLARS	171.0	73.0	28.15	
5	CROSSOVER	171.0	73.0	0.30	
80	AP RUNNING CASE	127.0	57.0	1.25	
12	DUAL CIP VALVE	127.0	22.1	1.79	
62	MULTIPLE CIP SAMPLER	127.0	19.1	2.54	
80	AP RUNNING CASE	127.0	57.0	1.25	
15	JAR	127.0	44.5	1.52	
16	VR SAFETY JOINT	127.0	25.4	0.86	
17	PRESSURE EQUALIZING CROSSOVER	127.0	19.1	0.31	
70	OPEN HOLE PACKER	197.0	38.9	1.83	
70	OPEN HOLE PACKER	197.0	38.9	1.83	3377.90
20	FLUSH JOINT ANCHOR	127.0	60.2	3.05	
17	PRESSURE EQUALIZING CROSSOVER	127.0		0.31	
81	BLANKED-OFF RUNNING CASE	127.0		1.25	
82	TEMPERATURE RUNNING CASE	127.0	57.0	1.25	
5	CROSSOVER	127.0	60.2		
5	CROSSOVER	171.0	73.0	0.30	
3	DRILL COLLARS	171.0	73.0	27.96	
5	CROSSOVER	171.0	73.0	0.30	
5	CROSSOVER	127.0	57.0	0.30	
70	OPEN HOLE PACKER	197.0	38.9	1.83	3414.09
70	OPEN HOLE PACKER	197.0	38.9	1.83	
5	CROSSOVER	127.0	60.2	0.31	
5	CROSSOVER	171.0	57.0	0.30	
1	DRILL PIPE	127.0	107.0	46.72	
5	CROSSOVER	171.0	57.0	0.30	

CONTINUED

EQUIPMENT DATA

HALLIBURTON SERVIC LIMITED TICKET NO. 75303

			O.D. (mm)	I.D. (mm)	LENGTH (m)	DEPTH (m)
31		BLANKED-OFF RUNNING CASE.....	127.0	62.0	1.25	

EQUIPMENT DATA

TEST #2

TESTERS	R. McIntosh
WITNESS	W. Kyster
DRILLING CONTRACTOR	Bawden 33

HALLIBURTON SERVICES LIMITED
FORMATION TESTING
DATA SHEET

REFER TO INVOICE NO.	75 807
DATE OF TEST	86-11-22
TEST No.	2
JOB TYPE	Dual Straddle

PRESSURE SUMMARY kPa

GAUGE NUMBER		4477	2175	763	3655		
GAUGE DEPTH		3215.05	3220.92	3230.95	3464.75		
BLANKED OFF		~~YES~~/NO	~~YES~~/NO	~~YES~~/NO	~~YES~~/NO	YES/NO	YES/NO
HOUR CLOCK TRAVEL		24	24	24	24		
INITIAL HYDROSTATIC			33 875	33 800	36 184		
FIRST FLOW	INITIAL	2 710	*	24 426			
	FINAL	10 170	*	21 724			
FIRST CLOSED IN		634	28 373	28 178			
SECOND FLOW	INITIAL	634	18 041	23 260			
	FINAL	20 983	18 175	21 798			
SECOND CLOSED IN		2 447	28 066	27 861			
THIRD FLOW	INITIAL						
	FINAL						
THIRD CLOSED IN							
FINAL HYDROSTATIC			33 804	33 572	35 872		

TIME PERIODS

	FIRST	SECOND	THIRD		TIME
FLOW	8	120		TEST VALVE OPENED	06:30
CLOSED IN	67	240		PACKER UNSEATED	13:45

LIQUID RECOVERY DATA

MEASURED FROM TESTER VALVE

METRES	DESCRIPTION OF LIQUID
244	Salt water.
244	TOTAL LIQUID RECOVERY

EQUIPMENT AND WELL DATA

FORMATION TESTED	Nahans	TEMP. REC. No. DEPTH / MAX. TEMP.	157 m / °C
NET PRODUCTIVE THICKNESS	10 m	MUD TYPE	Gel
K.B. ELEVATION	723 m	MUD DENSITY kg/m³ / MUD VISC s/L	1110 / 45
ALL DEPTHS MEASURED FROM:	☒ KB ☐ GROUND	CASING OR HOLE SIZE	216 mm
PACKER DEPTHS TOP / BOTTOM	3227 / 3263 m	RATHOLE SIZE	N/A mm
DEPTH OF TESTER VALVE	m	DRILL PIPE OD mm / kg/m	127 / 30.5
CASING PERFORATED INTERVAL	N/A m	DRILL COLLARS ABOVE TESTER VALVE ID mm / LENGTH m	73 / 75.14
TOTAL DEPTH	3466 m	SURFACE CHOKE	25.4 mm
AMOUNT AND TYPE CUSHION	300 m Water	BOTTOM CHOKE	19.1 mm

SAMPLE DATA

OIL GRAVITY _____ @ _____ °C
GAS/OIL RATIO _____
REFRACTOMETER/RELATIVE DENSITY
RECOVERY WATER _____ @ _____ °C
CHLORIDE CONTENT _____ mg/L

SAMPLE SHIPPED TO LABORATORY — YES ☒ NO ☐
SAMPLER No. 507
GAS SAMPLE BOTTLE No. _____
LABORATORY 9153

REMARKS

* Not readable.

Samples taken by Northcor.

COMPANY: NORTHCOR ENERGY LTD.
LEGAL DESCRIPTION: 60-24-22 123-35-07
PROVINCE OR TERRITORY: N.W.T.
FIELD OR AREA: LIARD
TEST NUMBER: 2
WELL NAME AND NUMBER: HUKINUK E-1 ET AL LIARD F-25A
TESTED INTERVAL: 3227 - 3263

TICKET NO. 75 307

DATES AND TIMES (00:00-24:00 HRS.)	CHOKE SIZE (mm)	SURFACE PRESSURE (kPa)	GAS RATE (m^3/day)	LIQUID RATE (m^3/day)	REMARKS
86-11-22					
21:00					Start to pick up tools. Repair 4 packers.
					Steam all tools as they were badly iced up.
86-11-23					
00:45					Tools built, weight below hydrospring
					8000 daN.
01:00					Start to run collars.
					Note: Add drilling jars as mine were
					damaged on DST #1.
					Add 304 m water cushion.
					Run in hole.
05:30					On bottom. String weight 80 000 daN.
					Head up.
06:30					Tool open for Preflow. Very weak initial
					to very strong in 1 minute.
06:34					Water cushion. Unloading gas to surface.
06:38					Shut in tool.
06:50					Still 250 PSI on manifold.
					Bleeding down sour 1600 PPM.
07:02					25 PSI on mainfold. Bleeding down.
07:45					Open for Preflow.
07:49	25.4	1379	162 022		Gas is quite wet.
07:50	25.4	1379	162 022		
07:55	25.4	1586	184 698		
08:00	25.4	1655	192 257		Close at manifold to relight flare.
08:05	25.4	2896	328 206		
08:10	25.4	3034	343 324		
08:15	25.4	3103	350 882		
08:20	25.4	3103	350 882		
08:25	25.4	3103	350 882		
08:30	25.4	3172	358 441		Very wet, fluid reading 124 000 PPM salt.
08:35	25.4	3172	358 441		
08:40	25.4	3172	358 441		
08:45	25.4	3172	358 441		
08:50	25.4	3172	358 441		
08:55	25.4	3172	358 441		
09:00	25.4	3172	358 441		

TICKET NO. 75 807

DATES AND TIMES (00:00-24:00 HRS.)	CHOKE SIZE (mm)	SURFACE PRESSURE (kPa)	GAS RATE (m^3/day)	LIQUID RATE (m^3/day)	REMARKS
09:05	25.4	3172	358 441		
09:10	25.4	3172	358 441		
09:15	25.4	3172	358 441		
09:20	25.4	3172	358 441		
09:25	25.4	3172	358 441		
09:30	8	8274			Pinch down choke. Try to keep a flare burning.
09:42	8	10 343			
09:45					Rotate pipe to shut in tool
					Open manifold to pit.
13:45					Pull to 120 000 and work pipe to free up packers.
14:15					Start out of hole.
20:00					Hit fluid 244 mm above tool.
					Take 3 samples at 244 m, at 112 m, and at tool.
21:00					Recover and read charts.
					Breakdown and load out.
24:00					Job complete.

PRODUCTION TEST DATA

Form 825

HALLIBURTON SERVICES LIMITED

SPECIAL PRESSURE DATA

DATE: 86-11-22 TICKET # 75807

* Gauge Number	:	763.	*
* Gauge Depth	:	3231. m	*
* Time of Flow	:	8.0 min.	*
* Final Pressure	:	21724.4 kPa.	*

Initial Hydrostatic Pressure = 33800.3 kPa
Final Hydrostatic Pressure = 33572.4 kPa

GAUGE 1, FLOW 1

	Time Deflection (in)	Time (minutes)	Pressure (kPa)
1.	0.0000	0.0	24426.3
2.	0.0098	4.0	22425.7
3.	0.0196	8.0	21724.4

HALLIBURTON SERVICES LIMITED

GAUGE 1, CIP 1

	Time Deflection (in)	Time (minutes)	T+dt Log ---- dt	Pressure (kPa)	M(P) (P Pa.Pa/Pa.s)
1.	0.0065	2.0	0.7044	26434.3	41264.1
2.	0.0133	4.0	0.4751	26796.0	42249.8
3.	0.0198	6.0	0.3681	27047.0	42933.8
4.	0.0265	8.0	0.3003	27238.9	43456.8
5.	0.0331	10.0	0.2548	27392.5	43875.3
6.	0.0395	12.0	0.2224	27495.8	44156.9
7.	0.0494	15.0	0.1860	27637.7	44547.2
8.	0.0660	20.0	0.1462	27807.9	45021.5
9.	0.0826	25.0	0.1205	27918.8	45330.8
10.	0.0992	30.0	0.1025	28007.6	45578.3
11.	0.1154	35.0	0.0895	28052.0	45702.0
12.	0.1322	40.0	0.0791	28089.0	45805.1
13.	0.1486	45.0	0.0710	28117.1	45883.5
14.	0.1651	50.0	0.0644	28126.0	45908.3
15.	0.1817	55.0	0.0589	28148.2	45970.1
16.	0.1980	60.0	0.0544	28161.5	46007.2
17.	0.2145	65.0	0.0504	28176.3	46048.5
18.	0.2212	67.0	0.0490	28177.8	46052.6

HALLIBURTON SERVICES LIMITED

SPECIAL PRESSURE DATA

DATE: 86-11-22 TICKET # 75807

Gauge Number	:	763.	
Gauge Depth	:	3231.	m
Time of Flow	:	120.0	min.
Final Pressure	:	21798.2	kPa.

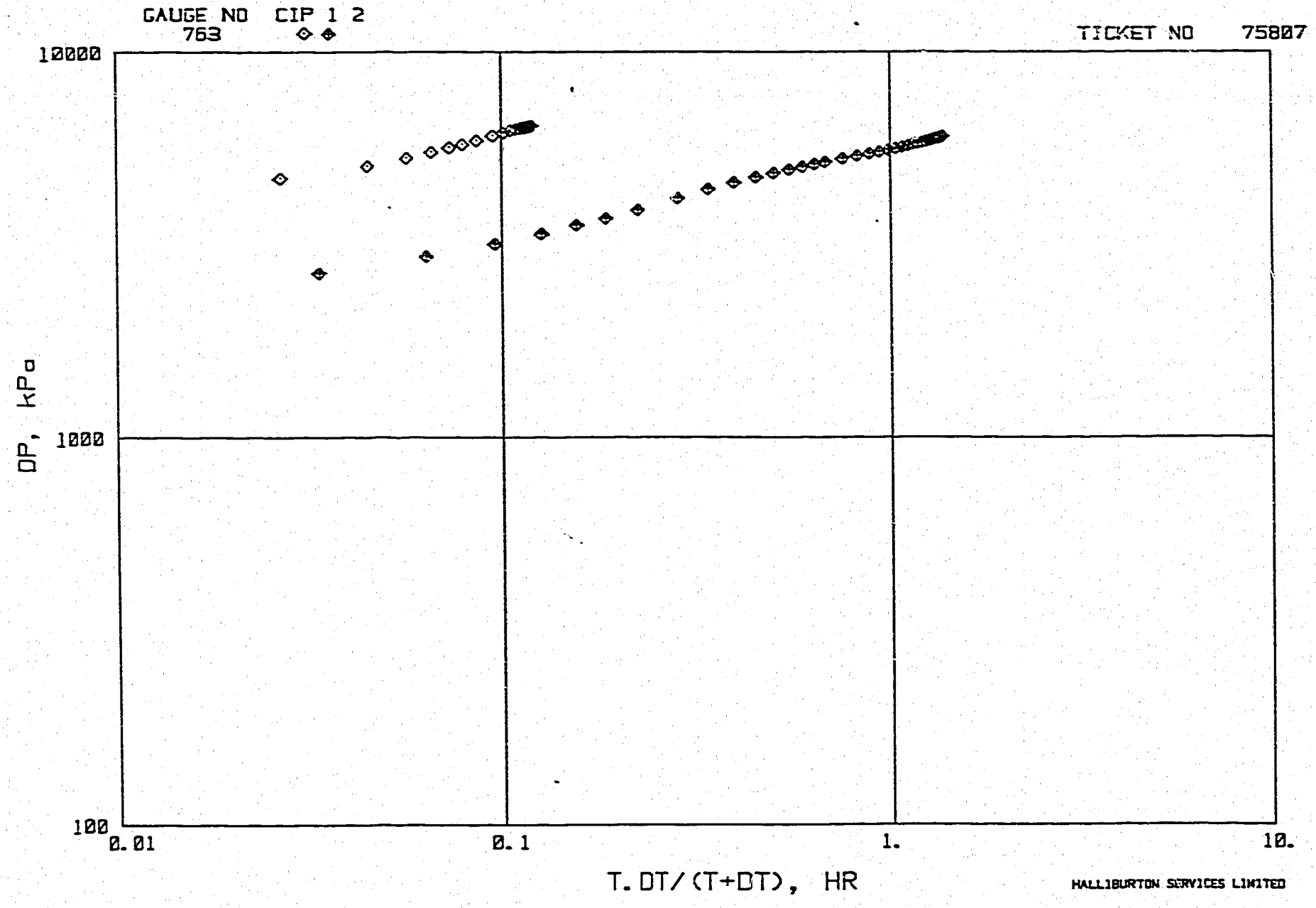
GAUGE 1, FLOW 2

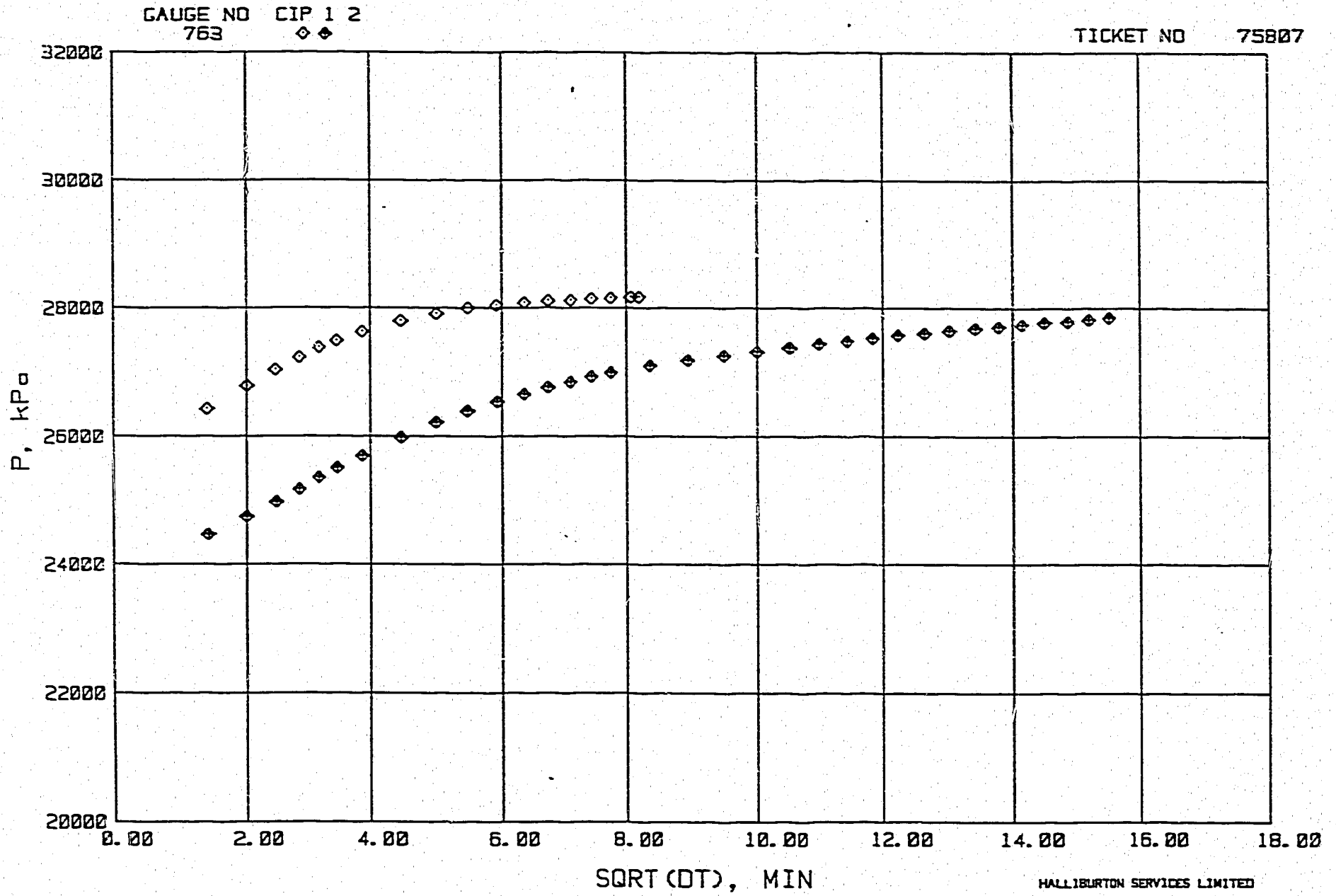
	Time Deflection (in)	Time (minutes)	Pressure (kPa)
1.	0.0000	0.0	23259.9
2.	0.0332	10.0	20120.1
3.	0.0664	20.0	19755.3
4.	0.0994	30.0	19586.3
5.	0.1326	40.0	19660.4
6.	0.1657	50.0	19592.2
7.	0.1988	60.0	19526.9
8.	0.2323	70.1	19439.5
9.	0.2653	80.1	19363.8
10.	0.2985	90.1	19289.7
11.	0.3314	100.0	19215.6
12.	0.3645	110.0	19526.9
13.	0.3977	120.0	21798.2

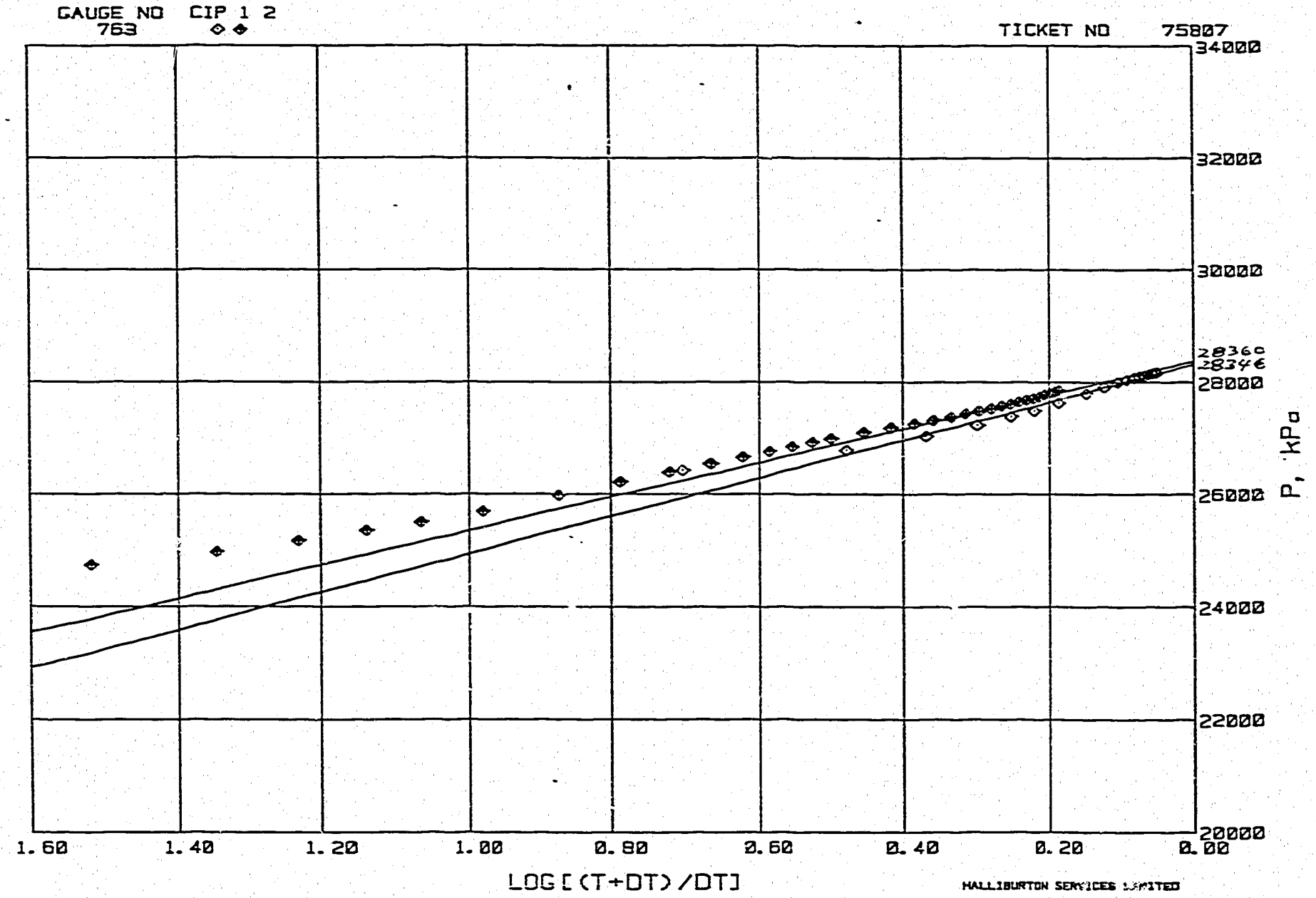
HALLIBURTON SERVICES LIMITED

GAUGE 1, CIP 2

	Time Deflection (in)	Time (minutes)	T+dt Log ---- dt	Pressure (kPa)	M(P) (P Pa.Pa/Pa.s)
1.	0.0067	2.0	1.8101	24470.6	36058.5
2.	0.0133	4.0	1.5189	24751.1	36782.5
3.	0.0201	6.0	1.3463	24980.0	37385.1
4.	0.0267	8.0	1.2293	25179.3	37914.6
5.	0.0333	10.0	1.1397	25363.9	38404.8
6.	0.0401	12.0	1.0654	25513.0	38800.9
7.	0.0498	15.0	0.9802	25703.4	39306.8
8.	0.0666	20.0	0.8690	25991.3	40071.5
9.	0.0831	25.0	0.7872	26227.6	40700.8
10.	0.0997	30.0	0.7221	26404.8	41183.7
11.	0.1168	35.1	0.6672	26552.4	41586.0
12.	0.1331	40.0	0.6233	26669.0	41903.8
13.	0.1497	45.0	0.5850	26772.4	42185.5
14.	0.1663	50.0	0.5517	26856.5	42414.8
15.	0.1831	55.0	0.5220	26936.3	42632.1
16.	0.1997	60.0	0.4960	27002.7	42813.1
17.	0.2329	70.0	0.4517	27113.4	43114.9
18.	0.2663	80.0	0.4149	27196.1	43340.2
19.	0.2997	90.0	0.3841	27268.5	43537.3
20.	0.3327	100.0	0.3580	27327.5	43698.2
21.	0.3662	110.0	0.3351	27386.6	43859.2
22.	0.3995	120.0	0.3152	27445.6	44020.1
23.	0.4328	130.0	0.2976	27489.9	44140.8
24.	0.4660	140.0	0.2820	27535.7	44265.5
25.	0.4996	150.1	0.2678	27584.4	44398.7
26.	0.5327	160.1	0.2552	27615.5	44485.3
27.	0.5658	170.0	0.2438	27654.0	44592.5
28.	0.5992	180.0	0.2332	27689.5	44691.5
29.	0.6323	190.0	0.2237	27717.6	44769.9
30.	0.6656	200.0	0.2149	27748.7	44856.5
31.	0.6991	210.0	0.2067	27785.7	44959.6
32.	0.7323	220.0	0.1991	27801.9	45005.0
33.	0.7655	230.0	0.1922	27830.1	45083.3
34.	0.7988	240.0	0.1856	27861.1	45170.0


GAUGE NO CIP 1 2
763
TICKET NO 75807
10000
1000
100
DP, kPa
0.01
0.1
1.
10.
T. DT/(T+DT), HR
HALLIBURTON SERVICES LIMITED


GAUGE NO 763
CIP 1 2
TICKET NO 75807
32000
30000
28000
26000
24000
22000
20000
P, kPa
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
SQRT(DT), MIN
HALLIBURTON SERVICES LIMITED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763
CIP 1 2
TICKET NO 75807
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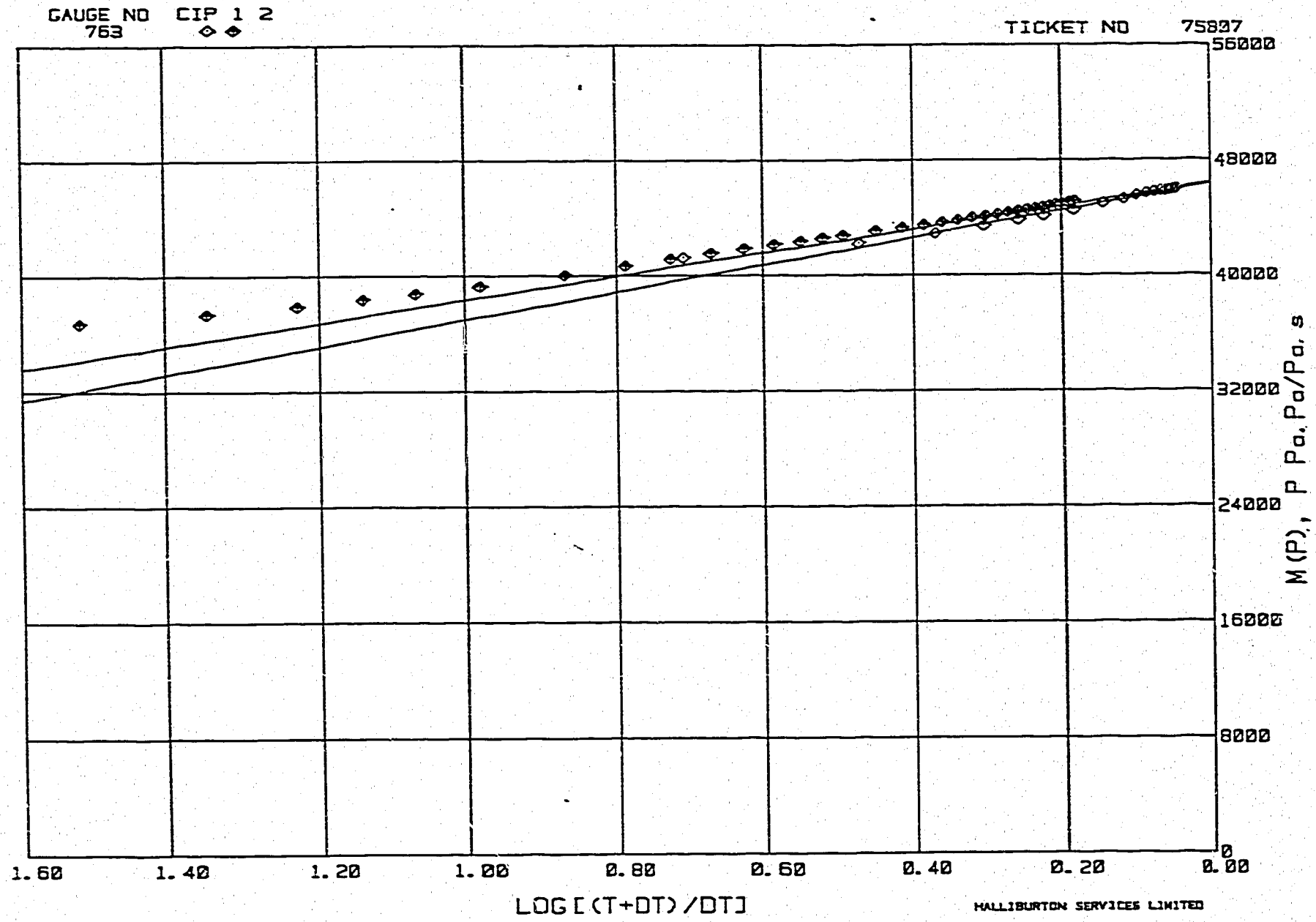
32000
30000
28360
28346
28000
26000
24000
22000
20000
P, kPa
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
LOG [(T+DT)/DT]
HALLIBURTON SERVICES LIMITED


GAUGE NO
763
CIP 1 2
TICKET NO 75807
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48000
40000
32000
24000
16000
8000
0
M(P), P Pa, Pa/Pa, s
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
LOG [(T+DT)/DT]
HALLIBURTON SERVICES LIMITED

HALLIBURTON SERVICES LIMITED

--- INTERPRETATIONS AND CALCULATIONS FOR GAS WELLS ---

USING HORNER METHOD

TICKET NO. 75807

FORMATION/FLUID PROPERTIES

TEMP =	150.0 C	SPGR =	0.600	Z =	1.0
POROS =	10. %	VISG =	20. uPa.s	CT =	0.00004 1/kPa

EXTRAPOLATED PRESSURE DATA

GAUGE	CIP	m3/d	P*	M(P*) (P Pa.Pa/Pa.s	M(Pf))	SLOPE
763.	1	0.0	28345.5	46520.3	0.0	9432.3
763.	2	358441.0	28359.8	46560.0	29319.4	8100.0

RESULTS

PARAMETER NAME		GAUGE NO. 763. FIRST	SECOND	THIRD	GAUGE NO. 0. FIRST	SECOND	THIRD
Theor. Flow Cap.	Kh	0.0	28.4	0.0	0.0	0.0	0.0
Avg. Permeability	K	0.000	2.839	0.000	0.000	0.000	0.000
Skin Factor	S	0.0	-2.9	0.0	0.0	0.0	0.0
Damage Ratio	DR	0.000	0.454	0.000	0.000	0.000	0.000
Ind. Flow Rate, Max	QF1	0.	968009.	0.	0.	0.	0.
Ind. Flow Rate, Min	QF2	0.	589045.	0.	0.	0.	0.
Theor. Pot.Rate Max	QF3	0.	968009.	0.	0.	0.	0.
Theor. Pot.Rate Min	QF4	0.	589045.	0.	0.	0.	0.
Radius of Invest.	b	0.0	31.5	0.0	0.0	0.0	0.0
Transmissibility	Kh/u	0.0	1407.9	0.0	0.0	0.0	0.0
Productivity Index	PI	0.0000	54.6275	0.0000	0.0000	0.0000	0.0000
Damage Zone Pr Drop	Pd	0.0	-20771.9	0.0	0.0	0.0	0.0

HALLIBURTON SERVICES LIMITED TICKET NO. 75807

		O.D.(mm)	I.D.(mm)	LENGTH(m)	DEPTH(m)
4	FLEX WEIGHT	166.0	80.0	28.30	
3	DRILL COLLARS	171.0	73.0	46.74	
15	JAR	171.0	73.0	4.66	
50	IMPACT REVERSING SUB	171.0	73.0	0.30	
3	DRILL COLLARS	171.0	73.0	28.40	
5	CROSSOVER	171.0	73.0	0.30	
80	AP RUNNING CASE	127.0	57.0	1.25	
12	DUAL CIP VALVE	127.0	22.1	1.79	
62	MULTIPLE CIP SAMPLER	127.0	19.1	2.54	
80	AP RUNNING CASE	127.0	57.0	1.25	
16	VR SAFETY JOINT	127.0	25.4	0.86	
17	PRESSURE EQUALIZING CROSSOVER	127.0	19.1	0.31	
70	OPEN HOLE PACKER	197.0	38.9	1.83	
18	DISTRIBUTOR VALVE	127.0	42.7	0.61	
70	OPEN HOLE PACKER	197.0	38.9	1.83	3227.00
20	FLUSH JOINT ANCHOR	127.0	60.2	3.05	
17	PRESSURE EQUALIZING CROSSOVER	127.0		0.31	
81	BLANKED-OFF RUNNING CASE	127.0		1.25	
22	BLANK ANCHOR	127.0	60.2	0.70	
5	CROSSOVER	127.0	60.2		
5	CROSSOVER	171.0	73.0	0.30	
3	DRILL COLLARS	171.0	73.0	28.30	
5	CROSSOVER	171.0	73.0	0.30	
5	CROSSOVER	127.0	57.0	0.30	
70	OPEN HOLE PACKER	197.0	38.9	1.83	3263.00
70	OPEN HOLE PACKER	197.0	38.9	1.83	
21	PERFORATED TAIL PIPE	127.0	57.0	1.52	
22	BLANK ANCHOR	127.0	60.2	5.56	

CONTINUED

EQUIPMENT DATA

HALLIBURTON SERVICES LIMITED TICKET NO. 75807

		O.D. (mm)	I.D. (mm)	LENGTH (m)	DEPTH (m)
5	CROSSOVER.....	127.0	60.2	0.31	
1	DRILL PIPE.....	127.0	107.0	191.03	
5	CROSSOVER.....	171.0	57.0	0.30	
81	BLANKED-OFF RUNNING CASE.....	127.0	62.0	1.25	

EQUIPMENT DATA

MUD PROPERTIES

NORTHCOR ET AL LIARD
F-25 (N.W.T.)
MUD PROPERTIES – SUMMARIZED & AVERAGED

1. CONDUCTOR HOLE (660 mm to 196 m)

Day	Mud Wt. (kg/m³)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm³)	Solids (%)	K+Ion x 1000 (mg/L)
1	1050	36	–	–	10.5	–	–	11.5
2	1100	37	5	7.5	8.5	–	–	11.0
3	1065	35	4	5.0	7.5	–	8	18.0
4	1220	37	8	10.0	11.5	–	10	19.0
5	1210	43	9	13.0	11.5	–	15	12.5
6	1250	43	6	19.0	10.5	–	13	21.0
7	1260	42	8	15.5	10.0	–	12	20.0
8	1245	38	5	14.5	10.5	–	12	13.5
9	1260	38	5	15.0	10.5	–	12	20.0
10	1280	47	5	23.5	10.5	–	13	19.0
11	1290	47	5	25.0	10.5	–	13	19.0
AVER. (11)	1203	40	6	14.8	10.2	–	12	16,800

2. SURFACE HOLE (444 mm to 767 m)

Day	Mud Wt. (kg/m³)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm³)	Solids (%)	K+Ion x 1000 (mg/L)
15	1180	40	7	18.0	13.0	75.0	12	18.0
16	1150	39	5	18.5	12.5	75.0	10	19.5
17	1125	37	5	14.0	12.5	75.0	7	20.0
18	1155	38	5	12.5	12.5	75.0	9	18.5
19	1150	41	6	16.0	12.0	75.0	8	24.0
20	1110	42	7	19.0	11.5	75.0	6	19.0
21	1090	47	8	19.5	11.0	75.0	4	19.0
22	1110	44	7	16.5	10.5	75.0	5	24.0
23	1085	42	7	17.0	10.0	75.0	5	21.0
24	1080	42	6	15.0	10.0	75.0	4	25.0
25	1075	39	5	11.0	10.0	75.0	4	21.5
26	1070	38	5	10.0	10.0	75.0	4	20.0
27	1070	38	5	10.5	11.0	75.0	3	22.0
28	1070	39	5	11.0	10.0	75.0	3	24.0
29	1065	38	4	10.0	10.0	75.0	3	24.0
30	1100	43	6	15.5	10.0	70.0	4	23.0
31	1120	43	5	16.5	11.0	70.0	6	26.5
32	1140	51	6	24.0	10.0	66.0	7	24.0
33	1150	59	6	28.0	11.0	64.0	8	24.0
34	1150	47	6	20.5	11.0	60.0	8	23.0
35	1160	48	5	23.5	11.0	60.0	8	23.0
36	1170	51	6	22.5	11.0	70.0	9	22.5
AVER. (22)	1117	43	6	16.8	11.0	72.0	6.6	22,000

INTERMEDIATE HOLE AVERAGE

The intermediate hole was averaged on a weekly (7 day) basis. The following is the weekly averages summed up and averaged.

Week #	Mud Wt. (kg/m³)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm³)	Solids (%)	K+Ion x 1000 (mg/L)
1	1129	60	8	20.0	10.9	44.4	7.4	25.1
2	1155	74	10	20.5	10.5	24.4	8.3	25.8
3	1160	83	13	19.0	11.0	24.6	7.8	24.2
4	1308	99	17	20.5	11.0	17.9	14.0	24.4
5	1387	87	20	17.0	11.5	17.0	21.3	27.8
6	1420	70	21	15.0	10.9	15.4	21.0	28.4
7	1444	70	20	16.0	10.2	15.5	20.0	27.7
8	1451	74	21	17.0	10.5	15.2	19.8	28.0
9	1512	83	20	20.0	10.4	16.3	20.7	26.6
10	1571	77	19	22.0	10.4	15.7	21.5	27.3
11	1647	85	24	23.5	10.2	15.7	23.3	27.5
12	1644	92	28	19.5	10.1	13.9	21.0	30.2
13	1651	82	31	16.0	11.0	13.8	20.6	28.9
14	1651	99	34	20.5	10.4	13.8	21.3	28.4
15	1659	95	34	16.5	10.1	12.7	21.8	25.3
16	1658	90	38	21.0	10.5	10.1	21.0	28.1
17	1653	74	35	19.5	10.8	8.9	20.7	28.8
18	1661	80	34	16.0	10.5	8.9	23.0	27.5
19	1654	89	35	23.0	10.4	10.0	21.0	26.8
20	1648	77	35	20.0	10.8	9.7	21.0	27.6
21	1633	134	23	47.0	10.3	9.4	21.8	25.0
22	1597	127	17	32.5	10.8	11.5	18.9	20.3
23	1605	71	28	18.0	11.4	9.6	16.5	24.0
24	1603	76	26	15.5	11.6	8.8	16.1	26.8
25	1617	91	24	16.5	10.1	8.4	18.0	29.4
26	1627	95	23	15.0	10.0	8.9	18.8	30.8
27	1638	93	26	16.0	10.3	9.9	21.1	29.0
28	1650	110	29	19.0	10.8	12.7	21.4	29.2
29	1627	99	28	19.5	11.0	11.1	22.0	30.0
30	1645	85	30	16.5	10.4	10.7	22.9	30.5
31	1651	100	30	20.0	10.5	10.7	22.3	29.6
32	1649	88	29	19.0	10.5	9.6	20.5	30.5
33	1636	86	29	18.0	10.4	9.9	18.1	27.3
34	1634	89	23	18.0	10.7	9.5	22.9	22.8
35	1589	83	26	17.0	11.1	10.0	21.0	25.2
AVER. (35)	1548	88	25	20.0	10.6	13.6	19.4	27,300

4. MAIN HOLE (215.9 mm - T.D., 3478 m)

Day	Mud Wt. (kg/m^3)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm^3)	Solids (%)	K+Ion x 1000 (mg/L)
288	-	-	-	-	-	-	-	-
289	-	-	-	-	-	-	-	-
290	1040	109	30	25.0	10.5	6.4	2	-
291	1040	52	15	12.5	9.5	5.1	2	-
292	1110	44	10	9.0	8.2	6.9	5	-
293	1110	48	12	10.5	9.8	4.8	5	-
294	1100	46	12	9.0	9.9	5.2	5	-
295	1100	43	12	8.0	10.0	5.4	5	-
296	1105	44	13	8.0	10.8	5.0	5	-
297	1110	42	12	7.5	10.8	5.2	5	-
298	1115	49	14	9.5	10.3	5.2	5	-
299	1115	52	17	11.0	10.1	4.8	5	-
300	1115	50	16	8.5	9.8	5.0	5	-
301	1110	57	20	11.5	9.4	4.6	5	-
302	1110	55	18	9.0	9.8	4.2	5	-
303	1105	50	16	9.0	9.8	5.4	5	-
304	1110	46	14	7.0	9.9	5.8	5	-
305	1110	46	16	7.0	9.5	5.8	5	-
AVER.	1100	52	15	10.0	9.9	5.3	4.6	-

3. INTERMEDIATE HOLE (311 mm to 3186 m)

Day	Mud Wt. (kg/m³)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm³)	Solids (%)	K+Ion x 1000 (mg/L)
42	1100	40	5	16.0	12.5	70.0	7	21.5
43	1130	42	6	15.0	11.5	40.0	7	26.5
44	1140	41	6	12.0	11.5	65.0	8	26.5
45	1140	41	6	12.0	11.5	60.0	7	25.0
46	1110	72	12	24.5	9.0	32.0	7	25.0
47	1130	80	11	27.0	10.0	21.0	8	25.5
48	1150	102	8	32.0	10.5	23.0	8	26.0
AVER. (7)	1129	60	8	20.0	10.9	44.4	7.4	25,100
49	1150	83	9	26.0	10.0	25.5	8	26.0
50	1165	92	12	25.5	10.0	25.8	8	25.0
51	1160	72	9	22.0	10.5	18.0	8	25.0
52	1150	61	7	19.0	10.5	26.4	8	25.0
53	1140	66	8	19.5	11.0	28.6	8	27.5
54	1160	72	11	17.5	11.0	26.2	9	26.0
55	1160	70	12	15.5	11.0	20.0	9	26.0
AVER. (7)	1155	74	10	20.5	10.5	24.4	8.3	25,800
56	1160	78	13	16.0	10.5	23.0	9	27.0
57	1170	80	13	15.0	10.5	28.0	9	22.5
58	1120	75	12	15.5	11.5	20.0	6	26.5
59	1110	68	11	15.5	11.0	24.0	5	24.0
60	1120	70	12	16.0	11.5	25.0	5	26.5
61	1160	90	12	28.0	11.5	29.0	8	24.0
62	1280	120	15	27.5	11.5	23.0	11	19.0
AVER. (7)	1160	83	13	19.0	11.0	24.6	7.8	24,200
63	1260	85	14	26.0	11.5	20.0	12	20.0
64	1300	81	16	18.0	11.5	16.4	12	25.0
65	1300	150	19	28.5	11.0	19.0	12	20.0
66	1290	65	11	15.5	11.0	17.0	13	26.5
67	1320	95	18	19.5	10.5	18.0	15	24.0
68	1335	130	20	23.0	9.5	16.8	16	27.0
69	1350	84	22	14.0	10.5	18.0	18	28.0
AVER. (7)	1308	99	17	20.5	11.0	17.9	14	24,400

Intermediate Hole (311 mm to 3186 m) - Con't

Day	Mud Wt. (kg/m³)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm^3)	Solids (%)	K+Ion x 1000 (mg/L)
70	1375	78	20	14.0	11.5	18.0	19	29.0
71	1350	81	20	15.0	11.0	18.4	20	27.5
72	1385	81	15	15.0	11.5	17.6	22	27.0
73	1390	118	24	21.0	11.5	17.2	22	28.0
74	1385	86	20	19.0	11.5	15.6	21	28.0
75	1395	82	18	18.0	11.0	17.4	22	28.0
76	1430	84	20	17.5	11.5	15.0	23	27.0
AVER. (7)	1387	87	20	17.0	11.5	17.0	21.3	27,800
77	1430	66	20	13.0	11.5	15.4	23	28.0
78	1385	68	20	14.5	11.5	16.2	23	28.0
79	1430	70	21	15.0	11.0	15.2	22	28.0
80	1435	70	20	15.0	11.0	15.3	22	29.5
81	1430	84	24	18.0	10.5	15.0	18	28.0
82	1410	74	20	17.5	10.5	16.0	19	28.5
83	1420	61	19	14.0	10.5	15.0	20	28.5
AVER. (7)	1420	70	21	15.0	10.9	15.4	21	28,400
84	1420	58	20	12.5	10.5	15.0	19	28.5
85	1450	64	20	15.0	10.0	14.8	19	28.5
86	1445	79	23	17.0	10.0	18.0	20	26.0
87	1440	66	18	17.0	10.5	15.0	21	28.5
88	1445	66	19	17.0	10.5	16.4	21	28.5
89	1440	79	20	16.5	10.0	15.0	20	25.0
90	1470	80	22	15.5	10.0	14.0	22	29.0
AVER. (7)	1444	70	20	16.0	10.2	15.5	20	27,700
91	1450	85	26	19.0	10.5	16.0	22	30.0
92	1440	85	20	19.0	10.5	16.8	20	27.0
93	1450	69	19	15.5	10.0	14.5	20	26.0
94	1450	65	18	15.0	10.0	14.5	20	26.0
95	1450	65	-	-	-	-	-	-
96	1440	80	25	17.5	10.0	14.5	19	30.0
97	1480	70	19	15.5	10.0	15.0	18	29.5
AVER. (7)	1451	74	21	17.0	10.5	15.2	19.8	28,000

Intermediate Hole (311 mm to 3186 m) - Con't

Day	Mud Wt. (kg/m³)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm³)	Solids (%)	K+Ion x 1000 (mg/L)
98	1495	88	22	20.5	10.5	17.0	20	26.0
99	1500	83	20	20.0	10.5	17.0	20	26.0
100	1510	85	24	20.5	10.0	16.0	20	31.0
101	1500	71	18	17.0	10.5	16.0	20	25.0
102	1510	78	22	18.5	10.5	15.0	20	25.0
103	1520	79	18	16.0	10.5	17.0	22	27.0
104	1550	94	20	25.5	10.5	16.0	23	26.0
AVER. (7)	1512	83	20	20.0	10.4	16.3	20.7	26,600
105	1550	76	21	23.5	10.5	15.4	21	27.5
106	1555	78	19	21.0	10.5	15.0	21	27.5
107	1540	74	18	19.5	10.5	17.5	21	27.0
108	1540	76	20	20.0	10.0	16.5	21	27.5
109	1550	87	21	25.0	10.5	15.0	21	27.0
110	1610	74	19	21.0	10.5	15.0	22	27.0
111	1655	76	18	22.0	10.5	15.6	24	28.0
AVER. (7)	1571	77	19	22.0	10.4	15.7	21.5	27,300
112	1650	89	25	26.0	10.5	17.0	24	28.0
113	1660	94	26	28.0	10.5	16.0	24	28.0
114	1630	76	25	20.0	10.5	16.5	24	28.5
115	1645	90	23	23.5	10.0	16.5	23	28.5
116	1650	85	23	27.0	10.0	16.4	24	25.0
117	1650	73	23	18.0	10.0	13.8	22	29.0
118	1645	90	24	23.0	10.0	14.0	22	25.7
AVER. (7)	1647	85	24	23.5	10.2	15.7	23.3	27,500
119	1635	80	25	18.0	10.0	15.2	21	28.3
120	1635	82	23	19.0	10.5	14.4	20	30.0
121	1650	85	26	22.0	9.5	14.1	21	29.4
122	1650	140	30	28.0	10.0	14.0	22	31.0
123	1645	88	30	17.5	10.5	14.0	20	31.5
124	1640	79	26	15.0	10.5	13.0	21	32.0
125	1655	90	36	16.5	10.0	12.8	22	29.4
AVER. (7)	1644	92	28	19.5	10.1	13.9	21.0	30,200

Intermediate Hole (311 mm to 3186 m) - Con't

Day	Mud Wt. (kg/m³)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm³)	Solids (%)	K+Ion x 1000 (mg/L)
126	1635	90	30	20.0	11.0	14.6	21	28.5
127	1645	64	26	11.0	11.0	14.8	20	29.0
128	1650	76	28	15.0	11.0	13.8	20	29.5
129	1655	78	35	15.0	11.0	12.8	21	29.0
130	1655	74	25	15.0	11.0	14.4	21	29.5
131	1655	78	30	15.0	11.0	13.6	20	28.5
132	1660	115	45	20.0	11.0	12.8	21	28.5
AVER. (7)	1651	82	31	16.0	11.0	13.8	20.6	28,900
133	1650	124	38	21.0	10.0	14.0	22	28.0
134	1655	120	35	25.0	10.0	15.0	22	28.5
135	1640	91	32	19.0	10.5	14.0	22	29.0
136	1645	75	30	18.0	11.0	14.0	20	28.5
137	1665	90	37	19.0	11.0	13.0	21	28.0
138	1650	92	35	20.0	10.5	12.8	21	28.5
139	1650	100	34	22.0	10.0	14.0	21	28.0
AVER. (7)	1651	99	34	20.5	10.4	13.8	21.3	28,400
140	1645	78	30	15.0	10.0	12.0	21	27.0
141	1655	90	34	16.0	10.0	12.5	22	26.0
142	1640	123	38	18.5	10.0	12.0	22	25.0
143	1660	92	33	19.0	10.5	12.6	23	25.0
144	1675	110	37	17.0	10.5	13.5	23	26.0
145	1675	78	30	12.5	10.0	13.8	21	25.0
146	1665	92	35	17.5	10.0	12.4	21	23.0
AVER. (7)	1659	95	34	16.5	10.1	12.7	21.8	25,300
147	1670	97	40	22.5	10.5	11.0	21	29.0
148	1665	98	42	23.0	10.5	10.6	21	28.0
149	1660	90	45	20.0	10.5	10.4	21	28.0
150	1660	92	41	22.0	10.5	10.4	22	28.0
151	1650	97	36	19.0	10.5	9.5	21	27.0
152	1650	74	26	17.0	10.5	10.0	21	28.5
153	1650	81	32	23.0	10.5	9.0	20	28.5
AVER. (7)	1658	90	38	21.0	10.5	10.1	21	28,100

Intermediate Hole (311 mm to 3186 m) - Con't

Day	Mud Wt. (kg/m³)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm³)	Solids (%)	K+Ion x 1000 (mg/L)
154	1650	73	32	19.0	10.5	9.0	21	29.0
155	1650	92	43	22.0	10.5	9.6	21	29.0
156	1655	74	34	18.0	10.5	9.0	21	29.5
157	1650	60	28	16.0	11.0	9.6	20	29.0
158	1655	74	37	18.0	11.0	9.0	22	28.5
159	1660	67	33	19.0	11.0	9.0	20	28.5
160	1650	89	35	25.0	11.0	7.0	20	28.0
AVER. (7)	1653	74	35	19.5	10.8	8.9	20.7	28,800
161	1660	70	32	15.0	11.0	8.5	22	26.0
162	1670	75	34	17.0	10.5	8.0	22	28.0
163	1675	88	35	17.0	10.5	8.2	23	28.0
164	1665	85	36	17.5	10.5	8.8	23	27.5
165	1655	103	36	16.0	10.0	9.8	22	30.0
166	1650	70	32	13.0	10.5	9.8	21	26.0
167	1655	71	30	15.0	11.0	9.5	27.5	27.0
AVER. (7)	1661	80	34	16.0	10.5	8.9	23	27,500
168	1655	74	30	20.0	10.5	9.2	21	27.0
169	1655	72	30	20.0	11.0	9.4	21	27.0
170	1655	85	36	24.0	10.5	9.8	21	27.0
171	1655	90	38	26.0	11.0	10.0	22	27.0
172	1660	140	40	30.0	10.0	10.0	21	27.0
173	1660	90	35	24.0	10.0	11.2	21	26.5
174	1640	70	35	18.0	10.0	9.5	21	26.5
AVER. (7)	1654	89	35	23.0	10.4	10.0	21	26,800
175	1650	60	28	16.0	10.5	11.0	20	27.0
176	1650	74	36	20.0	10.5	10.4	20	27.0
177	1650	68	32	19.0	10.5	9.5	20	28.0
178	1660	68	32	19.0	10.5	9.5	21	28.5
179	1640	68	32	20.0	11.0	9.5	21	28.0
180	1640	70	32	17.0	11.5	9.0	22	28.0
181	1645	130	52	30.0	11.0	9.2	22	27.0
AVER. (7)	1648	77	35	20.0	10.8	9.7	21	27,600

Intermediate Hole (311 mm to 3186 m) - Con't

Day	Mud Wt. (kg/m^3)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm^3)	Solids (%)	K+Ion x 1000 (mg/L)
182	1640	78	20	40.0	11.0	9.0	22	26.0
183	1630	84	25	30.0	11.0	8.9	21	26.0
184	1650	180	25	50.0	10.5	9.0	23	25.0
185	1640	-	-	-	-	-	-	-
186	1610	150	25	57.0	9.5	10.0	21	24.0
187	-	-	-	-	-	-	-	-
188	1630	180	20	60.0	9.5	10.0	22	24.0
AVER. (7)	1633	134	23	47.0	10.3	9.4	21.8	25,000
189	1620	250	25	35.0	9.0	12.5	22	22.0
190	1640	210	30	35.0	9.0	13.8	23	20.0
191	1620	180	20	35.0	11.5	14.5	23	18.0
192	1590	75	15	35.0	11.5	10.5	16	21.0
193	1570	56	10	30.0	11.5	9.6	16	21.0
194	1570	58	10	25.0	11.5	9.5	16	18.0
195	1570	60	10	34.0	11.5	10.5	16	22.0
AVER. (7)	1597	127	17	32.5	10.8	11.5	18.9	20,300
196	1600	58	24	17.0	11.0	10.0	16	22.0
197	1600	68	23	19.5	11.5	10.0	16	22.0
198	1600	70	23	20.5	11.5	9.7	16	23.5
199	1610	70	31	17.5	11.5	10.4	17	26.0
200	1610	70	30	15.0	11.5	9.6	17	25.5
201	-	-	-	-	-	-	-	-
202	1610	90	34	18.0	11.5	8.0	17	25.5
AVER. (7)	1605	71	28	18.0	11.4	9.6	16.5	24,000
203	1610	125	26	17.0	12.5	9.5	16	25.0
204	1595	67	24	14.5	12.0	9.6	16	26.5
205	1615	60	28	15.0	12.0	8.5	16	26.5
206	1605	68	26	15.0	12.0	9.0	17	27.5
207	1600	68	25	15.0	11.0	8.6	16	27.5
208	1605	70	27	14.5	11.0	8.0	16	27.0
209	1590	74	28	16.0	11.0	8.9	16	27.5
AVER. (7)	1603	76	26	15.5	11.6	8.8	16.1	26,800

Intermediate Hole (311 mm to 3186 m) - Con't

Day	Mud Wt. (kg/m³)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm³)	Solids (%)	K+Ion x 1000 (mg/L)
210	1600	68	24	15.0	10.5	8.5	16	24.0
211	1605	66	22	16.0	10.0	7.8	17	26.0
212	1605	78	20	16.0	10.0	8.6	17	30.0
213	1630	85	24	15.0	10.0	9.5	19	32.0
214	1630	100	24	18.0	10.0	7.0	19	30.0
215	1625	90	24	17.0	10.0	9.0	19	30.0
216	1625	150	28	20.0	10.0	8.5	19	34.0
AVER. (7)	1617	91	24	16.5	10.1	8.4	18	29,400
217	1620	70	24	14.0	10.0	9.0	19	34.0
218	1630	90	24	15.0	10.0	8.8	19	32.0
219	1630	90	22	14.0	10.0	9.0	19	32.0
220	1620	99	22	15.0	10.0	9.0	18	30.0
221	1630	98	24	14.0	10.0	8.5	19	30.0
222	1630	98	24	14.0	10.0	8.5	19	30.0
223	1630	120	24	18.0	10.0	9.5	19	28.0
AVER. (7)	1627	95	23	15.0	10.0	8.9	18.8	30,800
224	1630	101	30	15.0	9.5	9.0	21	29.0
225	1625	88	29	15.0	10.0	9.5	21	29.0
226	-	-	-	-	-	-	-	-
227	1630	100	21	17.5	10.0	9.5	21.5	30.0
228	1630	90	23	17.0	10.5	10.5	20.5	28.0
229	1655	92	25	16.0	10.7	10.8	21.5	28.0
230	1655	88	25	16.0	11.0	10.0	21	30.0
AVER. (7)	1637	93	26	16.0	10.3	9.9	21.1	29,000
231	1655	86	25	16.0	11.5	14.0	21	29.0
232	1655	84	26	16.0	11.0	13.9	21	28.0
233	1655	155	30	25.0	10.5	12.5	22	30.0
234	1640	78	24	15.0	10.5	12.4	22	27.5
235	1650	110	30	18.5	11.0	12.0	21	30.0
236	1650	120	33	21.0	11.0	11.8	21	30.0
237	1645	140	35	20.0	10.5	12.5	22	30.0
AVER. (7)	1650	110	29	19.0	10.8	12.7	21.4	29,200

Intermediate Hole (311 mm to 3186 m) - Con't

Day	Mud Wt. (kg/m^3)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm^3)	Solids (%)	K+Ion x 1000 (mg/L)
238	1630	85	25	16.0	11.0	11.8	21	30.0
239	1635	88	20	18.0	11.0	11.0	21	30.0
240	1625	82	28	16.0	11.0	11.4	22	30.0
241	1635	94	28	20	12.0	11.0	22	30.0
242	1630	100	30	19.0	10.5	11.6	22	30.0
243	1615	128	30	25.0	11.0	10.4	23	30.0
244	1620	120	33	22.0	10.5	10.6	23	30.0
AVER. (7)	1627	99	28	19.5	11.0	11.1	22	30,000
245	1630	85	28	15.0	10.5	10.2	22.5	31.0
246	1640	90	30	16.5	10.3	11.0	23	31.0
247	1645	80	29	15.0	10.5	11.5	23	31.0
248	1645	85	30	17.5	10.5	10.5	22.5	30.0
249	1645	90	30	18.0	10.5	11.0	22.5	31.0
250	1650	85	30	16.5	10.3	11.0	23	30.0
251	1660	82	30	17.0	10.5	10.2	24	30.0
AVER. (7)	1645	85	30	16.5	10.4	10.7	22.9	30,500
252	1650	102	30	22.5	11.0	11.0	24	30.0
253	1645	100	27	20.0	11.0	11.4	23	29.0
254	1650	130	35	25.0	11.0	10.8	23	30.5
255	1650	115	33	19.0	10.5	10.4	22.5	30.5
256	1650	93	28	19.0	10.0	11.4	21.5	28.0
257	1650	80	26	19.0	10.0	10.0	21	29.0
258	1660	80	31	18.0	10.5	10.0	21	30.0
AVER. (7)	1651	100	30	20.5	10.5	10.7	22.3	29,600
259	1650	80	28	19.0	11.0	9.6	21	30.0
260	1645	80	30	19.0	10.5	10.0	21	31.0
261	1650	87	29	19.0	10.5	9.8	21	31.0
262	1650	90	30	20.0	10.7	9.2	21	31.5
263	1650	80	27	19.0	10.3	9.2	20	31.5
264	1650	120	30	20.0	10.2	9.8	20	29.0
265	1650	80	27	19.0	10.6	9.8	20	30.0
AVER. (7)	1649	88	29	19.0	10.5	9.6	20.5	30,500

Intermediate Hole (311 mm to 3186 m) - Con't

Day	Mud Wt. (kg/m^3)	Funnel Vis.(s/L)	P.V.	Y.P.	PH	W.L. (cm^3)	Solids (%)	K+Ion x 1000 (mg/L)
266	1650	110	33	21.0	10.6	9.5	20	31.0
267	1635	85	31	20.5	9.8	10.0	19	29.0
268	1630	78	28	17.0	10.0	10.0	19	28.5
269	1640	85	29	18.0	10.4	10.2	20.5	29.0
270	1640	77	29	16.0	10.7	10.3	23	25.7
271	1630	82	26	16.0	10.5	9.8	25	24.0
272	1630	84	27	15.5	10.6	9.6	-	24.0
AVER. (7)	1636	86	29	18.0	10.4	9.9	18.1	27,300
273	1630	83	18	17.0	10.9	9.8	-	22.0
274	1630	82	22	16.0	10.6	9.8	-	21.0
275	-	-	-	-	-	-	-	-
276	1630	82	20	17.0	10.9	9.2	23	21.0
277	1640	115	30	20.0	10.9	10.0	23	22.0
278	1635	92	24	20.0	10.8	9.4	22.5	25.0
279	1640	81	26	19.0	10.4	9.0	23	26.0
AVER. (7)	1634	89	23	18.0	10.7	9.5	22.9	22,800
280	1630	81	26	19.0	11.5	9.6	22	26.5
281	1640	86	30	20.0	11.5	9.6	22	26.5
282	-	-	-	-	-	-	-	-
283	1635	90	28	16.0	11.3	9.0	22	26.0
284	-	-	-	-	-	-	-	-
285	-	-	-	-	-	-	-	-
286	1450	74	20	11.0	10.0	12.0	18	22.0
AVER. (7)	1589	83	26	17.0	11.1	10.0	21	25,200

GRAVITY DENSITY
SURVEY

REPORT ON A

BOREHOLE GRAVITY DENSITY SURVEY OF WELL NORTHCOR ET AL LIARD F - 25

NORTHWEST TERRITORIES, CANADA
FOR
NORTHCOR ENERGY LIMITED

Exploration Data Consultants Inc.
12136 W.Bayaud St.
Denver, Colorado
USA 80228

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1. Introduction

From July 29 to July 30 1986, a Borehole Gravity Density survey was performed in the Northcor et al Liard F-25 well in the North West Territories on behalf of Northcor Energy Ltd. This report presents the data collected on this survey and its reduction to density values.

The survey was conducted by a three man crew from Exploration Data Consultants Inc. of Denver Colorado. The field data were reduced to densities in Denver.

2. Presentation of Density values.

The following table contains the final drift corrected densities obtained from the field data. These densities are also presented as a well log at a scale of 1:1000. This log may be found in the back pocket of this report.

DEPTH INTERVAL	DENSITY	DENSITY ERROR
3142.0 - 3130.0	2.633	0.006
3130.0 - 3104.0	2.621	0.003
3104.0 - 3081.0	2.645	0.004
3081.0 - 3060.0	2.657	0.002
3060.0 - 3037.0	2.656	-----
3037.0 - 3022.0	2.657	-----
3022.0 - 2995.0	2.648	-----
2995.0 - 2981.0	2.633	-----
2981.0 - 2948.0	2.656	0.003
2948.0 - 2910.0	2.648	0.003
2910.0 - 2888.0	2.651	0.001
2888.0 - 2876.0	2.658	0.008
2876.0 - 2862.0	2.664	0.008
2862.0 - 2837.0	2.658	0.012
2837.0 - 2794.0	2.641	0.011
2794.0 - 2768.0	2.640	0.023
2768.0 - 2740.0	2.637	0.023
2740.0 - 2712.0	2.662	0.014
2712.0 - 2573.0	2.628	-----
2573.0 - 2538.0	2.532	-----
2538.0 - 2472.0	2.593	-----
2472.0 - 2450.0	2.592	-----
2450.0 - 2380.0	2.613	-----
2380.0 - 2367.0	2.581	0.003
2367.0 - 2314.0	2.602	0.004
2314.0 - 2235.0	2.489	0.003
2235.0 - 2193.0	2.445	-----
2193.0 - 2132.0	2.400	-----
2132.0 - 2077.0	2.450	-----
2077.0 - 2035.0	2.487	-----
2035.0 - 1998.0	2.530	-----

4. Field operation notes.

For this survey, the BHGM tool was attached to a Schlumberger wireline unit. A Schlumberger natural gamma tool was attached as the uppermost tool in the string and provided the means of depth tying the BHGM tool to previously run logs. The Schlumberger wireline odometer was used for depth control throughout the survey.

The first survey station was the deepest station occupied at 3142 meters. The stations were read in a looping pattern designed to allow for calculation of gravity meter drift and to provide repeat data to provide statistical confidence levels for the density values. Station positions were marked on the wireline cable at the surface and checked when the stations were re-occupied for meter drift control.

The condition of the hole caused the tool to become stuck several times when moving between station locations. Freeing the tool from one of these stuck locations caused a large physical shock which loosened the gravity meter module from the supporting electronics module. This parted some electronic paths and caused the premature end of the survey.

The BHGM tool performed well during this survey although some high drift rates were experienced. The data set has been divided into two parts to enable the data processing to deal with these drift rates.

5. Field recording system

The BHGM survey system consists of the downhole gravity sensor mounted in a pressure sonde and Dewar flask and an uphole power supply and computer controller. The sensing element is a LaCoste and Romberg zero length spring gravity meter which is thermostatted to about 125 degrees Centigrade.

A gravity reading is made by adjusting the spring tension until the resultant force of spring tension and the force of gravity downward is an upward force sufficient to accelerate the beam upward at about 150 microgals. An electrostatic force is applied downwards to keep the beam at a null position.

The gravity value is obtained from an empirical relationship between the voltage producing the electrostatic force and the upwards acceleration of the beam and the position of the counter screw which adjusts the spring tension. The gravity meter manufacturer supplies a calibration table relating the counter screw position to relative gravity.

The computer automatically calculates a tidal correction for the attraction of the sun and the moon as the readings are taken. This calculation is based on an algorithm developed by Longman, J.G.R., Vol. 6, no. 12, 1959.

As the gravity meter sits at a position in the well it is subject to a variety of physical noises which cause the sensor to accelerate at higher amplitudes than the desired maximum errors in the gravity reading. Since the gravity meter remains at the same vertical location during the reading, it is possible to remove these noises from the gravity reading by averaging the readings over a length of time greater than the periods of the noises. Five averages of thirty second lengths were used on this survey. Tide corrected gravity is displayed graphically on the uphole computer enabling the observer to monitor the level of noise present downhole.

Since the tool measures the vertical component of the gravitational field, the sensor must be levelled before a reading is taken. This is done automatically by the computer. The tilt of the sensor with respect to vertical is given by two electrostatic levels suspended under the the sensor. The outputs of these levels are the Cross Level and Long Level readings. The Long direction is in the plane of the beam and vertical. The Cross direction is normal to the Long direction.

To level the sensor, the computer first rotates the sensor with respect to the pressure sonde until the sensor Cross direction is in the plane including the well deviation and vertical at that point. The amount of rotation with respect to the sonde is termed the Rotation Position. The sensor is then tilted in the Cross direction until the Cross Level indicates that it is vertical. The tilt in both the Long and the Cross directions are then both finely adjusted until the sensor is vertical. The amounts that the sensor is tilted with respect to the sonde in the Cross and Long directions are called the Cross Position and the Long Position respectively. The Long Position is always kept within a narrow range for thermostatting considerations.

The attitude positions and levels just described are recorded with the gravity data at each reading on disc and paper printout. The disc file format is a simple ASCII text form allowing the data to be read with IBM PC word processing programs. It is read directly by the data reduction program.

The gravity meter was housed in a Dewar flask in this hole to provide protection against the well bore environment which was expected to be at a higher temperature than the gravity meter electronics and thermostatting circuits could operate under. The effect of the Dewar system is to isolate the gravity system very effectively from external temperature changes which can be large and erratic on a survey run over large intervals such as this survey was.

6. Field Data Records

The following table contains a printout of all data written to the computer disc during the survey:

northcor energy limited wildcat northcor et al liard87291986
n.w.t. canada northwest territoriescanada
68.242225 -123.350753 10
m.s.l 716.6 723.2 723.8 722.7 722.7 716.6 meters
gamma gamma mud 16.5 thick 16.5 geez i don

capt g

File Line Number	Time Since Unclamp	Depth	SMT Time	Date	Tide Corrected Gravity	Tide Corr	Calculated Null Reading	Cheat Voltage	Standard Deviation Cheat Voltage	Beam Posn.	Counter Reading	Long Level	Cross Level	Lg Ps	Cr Ps	Rot	Temp	Unclamp Time	Vernier	Alternate Vernier
10	15.4333	3142.8	11.5246	72986	2398.2593	-0.8192	2625.3567	152.3885	5.4186	43.263	2625.5871	59.228	59.444	49	38	38	37	11.372878	7.8	79.888888888
11	15.9833	3142.8	11.5319	72986	2398.2596	-0.8190	2625.3568	152.3541	5.1358	42.995	2625.5871	59.228	59.528	49	38	38	37	11.372878	7.8	79.888888888
12	16.5333	3142.8	11.5352	72986	2398.2597	-0.8188	2625.3568	152.3289	4.7166	42.678	2625.5871	59.228	59.481	49	38	38	37	11.372878	7.8	79.888888888
13	17.0833	3142.8	11.5425	72986	2398.2599	-0.8187	2625.3569	152.3087	4.1929	43.429	2625.5871	59.228	59.389	49	38	38	37	11.372878	7.8	79.888888888
14	17.6333	3142.8	11.5458	72986	2398.2597	-0.8185	2625.3565	152.4767	4.6798	43.283	2625.5871	59.228	59.222	49	38	38	38	11.372878	7.8	79.888888888
15	18.1833	3142.8	11.5531	72986	2398.2599	-0.8184	2625.3565	152.4581	4.1349	42.895	2625.5871	59.228	59.815	49	38	38	38	11.372878	7.8	79.888888888
16	18.7333	3142.8	11.5604	72986	2398.2602	-0.8182	2625.3567	152.3837	5.8751	43.436	2625.5871	59.228	59.556	49	38	38	38	11.372878	7.8	79.888888888
17	19.2833	3142.8	11.5637	72986	2398.2598	-0.8181	2625.3552	153.0893	5.8518	43.436	2625.5871	59.333	59.926	49	38	38	38	11.372878	7.8	79.888888888
18	19.8333	3142.8	11.5718	72986	2398.2601	-0.8179	2625.3562	152.5921	4.7767	43.587	2625.5871	59.874	59.593	49	38	38	38	11.372878	7.8	79.888888888
19	20.3833	3142.8	11.5743	72986	2398.2595	-0.8178	2625.3554	152.9893	4.3526	43.193	2625.5871	59.378	59.593	49	38	38	38	11.372878	7.8	79.888888888
20	20.9333	3142.8	11.5816	72986	2398.2593	-0.8176	2625.3549	153.1893	3.7714	42.975	2625.5871	59.528	59.944	49	38	38	38	11.372878	7.8	79.888888888
21	21.4833	3142.8	11.5849	72986	2398.2587	-0.8175	2625.3542	153.4256	4.8363	43.278	2625.5871	59.519	59.963	49	38	38	38	11.372878	7.8	79.888888888
22	22.0333	3142.8	11.5922	72986	2398.2595	-0.8173	2625.3549	153.1349	5.2268	43.431	2625.5871	59.639	60.222	49	38	38	38	11.372878	7.8	79.888888888
23	22.5833	3142.8	11.5955	72986	2398.2519	-0.8172	2625.3465	156.6158	4.4629	43.246	2625.5871	61.139	53.111	49	38	38	38	11.372878	7.8	79.888888888
24	23.1833	3142.8	12.0031	72986	2398.2393	-0.8171	2625.3326	162.1482	7.1658	43.529	2625.5871	58.228	53.593	49	38	38	38	11.372878	7.8	79.888888888
25	23.3833	3142.8	12.0243	72986	2398.1765	-0.8170	2625.2634	187.2228	8.8228	43.497	2625.5871	56.978	62.991	49	38	38	38	11.372878	7.8	79.888888888
26	16.8167	3132.8	12.2513	72986	2397.1678	-0.8102	2624.1525	166.4163	5.7854	43.768	2624.3381	64.228	61.874	53	38	33	43	12.882465	38.8	5.588888888
27	17.1167	3132.8	12.2531	72986	2397.1698	-0.8102	2624.1537	165.9461	4.5693	43.719	2624.3381	64.822	61.874	53	38	33	43	12.882465	38.8	5.588888888
28	17.4167	3132.8	12.2549	72986	2397.1679	-0.8101	2624.1524	166.4486	5.5797	43.985	2624.3381	64.228	61.888	53	38	33	43	12.882465	38.8	5.588888888
29	17.7167	3132.8	12.2607	72986	2397.1673	-0.8100	2624.1517	166.7157	4.3668	43.828	2624.3381	64.228	61.888	53	38	33	42	12.882465	38.8	5.588888888
30	18.0167	3132.8	12.2625	72986	2397.1662	-0.8099	2624.1504	167.2315	4.9573	43.896	2624.3381	64.388	61.228	53	38	33	40	12.882465	38.8	5.588888888
31	18.3167	3132.8	12.2643	72986	2397.1677	-0.8098	2624.1520	166.6869	4.1991	43.889	2624.3381	64.148	61.815	53	38	33	43	12.882465	38.8	5.588888888
32	18.6167	3132.8	12.2701	72986	2397.1652	-0.8096	2624.1491	167.6988	2.2775	43.629	2624.3381	64.321	61.378	53	38	33	42	12.882465	38.8	5.588888888
33	18.9167	3132.8	12.2719	72986	2397.1663	-0.8097	2624.1508	167.3762	5.8428	43.889	2624.3381	64.593	61.556	53	38	33	41	12.882465	38.8	5.588888888

34	19.2333	3132.8	12.2738	72986	2397.1645	-8.8896	2624.1584	167.2118	3.6681	43.845	2624.3381	65.888	61.728	53	38	33	42	12.882465	38.8	5.522222888
35	19.5333	3132.8	12.2756	72986	2397.1642	-8.8895	2624.1499	167.3854	5.4479	43.894	2624.3381	63.888	62.888	53	38	33	41	12.882465	38.8	5.522222228
36	19.8333	3132.8	12.2814	72986	2397.1645	-8.8894	2624.1488	168.1188	5.8528	43.828	2624.3381	63.874	62.288	53	38	33	41	12.882465	38.8	5.522222288
37	28.1333	3132.8	12.2832	72986	2397.1641	-8.8894	2624.1475	168.2871	3.5164	43.852	2624.3381	63.519	62.228	53	38	33	41	12.882465	38.8	5.522222228
38	28.4588	3132.8	12.2851	72986	2397.1633	-8.8893	2624.1466	168.6528	4.6473	43.822	2624.3381	64.333	62.888	53	38	33	41	12.882465	38.8	5.522222888
39	28.8333	3132.8	12.2914	72986	2397.1625	-8.8892	2624.1466	168.6457	6.4873	43.824	2624.3381	63.432	62.228	53	38	33	41	12.882465	38.8	5.522222228
48	8.8167	3132.8	12.3224	72986	2397.1575	-8.8885	2624.1392	171.4835	7.4541	43.816	2624.3381	62.556	61.472	53	38	33	41	12.313597	38.8	5.522222228
41	1.1167	3132.8	12.3242	72986	2397.1557	-8.8883	2624.1371	172.1634	4.9443	43.771	2624.3381	62.333	61.333	53	38	33	41	12.313597	38.8	5.522222228
42	1.4167	3132.8	12.3388	72986	2397.1553	-8.8882	2624.1366	172.3399	3.6638	43.812	2624.3381	62.428	61.395	53	38	33	41	12.313597	38.8	5.522222228
43	1.7167	3132.8	12.3318	72986	2397.1574	-8.8881	2624.1387	171.5495	3.1967	43.726	2624.3381	63.888	61.926	53	38	33	41	12.313597	38.8	5.522222228
44	2.8167	3132.8	12.3336	72986	2397.1577	-8.8888	2624.1391	171.4335	4.4432	43.825	2624.3381	63.888	61.963	53	38	33	41	12.313597	38.8	5.522222228
45	2.3167	3132.8	12.3354	72986	2397.1588	-8.8888	2624.1482	171.8248	5.2919	43.769	2624.3381	63.857	62.888	53	38	33	41	12.313597	38.8	5.522222228
46	2.6167	3132.8	12.3412	72986	2397.1577	-8.8879	2624.1389	171.4975	3.9141	43.741	2624.3381	63.784	62.888	53	38	33	41	12.313597	38.8	5.522222288
47	2.9167	3132.8	12.3432	72986	2397.1583	-8.8878	2624.1395	171.2838	4.5853	43.695	2624.3381	63.667	62.333	53	38	33	41	12.313597	38.8	5.522222288
48	3.2167	3132.8	12.3448	72986	2397.1594	-8.8877	2624.1486	178.8719	2.6126	43.668	2624.3381	63.667	62.333	53	38	33	41	12.313597	38.8	5.522222228
49	3.5167	3132.8	12.3526	72986	2397.1576	-8.8876	2624.1487	178.8276	2.9743	43.834	2624.3381	63.638	62.487	53	38	33	41	12.313597	38.8	5.522222288
58	3.8333	3132.8	12.3525	72986	2397.1683	-8.8876	2624.1413	178.5911	4.8648	43.655	2624.3381	64.888	62.165	53	38	33	41	12.313597	38.8	5.522222228
51	4.1167	3132.8	12.3542	72986	2397.1685	-8.8875	2624.1415	178.5248	9.1878	43.999	2624.3381	64.888	62.333	53	38	33	41	12.313597	38.8	5.522222288
52	4.4167	3132.8	12.3628	72986	2397.1591	-8.8874	2624.1399	171.1182	2.9241	43.799	2624.3381	64.228	62.889	53	38	33	41	12.313597	38.8	5.522222228
53	4.7167	3132.8	12.3618	72986	2397.1592	-8.8873	2624.1399	171.1429	5.4268	43.829	2624.3381	64.224	62.889	53	38	33	41	12.313597	38.8	5.522222288
54	5.8167	3132.8	12.3636	72986	2397.1582	-8.8873	2624.1387	171.5714	5.7942	43.829	2624.3381	64.378	62.963	53	38	33	41	12.313597	38.8	5.522222228
55	5.3167	3132.8	12.3654	72986	2397.1597	-8.8872	2624.1483	178.9981	5.2128	43.768	2624.3381	64.975	63.249	53	38	33	41	12.313597	38.8	5.522222888
56	5.6588	3132.8	12.3714	72986	2397.1588	-8.8871	2624.1383	171.7815	3.9699	43.758	2624.3381	63.228	62.444	53	38	33	41	12.313597	38.8	5.522222228
57	5.9588	3132.8	12.3732	72986	2397.1567	-8.8878	2624.1369	172.2376	3.4371	43.986	2624.3381	63.333	62.667	53	38	33	41	12.313597	38.8	5.522222888
58	6.2588	3132.8	12.3758	72986	2397.1584	-8.8869	2624.1386	171.5891	5.7385	43.717	2624.3381	63.148	62.926	53	38	33	41	12.313597	38.8	5.522222228
59	6.5588	3132.8	12.3888	72986	2397.1564	-8.8869	2624.1363	172.4286	5.3248	43.819	2624.3381	63.889	62.556	53	38	33	41	12.313597	38.8	5.522222888
68	6.9588	3132.8	12.3832	72986	2397.1579	-8.8868	2624.1379	171.2693	4.8983	43.966	2624.3381	63.971	63.882	53	38	33	41	12.313597	38.8	5.522222888
61	8.6228	3124.8	12.4918	72986	2394.8157	-8.2241	2621.5718	158.1824	3.1271	43.652	2621.7361	64.444	62.778	48	38	37	42	12.483434	36.8	3.522222288
62	8.9167	3124.8	12.4929	72986	2394.8183	-8.2248	2621.5745	156.9858	2.9898	43.571	2621.7361	65.228	62.321	48	38	37	42	12.483434	36.8	3.522222888
63	1.2167	3124.8	12.4947	72986	2394.8181	-8.2239	2621.5743	157.1818	5.1466	43.326	2621.7361	63.975	62.249	48	38	37	42	12.483434	36.8	3.522222288
64	1.5167	3124.8	12.5025	72986	2394.8228	-8.2238	2621.5772	155.9855	4.5712	43.818	2621.7361	64.228	62.274	48	38	37	42	12.483434	36.8	3.522222288
65	1.8167	3124.8	12.5023	72986	2394.8241	-8.2238	2621.5887	154.4832	6.1228	43.456	2621.7361	64.556	62.837	48	38	37	42	12.483434	36.8	3.522222888
66	2.1333	3124.8	12.5042	72986	2394.8228	-8.2237	2621.5778	155.9757	7.2995	43.371	2621.7361	64.888	62.333	48	38	37	42	12.483434	36.8	3.522222888
67	2.4333	3124.8	12.5188	72986	2394.8212	-8.2236	2621.5773	155.8488	6.3225	43.184	2621.7361	64.889	61.963	48	38	37	42	12.483434	36.8	3.522222228
68	2.7588	3124.8	12.5119	72986	2394.8214	-8.2235	2621.5775	155.7882	4.6766	42.952	2621.7361	64.888	61.951	48	38	37	42	12.483434	36.8	3.522222238
69	3.0528	3124.8	12.5137	72986	2394.8234	-8.2234	2621.5796	154.9257	4.7546	43.231	2621.7361	64.111	61.556	48	38	37	42	12.483434	36.8	3.522222288
78	3.3588	3124.8	12.5155	72986	2394.8226	-8.8834	2621.5786	155.3366	4.4694	43.288	2621.7361	64.487	61.481	48	38	37	43	12.483434	36.8	3.522222228
71	3.6528	3124.8	12.5213	72986	2394.8191	-8.2833	2621.5748	156.9888	5.2535	42.941	2621.7361	64.975	61.519	48	38	37	43	12.483434	36.8	3.522222888
72	3.9667	3124.8	12.5232	72986	2394.8219	-8.8832	2621.5777	155.7841	5.5335	43.399	2621.7361	63.222	61.296	48	38	37	43	12.483434	36.8	3.522222888

73	4.2667	3124.8	12.5252	72986	2394.8287	-8.8831	2621.5763	156.2574	3.6682	43.791	2621.7361	63.333	61.822	48	38	37	43	12.483434	36.8	3.522222222
74	4.5667	3124.8	12.5326	72986	2394.8219	-8.8831	2621.5774	155.8168	4.9946	43.347	2621.7361	63.658	61.822	48	38	37	43	12.483434	36.8	3.522222222
75	4.8667	3124.8	12.5326	72986	2394.8213	-8.8830	2621.5768	156.0743	6.1482	43.291	2621.7361	64.288	61.837	48	38	37	43	12.483434	36.8	3.522222222
76	5.1667	3124.8	12.5344	72986	2394.8199	-8.8829	2621.5752	156.7228	6.1517	43.172	2621.7361	64.288	61.828	48	38	37	43	12.483434	36.8	3.522222222
77	5.4667	3124.8	12.5482	72986	2394.8284	-8.8828	2621.5757	156.5297	4.5528	43.184	2621.7361	64.837	62.556	48	38	37	43	12.483434	36.8	3.522222222
78	5.7833	3124.8	12.5421	72986	2394.8213	-8.8828	2621.5766	156.1527	4.2475	43.455	2621.7361	64.825	62.296	48	38	37	43	12.483434	36.8	3.522222222
79	6.0833	3124.8	12.5439	72986	2394.8284	-8.8827	2621.5754	156.6288	4.6241	43.255	2621.7361	64.519	62.481	48	38	37	43	12.483434	36.8	3.522222222
80	6.3833	3124.8	12.5457	72986	2394.8194	-8.8826	2621.5743	157.0796	5.5185	43.196	2621.7361	64.975	62.272	48	38	37	43	12.483434	36.8	3.522222222
81	7.4288	3124.8	12.5555	72986	2394.7675	-8.8825	2621.5833	178.5888	118.3443	81.864	2621.7361	56.288	8.888	49	38	37	43	12.483434	36.8	3.522222222
82	8.9833	3281.8	13.8538	72986	2392.8291	-8.2281	2619.3717	124.8842	5.4866	43.888	2619.4621	64.853	61.187	53	39	16	44	13.843131	62.8	29.52222228
83	1.3167	3281.8	13.8558	72986	2392.8126	-8.2888	2619.3754	122.8813	4.9115	42.613	2619.4621	64.267	60.933	53	39	16	44	13.843131	62.8	29.52222288
84	1.6588	3281.8	13.8618	72986	2392.8136	8.8881	2619.3763	121.5498	7.9838	42.328	2619.4621	66.288	61.888	53	39	16	44	13.843131	62.8	29.52228288
85	2.8888	3281.8	13.8631	72986	2392.8873	8.8882	2619.3694	125.3839	8.4818	42.931	2619.4621	63.528	61.328	53	39	16	44	13.843131	62.8	29.52222228
86	2.3333	3281.8	13.8651	72986	2392.8128	8.8882	2619.3753	122.1818	7.1569	42.839	2619.4621	64.228	61.568	53	39	16	44	13.843131	62.8	29.52888228
87	2.6667	3281.8	13.8711	72986	2392.8125	8.8883	2619.3758	122.3829	8.7813	42.597	2619.4621	65.288	61.682	53	39	16	44	13.843131	62.8	29.52222228
88	3.0167	3281.8	13.8732	72986	2392.8126	8.8884	2619.3758	122.2941	8.5927	42.894	2619.4621	63.688	62.488	53	38	16	44	13.843131	62.8	29.52228888
89	3.3588	3281.8	13.8752	72986	2392.8126	8.8885	2619.3727	123.5577	6.8923	42.887	2619.4621	63.867	62.688	53	39	16	44	13.843131	62.8	29.52222228
98	3.6833	3281.8	13.8812	72986	2392.8138	8.8885	2619.3768	121.7129	5.8928	42.891	2619.4621	64.133	62.533	53	39	16	44	13.843131	62.8	29.52228828
91	4.0167	3281.8	13.8832	72986	2392.8127	8.8886	2619.3726	123.5859	9.8888	42.853	2619.4621	64.228	63.858	53	39	16	44	13.843131	62.8	29.52222228
92	4.3588	3281.8	13.8852	72986	2392.8138	8.8887	2619.3759	121.7642	5.3389	42.891	2619.4621	64.238	63.288	53	38	16	44	13.843131	62.8	29.52222828
93	4.7228	3281.8	13.8913	72986	2392.8132	8.8888	2619.3749	122.3286	4.5115	42.856	2619.4621	64.228	63.858	53	38	16	44	13.843131	62.8	29.52222288
94	5.0167	3281.8	13.8932	72986	2392.8151	8.8889	2619.3772	121.0913	5.6574	42.686	2619.4621	65.188	63.328	53	38	16	44	13.843131	62.8	29.52228328
95	5.3667	3281.8	13.8953	72986	2392.8883	8.8889	2619.3696	125.2322	7.7418	42.862	2619.4621	63.956	62.333	53	38	16	44	13.843131	62.8	29.52222288
96	5.7288	3281.8	13.1813	72986	2392.8122	8.8818	2619.3738	122.9289	6.1365	42.838	2619.4621	64.533	62.828	53	38	16	44	13.843131	62.8	29.52882288
97	6.0333	3281.8	13.1833	72986	2392.8114	8.8811	2619.3729	123.4375	7.5627	42.836	2619.4621	64.688	62.358	53	38	16	44	13.843131	62.8	29.52222888
98	6.3667	3281.8	13.1853	72986	2392.8184	8.8812	2619.3717	124.8657	6.8974	42.895	2619.4621	64.858	62.628	53	38	16	44	13.843131	62.8	29.52882288
99	6.7167	3281.8	13.1114	72986	2392.8284	8.8812	2619.3694	125.2938	7.5118	42.673	2619.4621	64.288	62.133	53	39	16	44	13.843131	62.8	29.52888288
188	7.0588	3281.8	13.1134	72986	2392.8124	8.8813	2619.3715	124.1971	7.9967	42.981	2619.4621	64.467	62.867	53	39	16	44	13.843131	62.8	29.52222828
181	7.4833	3281.8	13.1168	72986	2392.8141	8.8814	2619.3755	122.8191	11.7244	42.818	2619.4621	64.191	62.828	53	39	16	44	13.843131	62.8	29.52222288
182	8.8333	3268.8	13.2625	72986	2398.9788	8.8246	2617.3637	157.9431	4.2581	43.841	2617.5276	64.658	61.849	49	48	27	45	13.252928	27.5	99.52888288
183	8.9667	3268.8	13.2625	72986	2398.9826	8.8246	2617.3677	156.3328	4.3632	43.671	2617.5276	63.852	62.888	49	48	27	45	13.252888	27.5	99.52888228
184	1.3888	3268.8	13.2645	72986	2398.9784	8.8847	2617.3631	158.1827	4.2261	43.859	2617.5276	65.888	61.519	49	48	27	45	13.252828	27.5	188.22888888
185	1.6667	3268.8	13.2787	72986	2398.9795	8.8848	2617.3642	157.7356	6.3598	43.892	2617.5276	64.888	61.888	58	48	27	45	13.252928	27.5	188.22888288
186	1.9833	3268.8	13.2726	72986	2398.9889	8.8848	2617.3656	157.1472	4.3788	43.171	2617.5276	65.361	61.888	49	48	27	45	13.252928	27.5	188.22888228
187	2.3528	3268.8	13.2748	72986	2398.9777	8.8849	2617.3621	158.5882	5.9296	43.173	2617.5276	62.888	61.972	58	48	27	45	13.252888	27.5	99.52888228
188	2.6667	3268.8	13.2887	72986	2398.9793	8.8858	2617.3637	157.9234	4.8546	43.316	2617.5276	62.888	61.519	58	48	27	45	13.252928	27.5	188.22888288
189	3.0228	3268.8	13.2927	72986	2398.9813	8.8851	2617.3659	157.8625	5.6324	42.954	2617.5276	64.888	61.926	49	48	27	45	13.252928	27.5	188.22888228
118	3.3167	3268.8	13.2846	72986	2398.9839	8.8851	2617.3686	155.9239	5.5813	42.895	2617.5276	65.288	61.333	58	48	27	45	13.252888	27.5	188.22888888
111	3.6833	3268.8	13.2988	72986	2398.9825	8.8852	2617.3648	157.4857	6.8652	43.492	2617.5276	63.917	62.528	58	48	27	45	13.252228	27.5	188.22888228

112	4.2333	3268.8	13.2927	72986	2398.9821	8.8853	2617.3665	156.7941	6.6129	43.277	2617.5276	64.222	62.222	58	48	27	45	13.252608	27.5	188.88888888
113	4.3167	3262.8	13.2946	72986	2398.9842	8.8853	2617.3686	155.9239	6.2364	43.418	2617.5276	65.857	62.888	58	48	27	45	13.252828	27.5	99.58888888
114	4.6588	3268.8	13.3885	72986	2398.9777	8.8854	2617.3615	158.8173	5.4835	42.929	2617.5276	63.888	62.888	58	48	27	45	13.252888	27.5	188.88888888
115	4.9833	3262.8	13.3826	72986	2398.9788	8.8855	2617.3617	158.7225	5.9831	43.629	2617.5276	65.595	61.481	58	48	27	45	13.252888	27.5	99.58888888
116	5.3333	3268.8	13.3847	72986	2398.9823	8.8855	2617.3678	156.6154	5.5722	43.749	2617.5276	64.378	61.247	58	48	27	45	13.252828	27.5	99.58888888
117	5.6588	3262.8	13.3186	72986	2398.9828	8.8856	2617.3647	157.5261	5.4785	43.349	2617.5276	65.333	61.888	58	48	27	45	13.252928	27.5	188.88888888
118	5.9833	3268.8	13.3126	72986	2398.9817	8.8857	2617.3656	157.1675	5.9759	43.588	2617.5276	64.888	62.519	58	48	27	46	13.252928	27.5	188.88888888
119	6.3167	3262.8	13.3146	72986	2398.9845	8.8858	2617.3686	155.9423	8.6126	43.339	2617.5276	64.888	62.874	58	48	27	46	13.252888	27.5	188.88888888
120	6.6588	3268.8	13.3286	72986	2398.9889	8.8858	2617.3645	157.6126	6.4139	43.179	2617.5276	65.888	62.333	58	48	27	46	13.252888	27.5	99.58888888
121	7.8888	3262.8	13.3227	72986	2398.9795	8.8859	2617.3627	158.3221	5.3845	43.237	2617.5276	63.667	62.333	58	48	27	46	13.252928	27.5	99.58888888
122	7.3167	3268.8	13.3246	72986	2398.9824	8.8868	2617.3638	157.8731	6.2376	43.257	2617.5276	63.481	61.963	58	48	27	46	13.252888	27.5	188.88888888
123	7.6667	3262.8	13.3387	72986	2398.9889	8.8868	2617.3643	157.6875	7.4265	43.116	2617.5276	64.457	61.951	58	48	27	46	13.252888	27.5	188.88888888
124	7.9833	3268.8	13.3326	72986	2398.9791	8.8861	2617.3623	158.5858	5.8115	43.361	2617.5276	64.837	61.593	58	48	27	46	13.252928	27.5	188.88888888
125	8.3667	3262.8	13.3349	72986	2398.9788	8.8862	2617.3618	158.6888	5.3381	43.188	2617.5276	64.222	61.222	58	48	27	46	13.252928	27.5	188.88888888
126	5.4167	3142.8	13.5723	72986	2398.1542	8.8187	2625.2898	176.9179	3.5698	43.939	2625.4231	62.888	63.222	51	39	43	47	13.515983	23.8	95.88888888
127	5.7588	3142.8	13.5743	72986	2398.1544	8.8188	2625.2892	176.7933	3.8499	43.983	2625.4231	62.888	63.888	51	39	43	47	13.515983	23.8	95.88888888
128	6.8667	3142.8	13.5882	72986	2398.1551	8.8188	2625.2877	177.3128	3.1285	43.999	2625.4231	62.888	62.667	51	39	43	48	13.515983	23.8	95.88888888
129	6.3833	3142.8	13.5821	72986	2398.1545	8.8189	2625.2891	176.8122	4.5793	43.958	2625.4231	62.828	63.386	51	39	43	48	13.515983	23.8	95.88888888
130	6.7167	3142.8	13.5841	72986	2398.1553	8.8189	2625.2188	176.5896	2.7187	43.746	2625.4231	62.111	63.857	51	39	43	48	13.515983	23.8	95.88888888
131	7.8588	3142.8	13.5981	72986	2398.1546	8.8118	2625.2891	176.8325	6.4417	43.864	2625.4231	62.888	63.888	58	39	43	48	13.515983	23.8	95.88888888
132	7.3667	3142.8	13.5928	72986	2398.1562	8.8118	2625.2189	176.1988	3.3528	43.736	2625.4231	62.778	63.856	51	39	43	48	13.515983	23.8	95.88888888
133	7.7888	3142.8	13.5948	72986	2398.1546	8.8111	2625.2898	176.8483	4.5728	43.931	2625.4231	62.111	62.963	58	39	43	48	13.515983	23.8	95.88888888
134	7.9888	3142.8	13.5952	72986	2398.1556	8.8111	2625.2181	176.4737	2.6743	43.789	2625.4231	62.294	63.888	51	39	43	48	13.515983	23.8	95.88888888
135	8.6833	3138.8	14.2435	72986	2397.2231	8.8158	2624.1854	181.2672	111.5472	71.945	2624.4121	65.333	51.267	53	39	52	49	14.235585	12.8	83.52222228
136	1.1888	3138.8	14.2588	72986	2397.8693	8.8151	2624.8178	231.3412	3.5893	44.754	2624.4121	64.888	63.388	53	39	52	49	14.235585	12.8	83.52222228
137	1.4167	3138.8	14.2519	72986	2397.8698	8.8151	2624.8175	231.1958	3.2278	44.699	2624.4121	64.888	63.388	53	39	51	49	14.235585	12.8	83.52222888
138	1.7333	3138.8	14.2538	72986	2397.8782	8.8152	2624.8179	231.1284	4.4438	44.667	2624.4121	64.888	63.467	53	39	52	49	14.235585	12.8	83.52228888
139	2.2588	3138.8	14.2557	72986	2397.8783	8.8152	2624.8179	231.8931	3.9661	44.558	2624.4121	64.888	63.758	53	39	52	49	14.235585	12.8	83.52222888
140	3.2333	3138.8	14.2656	72986	2397.8784	8.8154	2624.8266	155.5124	4.6164	43.822	2624.1946	63.667	60.578	53	39	52	49	14.235585	84.5	51.52228888
141	4.6888	3138.8	14.2858	72986	2397.8829	8.8156	2624.8314	153.5561	3.7368	43.285	2624.1846	63.867	61.888	53	39	52	58	14.235585	84.5	51.52228888
142	4.9333	3138.8	14.2858	72986	2397.8816	8.8156	2624.8299	154.1685	6.1688	42.871	2624.1846	64.888	60.888	53	39	52	58	14.235585	84.5	51.52222888
143	5.2933	3138.8	14.2911	72986	2397.8829	8.8157	2624.8312	153.6114	2.6441	43.134	2624.1846	64.888	61.128	52	39	52	58	14.235585	84.5	51.52222888
144	5.6288	3138.8	14.2938	72986	2397.8823	8.8157	2624.8385	153.9873	3.5648	43.888	2624.1846	64.888	61.133	52	39	52	58	14.235585	84.5	51.52228888
145	5.9588	3138.8	14.2951	72986	2397.8823	8.8158	2624.8385	153.9878	3.5622	42.995	2624.1846	64.853	61.187	53	39	52	58	14.235585	84.5	51.52228888
146	6.2667	3138.8	14.3818	72986	2397.8838	8.8158	2624.8321	153.2781	2.7489	43.881	2624.1846	64.258	61.258	52	39	52	58	14.235585	84.5	51.52228888
147	6.4833	3138.8	14.3823	72986	2397.8832	8.8158	2624.8281	154.8998	5.3434	42.797	2624.1846	64.213	61.177	53	39	52	58	14.235585	84.5	51.52228888
148	8.4333	3184.8	14.4218	72986	2394.7385	8.8173	2621.4639	162.2412	3.7876	42.978	2621.6336	64.956	62.887	53	39	56	51	14.415225	33.5	1.28888888
149	8.8333	3184.8	14.4242	72986	2394.7488	8.8173	2621.4751	155.7236	4.9136	42.997	2621.6336	64.228	62.252	54	39	56	51	14.415225	33.5	1.28888888

150	1.1500	3184.8	14.4321	72986	2394.7534	8.8174	2621.4881	153.6598	7.2989	43.838	2621.6336	65.200	61.667	53	39	56	51	14.415225	33.5	1.8888888
151	1.5500	3184.8	14.4325	72986	2394.7536	8.8174	2621.4883	153.5821	6.2325	43.178	2621.6336	64.200	61.150	54	39	56	51	14.415225	33.5	1.8888888
152	1.8833	3184.8	14.4345	72986	2394.7543	8.8175	2621.4811	153.2644	6.6705	42.926	2621.6336	64.800	61.333	54	39	56	51	14.415225	33.5	1.8888888
153	2.2200	3184.8	14.4484	72986	2394.7556	8.8175	2621.4825	152.6855	4.1271	42.898	2621.6336	64.378	61.389	54	39	56	51	14.415225	33.5	1.8888888
154	2.5667	3184.8	14.4426	72986	2394.7549	8.8175	2621.4817	153.0897	4.3289	42.918	2621.6336	64.200	62.722	54	39	56	51	14.415225	33.5	1.8888888
155	2.9028	3184.8	14.4446	72986	2394.7563	8.8176	2621.4831	152.4211	2.6438	43.005	2621.6336	64.822	60.933	54	39	56	51	14.415225	33.5	1.8888888
156	3.2333	3184.8	14.4586	72986	2394.7575	8.8176	2621.4844	151.8752	5.6143	42.995	2621.6336	64.200	60.750	54	39	56	51	14.415225	33.5	1.8888888
157	3.5667	3184.8	14.4526	72986	2394.7567	8.8177	2621.4835	152.2322	4.8553	42.982	2621.6336	64.533	60.667	54	39	56	51	14.415225	33.5	1.8888888
158	4.3833	3184.8	14.4615	72986	2394.7553	8.8177	2621.4818	152.9573	5.9524	43.229	2621.6336	63.200	60.450	54	39	56	51	14.415225	33.5	1.8888888
159	4.7167	3184.8	14.4635	72986	2394.7554	8.8178	2621.4819	152.9891	4.5411	43.882	2621.6336	63.267	60.428	54	39	56	51	14.415225	33.5	1.8888888
160	5.0333	3184.8	14.4654	72986	2394.7558	8.8178	2621.4815	153.1815	4.6915	42.992	2621.6336	63.200	60.428	54	39	56	51	14.415225	33.5	1.8888888
161	5.3833	3184.8	14.4715	72986	2394.7569	8.8179	2621.4835	152.2547	4.5479	42.887	2621.6336	63.422	60.533	54	39	56	51	14.415225	33.5	1.8888888
162	5.7000	3184.8	14.4734	72986	2394.7564	8.8179	2621.4829	152.4828	6.1196	42.837	2621.6336	63.600	60.533	54	39	56	51	14.415225	33.5	1.8888888
163	6.1500	3184.8	14.4801	72986	2394.7576	8.8179	2621.4842	151.9639	6.4458	42.788	2621.6336	63.998	60.625	54	39	56	51	14.415225	33.5	1.8888888
164	2.6833	3881.8	14.5857	72986	2392.7226	8.8198	2619.2568	176.8465	6.2986	43.495	2619.4781	78.467	61.328	47	39	51	52	14.561694	78.8	37.8888888
165	3.1667	3881.8	14.5926	72986	2392.7237	8.8191	2619.2573	176.4858	6.3138	43.628	2619.4781	69.267	63.228	47	39	51	52	14.561694	78.8	37.8888888
166	3.6500	3881.8	14.5955	72986	2392.7289	8.8191	2619.2628	174.4195	6.7417	43.867	2619.4781	67.800	61.067	48	39	51	52	14.561694	78.8	37.8888888
167	4.1667	3881.8	15.0026	72986	2392.7268	8.8191	2619.2597	175.5458	5.8433	43.743	2619.4781	68.333	62.867	49	39	51	52	14.561694	78.8	37.8888888
168	4.6167	3881.8	15.0053	72986	2392.7321	8.8192	2619.2663	173.1643	5.3873	43.786	2619.4781	68.667	61.867	49	39	51	52	14.561694	78.8	37.8888888
169	5.0500	3881.8	15.0119	72986	2392.7256	8.8192	2619.2592	175.7368	5.4828	43.498	2619.4781	68.200	62.822	49	39	51	52	14.561694	78.8	37.8888888
170	5.5167	3881.8	15.0147	72986	2392.7261	8.8193	2619.2596	175.5714	6.3132	43.791	2619.4781	67.467	61.867	50	39	51	52	14.561694	78.8	37.8888888
171	5.9833	3881.8	15.0215	72986	2392.7266	8.8193	2619.2601	175.3942	6.3891	43.619	2619.4781	67.733	61.458	51	39	51	52	14.561694	78.8	37.8888888
172	6.4000	3881.8	15.0248	72986	2392.7298	8.8193	2619.2627	174.4673	4.1118	43.778	2619.4781	67.200	61.800	51	39	51	52	14.561694	78.8	37.8888888
173	6.8500	3881.8	15.0307	72986	2392.7279	8.8194	2619.2615	174.9264	4.2164	43.817	2619.4781	67.222	61.222	51	39	51	52	14.561694	78.8	37.8888888
174	7.3200	3281.8	15.0334	72986	2392.7316	8.8194	2619.2653	173.4734	7.9481	43.885	2619.4781	66.956	60.867	51	39	51	52	14.561694	78.8	37.8888888
175	7.7667	3881.8	15.0402	72986	2392.7262	8.8195	2619.2596	175.5988	5.3643	43.595	2619.4781	67.222	60.733	52	39	51	52	14.561694	78.8	37.8888888
176	8.2667	3881.8	15.0432	72986	2392.7307	8.8195	2619.2644	173.8537	7.4288	43.638	2619.4781	67.000	60.800	52	39	51	52	14.561694	78.8	37.8888888
177	8.7333	3281.8	15.0500	72986	2392.7262	8.8195	2619.2594	175.6396	5.9955	43.638	2619.4781	67.222	62.867	52	39	50	52	14.561694	78.8	37.8888888
178	9.2200	3881.8	15.0528	72986	2392.7247	8.8196	2619.2578	176.2271	6.2571	43.491	2619.4781	66.733	61.867	53	39	51	52	14.561694	78.8	37.8888888
179	9.7333	3881.8	15.0600	72986	2392.6511	8.8196	2619.1772	282.6149	97.0515	42.963	2619.4781	69.200	81.308	53	39	51	52	14.561694	78.8	37.8888888
180	10.2167	3881.8	15.0629	72986	2392.7732	8.8196	2619.3188	156.2815	88.0342	43.591	2619.4781	64.756	58.844	53	39	51	52	14.561694	78.8	37.8888888
181	10.7000	3881.8	15.0658	72986	2392.7256	8.8197	2619.2586	175.9296	5.4611	43.665	2619.4781	66.933	62.067	53	39	50	52	14.561694	78.8	37.8888888
182	11.2167	3881.8	15.0729	72986	2392.7319	8.8197	2619.2655	173.4585	5.7184	43.567	2619.4781	66.200	61.200	53	39	51	52	14.561694	78.8	37.8888888
183	12.1000	3881.8	15.0822	72986	2392.7312	8.8198	2619.2647	173.7598	4.5655	43.652	2619.4781	66.467	60.733	53	39	51	52	14.561694	78.8	37.8888888
184	12.5333	3881.8	15.0848	72986	2392.7255	8.8198	2619.2583	176.0383	4.3689	43.570	2619.4781	66.200	62.200	53	39	50	52	14.561694	78.8	37.8888888
185	12.9833	3881.8	15.0915	72986	2392.7207	8.8199	2619.2531	177.8792	6.5613	43.651	2619.4781	66.200	61.133	54	39	51	52	14.561694	78.8	37.8888888
186	13.4500	3281.8	15.0943	72986	2392.7233	8.8199	2619.2558	176.9167	6.0976	43.714	2619.4781	65.467	61.853	54	38	50	52	14.561694	78.8	37.8888888
187	13.8667	3881.8	15.1008	72986	2392.7253	8.8199	2619.2582	176.1488	4.8635	43.574	2619.4781	65.467	61.667	54	39	51	52	14.561694	78.8	37.8888888
188	15.1333	3881.8	15.1124	72986	2392.7238	8.8200	2619.2563	176.7688	6.9164	43.781	2619.4781	65.200	61.800	55	39	51	53	14.561694	78.8	37.8888888
189	15.9333	3281.8	15.1212	72986	2392.7347	8.8201	2619.2682	172.4782	3.9147	43.489	2619.4781	65.982	62.800	55	39	50	53	14.561694	78.8	37.8888888

190	16.3500	3081.0	15.1237	72986	2392.7317	0.0201	2619.2648	173.7136	7.2125	43.858	2619.4701	65.578	63.244	55	39	50	53	14.561694	78.0	37.0222000
191	16.7500	3081.0	15.1321	72986	2392.7334	0.0201	2619.2667	173.0284	6.1473	43.274	2619.4701	65.200	62.578	55	39	50	53	14.561694	78.0	37.0222000
192	17.1500	3081.0	15.1325	72986	2392.7314	0.0202	2619.2644	173.8454	4.7822	43.965	2619.4701	66.200	62.200	56	39	50	53	14.561694	78.0	37.0222000
193	17.6200	3081.0	15.1352	72986	2392.7341	0.0202	2619.2674	172.7762	4.1471	43.384	2619.4701	66.222	62.333	56	38	50	53	14.561694	78.0	37.0222000
194	17.9833	3081.0	15.1415	72986	2392.7318	0.0202	2619.2639	174.0195	6.2103	43.638	2619.4701	66.000	61.750	56	38	51	53	14.561694	78.0	37.0222000
195	19.0000	3081.0	15.1584	72986	2392.7326	0.0203	2619.2635	174.1950	6.1658	43.362	2619.4701	65.400	60.500	56	39	51	53	14.561694	78.0	37.0222000
196	19.6833	3081.0	15.1557	72986	2392.7343	0.0203	2619.2674	172.7739	6.9974	43.617	2619.4701	66.000	63.240	57	38	51	53	14.561694	78.0	37.0222000
197	20.1333	3081.0	15.1624	72986	2392.7284	0.0204	2619.2522	178.1818	5.1898	43.697	2619.4701	66.000	61.200	57	39	51	53	14.561694	78.0	37.0222000
198	20.5333	3081.0	15.1648	72986	2392.7252	0.0204	2619.2574	176.3671	5.4274	43.737	2619.4701	66.000	60.500	57	39	50	53	14.561694	78.0	37.0222000
199	20.9833	3081.0	15.1715	72986	2392.7234	0.0204	2619.2554	177.0813	6.6952	43.758	2619.4701	66.000	62.200	58	39	50	53	14.561694	78.0	37.0222000
200	21.4333	3081.0	15.1742	72986	2392.7148	0.0204	2619.2458	180.3585	6.6778	43.571	2619.4701	65.933	62.867	58	39	51	53	14.561694	78.0	37.0222000
201	21.8500	3081.0	15.1987	72986	2392.7246	0.0205	2619.2567	176.6268	6.9893	43.714	2619.4701	65.733	62.667	58	38	50	53	14.561694	78.0	37.0222000
202	22.3500	3081.0	15.1837	72986	2392.7277	0.0205	2619.2638	175.4134	6.4428	43.658	2619.4701	66.066	61.585	58	38	50	53	14.561694	78.0	37.0222000
203	3.2667	3268.0	15.2729	72986	2398.9828	0.0210	2617.2625	164.6824	4.8673	42.988	2617.4441	63.947	62.220	53	40	71	53	15.242574	44.0	11.5222000
204	3.4000	3268.0	15.2749	72986	2398.9844	0.0210	2617.2642	164.2338	5.8224	43.325	2617.4441	65.020	59.420	53	40	71	53	15.242574	44.0	11.5222000
205	3.8000	3268.0	15.2813	72986	2398.9838	0.0210	2617.2636	164.4677	10.2947	43.342	2617.4441	63.867	62.267	53	40	71	53	15.242574	44.0	11.5222000
206	4.1167	3268.0	15.2832	72986	2398.9851	0.0210	2617.2658	163.9163	5.5578	43.259	2617.4441	64.333	61.800	53	40	71	53	15.242574	44.0	11.5222000
207	4.4500	3268.0	15.2852	72986	2398.9868	0.0210	2617.2660	163.5628	3.9222	43.826	2617.4441	65.733	61.400	53	40	71	53	15.242574	44.0	11.5222000
208	4.8333	3268.0	15.2915	72986	2398.9836	0.0210	2617.2633	164.5771	5.4833	43.573	2617.4441	64.200	60.240	53	40	71	54	15.242574	44.0	11.5222000
209	5.1833	3268.0	15.2936	72986	2398.9845	0.0211	2617.2643	164.1912	5.5352	43.138	2617.4441	64.420	60.160	53	40	71	54	15.242574	44.0	11.5222000
210	5.5167	3268.0	15.2956	72986	2398.9861	0.0211	2617.2668	163.5567	3.4997	43.644	2617.4441	66.200	60.867	53	40	71	54	15.242574	44.0	11.5222000
211	5.9167	3268.0	15.3028	72986	2398.9842	0.0211	2617.2637	164.4444	7.2367	43.298	2617.4441	63.867	60.620	53	40	71	54	15.242574	44.0	11.5222000
212	6.2500	3268.0	15.3048	72986	2398.9844	0.0211	2617.2641	164.2788	7.2265	43.118	2617.4441	64.267	60.333	53	40	71	54	15.242574	44.0	11.5222000
213	6.6000	3268.0	15.3101	72986	2398.9844	0.0211	2617.2641	164.2648	6.3520	43.855	2617.4441	64.800	61.178	53	40	71	54	15.242574	44.0	11.5222000
214	6.9333	3268.0	15.3121	72986	2398.9858	0.0211	2617.2656	163.7824	6.3728	43.887	2617.4441	64.733	61.200	53	40	71	54	15.242574	44.0	11.5222000
215	7.3000	3268.0	15.3143	72986	2398.9817	0.0211	2617.2611	165.4343	7.7166	43.894	2617.4441	63.950	60.800	53	40	71	54	15.242574	44.0	11.5222000
216	7.6167	3268.0	15.3202	72986	2398.9855	0.0212	2617.2652	163.8462	8.1858	43.872	2617.4441	64.800	60.600	53	40	71	54	15.242574	44.0	11.5222000
217	7.9500	3268.0	15.3222	72986	2398.9844	0.0212	2617.2640	164.3818	4.6932	43.822	2617.4441	65.200	60.867	53	40	71	54	15.242574	44.0	11.5222000
218	8.3500	3268.0	15.3246	72986	2398.9831	0.0212	2617.2626	164.8621	8.2252	43.236	2617.4441	64.200	61.307	53	40	71	54	15.242574	44.0	11.5222000
219	8.7500	3268.0	15.3318	72986	2398.9838	0.0212	2617.2634	164.5558	5.4259	43.872	2617.4441	64.318	60.985	53	40	71	54	15.242574	44.0	11.5222000
220	8.8667	3037.0	15.3633	72986	2388.9157	0.0214	2615.2875	155.1421	5.4378	42.879	2615.2446	64.800	62.652	45	40	45	54	15.374122	44.5	11.5222000
221	1.2000	3037.0	15.3853	72986	2388.9161	0.0214	2615.2828	154.9768	7.1143	42.992	2615.2446	65.933	62.800	45	40	45	54	15.374122	44.5	11.5222000
222	1.6000	3037.0	15.3917	72986	2388.9186	0.0214	2615.2987	153.8317	5.5894	42.996	2615.2446	64.200	61.120	45	40	45	54	15.374122	44.5	11.5222000
223	1.9333	3037.0	15.3937	72986	2388.9148	0.0214	2615.2857	155.9188	4.2141	42.936	2615.2446	64.178	61.222	45	40	45	54	15.374122	44.5	11.5222000
224	2.2500	3037.0	15.3956	72986	2388.9166	0.0214	2615.2886	154.7251	5.2286	42.728	2615.2446	64.956	61.220	45	40	45	54	15.374122	44.5	11.5222000
225	2.9500	3037.0	15.4038	72986	2388.9145	0.0214	2615.2861	155.7192	6.1237	43.076	2615.2446	64.200	60.800	45	40	45	54	15.374122	44.5	11.5222000
226	6.1500	3037.0	15.4358	72986	2388.9157	0.0215	2615.2987	153.9246	5.8352	42.665	2615.2446	63.356	61.378	45	40	45	55	15.374122	44.5	11.5222000
227	8.9500	3237.0	15.5815	72986	2388.9159	0.0217	2615.2875	284.9222	6.5903	44.222	2615.2681	63.289	60.278	46	40	45	55	15.572492	89.0	55.5222000

228	2.3167	3037.8	16.5943	72986	2388.9148	8.8217	2615.8654	147.1384	4.5322	42.909	2615.2236	64.888	63.822	46	48	45	56	15.572492	23.5	95.58888
229	2.6588	3037.8	16.8883	72986	2388.9185	8.8217	2615.8723	144.9582	4.3228	42.985	2615.2236	63.963	62.963	46	48	45	56	15.572492	23.5	95.58888
238	2.9833	3037.8	16.8823	72986	2388.9174	8.8217	2615.8872	145.4778	7.8489	42.889	2615.2236	64.888	63.828	46	48	45	56	15.572492	23.5	95.58888
231	3.3167	3037.8	16.8843	72986	2388.9283	8.8217	2615.8923	144.8829	4.6429	42.957	2615.2236	64.888	62.963	46	48	45	56	15.572492	23.5	95.58888
232	3.6588	3037.8	16.8183	72986	2388.9129	8.8217	2615.8842	147.6456	7.6859	42.731	2615.2236	64.888	63.888	46	48	45	56	15.572492	23.5	95.58888
233	3.9833	3037.8	16.8123	72986	2388.9214	8.8217	2615.8935	145.5348	4.2468	42.895	2615.2236	64.874	62.784	46	48	45	56	15.572492	23.5	95.58888
234	4.3333	3037.8	16.8144	72986	2388.9197	8.8217	2615.8916	144.3786	4.8845	42.886	2615.2236	64.333	63.888	46	48	45	56	15.572492	23.5	95.58888
235	4.6588	3037.8	16.8283	72986	2388.9283	8.8217	2615.8923	144.8966	10.1552	42.997	2615.2236	64.667	63.888	46	48	45	56	15.572492	23.5	95.58888
236	5.0167	3037.8	16.8225	72986	2388.9219	8.8216	2615.8941	143.2632	18.2858	42.915	2615.2236	64.888	63.888	46	48	45	56	15.572492	23.5	95.58888
237	5.3667	3037.8	16.8246	72986	2388.9186	8.8216	2615.8984	144.9175	4.3492	42.758	2615.2236	64.828	62.667	46	48	45	56	15.572492	23.5	95.58888
238	5.6833	3037.8	16.8385	72986	2388.9149	8.8216	2615.8864	146.6825	5.8321	42.758	2615.2236	64.888	63.874	46	48	45	56	15.572492	23.5	95.58888
239	6.0167	3037.8	16.8325	72986	2388.9157	8.8216	2615.8872	146.3365	6.6981	42.882	2615.2236	64.111	63.888	46	48	45	56	15.572492	23.5	95.58888
240	6.3588	3037.8	16.8345	72986	2388.9178	8.8216	2615.8887	145.6875	6.4668	42.885	2615.2236	64.667	63.888	46	48	45	56	15.572492	23.5	95.58888
241	6.7228	3037.8	16.8486	72986	2388.9112	8.8216	2615.8824	148.4524	7.9762	42.842	2615.2236	64.288	62.926	46	48	45	56	15.572492	23.5	95.58888
242	7.1588	3037.8	16.8433	72986	2388.9171	8.8216	2615.8888	145.6333	7.7858	42.768	2615.2236	64.282	62.993	46	48	45	56	15.572492	23.5	95.58888
243	1.9667	3022.8	16.1544	72986	2387.6519	8.8214	2613.7845	163.5582	7.5223	42.938	2613.8826	63.825	61.874	46	48	62	56	16.134693	82.5	49.58888
244	2.3888	3022.8	16.1684	72986	2387.6545	8.8214	2613.7873	162.4398	5.9188	43.283	2613.8826	63.888	61.481	46	48	62	57	16.134693	82.5	49.58888
245	2.6333	3022.8	16.1624	72986	2387.6489	8.8214	2613.7813	164.7837	9.3166	43.471	2613.8826	63.667	61.667	46	48	62	56	16.134693	82.5	49.58888
246	2.9667	3022.8	16.1644	72986	2387.6444	8.8214	2613.6963	166.6777	7.6942	43.334	2613.8826	63.837	61.519	46	48	62	57	16.134693	82.5	49.58888
247	3.3888	3022.8	16.1784	72986	2387.6583	8.8214	2613.7829	164.1739	11.1211	43.288	2613.8826	63.963	61.519	46	48	62	57	16.134693	82.5	49.58888
248	3.6333	3022.8	16.1724	72986	2387.6518	8.8214	2613.7845	163.5529	12.4822	43.283	2613.8826	64.288	61.667	46	48	62	57	16.134693	82.5	49.58888
249	3.9667	3022.8	16.1744	72986	2387.6583	8.8214	2613.7828	164.1943	13.2699	43.246	2613.8826	64.667	62.288	46	48	62	57	16.134693	82.5	49.58888
250	4.3667	3022.8	16.1888	72986	2387.6557	8.8214	2613.7866	162.7327	10.3221	42.932	2613.8826	63.963	61.148	46	48	62	57	16.134693	82.5	49.58888
251	4.7888	3022.8	16.1928	72986	2387.6516	8.8213	2613.7842	163.6456	6.1878	42.944	2613.8826	63.963	61.444	46	48	62	57	16.134693	82.5	49.58888
252	5.8333	3022.8	16.1848	72986	2387.6526	8.8213	2613.7853	163.2157	9.1991	42.949	2613.8826	64.288	61.519	46	48	62	57	16.134693	82.5	49.58888
253	5.3833	3022.8	16.1989	72986	2387.6575	8.8213	2613.7187	161.1149	18.1818	42.848	2613.8826	64.288	61.148	46	48	62	57	16.134693	82.5	49.58888
254	5.7888	3022.8	16.1928	72986	2387.6519	8.8213	2613.7846	163.4984	11.1697	42.976	2613.8826	64.288	61.926	46	48	62	57	16.134693	82.5	49.58888
255	6.8333	3022.8	16.1948	72986	2387.6478	8.8213	2613.6993	165.5385	7.3681	43.343	2613.8826	64.288	61.667	46	48	62	57	16.134693	82.5	49.58888
256	6.3667	3022.8	16.2008	72986	2387.6466	8.8213	2613.6989	165.6878	9.1338	43.297	2613.8826	64.481	61.963	46	48	62	57	16.134693	82.5	49.58888
257	6.7288	3022.8	16.2028	72986	2387.6373	8.8213	2613.6887	169.5248	7.4492	43.828	2613.8826	64.926	62.228	46	48	62	57	16.134693	82.5	49.58888
258	7.1167	3022.8	16.2053	72986	2387.6575	8.8213	2613.7128	161.8773	7.8718	42.878	2613.8826	63.926	61.556	46	48	62	57	16.134693	82.5	49.58888
259	7.4588	3022.8	16.2113	72986	2387.6533	8.8213	2613.7263	162.8614	8.2836	43.247	2613.8826	64.288	61.593	46	48	62	57	16.134693	82.5	49.58888
268	7.8588	3022.8	16.2137	72986	2387.6584	8.8212	2613.7118	168.6683	7.5717	43.146	2613.8826	63.778	61.778	46	48	62	57	16.134693	82.5	49.58888
261	2.5338	2995.8	16.2948	72986	2385.2732	8.8289	2611.1821	153.8852	13.2813	43.645	2611.2561	64.288	61.882	49	43	76	57	16.271827	56.8	23.88888
262	3.4288	2995.8	16.3834	72986	2385.2784	8.8289	2611.1878	151.4769	23.6983	43.849	2611.2561	65.148	61.288	49	43	76	57	16.271827	56.8	23.88888
263	1.8667	2995.8	16.3318	72986	2385.2657	8.8287	2611.3941	149.4483	18.2576	42.874	2611.2376	63.889	60.519	49	43	76	57	16.311884	37.5	5.88888
264	2.2888	2995.8	16.3338	72986	2385.2728	8.8287	2611.1818	146.2678	16.1553	42.666	2611.2376	64.222	60.228	49	43	76	57	16.311884	37.5	5.88888
265	2.5333	2995.8	16.3358	72986	2385.2834	8.8287	2611.1174	148.8431	14.8329	42.981	2611.2376	64.228	60.444	49	43	76	57	16.311884	37.5	5.88888

266	2.8833	2995.8	16.3411	72986	2385.2713	8.8287	2611.1823	146.7562	16.1995	42.979	2611.2376	64.888	59.667	49	43	76	57	16.311824	37.5	5.88288
267	1.3933	2995.8	16.4886	72986	2385.2755	8.8285	2611.1852	167.6758	23.7876	43.625	2611.2941	62.417	59.972	49	44	76	58	16.384371	94.8	61.88282
268	5.2833	2995.8	16.4348	72986	2385.2781	8.8281	2611.8995	126.8276	15.4628	42.643	2611.1946	62.888	59.888	58	43	76	58	16.384371	94.5	62.88288
269	5.4888	2995.8	16.4427	72986	2385.2642	8.8281	2611.8931	129.8693	12.6827	42.225	2611.1751	62.888	59.888	58	43	76	58	16.384371	95.8	62.88288
270	5.7528	2995.8	16.4428	72986	2385.2693	8.8281	2611.8987	126.9698	22.5359	42.789	2611.1946	59.667	59.888	58	43	76	58	16.384371	94.5	62.88288
271	8.3888	2995.8	16.5211	72986	2385.2717	8.8195	2611.1819	171.4873	13.8249	43.275	2611.3811	61.888	62.888	51	43	76	59	16.515489	181.8	69.88288
272	8.6167	2995.8	16.5238	72986	2385.2537	8.8195	2611.8823	178.5255	18.4447	43.585	2611.3811	61.444	61.638	51	43	76	59	16.515489	181.8	69.88288
273	8.9528	2995.8	16.5258	72986	2385.2641	8.8195	2611.8937	174.4686	8.8733	42.976	2611.3811	61.519	61.481	51	43	76	59	16.515489	181.8	69.88288
274	1.2833	2995.8	16.5318	72986	2385.2686	8.8194	2611.8986	172.6938	9.6885	43.578	2611.3811	62.888	61.148	51	43	76	59	16.515489	181.8	69.88288
275	1.6167	2995.8	16.5338	72986	2385.2729	8.8194	2611.1834	178.9479	8.2613	43.247	2611.3811	62.888	61.333	51	43	76	59	16.515489	181.8	69.88288
276	1.9536	2995.8	16.5358	72986	2385.2558	8.8194	2611.8847	177.6635	9.4211	43.264	2611.3811	62.888	61.837	51	43	76	59	16.515489	181.8	69.88888
277	2.2833	2995.8	16.5418	72986	2385.2692	8.8193	2611.8994	172.3998	8.4518	43.555	2611.3811	62.888	61.837	51	43	76	59	16.515489	181.8	69.88288
278	2.6167	2995.8	16.5438	72986	2385.2674	8.8193	2611.8974	173.1244	9.6229	43.917	2611.3811	63.888	60.593	51	43	76	59	16.515489	181.8	69.88888
279	2.9667	2995.8	16.5451	72986	2385.2739	8.8193	2611.1845	178.5213	18.5983	43.429	2611.3811	63.888	60.926	51	43	76	59	16.515489	181.8	69.88288
280	3.2833	2995.8	16.5518	72986	2385.2668	8.8193	2611.8962	173.6571	9.9735	42.945	2611.3811	63.888	60.556	51	43	76	59	16.515489	181.8	69.88288
281	3.6167	2995.8	16.5538	72986	2385.2743	8.8192	2611.1851	178.3873	13.2624	43.526	2611.3811	63.888	60.888	51	43	76	59	16.515489	181.8	69.88288
282	3.9538	2995.8	16.5558	72986	2385.2697	8.8192	2611.1881	172.1683	13.9366	42.923	2611.3811	63.667	60.333	51	43	76	59	16.515489	181.8	69.88288
283	4.2833	2995.8	16.5618	72986	2385.2731	8.8192	2611.1839	178.7746	8.7154	43.318	2611.3811	63.889	60.837	51	43	76	59	16.515489	181.8	69.88288
284	4.6167	2995.8	16.5638	72986	2385.2598	8.8192	2611.8893	176.8337	14.6859	42.937	2611.3811	63.667	60.888	58	43	76	59	16.515489	181.8	69.88288
285	4.9528	2995.8	16.5658	72986	2385.2731	8.8191	2611.1839	178.7618	8.3787	42.929	2611.3811	64.888	59.593	51	43	76	59	16.515489	181.8	69.88288
286	5.2833	2995.8	16.5718	72986	2385.2787	8.8191	2611.1813	171.7867	18.8394	43.887	2611.3811	64.888	59.667	58	43	76	59	16.515489	181.8	69.88288
287	5.6167	2995.8	16.5738	72986	2385.2755	8.8191	2611.1866	169.7692	12.2882	43.477	2611.3811	64.874	59.111	58	43	76	59	16.515489	181.8	69.88288
288	5.9588	2995.8	16.5758	72986	2385.2698	8.8198	2611.8995	172.3582	9.8849	43.868	2611.3811	64.487	59.378	51	43	76	59	16.515489	181.8	69.88288
289	7.5167	2995.8	16.5924	72986	2385.2784	8.8189	2611.1899	168.5236	13.6886	43.264	2611.3811	66.888	61.421	58	43	76	59	16.515489	181.8	69.88288
290	8.6333	2981.8	17.1826	72986	2384.8671	8.8179	2689.7856	165.4394	23.2848	43.886	2689.9686	65.333	62.888	52	43	182	68	17.894832	68.5	36.88288
291	8.9528	2981.8	17.1845	72986	2384.8517	8.8178	2689.7687	171.9338	21.9868	43.397	2689.9691	66.888	62.888	52	43	182	68	17.894832	69.8	36.88288
292	1.3333	2981.8	17.1188	72986	2384.8441	8.8178	2689.7624	174.7489	12.8673	43.675	2689.9691	64.951	61.399	52	43	182	68	17.894832	69.8	36.88888
293	1.6667	2981.8	17.1128	72986	2384.8527	8.8178	2689.7699	171.3231	17.9711	43.915	2689.9686	65.888	61.222	52	43	182	68	17.894832	68.5	36.88288
294	2.8888	2981.8	17.1148	72986	2384.8512	8.8177	2689.7683	172.8758	17.1975	43.241	2689.9691	65.888	61.333	52	43	182	68	17.894832	69.8	36.88288
295	2.3333	2981.8	17.1288	72986	2384.8521	8.8177	2689.7693	171.5361	22.2828	43.176	2689.9691	65.888	61.346	52	43	182	68	17.894832	69.8	36.88288
296	2.6588	2981.8	17.1227	72986	2384.8533	8.8177	2689.7787	171.1949	14.3643	43.254	2689.9686	65.888	61.667	52	43	182	68	17.894832	68.5	36.88288
297	3.8888	2981.8	17.1248	72986	2384.8518	8.8176	2689.7682	171.9192	8.4921	43.247	2689.9691	65.837	61.259	52	43	182	68	17.894832	69.8	36.88288
298	3.3333	2981.8	17.1288	72986	2384.8577	8.8176	2689.7756	169.2828	12.5595	43.738	2689.9686	65.888	62.888	52	43	182	68	17.894832	68.5	36.88288
299	3.6588	2981.8	17.1327	72986	2384.8527	8.8176	2689.7782	171.2873	15.6488	43.111	2689.9691	65.888	61.333	52	43	182	68	17.894832	69.8	36.88288
388	3.9833	2981.8	17.1347	72986	2384.8513	8.8175	2689.7686	171.7744	12.7186	43.465	2689.9691	65.888	61.278	52	43	182	68	17.894832	69.8	36.88288
381	4.3333	2981.8	17.1488	72986	2384.8562	8.8175	2689.7742	169.7828	11.1796	43.882	2689.9691	65.888	62.888	52	43	182	68	17.894832	69.8	36.88288
382	4.6667	2981.8	17.1428	72986	2384.8591	8.8174	2689.7773	168.7538	12.3186	43.156	2689.9691	65.167	61.861	52	42	182	68	17.894832	69.8	36.88288
383	5.3538	2981.8	17.1589	72986	2384.8483	8.8174	2689.7656	172.8964	13.4832	43.284	2689.9686	65.874	61.111	52	42	182	68	17.894832	68.5	36.88288

304	6.2167	2981.8	17.1549	72986	2384.8562	8.8173	2689.7742	169.7186	18.2697	43.836	2689.9686	65.856	61.472	52	43	182	68	17.894832	68.5	36.88888
305	6.3522	2981.8	17.1689	72986	2384.8467	8.8173	2689.7639	173.6814	16.8243	43.821	2689.9686	65.378	61.111	52	43	122	68	17.894832	68.5	36.88888
306	6.7528	2981.8	17.1633	72986	2384.8478	8.8172	2689.7651	173.2268	19.7824	43.873	2689.9686	64.888	61.667	52	43	182	68	17.894832	68.5	36.88888
307	7.1288	2981.8	17.1654	72986	2384.8518	8.8172	2689.7687	171.9428	15.8183	43.364	2689.9686	64.494	61.481	52	43	182	68	17.894832	68.5	36.88888
308	7.4167	2981.8	17.1713	72986	2384.8558	8.8172	2689.7731	170.1337	13.4526	43.776	2689.9686	64.333	61.556	52	43	182	68	17.894832	68.5	36.88888
309	8.4333	2981.8	17.1914	72986	2384.8487	8.8178	2689.7564	172.6858	11.8982	42.941	2689.9686	64.821	61.273	52	43	182	68	17.894832	68.5	36.88888
310	18.8333	2981.8	18.2328	72986	2383.8111	8.8875	2689.5167	127.2281	7.7848	42.883	2689.6131	68.888	59.638	49	42	38	64	18.852658	13.8	85.8888
311	18.8167	2981.8	18.2423	72986	2383.8185	8.8874	2689.5162	127.5218	18.7758	42.892	2689.6131	68.822	68.378	49	42	38	64	18.852658	13.8	85.8888
312	19.2333	2981.8	18.2448	72986	2383.8842	8.8873	2689.5894	132.9938	14.5589	42.778	2689.6131	68.288	67.679	49	42	38	64	18.852658	13.8	85.8888
313	21.1833	2981.8	18.2637	72986	2383.7956	8.8878	2689.5883	112.6197	18.5534	42.849	2689.5711	59.288	68.888	49	42	38	64	18.852658	71.8	38.8888
314	21.7522	2981.8	18.2711	72986	2383.7927	8.8869	2689.4973	114.4434	8.3222	42.213	2689.5711	58.926	52.593	49	42	38	64	18.852658	71.8	38.8888
315	22.6667	2981.8	18.2926	72986	2383.7863	8.8867	2689.4985	172.7318	18.8883	43.837	2689.6931	58.222	49.888	49	42	32	64	18.852658	93.8	68.8888
316	25.5167	2981.8	18.3857	72986	2383.7984	8.8862	2689.5843	145.6521	11.6981	42.965	2689.6391	59.888	59.667	49	42	38	64	18.852658	39.8	6.5888
317	26.6667	2981.8	18.3286	72986	2383.8815	8.8868	2689.5879	144.8518	8.5835	42.833	2689.6391	68.857	59.963	49	42	38	64	18.852658	39.8	6.5888
318	27.7528	2981.8	18.3311	72986	2383.8816	8.8858	2689.5882	143.8919	11.8174	42.823	2689.6391	68.288	55.681	49	42	38	64	18.852658	39.8	6.5888
319	2.1528	2948.8	18.4645	72986	2382.9514	8.8833	2686.3928	149.6986	7.9924	42.985	2686.5361	68.888	58.333	58	43	58	65	18.443673	36.8	3.588
320	2.7333	2948.8	18.4728	72986	2382.9624	8.8831	2686.4819	145.3573	9.4894	42.695	2686.5361	68.963	[illegible]	58	43	58	65	18.443673	36.8	3.588
321	3.3667	2948.8	18.4758	72986	2382.9538	8.8838	2686.3949	148.4529	7.2681	42.983	2686.5361	59.926	[illegible]37	51	43	58	65	18.443673	36.8	3.588
322	3.9333	2948.8	18.4832	72986	2382.9586	8.8829	2686.4883	146.2824	13.8193	42.728	2686.5361	68.288	[illegible].333	51	43	58	65	18.443673	36.8	3.588
323	4.5828	2948.8	18.4986	72986	2382.9593	8.8828	2686.4812	145.6974	6.5897	42.984	2686.5361	68.926	57.874	51	43	58	65	18.443673	36.8	3.588
324	5.1167	2948.8	18.4943	72986	2382.9561	8.8827	2686.3978	147.1787	9.4477	42.997	2686.5361	68.874	56.111	51	43	58	65	18.443673	36.8	3.588
325	6.5528	2948.8	18.5189	72986	2382.9642	8.8824	2686.4878	143.1811	8.3594	43.838	2686.5361	68.667	57.333	51	44	58	65	18.443673	36.8	3.588
326	7.4288	2948.8	18.5288	72986	2382.9544	8.8822	2686.3954	158.8498	7.9895	43.838	2686.5686	59.288	56.481	51	44	58	65	18.443673	68.5	27.588
327	8.8833	2948.8	18.5241	72986	2382.9621	8.8821	2686.4858	154.5686	9.8819	42.999	2686.5686	59.278	55.933	51	44	58	65	18.443673	68.5	27.588
328	2.7533	2888.8	19.8521	72986	2375.7587	-8.8884	2688.7137	156.7358	11.2883	42.824	2688.8746	69.388	65.222	47	38	27	66	19.823448	74.5	42.888
329	3.5888	2888.8	19.8684	72986	2375.7651	-8.8885	2688.7288	153.7995	18.4352	42.985	2688.8746	67.537	66.874	48	38	27	66	19.823448	74.5	42.888
330	4.1667	2888.8	19.8644	72986	2375.7678	-8.8887	2688.7238	152.8756	13.4156	42.817	2688.8746	68.288	65.288	48	38	27	66	19.823448	74.5	42.888
331	4.8528	2888.8	19.8725	72986	2375.7686	-8.8888	2688.7249	152.8934	14.4919	42.945	2688.8746	67.288	64.913	48	38	27	66	19.823448	74.5	42.888
332	6.2288	2888.8	19.8846	72986	2375.7688	-8.8811	2688.7254	151.8782	13.7565	42.937	2688.8746	67.288	65.888	49	38	27	66	19.823448	74.5	42.888
333	6.7833	2888.8	19.8921	72986	2375.7725	-8.8812	2688.7296	152.8671	19.7728	42.978	2688.8746	69.926	65.874	49	38	27	66	19.823448	74.5	42.888
334	9.8667	2888.8	19.1226	72986	2375.7685	-8.8818	2688.7258	139.1691	12.6382	42.793	2688.8466	66.486	65.139	49	38	27	66	19.823448	46.5	13.588
335	11.2833	2888.8	19.1339	72986	2375.7714	-8.8821	2688.7294	137.5892	18.1258	42.925	2688.8466	67.888	66.374	49	38	27	66	19.823448	46.5	13.588
336	2.2888	2876.8	19.1949	72986	2374.7447	-8.8834	2599.6873	148.6659	17.5178	42.884	2599.7311	66.528	62.833	55	39	14	66	19.173746	31.8	8.888
337	3.1588	2876.8	19.2246	72986	2374.7333	-8.8836	2599.5958	154.1129	13.8767	42.872	2599.7746	67.288	62.417	55	39	14	66	19.173746	74.5	42.888
338	4.4833	2876.8	19.2286	72986	2374.7366	-8.8838	2599.5998	186.4811	14.4657	43.555	2599.8411	66.148	62.463	55	39	14	66	19.173746	41.8	8.588
339	6.7667	2876.8	19.2423	72986	2374.7485	-8.8843	2599.6124	138.9694	13.2135	42.838	2599.7326	67.288	63.288	55	39	14	67	19.173746	32.5	8.888
340	7.3588	2876.8	19.2458	72986	2374.7428	-8.8844	2599.6055	142.1916	11.3882	42.682	2599.7326	67.862	62.448	56	39	14	67	19.173746	32.5	8.888

341	12.2333	2876.0	19.2751	72986	2374.7328	-0.0252	2599.5931	185.7626	15.1828	43.225	2599.8271	67.000	64.933	56	39	14	67	19.173746	27.0	99.000
342	11.1167	2876.0	19.2844	72986	2374.7467	-0.0252	2599.6115	153.4941	22.2638	42.833	2599.7646	67.000	65.074	56	39	14	67	19.173746	64.5	31.500
343	11.7000	2876.0	19.2919	72986	2374.7482	-0.0254	2599.6845	156.3982	15.6853	42.896	2599.7646	67.274	64.685	56	39	14	67	19.173746	64.5	31.500
344	12.2833	2876.0	19.2954	72986	2374.7411	-0.0255	2599.6856	155.9277	11.4727	42.898	2599.7646	67.778	64.296	56	39	14	67	19.173746	64.5	31.500
345	13.2333	2876.0	19.3039	72986	2374.7498	-0.0256	2599.6153	151.8930	10.8719	42.831	2599.7646	67.137	64.259	56	39	14	67	19.173746	64.5	31.500
346	2.4167	2837.0	19.4028	72986	2371.3823	-0.0077	2595.9358	166.8485	9.4834	42.771	2596.1176	68.200	64.800	52	42	59	67	19.375592	17.5	89.300
347	3.8333	2837.0	19.4057	72986	2371.3843	-0.0078	2595.9353	165.1439	11.8995	43.032	2596.1176	68.200	64.800	52	42	59	67	19.375592	17.5	89.500
348	3.7000	2837.0	19.4137	72986	2371.3895	-0.0080	2595.9412	162.8889	7.5962	42.951	2596.1176	67.800	64.333	53	42	59	67	19.375592	17.5	89.300
349	4.2667	2837.0	19.4211	72986	2371.3843	-0.0081	2595.9357	165.8255	7.8915	42.731	2596.1176	69.000	65.250	52	42	59	67	19.375592	17.5	89.200
350	4.9167	2837.0	19.4258	72986	2371.3876	-0.0082	2595.9393	163.6028	9.6884	43.001	2596.1176	68.000	65.000	53	42	59	67	19.375592	17.5	89.200
351	5.5333	2837.0	19.4327	72986	2371.3928	-0.0084	2595.9452	161.3287	11.3485	43.083	2596.1176	67.000	64.500	53	42	59	67	19.375592	17.5	89.200
352	6.4333	2837.0	19.4405	72986	2371.3948	-0.0085	2595.9357	165.2024	11.2782	43.001	2596.1176	68.000	65.000	53	42	59	68	19.375592	17.5	89.000
353	2.8333	2794.0	19.5116	72986	2367.6268	-0.0182	2591.8265	169.2303	14.8116	42.793	2591.9956	67.000	62.000	52	42	93	68	19.491488	95.5	63.000
354	2.6667	2794.0	19.5154	72986	2367.6272	-0.0182	2591.8271	169.7983	6.2378	42.910	2591.9956	67.000	62.500	52	42	93	68	19.491488	95.5	63.000
355	4.1167	2794.0	19.5321	72986	2367.6277	-0.0185	2591.8279	169.4638	7.5858	42.899	2591.9956	63.000	64.000	52	42	93	68	19.491488	95.5	63.000
356	4.6833	2794.0	19.5355	72986	2367.6389	-0.0186	2591.8316	167.9882	8.7138	42.848	2591.9956	63.000	64.000	52	42	93	68	19.491488	95.5	63.000
357	5.3667	2794.0	19.5436	72986	2367.6312	-0.0187	2591.8321	167.7648	7.2267	42.914	2591.9956	62.750	63.118	52	42	93	68	19.491488	95.5	63.000
358	2.6667	2769.0	20.0525	72986	2365.3512	-0.0131	2589.3399	158.6589	8.6542	42.983	2589.5856	64.000	66.000	49	42	92	69	20.024388	5.5	77.500
359	3.2500	2769.0	20.0559	72986	2365.3511	-0.0132	2589.3399	158.6586	7.6675	42.986	2589.5856	64.000	66.333	49	42	92	69	20.024388	5.5	77.500
360	3.8333	2769.0	20.0633	72986	2365.3471	-0.0134	2589.3357	160.3494	7.7442	42.899	2589.5856	61.500	66.500	49	42	92	69	20.024388	5.5	77.500
361	4.4833	2769.0	20.0712	72986	2365.3536	-0.0135	2589.3438	157.4868	8.4261	42.931	2589.5856	62.000	65.000	49	42	92	69	20.024388	5.5	77.500
362	5.1167	2769.0	20.0752	72986	2365.3545	-0.0136	2589.3441	156.9589	10.2231	42.898	2589.5856	63.000	64.667	49	42	92	69	20.024388	5.5	77.500
363	5.7500	2769.0	20.0828	72986	2365.3526	-0.0138	2589.3422	157.7252	6.4592	42.871	2589.5856	62.741	64.969	49	42	92	69	20.024388	5.5	77.500
364	1224.8833	2748.0	20.2485	72986	2362.9891	-0.0172	2586.6723	161.8749	6.1273	42.889	2586.8441	60.000	58.000	52	43	40	69	0.222222	44.0	11.50
365	1224.8833	2748.0	20.2441	72986	2362.9121	-0.0173	2586.6757	159.7241	3.7957	42.983	2586.8441	60.000	57.750	52	43	40	69	0.222222	44.0	11.50
366	1225.2500	2748.0	20.2515	72986	2362.9131	-0.0174	2586.6770	159.2088	5.9924	42.893	2586.8441	60.000	57.500	52	43	40	69	0.222222	44.0	11.50
367	1225.8667	2748.0	20.2552	72986	2362.9154	-0.0176	2586.6797	158.1517	4.4982	42.898	2586.8441	60.500	57.250	52	43	40	69	0.222222	44.0	11.50
368	2.7000	3060.0	20.5341	72986	2390.7773	-0.0236	2617.1739	188.9693	11.1819	43.477	2617.4236	75.000	64.500	51	41	61	71	20.585958	23.5	95.00
369	4.2333	3060.0	20.5513	72986	2390.7736	-0.0239	2617.1782	190.1879	8.8344	43.817	2617.4236	74.000	64.000	52	40	61	71	20.585958	23.5	95.00
370	5.8500	3060.0	20.5602	72986	2390.7763	-0.0241	2617.1734	189.1555	4.4294	43.743	2617.4236	73.500	66.500	52	40	61	71	20.585958	23.5	95.00
371	5.9000	3060.0	20.5647	72986	2390.7736	-0.0243	2617.1787	190.3402	5.8657	43.622	2617.4236	73.000	65.000	52	40	61	71	20.585958	23.5	95.00
372	6.5833	3060.0	20.5734	72986	2390.7788	-0.0244	2617.1765	188.1201	9.9112	43.589	2617.4236	72.000	64.000	52	40	61	71	20.585958	23.5	95.00
373	7.4500	3060.0	20.5826	72986	2390.7749	-0.0246	2617.1725	189.4553	5.8744	43.567	2617.4236	73.000	64.500	52	40	61	71	20.585958	23.5	95.00
374	8.9167	3060.0	20.5954	72986	2390.7771	-0.0249	2617.1752	188.5443	5.4191	42.978	2617.4236	71.000	64.534	52	40	61	71	20.585958	23.5	95.00
375	8.7500	3037.0	21.1946	72986	2392.6483	-0.0291	2617.2389	153.8824	2.7794	42.764	2617.1926	67.667	65.000	54	40	42	72	21.198167	92.5	59.5

376	1.4333	3837.8	21.2825	72986	2392.6479	-0.0293	2617.0336	153.5922	4.2428	42.812	2617.1926	68.000	64.333	54	40	42	72	21.198167	92.5	59.5
377	2.0333	3837.8	21.2123	72986	2392.6473	-0.0294	2617.0350	154.1233	5.0152	42.843	2617.1926	67.500	66.222	54	42	42	72	21.198167	92.5	59.5
378	3.0333	3837.8	21.2281	72986	2392.6493	-0.0296	2617.0484	144.2437	5.6750	42.828	2617.1721	67.250	64.333	54	40	42	72	21.198167	72.0	39.0
379	4.0167	3837.8	21.2350	72986	2388.8223	-0.0320	2615.0412	145.5923	8.6235	42.680	2615.1721	67.667	65.000	55	40	42	72	21.198167	72.0	39.0
380	5.4333	3837.8	21.2427	72986	2388.8237	-0.0321	2615.0433	142.9724	7.6018	42.577	2615.1721	66.500	62.000	55	42	42	72	21.198167	72.0	39.0
381	0.9000	3837.8	21.2943	72986	2389.8130	-0.0312	2615.0327	168.1132	4.0579	42.983	2615.2021	66.250	66.250	52	40	42	72	21.284916	2.0	74.0
382	1.4833	3837.0	21.3818	72986	2389.8171	-0.0313	2615.0373	158.2797	3.3823	42.668	2615.2021	66.500	66.250	53	40	42	72	21.284916	2.0	74.0
383	2.0667	3837.0	21.3853	72986	2389.8172	-0.0314	2615.0376	159.1717	5.1614	42.951	2615.2021	67.222	65.333	52	42	42	72	21.284916	2.0	74.0
384	2.6500	3837.0	21.3128	72986	2389.8168	-0.0315	2615.0373	158.3148	4.6204	42.995	2615.2021	67.000	65.000	52	40	42	72	21.284916	2.0	74.0
385	3.2333	3837.0	21.3203	72986	2388.8159	-0.0317	2615.0364	158.5713	3.6636	42.755	2615.2021	67.333	65.222	52	42	42	72	21.284916	2.0	74.0
386	3.8167	3837.0	21.3238	72986	2388.8148	-0.0318	2615.0353	159.0818	6.2498	42.968	2615.2021	67.500	65.500	52	40	42	72	21.284916	2.0	74.0
387	4.4000	3837.0	21.3313	72986	2388.8139	-0.0319	2615.0344	159.4697	3.7755	42.956	2615.2021	67.222	65.000	52	42	42	72	21.284916	2.0	74.0
388	4.9833	3837.0	21.3348	72986	2388.8134	-0.0320	2615.0341	159.5893	4.3643	42.836	2615.2021	68.000	65.500	52	40	42	72	21.284916	2.0	74.0
389	5.7167	3837.0	21.3432	72986	2388.8175	-0.0322	2615.0387	157.7163	4.5867	42.786	2615.2021	68.250	65.667	53	42	42	72	21.284916	2.0	74.0
390	6.3333	3837.0	21.3509	72986	2388.8201	-0.0323	2615.0417	156.5324	4.9929	42.759	2615.2021	67.200	65.500	53	40	42	72	21.284916	2.0	74.0
391	6.9833	3837.0	21.3548	72986	2388.8223	-0.0324	2615.0443	155.4581	7.6687	42.912	2615.2021	67.222	65.125	53	40	42	73	21.284916	2.0	74.0
392	1.5500	3822.0	21.4313	72986	2387.5269	-0.0339	2613.6293	165.1726	6.1497	42.960	2613.8186	69.200	66.000	52	42	32	73	21.414859	10.5	82.0
393	2.6167	3822.0	21.4417	72986	2387.5291	-0.0341	2613.6329	164.1551	6.1702	42.981	2613.8186	69.250	65.250	52	42	32	73	21.414859	10.5	82.0
394	3.3250	3822.0	21.4458	72986	2387.5317	-0.0343	2613.6348	162.9771	4.2181	42.915	2613.8186	68.250	64.250	53	42	32	73	21.414859	10.5	82.0
395	3.9667	3822.0	21.4538	72986	2387.5319	-0.0344	2613.6342	162.8924	4.6977	42.911	2613.8186	67.667	66.250	52	42	32	73	21.414859	10.5	82.0
396	4.6333	3822.0	21.4618	72986	2387.5328	-0.0345	2613.6354	162.4282	5.8591	42.747	2613.8186	68.000	63.667	53	42	32	73	21.414859	10.5	82.0
397	5.3167	3822.0	21.4659	72986	2387.5334	-0.0347	2613.6362	162.0845	4.8515	42.898	2613.8186	67.500	64.250	53	42	32	73	21.414859	10.5	82.5
398	5.9667	3822.0	21.4738	72986	2387.5283	-0.0348	2613.6308	164.2878	5.1247	42.951	2613.8186	69.984	64.434	53	42	32	73	21.414859	10.5	82.0
399	1.5333	2995.0	21.5413	72986	2385.1875	-0.0361	2611.3726	171.5255	4.8498	42.921	2611.2721	68.000	64.500	52	42	38	73	21.524156	78.0	37.0
400	2.1833	2995.0	21.5452	72986	2385.1985	-0.0362	2611.3741	170.3279	6.4285	42.989	2611.2721	67.000	64.250	52	42	38	73	21.524156	78.0	37.0
401	2.7500	2995.0	21.5526	72986	2385.1897	-0.0363	2611.3734	170.5791	8.1996	42.796	2611.2721	68.000	64.250	52	42	38	73	21.524156	78.0	37.0
402	3.4000	2995.0	21.5605	72986	2385.1888	-0.0365	2611.3725	170.9816	6.8553	42.776	2611.2721	67.250	65.250	52	42	38	73	21.524156	78.0	37.0
403	3.9833	2995.0	21.5640	72986	2385.1927	-0.0366	2611.3747	170.1857	6.5998	42.968	2611.2721	67.250	65.000	52	42	38	73	21.524156	78.0	37.0
404	4.5667	2995.0	21.5715	72986	2385.1885	-0.0367	2611.3724	170.9486	7.1059	42.853	2611.2721	68.250	65.500	52	42	38	73	21.524156	78.0	37.0
405	5.2167	2995.0	21.5754	72986	2385.1928	-0.0368	2611.3754	169.4543	7.1496	42.991	2611.2721	66.500	65.500	52	42	38	73	21.524156	78.0	37.0
406	5.8000	2995.0	21.5829	72986	2385.1981	-0.0369	2611.3744	170.2182	8.6827	42.919	2611.2721	66.667	65.667	52	42	38	73	21.524156	78.0	37.0
407	6.4500	2995.0	21.5908	72986	2385.1934	-0.0370	2611.3749	170.6222	8.4696	42.757	2611.2721	68.000	65.469	52	42	38	73	21.524156	78.0	37.0
408	1.3833	2981.0	22.0423	72986	2383.9511	-0.0381	2609.7198	169.1233	5.8878	42.944	2609.9126	68.000	65.200	53	42	34	74	22.838879	12.5	84.0
409	2.0000	2981.0	22.0500	72986	2383.9571	-0.0382	2609.7265	166.4028	7.2238	42.893	2609.9126	66.667	65.250	53	42	34	74	22.838879	12.5	84.0
410	2.5833	2981.0	22.0535	72986	2383.9597	-0.0383	2609.7295	165.4564	6.1333	42.979	2609.9126	68.500	65.000	53	42	34	74	22.838879	12.5	84.0
411	3.2333	2981.0	22.0614	72986	2383.9623	-0.0384	2609.7325	164.3242	5.9471	42.915	2609.9126	67.000	65.500	53	42	34	74	22.838879	12.5	84.0
412	3.8167	2981.0	22.0649	72986	2383.9606	-0.0385	2609.7328	164.9814	5.8593	43.000	2609.9126	67.500	66.500	53	42	34	74	22.838879	12.5	84.0

413	4.4333	2981.8	22.8728	72986	2383.9631	-8.8386	2689.7336	163.7849	5.9998	42.985	2689.9126	63.583	66.222	53	42	34	74	22.838879	12.5	84.8
414	5.8667	2981.8	22.8884	72986	2383.9621	-8.8388	2689.7327	164.2575	6.4231	42.889	2689.9126	67.888	65.888	53	42	34	74	22.838879	12.5	84.8
415	5.6528	2981.8	22.8939	72986	2383.9681	-8.8389	2689.7386	165.8687	4.8147	42.843	2689.9126	67.233	65.233	53	42	34	74	22.838879	12.5	84.8
416	6.3888	2981.8	22.8918	72986	2383.9622	-8.8398	2689.7338	164.1311	4.3661	42.738	2689.9126	68.125	65.228	53	42	34	74	22.838879	12.5	84.8
417	1.3528	2948.8	22.1454	72986	2381.1248	-8.8481	2686.6254	158.6549	9.3683	42.956	2686.7721	63.333	64.667	52	49	72	74	22.133364	72.8	39.5
418	1.9333	2948.8	22.1529	72986	2381.1183	-8.8482	2686.6135	155.7967	10.8132	42.889	2686.7721	63.528	63.828	52	49	72	74	22.133364	72.8	39.5
419	2.5167	2948.8	22.1604	72986	2381.1119	-8.8483	2686.6153	155.8597	8.9136	42.646	2686.7721	64.222	63.228	52	49	72	74	22.133364	72.8	39.5
420	3.4833	2948.8	22.1657	72986	2381.1075	-8.8484	2686.6126	171.8346	9.2171	42.939	2686.9286	64.667	64.667	52	49	72	74	22.133364	8.5	88.8
421	3.9833	2948.8	22.1732	72986	2381.1036	-8.8485	2686.6119	178.5545	11.2748	42.697	2686.9286	65.222	64.228	52	49	72	74	22.133364	8.5	88.8
422	4.5667	2948.8	22.1807	72986	2381.1143	-8.8487	2686.6183	168.1733	6.7855	42.858	2686.9286	65.888	63.828	52	49	72	74	22.133364	8.5	88.8
423	5.1528	2948.8	22.1842	72986	2381.1128	-8.8488	2686.6168	168.7622	8.6785	42.983	2686.9286	65.282	63.228	52	49	72	74	22.133364	8.5	88.8
424	6.4667	2948.8	22.2201	72986	2381.1293	-8.8418	2686.6351	161.7329	9.8169	42.762	2686.8886	63.528	64.528	52	49	72	74	22.133364	8.5	88.8
425	7.2528	2948.8	22.2836	72986	2381.1318	-8.8411	2686.6388	162.6195	8.4255	42.989	2686.8836	63.828	64.828	52	49	72	74	22.133364	8.5	88.8
426	7.6333	2948.8	22.2111	72986	2381.1381	-8.8412	2686.6362	161.3861	6.9294	42.899	2686.8886	63.528	63.528	52	49	72	74	22.133364	8.5	88.8
427	8.9828	2948.8	22.2311	72986	2381.1328	-8.8416	2686.6387	168.3373	11.8364	42.985	2686.8286	67.528	63.828	52	49	72	74	22.221728	8.5	88.8
428	1.4833	2948.8	22.2346	72986	2381.1351	-8.8417	2686.6423	158.9129	12.5375	42.776	2686.8286	67.888	63.888	52	49	72	74	22.221728	8.5	88.8
429	2.8667	2948.8	22.2421	72986	2381.1299	-8.8418	2686.6366	161.1558	11.5935	42.924	2686.8886	67.222	63.828	52	49	72	75	22.221728	8.5	88.8
430	4.8228	2948.8	22.2617	72986	2381.1299	-8.8422	2686.6371	168.9698	9.4682	42.954	2686.8886	64.288	63.828	52	49	72	75	22.221728	8.5	88.8
431	4.6228	2948.8	22.2653	72986	2381.1362	-8.8423	2686.6448	158.2889	12.6694	42.582	2686.8286	64.228	63.228	52	49	72	75	22.221728	8.5	88.8
432	5.1667	2948.8	22.2727	72986	2381.1354	-8.8424	2686.6432	158.5125	9.8983	42.639	2686.8886	64.228	63.888	52	49	72	75	22.221728	8.5	88.8
433	6.2888	2948.8	22.2829	72986	2381.1373	-8.8426	2686.6456	157.5616	12.5386	42.992	2686.8886	65.223	65.888	52	49	72	75	22.221728	8.5	88.8
434	6.7833	2948.8	22.2924	72986	2381.1346	-8.8427	2686.6427	158.7383	9.7229	42.744	2686.8886	65.282	65.288	52	49	72	75	22.221728	8.5	88.8
435	7.3667	2948.8	22.2939	72986	2381.1388	-8.8428	2686.6466	157.1597	7.6541	42.921	2686.8886	65.288	65.828	52	49	72	75	22.221728	8.5	88.8
436	8.3167	2948.8	22.3836	72986	2381.1338	-8.8429	2686.6422	158.9494	9.9562	42.762	2686.8886	65.258	64.933	52	49	72	75	22.221728	8.5	88.8
437	2.2833	2918.8	22.3549	72986	2377.8143	-8.8444	2683.8222	155.8757	14.7236	42.529	2683.1791	67.282	66.228	47	48	35	75	22.363255	79.8	46.8
438	2.8833	2918.8	22.3925	72986	2377.8273	-8.8445	2683.8256	153.4723	16.2232	42.748	2683.1786	69.758	66.882	47	48	35	75	22.363255	78.5	46.8
439	3.5167	2918.8	22.4823	72986	2377.8326	-8.8446	2683.8315	151.2815	12.4148	42.991	2683.1791	67.222	64.522	47	48	35	75	22.363255	79.8	46.8
440	4.1228	2918.8	22.4838	72986	2377.8338	-8.8447	2683.8287	152.1671	16.8327	42.766	2683.1786	68.282	64.522	47	48	35	75	22.363255	78.5	46.8
441	4.7528	2918.8	22.4117	72986	2377.8367	-8.8448	2683.8362	148.9562	33.1473	42.811	2683.1791	68.222	63.888	47	48	35	75	22.363255	79.8	46.8
442	5.4288	2918.8	22.4156	72986	2377.8336	-8.8449	2683.8329	158.5828	23.8229	42.818	2683.1786	69.288	63.282	47	48	35	75	22.363255	78.5	46.8
443	6.1288	2918.8	22.4238	72986	2377.8265	-8.8451	2683.8253	153.6824	15.3263	42.744	2683.1786	67.252	65.828	47	48	35	75	22.363255	78.5	46.8
444	6.6833	2918.8	22.4313	72986	2377.8141	-8.8452	2683.8118	159.2793	14.1742	42.784	2683.1786	71.588	65.888	47	48	35	75	22.363255	78.5	46.8
445	1.2833	2918.8	22.4628	72986	2377.8341	-8.8457	2683.8343	149.7812	26.7261	42.835	2683.1786	68.333	65.288	48	48	35	75	22.451143	79.5	46.8
446	1.9833	2918.8	22.4735	72986	2377.8414	-8.8458	2683.8425	146.2293	26.2488	42.817	2683.1786	78.288	65.528	48	48	35	75	22.451143	78.5	46.8
447	3.4667	2918.8	22.4839	72986	2377.8396	-8.8461	2683.8407	153.1935	18.5288	42.833	2683.1931	65.228	63.288	49	48	35	75	22.451143	93.8	68.8
448	4.3528	2918.8	22.4932	72986	2377.8241	-8.8463	2683.8248	168.8325	21.2692	42.576	2683.1931	78.228	63.528	49	48	35	76	22.451143	93.8	68.5
449	4.9833	2918.8	22.5018	72986	2377.8397	-8.8464	2683.8411	153.8426	31.2318	42.952	2683.1931	69.282	63.288	49	48	35	76	22.451143	93.8	68.8

450	5.6333	2910.0	22.5849	72986	2377.8448	-0.8465	2603.8459	158.6258	24.4481	42.882	2603.1931	70.500	63.330	49	40	35	76	22.451143	93.0	60.0							
451	6.2833	2910.0	22.5128	72986	2377.8263	-0.8466	2603.8268	156.9895	27.4413	42.239	2603.1931	70.000	64.220	49	40	35	76	22.451143	93.0	60.5							
452	6.9500	2910.0	22.5208	72986	2377.8539	-0.8467	2603.8571	146.1924	30.7945	43.112	2603.1931	70.000	62.520	49	40	35	76	22.451143	93.0	60.0							
453	1.1167	2910.0	22.5423	72986	2377.8414	-0.8471	2603.8437	166.7842	39.8312	42.185	2603.2301	68.220	63.222	50	40	35	76	22.531669	30.0	101.5							
454	1.7500	2910.0	22.5501	72986	2377.8421	-0.8472	2603.8446	166.3786	25.1827	43.416	2603.2301	68.500	62.222	50	40	35	76	22.531669	30.0	101.5							
455	3.9667	2910.0	22.5709	72986	2377.8380	-0.8475	2603.8486	161.5721	19.3758	43.273	2603.2136	67.200	65.222	50	40	35	76	22.531669	13.5	85.0							
456	4.4500	2910.0	22.5743	72986	2377.8252	-0.8476	2603.8267	166.9176	18.5911	42.526	2603.2136	70.220	63.020	50	40	35	76	22.531669	13.5	85.5							
457	2.3500	2910.0	23.8416	72986	2377.8296	-0.8487	2603.8327	129.5824	13.2129	42.836	2603.1336	63.220	65.520	45	40	20	76	23.815687	33.5	1.0							
458	2.9333	2910.0	23.8451	72986	2377.8355	-0.8488	2603.8393	126.1517	9.8981	42.153	2603.1336	62.500	65.200	45	40	20	76	23.815687	33.5	1.0							
459	4.2500	2910.0	23.8558	72986	2377.8266	-0.8490	2603.8297	131.8713	17.6511	42.817	2603.1336	62.520	64.520	45	40	20	76	23.815687	33.5	1.0							
460	5.2667	2910.0	23.8711	72986	2377.8332	-0.8492	2603.8371	127.2998	8.7500	42.878	2603.1336	65.200	61.200	45	40	20	76	23.815687	33.5	1.0							
461	5.8667	2910.0	23.8747	72986	2377.8314	-0.8493	2603.8353	128.2477	15.7471	42.853	2603.1336	65.020	66.220	45	40	20	76	23.815687	33.5	1.0							
462	6.4667	2910.0	23.8823	72986	2377.8372	-0.8494	2603.8417	124.8698	19.7821	42.455	2603.1336	65.220	66.020	45	40	20	76	23.815687	33.5	1.0							
463	7.0500	2910.0	23.8858	72986	2377.8358	-0.8495	2603.8403	125.5986	13.8539	41.676	2603.1336	65.020	66.220	45	40	20	76	23.815687	33.5	1.0							
464	7.6167	2910.0	23.8932	72986	2377.8345	-0.8496	2603.8389	126.3412	12.4983	42.186	2603.1336	65.220	66.220	45	40	20	76	23.815687	33.5	1.0							
465	8.2167	2910.0	23.1008	72986	2377.8371	-0.8497	2603.8419	124.7441	9.6989	42.959	2603.1336	64.333	66.200	45	40	20	76	23.815687	33.5	1.0							
466	8.7833	2910.0	23.1042	72986	2377.8288	-0.8498	2603.8329	129.4468	14.4587	42.351	2603.1336	65.000	66.020	45	40	20	76	23.815687	33.5	1.0							
467	9.3833	2910.0	23.1118	72986	2377.8387	-0.8498	2603.8438	123.7225	14.4534	41.997	2603.1336	64.200	66.220	45	40	20	76	23.815687	33.5	1.0							
468	10.0333	2910.0	23.1157	72986	2377.8385	-0.8499	2603.8438	123.7512	10.6176	42.161	2603.1336	64.838	65.166	45	40	20	76	23.815687	33.5	1.0							
469	1.6220	2888.0	23.1841	72986	2375.9178	-0.8512	2600.9422	167.3812	10.8913	42.915	2601.1301	66.200	63.020	45	39	54	77	23.178563	30.0	101.5							
470	3.3020	2888.0	23.2823	72986	2375.9198	-0.8513	2600.9447	166.3476	9.8695	42.892	2601.1296	65.220	64.220	45	39	54	77	23.178563	29.5	101.5							
471	3.9020	2888.0	23.2859	72986	2375.9224	-0.8514	2600.9485	164.9802	9.9647	42.898	2601.1296	65.200	63.220	45	39	54	77	23.178563	29.5	101.5							
472	4.4667	2888.0	23.2133	72986	2375.9186	-0.8515	2600.9422	167.2742	12.4288	42.713	2601.1296	65.200	63.320	45	39	54	77	23.178563	29.5	101.5							
473	5.4500	2888.0	23.2232	72986	2375.9206	-0.8516	2600.9448	165.5428	10.2995	42.713	2601.1296	66.520	64.220	45	39	54	77	23.178563	29.5	101.5							
474	6.0333	2888.0	23.2307	72986	2375.9230	-0.8517	2600.9496	164.4871	8.4164	42.858	2601.1301	67.220	63.333	45	39	54	77	23.178563	30.0	101.5							
475	6.6333	2888.0	23.2343	72986	2375.9209	-0.8518	2600.9473	165.3365	10.2624	42.900	2601.1301	67.220	63.020	45	39	54	77	23.178563	30.0	101.5							
476	7.6833	2888.0	23.2446	72986	2375.9224	-0.8520	2600.9491	164.6448	10.6133	42.826	2601.1301	67.000	63.500	45	39	54	77	23.178563	30.0	101.5							
477	8.2667	2888.0	23.2521	72986	2375.9196	-0.8520	2600.9462	165.7852	7.4021	42.891	2601.1301	67.220	62.500	45	39	54	77	23.178563	30.0	101.5							
478	1.6167	2888.0	23.2918	72986	2375.9383	-0.8526	2600.9585	181.8496	8.8187	42.988	2601.1846	67.200	62.020	45	39	54	77	23.273321	84.5	52.0							
479	2.2167	2888.0	23.2946	72986	2375.9248	-0.8527	2600.9526	183.8789	8.1244	42.779	2601.1846	66.220	64.020	45	39	54	77	23.273321	84.5	52.0							
480	2.8000	2888.0	23.3021	72986	2375.9223	-0.8528	2600.9499	183.9768	9.6850	42.903	2601.1846	67.200	64.000	45	39	54	77	23.273321	84.5	52.0							
481	3.3833	2888.0	23.3056	72986	2375.9389	-0.8529	2600.9595	180.7279	10.4281	42.889	2601.1846	67.220	62.000	45	39	54	77	23.273321	84.5	52.0							
482	4.3833	2888.0	23.3156	72986	2375.9198	-0.8530	2600.9475	184.8111	8.9989	43.268	2601.1846	67.020	64.200	45	39	54	77	23.273321	84.5	52.0							
483	4.9667	2888.0	23.3231	72986	2375.9185	-0.8531	2600.9462	185.2320	8.3873	42.917	2601.1846	67.200	63.000	45	39	54	77	23.273321	84.5	52.0							
484	5.5667	2888.0	23.3307	72986	2375.9234	-0.8532	2600.9516	183.4056	12.1472	42.924	2601.1846	66.200	64.000	45	39	54	77	23.273321	84.5	52.0							
485	6.1500	2888.0	23.3342	72986	2375.9277	-0.8533	2600.9564	181.7617	9.8884	42.996	2601.1846	67.500	63.520	45	39	54	77	23.273321	84.5	52.0							
486	7.0500	2888.0	23.3436	72986	2375.9336	-0.8534	2600.9638	179.4953	12.7177	42.797	2601.1846	66.000	62.500	45	39	54	77	23.273321	84.5	52.0							

487	7.6333	2888.8	23.3511	72986	2375.9254	-8.8535	2628.9542	192.5366	18.9861	42.915	2681.1846	67.288	63.588	45	39	54	77	23.273321	84.5	52.8
488	8.2167	2888.8	23.3546	72986	2375.9283	-8.8536	2628.9574	181.4229	18.2366	42.992	2681.1846	68.888	63.288	45	39	54	77	23.273321	84.5	52.8
489	8.8333	2888.8	23.3623	72986	2375.9259	-8.8537	2628.9549	182.2965	8.3291	42.842	2681.1846	67.222	64.222	45	39	54	77	23.273321	84.5	52.8
490	9.4167	2888.8	23.3658	72986	2375.9302	-8.8538	2628.9597	188.6233	18.8235	43.865	2681.1846	67.888	63.388	45	39	54	77	23.273321	84.5	52.8
491	10.2888	2888.8	23.3733	72986	2375.9265	-8.8539	2628.9558	181.9837	14.2583	43.832	2681.1846	68.888	62.388	45	39	54	77	23.273321	84.5	52.8
492	10.6833	2888.8	23.3814	72986	2375.9335	-8.8540	2628.9635	179.3819	9.5248	42.741	2681.1846	67.888	64.522	45	39	54	77	23.273321	84.5	52.8
493	11.2667	2888.8	23.3849	72986	2375.9285	-8.8548	2628.9493	184.1756	11.9577	43.288	2681.1846	67.888	63.888	45	39	54	77	23.273321	84.5	52.8
494	11.8528	2888.8	23.3924	72986	2375.9258	-8.8541	2628.9544	182.4628	8.4859	42.914	2681.1846	67.588	63.288	45	39	54	77	23.273321	84.5	52.8
495	12.2528	2888.8	23.4036	72984	2375.9235	-8.8542	2628.9528	182.9854	18.8989	42.955	2681.1845	67.462	78.288	45	39	54	77	23.273321	84.5	52.8
496	1.5888	2876.8	23.4611	72986	2374.8981	-8.8551	2599.8238	134.6643	23.1143	41.933	2599.9341	67.588	63.888	46	39	68	78	23.444136	34.8	2.8
497	2.3833	2876.8	23.4784	72986	2374.9829	-8.8552	2599.8372	127.5262	28.8672	41.225	2599.9346	65.667	62.333	46	39	68	78	23.444136	34.5	2.8
498	3.6667	2876.8	23.4821	72986	2374.9824	-8.8554	2599.8367	128.8128	25.5993	41.969	2599.9341	64.888	64.888	46	39	68	78	23.444136	34.8	2.8
499	4.2528	2876.8	23.4856	72986	2374.9864	-8.8555	2599.8412	125.4182	32.1686	41.193	2599.9341	66.888	63.882	46	39	68	78	23.444136	34.8	2.8
500	4.8333	2876.8	23.4931	72986	2374.8967	-8.8556	2599.8388	138.8888	19.8916	42.263	2599.9341	67.888	62.882	46	39	68	78	23.444136	34.8	2.8
501	5.5167	2876.8	23.5012	72986	2374.9821	-8.8557	2599.8368	127.7286	29.1189	42.224	2599.9346	67.888	65.888	46	39	68	78	23.444136	34.5	2.8
502	6.1888	2876.8	23.5847	72986	2374.9856	-8.8558	2599.8487	125.6932	15.1229	42.123	2599.9346	66.667	63.667	46	39	68	78	23.444136	34.5	2.8
503	6.7888	2876.8	23.5123	72986	2374.8962	-8.8558	2599.8384	131.2172	12.9773	41.628	2599.9341	67.752	63.888	46	39	68	78	23.444136	34.8	2.8
504	7.3333	2876.8	23.5281	72986	2374.9828	-8.8559	2599.8369	127.6618	13.7746	42.495	2599.9341	66.258	64.888	47	39	68	78	23.444136	34.8	2.8
505	7.9167	2876.8	23.5236	72986	2374.9829	-8.8568	2599.8379	127.1346	11.9128	42.181	2599.9341	66.667	63.288	47	39	68	78	23.444136	34.8	2.8
506	8.4833	2876.8	23.5318	72986	2374.8938	-8.8561	2599.8281	132.3878	13.8992	42.383	2599.9346	67.588	62.888	47	39	68	78	23.444136	34.5	2.8
507	9.1333	2876.8	23.5349	72986	2374.8996	-8.8562	2599.8345	129.1311	13.7583	42.258	2599.9346	67.888	63.888	47	39	68	78	23.444136	34.5	2.8
508	10.7500	2876.8	23.5526	72986	2374.8997	-8.8564	2599.8349	128.9385	14.9913	42.344	2599.9346	65.333	62.333	47	39	68	78	23.444136	34.5	2.8
509	12.4333	2876.8	23.5707	72986	2374.8781	-8.8566	2599.8334	129.4786	14.5465	41.942	2599.9341	67.888	62.258	47	39	68	78	23.444136	34.8	2.8
510	13.8333	2876.8	23.5743	72986	2374.9837	-8.8567	2599.8397	126.4821	14.6778	42.578	2599.9346	67.888	63.288	47	39	68	78	23.444136	34.5	2.8
511	13.6167	2876.8	23.5818	72986	2374.9827	-8.8568	2599.8364	127.9155	16.9988	42.119	2599.9341	67.333	63.888	47	39	68	78	23.444136	34.8	2.8
512	14.4333	2876.8	23.5987	72986	2374.9814	-8.8569	2599.8373	127.7153	13.9221	41.793	2599.9346	67.516	62.258	47	39	68	78	23.444136	34.5	2.8
513	2.2833	2862.8	8.8539	73086	2373.6878	-8.8578	2598.5184	176.3497	14.9436	42.838	2598.7231	67.667	61.667	53	44	98	78	8.833464	23.8	95.8
514	3.2288	2862.8	8.8634	73086	2373.6895	-8.8579	2598.5124	175.6651	19.3387	42.945	2598.7231	67.888	64.888	53	44	98	78	8.833464	23.8	95.8
515	3.5833	2862.8	8.8789	73086	2373.6934	-8.8588	2598.5167	174.1111	13.2411	43.152	2598.7231	66.528	62.888	53	44	98	78	8.833464	23.8	95.8
516	4.2167	2862.8	8.8747	73086	2373.6943	-8.8581	2598.5178	173.7148	13.5414	42.639	2598.7231	67.888	62.888	53	44	98	78	8.833464	23.8	95.8
517	4.8167	2862.8	8.8823	73086	2373.6936	-8.8581	2598.5171	173.9622	18.1122	43.864	2598.7231	66.888	59.667	53	44	98	78	8.833464	23.8	94.5
518	5.7833	2862.8	8.8921	73086	2373.6952	-8.8583	2598.5198	173.2611	17.5824	43.885	2598.7231	66.888	62.588	53	44	98	79	8.833464	23.8	95.8
519	8.5167	2862.8	8.1285	73086	2373.6838	-8.8586	2598.5068	177.9868	15.8476	42.924	2598.7231	67.888	63.888	53	44	98	79	8.833464	23.8	95.8
520	11.5667	2862.8	8.1588	73086	2373.6935	-8.8598	2598.5179	173.6698	21.4824	43.225	2598.7231	65.888	65.888	53	44	98	79	8.833464	23.8	95.8
521	12.1667	2862.8	8.1544	73086	2373.6949	-8.8591	2598.5196	173.8656	14.2863	42.951	2598.7231	65.288	63.888	53	44	98	79	8.833464	23.8	95.8
522	12.7333	2862.8	8.1618	73086	2373.6961	-8.8592	2598.5218	172.5582	15.5467	42.998	2598.7231	65.888	62.888	53	44	98	79	8.833464	23.8	95.8
523	13.7588	2862.8	8.1719	73086	2373.6821	-8.8593	2598.5858	177.9977	14.3933	43.178	2598.7231	67.288	63.888	53	44	98	79	8.833464	23.8	95.8
524	1.9588	2837.8	8.2259	73086	2371.5356	-8.8688	2596.1588	163.3518	24.8938	41.756	2596.3356	68.827	67.378	53	43	82	79	8.218251	35.5	3.5

525	2.5833	2837.0	0.2337	73086	2371.5562	-0.0601	2596.1586	154.2827	27.6146	42.411	2596.3356	67.825	70.519	53	43	82	79	0.210251	35.5	3.5
526	3.2500	2837.0	0.2417	73086	2371.5597	-0.0602	2596.1844	152.6781	32.7672	42.741	2596.3356	68.000	73.000	53	43	82	79	0.210251	35.5	3.5
527	4.3167	2837.0	0.2521	73086	2371.5632	-0.0603	2596.1884	151.0872	22.3980	42.891	2596.3356	63.333	66.667	53	43	82	79	0.210251	35.5	3.5
528	4.9167	2837.0	0.2557	73086	2371.5529	-0.0604	2596.1751	156.5472	28.5803	41.952	2596.3356	63.667	70.000	53	43	82	79	0.210251	35.5	3.5
529	6.3833	2837.0	0.2725	73086	2371.5628	-0.0605	2596.1683	151.8569	29.6233	42.928	2596.3356	67.000	69.000	53	42	82	79	0.210251	35.5	3.5
530	7.0000	2837.0	0.2802	73086	2371.5759	-0.0606	2596.2027	144.7957	39.6751	42.598	2596.3356	67.926	67.481	53	42	82	79	0.210251	35.5	3.5
531	7.6333	2837.0	0.2948	73086	2371.5528	-0.0607	2596.1767	155.9211	27.7877	41.755	2596.3356	67.000	68.000	53	42	82	79	0.210251	35.5	3.5
532	8.2667	2837.0	0.2918	73086	2371.5620	-0.0608	2596.1855	152.2290	26.2168	42.281	2596.3356	68.000	67.667	54	42	82	79	0.210251	35.5	3.5
533	13.0833	2837.0	0.3407	73086	2371.5498	-0.0614	2596.1736	157.3648	23.4135	43.396	2596.3356	70.000	69.500	55	42	82	79	0.210251	35.5	3.5
534	13.7667	2837.0	0.3448	73086	2371.5756	-0.0614	2596.2033	144.5459	28.7194	42.879	2596.3356	67.500	69.500	55	42	82	80	0.210251	35.5	3.5
535	14.4500	2837.0	0.3529	73086	2371.5544	-0.0615	2596.1681	154.4881	22.0886	42.267	2596.3356	67.000	69.000	55	42	82	80	0.210251	35.5	3.5
536	15.0833	2837.0	0.3607	73086	2371.5621	-0.0616	2596.1687	153.9844	25.9768	42.497	2596.3356	68.750	69.000	55	42	82	80	0.210251	35.5	3.5
537	15.7333	2837.0	0.3646	73086	2371.5643	-0.0617	2596.1912	149.8143	28.9559	42.822	2596.3356	68.000	67.333	55	42	82	80	0.210251	35.5	3.5
538	16.4000	2837.0	0.3726	73086	2371.5520	-0.0617	2596.1778	155.4515	23.8942	42.617	2596.3356	67.000	67.000	55	42	82	80	0.210251	35.5	3.5
539	17.1667	2837.0	0.3812	73086	2371.5813	-0.0618	2596.2108	141.5142	28.6987	42.939	2596.3356	67.000	67.137	55	42	82	80	0.210251	35.5	3.5
540	1.6667	2837.0	0.4157	73086	2371.5563	-0.0623	2596.1831	153.2361	23.8749	42.632	2596.3356	67.000	67.250	45	42	81	80	0.481793	35.5	3.5
541	2.2500	2837.0	0.4232	73086	2371.5618	-0.0623	2596.1884	151.8417	33.8330	42.851	2596.3356	71.000	69.333	45	42	81	80	0.481793	35.5	3.5
542	2.9000	2837.0	0.4311	73086	2371.5737	-0.0624	2596.2023	144.9983	32.5789	42.965	2596.3356	66.500	66.000	45	42	81	80	0.481793	35.5	3.5
543	3.5000	2837.0	0.4347	73086	2371.5608	-0.0625	2596.1892	151.8967	23.6319	43.246	2596.3356	71.000	67.500	45	42	81	80	0.481793	35.5	3.5
544	4.1333	2837.0	0.4425	73086	2371.5788	-0.0626	2596.1993	146.3122	31.2020	42.532	2596.3356	67.000	66.333	45	42	81	80	0.481793	35.5	3.5
545	4.7167	2837.0	0.4500	73086	2371.5515	-0.0626	2596.1782	155.2785	28.3592	42.961	2596.3356	72.000	68.500	45	42	81	80	0.481793	35.5	3.5
546	5.4000	2837.0	0.4541	73086	2371.5686	-0.0627	2596.1882	151.8966	28.4317	42.872	2596.3356	68.750	68.500	45	42	81	80	0.481793	35.5	3.5
547	6.0500	2837.0	0.4628	73086	2371.5724	-0.0628	2596.2813	145.4349	37.8333	42.951	2596.3356	65.750	64.250	45	42	81	80	0.481793	35.5	3.5
548	6.7000	2837.0	0.4659	73086	2371.5646	-0.0628	2596.1928	149.1271	38.7586	42.113	2596.3356	65.000	64.000	45	42	81	80	0.481793	35.5	3.5
549	4.6167	2794.0	0.5629	73086	2367.5879	-0.0639	2592.0836	117.7718	16.2224	41.991	2592.1626	63.000	65.000	52	42	95	80	0.515262	62.5	38.5
550	5.2000	2794.0	0.5704	73086	2367.7998	-0.0640	2592.0748	122.6760	75.3656	40.240	2592.1626	63.000	65.000	52	42	95	80	0.515262	62.5	38.5
551	5.7833	2794.0	0.5739	73086	2367.5897	-0.0640	2592.0856	116.6037	12.4361	41.764	2592.1626	63.000	65.667	52	42	95	80	0.515262	62.5	38.5
552	6.3667	2794.0	0.5814	73086	2367.6028	-0.0641	2592.0773	121.3162	19.1441	41.863	2592.1626	63.000	66.000	52	42	95	80	0.515262	62.5	38.5
553	6.9667	2794.0	0.5858	73086	2367.6048	-0.0642	2592.0804	119.5833	9.6957	41.978	2592.1626	63.000	65.250	52	42	95	80	0.515262	62.5	38.5
554	7.5333	2794.0	0.5924	73086	2367.6079	-0.0642	2592.0839	117.5948	11.2896	41.838	2592.1626	63.000	66.000	52	42	95	81	0.515262	62.5	38.5
555	8.1167	2794.0	0.5959	73086	2367.6083	-0.0643	2592.0844	117.2854	11.2741	41.930	2592.1626	62.667	66.000	52	42	95	80	0.515262	62.5	38.5
556	8.7000	2794.0	1.0034	73086	2367.6082	-0.0644	2592.0843	117.3465	12.9782	41.917	2592.1626	63.000	66.000	52	42	95	80	0.515262	62.5	38.5
557	9.3667	2794.0	1.0114	73086	2367.6082	-0.0644	2592.0844	117.2814	14.9648	41.896	2592.1626	63.000	66.000	52	42	95	81	0.515262	62.5	38.5
558	2.6167	2768.0	1.0749	73086	2365.5305	-0.0651	2589.5932	160.4287	15.8002	42.485	2589.7631	63.500	65.500	58	42	67	81	1.051228	63.0	38.5
559	3.2000	2768.0	1.0824	73086	2365.5365	-0.0652	2589.5996	157.7757	11.2236	42.784	2589.7631	63.500	65.000	58	42	67	81	1.051228	63.0	38.5
560	3.7833	2768.0	1.0859	73086	2365.5348	-0.0653	2589.5978	158.4814	10.1996	42.710	2589.7631	63.000	63.750	58	42	67	81	1.051228	63.0	38.5
561	4.3667	2768.0	1.0934	73086	2365.5362	-0.0653	2589.5994	157.8565	7.8132	42.915	2589.7631	63.000	62.667	58	42	67	81	1.051228	63.0	38.5
562	4.9500	2768.0	1.1009	73086	2365.5234	-0.0654	2589.5855	163.3506	9.8937	42.735	2589.7631	63.500	74.000	58	42	67	81	1.051228	63.0	38.5

563	6.4167	2768.8	1.1137	73086	2365.5363	-0.8655	2589.5998	157.6916	12.6448	42.621	2589.7631	63.888	63.528	58	42	67	81	1.851228	63.8	38.5
564	7.2838	2768.8	1.1212	73086	2365.5377	-0.8656	2589.6814	157.8625	11.2319	42.642	2589.7631	63.888	63.288	58	42	67	81	1.851228	63.8	38.5
565	8.0667	2768.8	1.1316	73086	2365.5481	-0.8657	2589.6241	155.9452	12.1385	42.717	2589.7631	62.588	65.917	58	42	67	81	1.851228	63.8	38.5
566	2.8833	2748.8	1.2244	73086	2363.8668	-0.8665	2586.8979	173.8625	4.2829	42.821	2587.1836	66.333	65.888	46	42	55	81	1.183919	3.5	75.8
567	2.6667	2748.8	1.2119	73086	2363.8681	-0.8665	2586.9282	173.8158	3.4188	42.825	2587.1836	66.888	64.528	46	42	55	81	1.183919	3.5	75.8
568	3.2528	2748.8	1.2154	73086	2363.8692	-0.8666	2586.9815	172.5631	5.2344	42.979	2587.1836	66.528	64.888	46	42	55	81	1.183919	3.5	75.8
569	3.8333	2748.8	1.2229	73086	2363.8787	-0.8666	2586.9832	171.9282	6.2416	42.743	2587.1836	67.228	64.288	46	42	55	81	1.183919	3.5	75.8
570	4.4167	2748.8	1.2324	73086	2363.8788	-0.8667	2586.9825	172.1698	5.6687	42.761	2587.1836	67.228	64.228	46	42	55	81	1.183919	3.5	75.8
571	5.0167	2748.8	1.2348	73086	2363.8789	-0.8667	2586.9836	171.7881	6.6699	42.912	2587.1836	67.522	64.328	46	42	55	81	1.183919	3.5	75.8
572	5.6028	2748.8	1.2415	73086	2363.8714	-0.8668	2586.9842	171.5638	5.2735	42.919	2587.1836	67.888	63.758	46	42	55	81	1.183919	3.5	75.8
573	6.4667	2748.8	1.2587	73086	2363.8678	-0.8669	2586.9825	172.1773	4.7809	42.818	2587.1836	68.939	63.813	46	42	55	81	1.183919	3.5	75.8
574	1.8333	2712.8	1.3185	73086	2368.6811	-0.8675	2584.2828	141.2788	5.3289	42.318	2584.3271	65.888	63.288	45	42	21	81	1.291562	27.8	98.5
575	2.4167	2712.8	1.3148	73086	2368.6828	-0.8675	2584.2831	140.7773	7.8346	42.281	2584.3271	65.228	62.888	45	42	21	82	1.291562	27.8	98.5
576	3.3167	2712.8	1.3234	73086	2368.6828	-0.8676	2584.2831	140.7486	5.6597	41.875	2584.3271	66.888	64.888	45	42	21	82	1.291562	27.8	98.5
577	3.9888	2712.8	1.3289	73086	2368.6828	-0.8677	2584.2841	140.3124	4.9521	42.293	2584.3271	65.528	64.828	45	42	21	82	1.291562	27.8	98.5
578	4.4833	2712.8	1.3344	73086	2368.6825	-0.8677	2584.2838	140.4429	4.8453	42.318	2584.3271	65.228	63.288	45	42	21	82	1.291562	27.8	98.5
579	5.0667	2712.8	1.3419	73086	2368.6827	-0.8678	2584.2841	140.2993	3.8629	42.443	2584.3271	65.333	63.888	45	42	21	82	1.291562	27.8	98.5
580	5.8167	2712.8	1.3716	73086	2368.6247	-0.8681	2584.2284	129.4333	5.7988	41.778	2584.3271	65.228	66.288	46	48	21	82	1.291562	27.8	98.5
581	8.6888	2712.8	1.3751	73086	2368.6269	-0.8681	2584.2329	127.1538	5.4167	41.921	2584.3271	65.888	65.528	46	48	21	82	1.291562	27.8	98.5
582	9.1833	2712.8	1.3826	73086	2368.6288	-0.8682	2584.2322	126.4421	3.4495	41.838	2584.3271	65.888	65.528	46	48	21	82	1.291562	27.8	98.5
583	10.6333	2712.8	1.3953	73086	2368.6332	-0.8683	2584.2388	153.4858	4.8845	42.632	2584.3916	66.667	64.667	46	48	21	82	1.291562	91.5	58.5
584	11.2333	2712.8	1.4029	73086	2368.6318	-0.8684	2584.2366	154.1882	4.5327	42.141	2584.3911	67.888	64.888	46	48	21	82	1.291562	91.8	58.5
585	11.8888	2712.8	1.4103	73086	2368.6356	-0.8684	2584.2428	152.5598	18.6838	42.525	2584.3911	67.888	64.888	46	48	21	82	1.291562	91.8	58.5
586	12.3833	2712.8	1.4138	73086	2368.6335	-0.8685	2584.2386	153.2781	7.8507	42.646	2584.3911	67.888	64.333	46	48	21	82	1.291562	91.8	58.5
587	12.9667	2712.8	1.4213	73086	2368.6351	-0.8685	2584.2483	152.7566	19.8353	41.988	2584.3916	66.667	63.888	46	48	21	82	1.291562	91.5	58.5
588	13.5588	2712.8	1.4248	73086	2368.6537	-0.8686	2584.2627	143.8918	44.5311	42.267	2584.3911	66.888	63.667	46	48	21	82	1.291562	91.8	58.5
589	14.1333	2712.8	1.4323	73086	2368.6342	-0.8686	2584.2394	152.9819	5.5297	42.537	2584.3916	66.667	63.667	46	48	21	82	1.291562	91.5	58.5
590	14.7833	2712.8	1.4402	73086	2368.6345	-0.8687	2584.2399	152.9319	4.4749	42.744	2584.3916	66.453	63.815	46	48	21	82	1.291562	91.5	58.5
591	3.0667	2573.8	1.5443	73086	2348.3158	-0.8696	2578.7622	153.4282	46.3298	39.846	2578.9151	69.888	67.888	47	27	42	82	1.513975	15.8	86.5
592	3.7888	2573.8	1.5521	73086	2348.3072	-0.8697	2578.7529	157.2588	23.2813	42.781	2578.9151	71.388	65.888	47	27	42	82	1.513975	15.8	86.5
593	4.3333	2573.8	1.5559	73086	2348.3516	-0.8697	2578.8815	135.8688	55.5734	42.924	2578.9151	72.888	66.888	47	27	42	82	1.513975	15.8	86.5
594	5.8167	2573.8	1.5648	73086	2348.3121	-0.8698	2578.7584	155.8162	7.3877	42.348	2578.9151	75.288	67.888	48	27	42	83	1.513975	15.8	86.5
595	5.7167	2573.8	1.5722	73086	2348.3124	-0.8699	2578.7588	154.8425	11.7822	42.998	2578.9151	74.528	68.228	48	27	42	83	1.513975	15.8	86.5
596	6.4167	2573.8	1.5884	73086	2348.3186	-0.8699	2578.7656	152.2892	8.2846	42.646	2578.9151	73.667	65.667	49	27	42	83	1.513975	15.8	86.5
597	7.1333	2573.8	1.5847	73086	2348.3212	-0.8700	2578.7685	150.7586	5.9394	42.558	2578.9151	71.888	66.888	49	27	42	83	1.513975	15.8	86.5
598	7.7588	2573.8	1.5924	73086	2348.3229	-0.8700	2578.7785	149.9155	4.5964	41.928	2578.9151	72.888	67.888	49	27	42	83	1.513975	15.8	86.5
599	8.4288	2573.8	2.0883	73086	2348.3265	-0.8701	2578.7745	148.1878	5.1461	42.782	2578.9151	69.888	63.288	49	27	42	83	1.513975	15.8	86.5
600	9.0528	2573.8	2.0842	73086	2348.3254	-0.8702	2578.7733	148.7382	6.7838	42.939	2578.9151	69.588	66.758	58	27	42	83	1.513975	15.8	86.5

621	9.6833	2573.0	2.0120	73086	2348.3259	-0.0702	2570.7738	148.5000	27.9671	42.341	2570.9151	69.000	67.000	50	27	42	83	1.513975	15.0	86.5
622	10.3167	2573.0	2.0159	73086	2348.3304	-0.0703	2570.7759	146.2731	48.8595	42.942	2570.9151	68.000	65.500	50	27	42	83	1.513975	15.0	86.5
623	11.0833	2573.0	2.0244	73086	2348.3239	-0.0703	2570.7719	149.3246	4.0626	42.649	2570.9151	70.938	66.594	50	27	42	83	1.513975	15.0	86.5
624	4.3333	2538.0	2.1212	73086	2344.9389	-0.0711	2567.0502	157.7136	6.3691	42.675	2567.2236	67.000	64.500	49	35	25	83	2.875281	23.5	95.0
625	4.9167	2538.0	2.1247	73086	2344.9358	-0.0712	2567.0548	155.5773	12.2139	42.754	2567.2236	67.000	64.000	49	35	25	83	2.875281	23.5	95.0
626	5.5000	2538.0	2.1322	73086	2344.9327	-0.0712	2567.0623	156.0826	5.3248	42.434	2567.2236	67.000	63.000	49	35	25	83	2.875281	23.5	95.5
627	6.4167	2538.0	2.1417	73086	2344.9649	-0.0713	2567.0976	141.6786	43.4929	42.653	2567.2236	66.063	60.996	49	35	25	83	2.875281	23.5	95.0
628	7.7833	2538.0	2.1539	73086	2344.9487	-0.0714	2567.0713	156.6838	7.2856	42.646	2567.2321	65.000	63.333	49	35	25	83	2.875281	32.0	0.0
629	8.3500	2538.0	2.1613	73086	2344.9487	-0.0714	2567.0713	156.6953	6.2816	42.900	2567.2321	65.500	63.200	49	35	25	83	2.875281	32.0	0.0
630	8.9333	2538.0	2.1648	73086	2344.9488	-0.0715	2567.0786	156.9697	5.8956	42.844	2567.2321	65.333	63.000	49	35	25	83	2.875281	32.0	0.0
631	9.5333	2538.0	2.1724	73086	2344.9328	-0.0715	2567.0627	166.1200	12.8686	42.832	2567.2321	66.000	71.500	49	35	25	83	2.875281	32.0	0.0
632	10.1167	2538.0	2.1759	73086	2344.9625	-0.0716	2567.0953	146.5213	38.2627	42.664	2567.2321	65.000	65.000	49	35	25	83	2.875281	32.0	0.0
633	10.7000	2538.0	2.1834	73086	2344.9416	-0.0716	2567.0725	156.1898	4.2387	42.671	2567.2321	65.333	65.333	49	35	25	83	2.875281	32.0	0.0
634	11.2833	2538.0	2.1909	73086	2344.9414	-0.0717	2567.0723	156.2593	5.8153	42.697	2567.2321	65.667	65.000	49	35	25	83	2.875281	32.0	0.0
635	12.5500	2538.0	2.2025	73086	2344.9416	-0.0718	2567.0726	156.1482	3.4191	42.626	2567.2321	65.000	64.500	49	35	25	83	2.875281	32.0	0.0
636	13.3167	2538.0	2.2111	73086	2344.9417	-0.0718	2567.0728	156.0672	3.9584	42.565	2567.2321	65.375	64.870	49	35	25	83	2.875281	32.0	0.0
617	2.9167	2472.0	2.4953	73086	2338.8937	-0.0748	2562.4577	135.7442	7.3962	41.835	2562.5711	63.000	65.000	45	45	48	84	2.465873	71.0	38.5
618	3.5000	2472.0	2.5028	73086	2338.8976	-0.0748	2562.4628	133.6766	6.6417	41.837	2562.5711	63.000	65.500	45	45	48	84	2.465873	71.0	38.5
619	4.0667	2472.0	2.5122	73086	2338.8994	-0.0741	2562.4648	132.6921	3.9891	41.901	2562.5711	63.000	65.667	45	45	48	84	2.465873	71.0	38.5
620	4.6500	2472.0	2.5137	73086	2338.9015	-0.0741	2562.4664	131.5012	4.2247	41.783	2562.5711	63.000	66.000	45	45	48	84	2.465873	71.0	38.5
621	5.2333	2472.0	2.5212	73086	2338.9022	-0.0742	2562.4671	131.1189	5.6702	42.036	2562.5711	63.000	67.000	45	45	48	84	2.465873	71.0	38.5
622	5.8167	2472.0	2.5247	73086	2338.9023	-0.0742	2562.4673	131.0395	7.4845	41.848	2562.5711	63.000	67.000	45	45	48	84	2.465873	71.0	38.5
623	6.4000	2472.0	2.5322	73086	2338.9012	-0.0742	2562.4662	131.5828	4.9158	41.677	2562.5711	63.000	67.000	45	45	48	84	2.465873	71.0	38.5
624	4.1667	2458.0	3.1642	73086	2336.8858	-0.0758	2558.2626	158.9585	5.9376	42.592	2558.4291	66.000	67.000	65	55	19	85	3.123242	29.0	100.5
625	5.3500	2458.0	3.1753	73086	2336.8877	-0.0759	2558.2648	158.8945	5.7458	42.684	2558.4291	66.000	68.333	65	55	19	85	3.123242	29.0	100.5
626	7.7167	2458.0	3.2015	73086	2336.8948	-0.0760	2558.2618	159.2807	6.4576	42.416	2558.4291	65.500	69.000	65	55	19	85	3.123242	29.0	100.5
627	9.5667	2458.0	3.2206	73086	2336.8758	-0.0761	2558.2521	163.1168	5.4826	42.521	2558.4291	64.000	65.999	65	55	19	85	3.123242	29.0	100.5
628	2.7500	2382.0	3.5333	73086	2330.6817	-0.0807	2551.3893	167.6288	6.7873	42.738	2551.5781	64.000	66.000	49	57	49	86	3.524825	78.0	45.0
629	3.3167	2382.0	3.5487	73086	2330.5997	-0.0807	2551.3871	168.4541	6.8418	42.682	2551.5781	63.667	66.000	49	57	49	86	3.524825	78.0	45.0
630	3.8833	2382.0	3.5441	73086	2330.5992	-0.0807	2551.3867	168.6179	6.1568	42.807	2551.5781	64.000	66.000	49	57	49	86	3.524825	78.0	45.0
631	4.4833	2382.0	3.5517	73086	2330.5981	-0.0807	2551.3854	169.0926	5.0216	42.807	2551.5781	63.500	66.000	49	57	49	86	3.524825	78.0	45.0
632	5.0667	2382.0	3.5552	73086	2330.5977	-0.0807	2551.3850	169.2269	6.3065	42.756	2551.5781	63.250	66.000	49	57	49	86	3.524825	78.0	45.0
633	5.7000	2382.0	3.5638	73086	2330.5966	-0.0807	2551.3838	169.6863	5.5085	42.691	2551.5781	63.414	66.797	49	57	49	86	3.524825	78.0	45.0
634	4.0833	2367.0	4.0914	73086	2329.3960	-0.0818	2550.0707	161.1318	7.0561	42.752	2550.2426	66.000	64.000	48	57	32	87	4.050948	42.5	10.0
635	4.6667	2367.0	4.0949	73086	2329.3973	-0.0818	2550.0721	160.5514	6.2631	42.428	2550.2426	66.000	63.000	48	57	32	87	4.050948	42.5	10.0
636	5.2500	2367.0	4.1224	73086	2329.3987	-0.0818	2550.0739	159.8565	6.7767	42.607	2550.2426	66.333	62.667	48	57	32	87	4.050948	42.5	10.0

637	6.1833	2367.0	4.1128	73086	2329.3968	-0.0010	2550.0731	160.1000	5.0275	42.673	2550.2426	65.609	66.000	48	57	32	87	4.852948	42.5	10.0
638	3.9167	2314.0	4.2601	73086	2324.5811	-0.0012	2544.0035	171.0747	48.5719	42.330	2545.0011	67.333	64.000	65	49	19	87	4.220670	101.0	69.0
639	4.5333	2314.0	4.2639	73086	2324.5930	-0.0012	2544.0165	166.2206	57.4436	42.365	2545.0016	66.667	64.667	65	49	19	87	4.220670	101.5	69.5
640	5.1167	2314.0	4.2713	73086	2324.5951	-0.0012	2544.0189	165.1527	51.4158	42.628	2545.0016	67.000	64.000	65	49	19	87	4.220670	101.5	69.0
641	6.1667	2314.0	4.2816	73086	2324.5928	-0.0012	2544.0169	166.0733	57.7988	41.793	2545.0016	67.000	64.000	65	49	19	87	4.220670	101.5	69.0
642	8.2667	2314.0	4.3018	73086	2324.6127	-0.0012	2544.0386	131.3888	73.7493	41.518	2544.9431	66.000	65.000	65	49	19	87	4.220670	43.0	11.0
643	8.6500	2314.0	4.3045	73086	2324.6161	-0.0012	2544.0424	129.4378	76.7830	42.034	2544.9431	67.000	65.000	65	49	19	87	4.220670	43.0	10.5
644	9.2333	2314.0	4.3120	73086	2324.6022	-0.0012	2544.0274	136.3471	81.8520	42.788	2544.9431	67.000	65.000	65	49	19	87	4.220670	43.0	10.5
645	10.5833	2314.0	4.3241	73086	2324.5883	-0.0012	2544.0128	143.6232	73.4777	42.129	2544.9431	67.000	63.500	65	49	19	87	4.220670	43.0	10.5
646	14.5833	2314.0	4.3647	73086	2324.5771	-0.0012	2544.0001	138.6597	53.7495	42.178	2544.9196	67.000	64.000	65	49	19	87	4.220670	19.5	91.5
647	15.5333	2314.0	4.3738	73086	2324.5621	-0.0012	2544.7938	146.0927	7.3927	41.981	2544.9196	67.752	63.232	65	49	19	87	4.220670	19.5	91.5
648	6.2167	2235.0	5.1303	73086	2316.6539	-0.0008	2536.1330	161.3954	3.6259	42.246	2536.3056	66.000	67.000	29	46	50	88	5.865091	5.5	77.0
649	6.8000	2235.0	5.1338	73086	2316.6546	-0.0008	2536.1338	161.0993	5.1545	42.881	2536.3056	66.000	67.000	29	46	50	88	5.865091	5.5	77.0
650	7.4000	2235.0	5.1414	73086	2316.6547	-0.0008	2536.1338	161.0783	5.1189	42.751	2536.3056	65.861	67.078	29	46	50	89	5.865091	5.5	77.0
651	3.1333	2193.0	5.2415	73086	2312.2789	-0.0005	2531.3462	190.3422	32.6398	42.919	2531.5996	67.000	68.000	50	48	38	89	5.218742	99.5	67.5
652	3.7333	2193.0	5.2451	73086	2312.2698	-0.0005	2531.3368	193.4798	29.4439	42.554	2531.5996	67.000	72.500	50	48	38	89	5.218742	99.5	67.5
653	4.3333	2193.0	5.2527	73086	2312.2758	-0.0005	2531.3425	191.5617	25.3596	43.108	2531.5996	67.000	58.667	50	48	38	89	5.218742	99.5	67.5
654	4.9333	2193.0	5.2603	73086	2312.2693	-0.0004	2531.3364	193.3593	20.2030	43.823	2531.5996	67.000	67.000	50	48	38	89	5.218742	99.5	67.5
655	5.5167	2193.0	5.2638	73086	2312.2767	-0.0004	2531.3444	190.7714	19.9282	42.551	2531.5996	67.000	68.500	50	48	38	89	5.218742	99.5	67.5
656	6.1333	2193.0	5.2715	73086	2312.2710	-0.0004	2531.3382	192.9471	15.1131	42.958	2531.5996	67.500	67.000	50	48	38	89	5.218742	99.5	67.5
657	6.7333	2193.0	5.2751	73086	2312.2788	-0.0004	2531.3467	190.1958	18.6367	42.780	2531.5996	67.000	65.000	50	48	38	89	5.218742	99.5	67.5
658	7.3000	2193.0	5.2825	73086	2312.2813	-0.0004	2531.3495	189.1819	25.0884	43.149	2531.6001	67.000	66.500	50	48	38	89	5.218742	100.0	67.5
659	7.8833	2193.0	5.2900	73086	2312.2765	-0.0003	2531.3444	190.7844	15.8620	42.966	2531.5996	67.000	67.500	50	48	38	89	5.218742	99.5	67.5
660	8.5167	2193.0	5.2938	73086	2312.2762	-0.0003	2531.3448	191.0726	13.7162	42.624	2531.5996	67.000	67.000	50	48	38	89	5.218742	99.5	67.5
661	9.1833	2193.0	5.3018	73086	2312.2776	-0.0003	2531.3456	190.4844	14.1259	42.743	2531.6001	67.000	68.624	50	48	38	89	5.218742	100.0	67.5
662	1.4833	2367.0	5.4306	73086	2329.3280	-0.0797	2549.9991	161.5553	18.1218	42.245	2550.1721	69.500	67.000	55	57	20	89	5.413704	72.0	39.5
663	2.1667	2367.0	5.4347	73086	2329.3186	-0.0797	2549.9887	165.5766	13.8512	42.705	2550.1721	72.000	68.667	55	57	20	89	5.413704	72.0	39.5
664	2.8833	2367.0	5.4430	73086	2329.3244	-0.0797	2549.9958	163.1564	16.5169	42.749	2550.1721	71.500	68.000	55	57	20	89	5.413704	72.0	39.5
665	3.5833	2367.0	5.4512	73086	2329.3146	-0.0796	2549.9844	167.2019	13.6706	42.459	2550.1721	73.000	73.000	56	57	20	89	5.413704	72.0	39.5
666	5.4333	2367.0	5.4703	73086	2329.3103	-0.0795	2549.9797	168.7971	12.7433	42.859	2550.2051	75.667	71.000	57	57	20	89	5.413704	5.0	76.5
667	10.1833	2367.0	5.5148	73086	2329.3285	-0.0793	2549.9995	168.0565	6.2784	42.652	2550.1916	65.000	68.000	57	57	20	89	5.413704	91.5	58.5
668	10.7833	2367.0	5.5224	73086	2329.3301	-0.0792	2550.0014	168.1581	11.5925	42.677	2550.1916	65.000	65.000	57	57	20	89	5.413704	91.5	58.5
669	11.4000	2367.0	5.5301	73086	2329.3258	-0.0792	2549.9966	169.9463	8.7457	42.669	2550.1916	68.000	66.000	57	57	20	89	5.413704	91.5	58.5
670	12.0667	2367.0	5.5341	73086	2329.3331	-0.0792	2550.0046	166.9648	20.9939	42.751	2550.1916	66.000	63.000	57	57	20	90	5.413704	91.5	58.5
671	12.7167	2367.0	5.5420	73086	2329.3308	-0.0791	2550.0021	167.8934	16.8572	42.781	2550.1916	66.003	65.827	57	57	20	89	5.413704	91.5	58.5
672	8.9833	2314.0	6.0304	73086	2324.4933	-0.0786	2544.7898	157.3823	17.7242	42.677	2544.8726	67.000	63.000	48	49	35	90	6.020605	72.5	40.0

673	1.5667	2314.0	6.0339	73086	2324.4779	-0.0785	2544.6938	164.1357	18.6418	42.346	2544.8726	70.000	62.000	48	49	35	90	6.020605	72.5	40.0
674	2.2667	2314.0	6.0421	73086	2324.4964	-0.0785	2544.7132	156.1069	26.6490	41.932	2544.8726	68.000	66.000	48	49	35	90	6.020605	72.5	40.0
675	2.9167	2314.0	6.0468	73086	2324.4937	-0.0785	2544.7101	157.3588	13.9094	42.296	2544.8726	66.500	63.500	48	49	35	90	6.020605	72.5	40.0
676	3.4833	2314.0	6.0534	73086	2324.4876	-0.0784	2544.7035	159.9953	11.7639	42.144	2544.8726	69.000	62.667	48	49	35	90	6.020605	72.5	40.0
677	4.1333	2314.0	6.0613	73086	2324.4978	-0.0784	2544.7138	155.6599	12.0093	42.256	2544.8726	67.000	63.000	48	49	35	90	6.020605	72.5	40.0
678	4.7167	2314.0	6.0648	73086	2324.4896	-0.0783	2544.7058	159.1021	15.5374	42.503	2544.8726	68.000	62.000	48	49	35	90	6.020605	72.5	40.0
679	5.3667	2314.0	6.0727	73086	2324.4942	-0.0783	2544.7107	157.1351	9.3382	42.419	2544.8726	67.000	64.500	48	49	35	90	6.020605	72.5	40.0
680	6.1500	2314.0	6.0814	73086	2324.4843	-0.0782	2544.6996	161.5644	9.5868	42.602	2544.8726	69.141	63.016	48	49	35	90	6.020605	72.5	40.0
681	4.4333	2132.0	6.2304	73086	2305.6419	-0.0771	2524.0857	145.7016	10.7558	42.159	2524.2206	65.000	67.000	46	56	47	90	6.183894	28.5	91.5
682	5.0167	2132.0	6.2339	73086	2305.6418	-0.0770	2524.0855	145.7723	8.6273	41.989	2524.2206	65.500	68.000	46	56	47	90	6.183894	28.5	91.5
683	5.6000	2132.0	6.2414	73086	2305.6497	-0.0770	2524.0941	141.9212	7.8674	41.769	2524.2206	67.000	62.000	46	56	47	90	6.183894	28.5	91.5
684	6.5333	2132.0	6.2518	73086	2305.6517	-0.0769	2524.0962	140.9519	10.0666	41.875	2524.2206	66.129	63.938	46	56	47	90	6.183894	28.5	91.5
685	3.3667	2077.0	6.3628	73086	2299.9395	-0.0758	2517.8469	153.7367	8.5068	42.468	2518.0086	65.000	64.000	32	67	40	91	6.340688	100.5	68.0
686	2.9500	2077.0	6.3703	73086	2299.9486	-0.0758	2517.8498	153.2900	9.9964	42.268	2518.0086	65.333	63.667	32	67	40	91	6.340688	100.5	68.0
687	3.5333	2077.0	6.3738	73086	2299.9411	-0.0757	2517.8486	153.8580	7.9246	42.063	2518.0086	65.000	63.000	32	67	40	91	6.340688	100.5	68.0
688	4.1167	2077.0	6.3813	73086	2299.9425	-0.0757	2517.8508	152.4724	6.7527	42.094	2518.0086	65.000	63.000	32	67	40	91	6.340688	100.5	68.0
689	4.7000	2077.0	6.3848	73086	2299.9437	-0.0756	2517.8512	151.9681	7.8764	42.037	2518.0086	65.333	63.000	32	67	40	91	6.340688	100.5	68.0
690	5.3167	2077.0	6.4855	73086	2299.9486	-0.0754	2517.8563	149.7792	7.3949	42.021	2518.0086	67.004	65.000	32	67	40	91	6.340688	100.5	68.0
691	3.8333	2035.0	6.5054	73086	2295.7115	-0.0743	2513.2287	151.5154	11.6373	41.956	2513.3691	64.000	65.000	36	67	35	91	6.470459	69.0	36.5
692	4.4167	2035.0	6.5129	73086	2295.7139	-0.0742	2513.2232	158.4548	14.3344	42.039	2513.3691	64.500	64.000	36	67	35	91	6.470459	69.0	36.5
693	5.0000	2035.0	6.5204	73086	2295.7130	-0.0742	2513.2222	158.8814	13.3742	41.939	2513.3691	64.000	64.000	36	67	35	91	6.470459	69.0	36.5
694	5.5833	2035.0	6.5239	73086	2295.7134	-0.0741	2513.2225	158.7459	13.3876	42.289	2513.3691	64.000	63.500	36	67	35	91	6.470459	69.0	36.5
695	6.2667	2035.0	6.5328	73086	2295.7114	-0.0740	2513.2203	151.6936	10.1445	42.010	2513.3691	64.000	63.235	36	67	35	91	6.470459	69.0	36.5
696	2.8000	1998.0	7.0722	73086	2292.1233	-0.0723	2509.2941	158.5618	7.9888	42.353	2509.4596	66.000	64.500	43	67	30	91	7.843422	59.5	27.0
697	3.3833	1998.0	7.0757	73086	2292.1220	-0.0722	2509.2926	159.1258	5.4338	42.405	2509.4596	66.000	64.000	43	67	30	91	7.843422	59.5	27.0
698	3.9667	1998.0	7.0832	73086	2292.1202	-0.0721	2509.2905	160.0094	9.1091	42.134	2509.4596	66.000	64.000	43	67	30	91	7.843422	59.5	27.0
699	4.5667	1998.0	7.0908	73086	2292.1198	-0.0721	2509.2892	158.5429	6.9802	42.558	2509.4596	66.000	63.500	43	67	30	91	7.843422	59.5	27.0
720	5.1333	1998.0	7.0942	73086	2292.1245	-0.0720	2509.2951	158.1565	31.6685	42.778	2509.4596	65.500	63.000	43	67	30	91	7.843422	59.5	27.0
721	5.7333	1998.0	7.1018	73086	2292.1161	-0.0719	2509.2858	161.8601	6.6781	42.833	2509.4596	65.000	63.000	43	67	30	91	7.843422	59.5	27.0
722	6.5000	1998.0	7.1184	73086	2292.1126	-0.0718	2509.2819	163.3887	4.9358	42.433	2509									

DATA PROCESSING.

The basic formula relating Borehole Gravity measurements to formation density is:

$$P = 3.6827 - 0.00524\ SIN^2(lat) + 0.000000524\ AvDepth - 39.1308\ (DelG/DelZ)$$

Equation 1.

where P is the BHGM density in g/cc.

lat is the well latitude

AvDepth is the depth below sea level of the midpoint between the two gravity readings.

DelG is the difference in gravity in mgals.

DelZ is the difference in depth in feet.

If the well is deviated by an angle D, the DelZ term is replaced by DelZ COS(D).

The field data contains several repeat tide corrected gravity values at a series of depths. The first step in the processing is to sort the data according to depth and determine which of the readings from each depth group should be used in the final processing. A factor in this decision is the effect of hysteresis on the spring of the gravity meter. Readings made immediately after the meter is unclamped at a station are lower than readings taken some minutes after unclamping. These earlier low readings may be discarded and the later steady readings after the hysteresis effects have died away are kept. Readings associated with tares are also discarded.

After this high grading of the data, the drift rates between readings made on consecutive occupations of the same depth are calculated. A function of drift rate with time is constructed and then integrated from the beginning of the survey to the time of each reading to determine the total drift and hence the drift correction to be applied to the gravity value for each reading.

Once the drift corrected gravity values are established, they are averaged at each depth. These average gravity values are used to find the vertical gravity gradient and hence the density of the formation according to equation 1.

7. Data Processing Printout

The first table presented each run shows the original gravity readings grouped according to depth so that readings disturbed by tares, excessive drift or other disturbances may be identified and deleted from the next processing stage. A list of the reading numbers deleted from the following processing is then given.

The remaining data is averaged for each occupation of a particular depth and presented in the next table. A table of drift rates between repeat readings at the same depths is then given. Since the drift rates change significantly after reading 14, (probably due to sticky hole conditions which required some hard physical manouvres of the tool) the data set has been split into two sets about reading 14.

The printouts for each subset of the data are then given separately. First the drift rates and drift corrections are tabulated and the repeated gravity measurements at each depth are shown after drift correction. The final table lists the depth intervals surveyed and the density values calculated for each interval. A confidence level is also given for each density value.

PRESENTATION OF COMPLETE SET OF READINGS AT EACH DEPTH.

Depth 3142.0
Average Gravity 2398.2174

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
1	0.00	2398.2593	-41.9
2	0.73	2398.2596	-42.2
3	1.06	2398.2597	-42.3
4	1.79	2398.2599	-42.5
5	2.12	2398.2597	-42.3
6	2.85	2398.2599	-42.5
7	3.58	2398.2602	-42.8
8	3.91	2398.2590	-41.6
9	4.64	2398.2601	-42.7
10	4.97	2398.2595	-42.1
11	5.70	2398.2593	-41.9
12	6.03	2398.2587	-41.3
13	6.76	2398.2595	-42.1
14	7.09	2398.2519	-34.5
15	7.85	2398.2393	-21.9
16	7.97	2398.1763	41.1
117	124.77	2398.1540	63.4
118	124.97	2398.1544	63.0
119	125.56	2398.1531	64.3
120	125.75	2398.1545	62.9
121	125.95	2398.1553	62.1
122	126.55	2398.1546	62.8
123	126.74	2398.1562	61.2
124	126.94	2398.1546	62.8
125	127.06	2398.1556	61.8

Average Absolute Error 48.4 microgals
Standard Deviation 50.8 microgals

Depth 3130.0
Average Gravity 2397.1418

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
17	32.67	2397.1678	-26.0
18	32.85	2397.1690	-27.2
19	33.03	2397.1679	-26.1
20	33.61	2397.1673	-25.5
21	33.79	2397.1662	-24.4
22	33.97	2397.1677	-25.9
23	34.55	2397.1652	-23.4
24	34.73	2397.1660	-24.2
25	34.92	2397.1665	-24.7
26	35.10	2397.1662	-24.4
27	35.68	2397.1645	-22.7
28	35.86	2397.1641	-22.3
29	36.05	2397.1633	-21.5
30	36.68	2397.1635	-21.7
31	39.78	2397.1575	-15.7
32	39.96	2397.1557	-13.9
33	40.54	2397.1553	-13.5
34	40.72	2397.1574	-15.6
35	40.90	2397.1577	-15.9
36	41.08	2397.1588	-17.0
37	41.66	2397.1577	-15.9
38	41.84	2397.1583	-16.5
39	42.02	2397.1594	-17.6
40	42.60	2397.1596	-17.8
41	42.79	2397.1603	-18.5
42	42.96	2397.1605	-18.7
43	43.54	2397.1591	-17.3
44	43.72	2397.1592	-17.4
45	43.90	2397.1582	-16.4
46	44.08	2397.1597	-17.9
47	44.68	2397.1580	-16.2
48	44.86	2397.1567	-14.9
49	45.04	2397.1584	-16.6
50	45.62	2397.1564	-14.6
51	45.86	2397.1579	-16.1
126	151.89	2397.2231	-81.3
127	152.54	2397.0693	72.5
128	152.73	2397.0698	72.0
129	152.92	2397.0702	71.6
130	153.11	2397.0703	71.5
131	154.10	2397.0784	63.4
132	155.84	2397.0829	58.9
133	156.04	2397.0816	60.2
134	156.65	2397.0829	58.9
135	156.84	2397.0823	59.5
136	157.05	2397.0823	59.5
137	157.64	2397.0838	58.0
138	157.77	2397.0802	61.6

Average Absolute Error 32.0 microgals
Standard Deviation 38.6 microgals

Depth 3081.0
Average Gravity 2392.7554

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
73	72.84	2392.8091	-53.7
74	73.04	2392.8126	-57.2
75	73.64	2392.8136	-58.2
76	73.85	2392.8073	-51.9
77	74.05	2392.8128	-57.4
78	74.65	2392.8125	-57.1
79	74.86	2392.8126	-57.2
80	75.06	2392.8106	-55.2
81	75.66	2392.8138	-58.4
82	75.86	2392.8107	-55.3
83	76.06	2392.8138	-58.4
84	76.67	2392.8130	-57.6
85	76.86	2392.8151	-59.7
86	77.07	2392.8083	-52.9
87	77.67	2392.8122	-56.8
88	77.87	2392.8114	-56.0
89	78.07	2392.8104	-55.0
90	78.68	2392.8084	-53.0
91	78.88	2392.8104	-55.0
92	79.14	2392.8141	-58.7
155	186.11	2392.7226	32.8
156	186.80	2392.7237	31.7
157	187.09	2392.7289	26.5
158	187.80	2392.7260	29.4
159	188.07	2392.7321	23.3
160	188.73	2392.7256	29.8
161	189.01	2392.7261	29.3
162	189.69	2392.7266	28.8
163	189.94	2392.7290	26.4
164	190.61	2392.7279	27.5
165	190.88	2392.7316	23.8
166	191.56	2392.7262	29.2
167	191.86	2392.7307	24.7
168	192.54	2392.7262	29.2
169	192.82	2392.7247	30.7
170	193.54	2392.6511	104.3
171	193.83	2392.7732	-17.8
172	194.12	2392.7256	29.8
173	194.83	2392.7319	23.5
174	195.76	2392.7312	24.2
175	196.02	2392.7255	29.9
176	196.69	2392.7207	34.7
177	196.97	2392.7233	32.1

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
178	197.62	2392.7253	30.1
179	198.78	2392.7238	31.6
180	199.66	2392.7347	20.7
181	199.91	2392.7317	23.7
182	200.55	2392.7334	22.0
183	200.79	2392.7314	24.0
184	201.06	2392.7341	21.3
185	201.69	2392.7310	24.4
186	202.58	2392.7306	24.8
187	203.11	2392.7343	21.1
188	203.78	2392.7204	35.0
189	204.02	2392.7252	30.2
190	204.69	2392.7234	32.0
191	204.96	2392.7148	40.6
192	205.61	2392.7246	30.8
193	205.91	2392.7277	27.7

Average Absolute Error 38.7 microgals
Standard Deviation 42.4 microgals

Depth 3104.0
Average Gravity 2394.7904

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
52	56.64	2394.8157	-25.3
53	56.83	2394.8183	-27.9
54	57.01	2394.8181	-27.7
55	57.59	2394.8208	-30.4
56	57.77	2394.8241	-33.7
57	57.96	2394.8208	-30.4
58	58.54	2394.8212	-30.8
59	58.73	2394.8214	-31.0
60	58.91	2394.8234	-33.0
61	59.09	2394.8226	-32.2
62	59.67	2394.8191	-28.7
63	59.86	2394.8219	-31.5
64	60.04	2394.8207	-30.3
65	60.62	2394.8218	-31.4
66	60.80	2394.8213	-30.9
67	60.98	2394.8199	-29.5
68	61.56	2394.8204	-30.0
69	61.75	2394.8213	-30.9
70	61.93	2394.8204	-30.0
71	62.11	2394.8194	-29.0
72	63.12	2394.7675	22.9
139	169.72	2394.7385	51.9
140	169.96	2394.7488	41.6
141	170.55	2394.7534	37.0
142	170.79	2394.7536	36.8
143	170.99	2394.7543	36.1
144	171.58	2394.7556	34.8
145	171.80	2394.7549	35.5
146	172.00	2394.7563	34.1
147	172.60	2394.7575	32.9
148	172.80	2394.7567	33.7
149	173.69	2394.7553	35.1
150	173.89	2394.7554	35.0
151	174.08	2394.7550	35.4
152	174.69	2394.7569	33.5
153	174.88	2394.7564	34.0
154	175.55	2394.7576	32.8

Average Absolute Error 32.6 microgals
Standard Deviation 33.4 microgals

Depth 3060.0
Average Gravity 2390.9237

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
93	93.59	2390.9788	-55.1
94	93.79	2390.9826	-58.9
95	93.99	2390.9784	-54.7
96	94.61	2390.9795	-55.8
97	94.80	2390.9809	-57.2
98	95.02	2390.9777	-54.0
99	95.61	2390.9793	-55.6
100	95.81	2390.9813	-57.6
101	96.00	2390.9839	-60.2
102	96.62	2390.9805	-56.8
103	96.81	2390.9821	-58.4
104	97.00	2390.9842	-60.5
105	97.60	2390.9777	-54.0
106	97.80	2390.9780	-54.3
107	98.01	2390.9828	-59.1
108	98.60	2390.9808	-57.1
109	98.80	2390.9817	-58.0
110	99.00	2390.9845	-60.8
111	99.60	2390.9809	-57.2
112	99.81	2390.9793	-55.6
113	100.00	2390.9804	-56.7
114	100.61	2390.9809	-57.2
115	100.80	2390.9791	-55.4
116	101.03	2390.9788	-55.1
194	214.83	2390.9028	20.9
195	215.03	2390.9044	19.3
196	215.67	2390.9038	19.9
197	215.86	2390.9051	18.6
198	216.06	2390.9060	17.7
199	216.69	2390.9036	20.1
200	216.90	2390.9045	19.2
201	217.10	2390.9061	17.6
202	217.74	2390.9040	19.7
203	217.94	2390.9044	19.3
204	218.55	2390.9044	19.3
205	218.75	2390.9058	17.9
206	218.97	2390.9017	22.0
207	219.56	2390.9055	18.2
208	219.76	2390.9044	19.3
209	220.00	2390.9031	20.6
210	220.64	2390.9038	19.9
359	540.95	2390.7773	146.4
360	542.67	2390.7736	150.1
361	543.56	2390.7763	147.4
362	544.01	2390.7736	150.1
363	544.88	2390.7788	144.9
364	545.80	2390.7749	148.8
365	547.08	2390.7771	146.6

Average Absolute Error 56.9 microgals
Standard Deviation 71.0 microgals

Depth 3037.0
Average Gravity 2389.0578

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
211	225.87	2388.9157	142.1
212	226.07	2388.9161	141.7
213	226.71	2388.9186	139.2
214	226.91	2388.9140	143.8
215	227.10	2388.9166	141.2
216	227.92	2388.9145	143.3
217	231.04	2388.9187	139.1
218	245.69	2388.9159	141.9
219	246.97	2388.9140	143.8
220	247.57	2388.9185	139.3
221	247.77	2388.9174	140.4
222	247.97	2388.9203	137.5
223	248.57	2388.9129	144.9
224	248.77	2388.9214	136.4
225	248.98	2388.9197	138.1
226	249.57	2388.9203	137.5
227	249.79	2388.9219	135.9
228	250.00	2388.9186	139.2
229	250.59	2388.9149	142.9
230	250.79	2388.9157	142.1
231	250.99	2388.9170	140.8
232	251.60	2388.9112	146.6
233	251.87	2388.9171	140.7
366	567.00	2390.6483	-1590.5
367	567.79	2390.6479	-1590.1
368	568.57	2390.6473	-1589.5
369	569.55	2390.6493	-1591.5
370	571.04	2388.8220	235.8
371	571.81	2388.8237	234.1
372	576.97	2388.8130	244.8
373	577.72	2388.8171	240.7
374	578.07	2388.8172	240.6
375	578.82	2388.8168	241.0
376	579.57	2388.8159	241.9
377	579.92	2388.8148	243.0
378	580.67	2388.8138	244.0
379	581.02	2388.8134	244.4
380	581.86	2388.8175	240.3
381	582.63	2388.8201	237.7
382	583.02	2388.8223	235.5

Average Absolute Error 318.1 microgals
Standard Deviation 538.9 microgals

Depth 3022.0
Average Gravity 2387.6173

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
234	262.98	2387.6519	-34.6
235	263.58	2387.6545	-37.2
236	263.78	2387.6489	-31.6
237	263.98	2387.6444	-27.1
238	264.58	2387.6503	-33.0
239	264.78	2387.6518	-34.5
240	264.98	2387.6503	-33.0
241	265.62	2387.6537	-36.4
242	265.82	2387.6516	-34.3
243	266.02	2387.6526	-35.3
244	266.63	2387.6575	-40.2
245	266.82	2387.6519	-34.6
246	267.02	2387.6470	-29.7
247	267.62	2387.6466	-29.3
248	267.82	2387.6373	-20.0
249	268.07	2387.6575	-40.2
250	268.67	2387.6533	-36.0
251	268.91	2387.6584	-41.1
383	590.67	2387.5269	90.4
384	591.71	2387.5291	88.2
385	592.12	2387.5317	85.6
386	592.92	2387.5318	85.5
387	593.72	2387.5328	84.5
388	594.13	2387.5334	83.9
389	594.92	2387.5283	89.0

Average Absolute Error 48.6 microgals
Standard Deviation 55.4 microgals

Depth 2995.0
Average Gravity 2385.2510

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
252	276.94	2385.2732	-22.2
253	277.88	2385.2784	-27.4
254	280.64	2385.2657	-14.7
255	280.84	2385.2728	-21.8
256	281.04	2385.2834	-32.4
257	281.65	2385.2713	-20.3
258	287.60	2385.2755	-24.5
259	291.02	2385.2701	-19.1
260	291.61	2385.2642	-13.2
261	291.82	2385.2693	-18.3
262	299.65	2385.2717	-20.7
263	299.84	2385.2537	-2.7
264	300.04	2385.2641	-13.1
265	300.64	2385.2686	-17.6
266	300.84	2385.2729	-21.9
267	301.04	2385.2558	-4.8
268	301.64	2385.2692	-18.2
269	301.84	2385.2674	-16.4
270	302.05	2385.2738	-22.8
271	302.64	2385.2660	-15.0
272	302.84	2385.2743	-23.3
273	303.04	2385.2697	-18.7
274	303.64	2385.2731	-22.1
275	303.84	2385.2598	-8.8
276	304.04	2385.2731	-22.1
277	304.64	2385.2707	-19.7
278	304.84	2385.2755	-24.5
279	305.04	2385.2690	-18.0
280	306.78	2385.2784	-27.4
390	601.67	2385.1875	63.5
391	602.06	2385.1905	60.5
392	602.80	2385.1897	61.3
393	603.59	2385.1888	62.2
394	603.94	2385.1907	60.3
395	604.69	2385.1885	62.5
396	605.08	2385.1920	59.0
397	605.83	2385.1901	60.9
398	606.62	2385.1904	60.6

Average Absolute Error 29.0 microgals
Standard Deviation 35.0 microgals

Depth 2981.0
Average Gravity 2383.9709

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
281	317.80	2384.0671	-96.2
282	317.99	2384.0517	-80.8
283	318.62	2384.0441	-73.2
284	318.82	2384.0527	-81.8
285	319.02	2384.0512	-80.3
286	319.62	2384.0521	-81.2
287	319.81	2384.0533	-82.4
288	320.02	2384.0510	-80.1
289	320.62	2384.0577	-86.8
290	320.81	2384.0527	-81.8
291	321.01	2384.0513	-80.4
292	321.62	2384.0562	-85.3
293	321.82	2384.0591	-88.2
294	322.63	2384.0483	-77.4
295	323.03	2384.0562	-85.3
296	323.63	2384.0467	-75.8
297	323.87	2384.0478	-76.9
298	324.08	2384.0510	-80.1
299	324.67	2384.0550	-84.1
300	325.68	2384.0487	-77.8
301	390.82	2383.8111	159.8
302	391.57	2383.8105	160.4
303	391.94	2383.8042	166.7
304	393.91	2383.7956	175.3
305	394.65	2383.7927	178.2
306	395.60	2383.7863	184.6
307	398.11	2383.7984	172.5
308	399.60	2383.8015	169.4
309	400.65	2383.8016	169.3
399	611.77	2383.9511	19.8
400	612.54	2383.9571	13.8
401	612.89	2383.9597	11.2
402	613.68	2383.9623	8.6
403	614.03	2383.9606	10.3
404	614.78	2383.9631	7.8
405	615.58	2383.9621	8.8
406	615.93	2383.9601	10.8
407	616.72	2383.9622	8.7

Average Absolute Error 86.1 microgals
Standard Deviation 103.7 microgals

Depth 2948.0
Average Gravity 2381.0732

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
310	413.99	2380.9514	121.8
311	414.74	2380.9604	112.8
312	415.12	2380.9538	119.4
313	415.86	2380.9586	114.6
314	416.60	2380.9593	113.9
315	416.97	2380.9561	117.1
316	418.63	2380.9642	109.0
317	419.54	2380.9544	118.8
318	419.95	2380.9621	111.1
408	622.08	2381.1040	-30.8
409	622.83	2381.1103	-37.1
410	623.58	2381.1119	-38.7
411	624.11	2381.1075	-34.3
412	624.86	2381.1086	-35.4
413	625.61	2381.1143	-41.1
414	625.96	2381.1128	-39.6
415	627.55	2381.1293	-56.1
416	627.90	2381.1318	-58.6
417	628.65	2381.1301	-56.9
418	630.65	2381.1320	-58.8
419	631.00	2381.1351	-61.9
420	631.75	2381.1299	-56.7
421	633.71	2381.1299	-56.7
422	634.07	2381.1362	-63.0
423	634.81	2381.1354	-62.2
424	635.83	2381.1373	-64.1
425	636.58	2381.1346	-61.4
426	636.93	2381.1380	-64.8
427	637.90	2381.1338	-60.6

Average Absolute Error 71.6 microgals
Standard Deviation 79.4 microgals

Depth 2910.0
Average Gravity 2377.8338

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
428	646.03	2377.8243	9.5
429	646.79	2377.8273	6.5
430	647.57	2377.8326	1.2
431	647.92	2377.8300	3.8
432	648.71	2377.8367	-2.9
433	649.10	2377.8336	0.2
434	649.92	2377.8265	7.3
435	650.67	2377.8141	19.7
436	653.82	2377.8341	-0.3
437	654.59	2377.8414	-7.6
438	655.93	2377.8396	-5.8
439	656.86	2377.8241	9.7
440	657.64	2377.8397	-5.9
441	658.03	2377.8448	-11.0
442	658.82	2377.8263	7.5
443	659.62	2377.8539	-20.1
444	661.77	2377.8414	-7.6
445	662.55	2377.8421	-8.3
446	664.62	2377.8380	-4.2
447	664.97	2377.8252	8.6
448	671.70	2377.8296	4.2
449	672.05	2377.8355	-1.7
450	673.12	2377.8266	7.2
451	674.65	2377.8332	0.6
452	675.01	2377.8314	2.4
453	675.77	2377.8372	-3.4
454	676.12	2377.8358	-2.0
455	676.86	2377.8345	-0.7
456	677.62	2377.8371	-3.3
457	677.96	2377.8288	5.0
458	678.72	2377.8387	-4.9
459	679.11	2377.8385	-4.7

Average Absolute Error 5.9 microgals
Standard Deviation 7.6 microgals

Depth 2888.0
Average Gravity 2375.8884

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
319	432.75	2375.7587	129.7
320	433.58	2375.7651	123.3
321	433.98	2375.7670	121.4
322	434.79	2375.7686	119.8
323	436.00	2375.7688	119.6
324	436.75	2375.7725	115.9
325	439.80	2375.7686	119.8
326	440.93	2375.7714	117.0
460	685.95	2375.9170	-28.6
461	687.77	2375.9190	-30.6
462	688.13	2375.9224	-34.0
463	688.87	2375.9166	-28.2
464	689.86	2375.9206	-32.2
465	690.61	2375.9230	-34.6
466	690.97	2375.9209	-32.5
467	692.00	2375.9224	-34.0
468	692.75	2375.9196	-31.2
469	696.64	2375.9303	-41.9
470	697.00	2375.9248	-36.4
471	697.75	2375.9223	-33.9
472	698.10	2375.9309	-42.5
473	699.10	2375.9198	-31.4
474	699.85	2375.9185	-30.1
475	700.61	2375.9234	-35.0
476	700.96	2375.9277	-39.3
477	701.90	2375.9336	-45.2
478	702.65	2375.9254	-37.0
479	703.00	2375.9283	-39.9
480	703.77	2375.9259	-37.5
481	704.12	2375.9302	-41.8
482	704.87	2375.9265	-38.1
483	705.68	2375.9335	-45.1
484	706.03	2375.9205	-32.1
485	706.78	2375.9250	-36.6
486	707.90	2375.9235	-35.1

Average Absolute Error 55.2 microgals
Standard Deviation 66.9 microgals

Depth 2876.0
Average Gravity 2374.8414

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
327	447.03	2374.7447	96.7
328	448.00	2374.7333	108.1
329	449.60	2374.7366	104.8
330	451.77	2374.7485	92.9
331	452.12	2374.7420	99.4
332	455.05	2374.7300	111.4
333	455.98	2374.7467	94.7
334	456.73	2374.7402	101.2
335	457.08	2374.7411	100.3
336	457.93	2374.7498	91.6
487	713.65	2374.8901	-48.7
488	714.58	2374.9029	-61.5
489	715.75	2374.9024	-61.0
490	716.10	2374.9064	-65.0
491	716.85	2374.8967	-55.3
492	717.66	2374.9021	-60.7
493	718.01	2374.9056	-64.2
494	718.77	2374.8962	-54.8
495	719.55	2374.9020	-60.6
496	719.90	2374.9029	-61.5
497	720.64	2374.8938	-52.4
498	721.03	2374.8996	-58.2
499	722.80	2374.8997	-58.3
500	724.61	2374.8981	-56.7
501	724.97	2374.9037	-62.3
502	725.72	2374.9007	-59.3
503	726.61	2374.9014	-60.0

Average Absolute Error 74.1 microgals
Standard Deviation 78.4 microgals

Depth 2862.0
Average Gravity 2373.6912

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
504	732.93	2373.6878	3.4
505	733.88	2373.6895	1.7
506	734.63	2373.6934	-2.2
507	735.01	2373.6943	-3.1
508	735.77	2373.6936	-2.4
509	736.75	2373.6952	-4.0
510	739.59	2373.6830	8.2
511	742.62	2373.6935	-2.3
512	742.98	2373.6949	-3.7
513	743.72	2373.6961	-4.9
514	744.73	2373.6821	9.1

Average Absolute Error 4.1 microgals
Standard Deviation 4.9 microgals

Depth 2837.0
Average Gravity 2371.5229

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
337	467.74	2371.3823	140.6
338	468.11	2371.3843	138.6
339	468.91	2371.3895	133.4
340	469.65	2371.3843	138.6
341	470.04	2371.3876	135.3
342	470.81	2371.3928	130.1
343	471.57	2371.3840	138.9
515	750.13	2371.5356	-12.7
516	750.91	2371.5562	-33.3
517	751.71	2371.5597	-36.8
518	752.75	2371.5632	-40.3
519	753.11	2371.5509	-28.0
520	754.79	2371.5628	-39.9
521	755.56	2371.5759	-53.0
522	755.94	2371.5520	-29.1
523	756.72	2371.5600	-37.1
524	761.61	2371.5488	-25.9
525	762.02	2371.5756	-52.7
526	762.83	2371.5544	-31.5
527	763.61	2371.5621	-39.2
528	764.00	2371.5643	-41.4
529	764.80	2371.5520	-29.1
530	765.66	2371.5813	-58.4
531	769.11	2371.5563	-33.4
532	769.86	2371.5610	-38.1
533	770.65	2371.5737	-50.8
534	771.01	2371.5608	-37.9
535	771.79	2371.5708	-47.9
536	772.54	2371.5515	-28.6
537	772.95	2371.5606	-37.7
538	773.74	2371.5724	-49.5
539	774.13	2371.5646	-41.7

Average Absolute Error 59.7 microgals
Standard Deviation 73.9 microgals

Depth 2794.0
Average Gravity 2367.7429

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
344	478.70	2367.6268	116.1
345	479.08	2367.6272	115.7
346	480.75	2367.6277	115.2
347	481.09	2367.6309	112.0
348	481.90	2367.6312	111.7
540	783.83	2367.8079	-65.0
541	784.58	2367.7998	-56.9
542	784.93	2367.8097	-66.8
543	785.68	2367.8020	-59.1
544	786.04	2367.8048	-61.9
545	786.78	2367.8079	-65.0
546	787.13	2367.8083	-65.4
547	787.88	2367.8082	-65.3
548	788.68	2367.8082	-65.3

Average Absolute Error 81.5 microgals
Standard Deviation 88.3 microgals

Depth 2768.0
Average Gravity 2365.4561

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
349	492.77	2365.3512	104.9
350	493.12	2365.3511	105.0
351	493.87	2365.3471	109.0
352	494.66	2365.3536	102.5
353	495.04	2365.3545	101.6
354	495.82	2365.3526	103.5
549	795.03	2365.5305	-74.4
550	795.78	2365.5765	-80.4
551	796.13	2365.5348	-78.7
552	796.88	2365.5362	-80.1
553	797.63	2365.5234	-67.3
554	798.91	2365.5363	-80.2
555	799.66	2365.5377	-81.6
556	800.70	2365.5401	-84.0

Average Absolute Error 89.5 microgals
Standard Deviation 93.9 microgals

Depth 2740.0
Average Gravity 2363.0172

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
355	511.59	2362.9091	108.1
356	511.95	2362.9121	105.1
357	512.69	2362.9131	104.0
358	513.06	2362.9154	101.8
557	807.98	2363.0660	-48.8
558	808.73	2363.0681	-50.9
559	809.08	2363.0692	-52.0
560	809.83	2363.0707	-53.6
561	810.58	2363.0700	-52.9
562	810.94	2363.0709	-53.8
563	811.69	2363.0714	-54.2
564	812.61	2363.0698	-52.7

Average Absolute Error 69.8 microgals
Standard Deviation 77.4 microgals

Depth 2712.0
Average Gravity 2360.6226

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
565	818.59	2360.6011	21.5
566	818.94	2360.6020	20.6
567	819.88	2360.6020	20.6
568	820.63	2360.6028	19.8
569	820.98	2360.6025	20.1
570	821.73	2360.6027	19.9
571	824.70	2360.6247	-2.1
572	825.05	2360.6269	-4.3
573	825.80	2360.6280	-5.4
574	827.07	2360.6332	-10.6
575	827.83	2360.6318	-9.2
576	828.57	2360.6356	-13.0
577	828.92	2360.6335	-10.9
578	829.67	2360.6351	-12.5
579	830.02	2360.6537	-31.1
580	830.77	2360.6342	-11.6
581	831.56	2360.6345	-11.9

Average Absolute Error 14.4 microgals
Standard Deviation 16.7 microgals

Depth 2573.0
Average Gravity 2348.3226

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
582	841.97	2348.3158	6.8
583	842.75	2348.3072	15.4
584	843.13	2348.3516	-29.0
585	843.94	2348.3121	10.5
586	844.76	2348.3124	10.2
587	845.58	2348.3186	4.0
588	846.01	2348.3212	1.4
589	846.78	2348.3229	-0.3
590	847.57	2348.3265	-3.9
591	847.96	2348.3254	-2.8
592	848.74	2348.3258	-3.2
593	849.12	2348.3304	-7.8
594	849.98	2348.3239	-1.3

Average Absolute Error 7.4 microgals
Standard Deviation 11.0 microgals

Depth 2538.0
Average Gravity 2344.9420

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
595	859.66	2344.9309	11.1
596	860.01	2344.9350	7.0
597	860.76	2344.9327	9.3
598	861.71	2344.9649	-22.9
599	862.93	2344.9407	1.3
600	863.67	2344.9407	1.3
601	864.02	2344.9400	2.0
602	864.78	2344.9328	9.2
603	865.13	2344.9625	-20.5
604	865.88	2344.9416	0.4
605	866.63	2344.9414	0.6
606	867.79	2344.9416	0.4
607	868.65	2344.9417	0.3

Average Absolute Error 6.7 microgals
Standard Deviation 10.4 microgals

Depth 2472.0
Average Gravity 2338.8997

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
608	897.07	2338.8937	6.0
609	897.82	2338.8976	2.1
610	898.56	2338.8994	0.3
611	898.91	2338.9015	-1.8
612	899.66	2338.9022	-2.5
613	900.01	2338.9023	-2.6
614	900.76	2338.9012	-1.5

Average Absolute Error 2.4 microgals
Standard Deviation 3.1 microgals

Depth 2450.0
Average Gravity 2336.8835

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
615	923.96	2336.8858	-2.3
616	925.07	2336.8877	-4.2
617	927.69	2336.8848	-1.3
618	929.60	2336.8758	7.7

Average Absolute Error 3.9 microgals
Standard Deviation 5.3 microgals

Depth 2380.0
Average Gravity 2330.5988

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
619	960.87	2330.6017	-2.9
620	961.61	2330.5997	-0.9
621	961.95	2330.5992	-0.4
622	962.71	2330.5981	0.7
623	963.06	2330.5977	1.1
624	963.84	2330.5966	2.2

Average Absolute Error 1.4 microgals
Standard Deviation 1.8 microgals

Depth 2367.0
Average Gravity 2329.3453

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
625	976.68	2329.3960	-50.7
626	977.03	2329.3973	-52.0
627	977.78	2329.3987	-53.4
628	978.74	2329.3980	-52.7
653	1070.60	2329.3280	17.3
654	1071.01	2329.3186	26.7
655	1071.84	2329.3244	20.9
656	1072.66	2329.3146	30.7
657	1074.57	2329.3103	35.0
658	1079.02	2329.3285	16.8
659	1079.78	2329.3301	15.2
660	1080.55	2329.3258	19.5
661	1080.95	2329.3331	12.2
662	1081.74	2329.3308	14.5

Average Absolute Error 29.8 microgals
Standard Deviation 34.8 microgals

Depth 2314.0
Average Gravity 2324.5439

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
629	993.55	2324.5811	-37.2
630	993.92	2324.5930	-49.1
631	994.67	2324.5951	-51.2
632	995.70	2324.5928	-48.9
633	997.64	2324.6127	-68.8
634	997.99	2324.6161	-72.2
635	998.74	2324.6022	-58.3
636	999.95	2324.5888	-44.9
637	1004.01	2324.5771	-33.2
638	1004.92	2324.5621	-18.2
663	1090.58	2324.4933	50.6
664	1090.93	2324.4779	66.0
665	1091.75	2324.4964	47.5
666	1092.14	2324.4937	50.2
667	1092.88	2324.4876	56.3
668	1093.67	2324.4970	46.9
669	1094.02	2324.4896	54.3
670	1094.81	2324.4942	49.7
671	1095.68	2324.4840	59.9

Average Absolute Error 50.7 microgals
Standard Deviation 53.6 microgals

Depth 2235.0
Average Gravity 2316.6544

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
639	1040.57	2316.6539	0.5
640	1040.92	2316.6546	-0.2
641	1041.68	2316.6547	-0.3

Average Absolute Error 0.3 microgals
Standard Deviation 0.4 microgals

Depth 2193.0
Average Gravity 2312.2755

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
642	1051.69	2312.2789	-3.4
643	1052.05	2312.2690	6.5
644	1052.81	2312.2750	0.5
645	1053.57	2312.2693	6.2
646	1053.92	2312.2767	-1.2
647	1054.69	2312.2710	4.5
648	1055.05	2312.2788	-3.3
649	1055.79	2312.2813	-5.8
650	1056.54	2312.2765	-1.0
651	1056.92	2312.2762	-0.7
652	1057.72	2312.2776	-2.1

Average Absolute Error 3.2 microgals
Standard Deviation 4.1 microgals

Depth 2132.0
Average Gravity 2305.6463

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
672	1110.58	2305.6419	4.4
673	1110.93	2305.6418	4.5
674	1111.68	2305.6497	-3.4
675	1112.64	2305.6517	-5.4

Average Absolute Error 4.4 microgals
Standard Deviation 5.2 microgals

Depth 2077.0
Average Gravity 2299.9427

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
676	1123.82	2299.9395	3.2
677	1124.57	2299.9406	2.1
678	1124.92	2299.9411	1.6
679	1125.67	2299.9425	0.2
680	1126.02	2299.9437	-1.0
681	1128.09	2299.9486	-5.9

Average Absolute Error 2.3 microgals
Standard Deviation 3.3 microgals

Depth 2035.0
Average Gravity 2295.7126

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
682	1138.08	2295.7115	1.1
683	1138.83	2295.7139	-1.3
684	1139.58	2295.7130	-0.4
685	1139.93	2295.7134	-0.8
686	1140.74	2295.7114	1.2

Average Absolute Error 1.0 microgals
Standard Deviation 1.1 microgals

Depth 1998.0
Average Gravity 2292.1197

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
687	1154.76	2292.1233	-3.6
688	1155.11	2292.1220	-2.3
689	1155.86	2292.1202	-0.5
690	1156.62	2292.1190	0.7
691	1156.96	2292.1245	-4.8
692	1157.72	2292.1161	3.6
693	1158.58	2292.1126	7.1

Average Absolute Error 3.2 microgals
Standard Deviation 4.2 microgals

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DRIFT CORRECTED DATA

READINGS 1 TO 10

Reading Number	Depth	Time	Tide Corrected Gravity
1	3142.0	5.87	2398.2593
2	3130.0	44.59	2397.1582
3	3104.0	61.07	2394.8208
4	3081.0	77.88	2392.8115
5	3060.0	99.31	2390.9804
6	3142.0	126.03	2398.1547
7	3130.0	157.05	2397.0828
8	3104.0	173.41	2394.7561
9	3081.0	190.76	2392.7275
10	3060.0	217.83	2390.9049

CALCULATED DRIFT RATES

First Reading	Second Reading	Drift Rate (microgals / minute)	Mid Time (minutes)
1	6	-0.870	65.95
2	7	-0.670	100.82
3	8	-0.575	117.24
4	9	-0.744	134.32
5	10	-0.637	158.57

CALCULATED DRIFT CORRECTIONS

Reading	Initial Gravity	Drift Corrected Gravity
1	2398.2593	2398.2644
2	2397.1582	2397.1970
3	2394.8208	2394.8739
4	2392.8115	2392.8780
5	2390.9804	2391.0635
6	2398.1547	2398.2550
7	2397.0828	2397.2042
8	2394.7561	2394.8881
9	2392.7275	2392.8705
10	2390.9049	2391.0651

DRIFT CORRECTED GRAVITY VALUES FOR EACH DEPTH

Depth 3142.0
Average Gravity 2398.2597

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
1	5.87	2398.2644	-4.7
6	126.03	2398.2550	4.7

Average Absolute Error 4.7 microgals
Standard Deviation 6.6 microgals

Depth 3130.0
Average Gravity 2397.2006

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
2	44.59	2397.1970	3.6
7	157.05	2397.2042	-3.6

Average Absolute Error 3.6 microgals
Standard Deviation 5.1 microgals

Depth 3104.0
Average Gravity 2394.8810

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
3	61.07	2394.8739	7.1
8	173.41	2394.8881	-7.1

Average Absolute Error 7.1 microgals
Standard Deviation 10.0 microgals

Depth 3081.0
Average Gravity 2392.8742

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
4	77.88	2392.8780	-3.8
9	190.76	2392.8705	3.8

Average Absolute Error 3.8 microgals
Standard Deviation 5.4 microgals

Depth 3060.0
Average Gravity 2391.0643

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
5	99.31	2391.0635	0.8
10	217.83	2391.0651	-0.8

Average Absolute Error 0.8 microgals
Standard Deviation 1.2 microgals

CALCULATED DENSITIES

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DEPTH INTERVAL	DENSITY	DENSITY ERROR
3142.0 - 3130.0	2.633	0.006
3130.0 - 3104.0	2.621	0.003
3104.0 - 3081.0	2.645	0.004
3081.0 - 3060.0	2.657	0.002

DRIFT CORRECTED DATA

READINGS 15 TO 50

INITIAL DATA

Reading Number	Depth	Time	Tide Corrected Gravity
1	3142.0	5.87	2398.2593
2	3130.0	44.59	2397.1582
3	3104.0	61.07	2394.8208
4	3081.0	77.88	2392.8115
5	3060.0	99.31	2390.9804
6	3142.0	126.03	2398.1547
7	3130.0	157.05	2397.0828
8	3104.0	173.41	2394.7561
9	3081.0	190.76	2392.7275
10	3060.0	217.83	2390.9049
11	3037.0	250.80	2388.9166
12	3022.0	267.34	2387.6514
13	2995.0	305.07	2385.2733
14	2981.0	324.39	2384.0498
15	2948.0	418.77	2380.9592
16	2888.0	437.65	2375.7700
17	2876.0	457.25	2374.7437
18	2837.0	470.52	2371.3872
19	2794.0	481.50	2367.6310
20	2768.0	495.43	2365.3535
21	2740.0	512.87	2362.9142
22	3060.0	544.14	390.7759
23	3037.0	581.52	2388.8170
24	3022.0	594.26	2387.5315
25	2995.0	605.84	2385.1908
26	2981.0	615.75	2383.9619
27	2948.0	636.02	2381.1359
28	2910.0	676.87	2377.8350
29	2888.0	704.02	2375.9270
30	2876.0	724.29	2374.9005
31	2862.0	743.51	2373.6916
32	2837.0	773.61	2371.5659
33	2794.0	786.17	2367.8063
34	2768.0	799.76	2365.5380
35	2740.0	811.46	2363.0705
36	2712.0	831.17	2360.6344
37	2573.0	847.84	2348.3243
38	2538.0	865.93	2344.9413
39	2472.0	899.84	2338.9018
40	2450.0	925.57	2336.8861
41	2380.0	963.20	2330.5975
42	2367.0	978.26	2329.3984
43	2314.0	998.89	2324.6024
44	2235.0	1041.06	2316.6544
45	2193.0	1055.43	2312.2766
46	2367.0	1081.35	2329.3319
47	2314.0	1094.55	2324.4912
48	2132.0	1111.46	2305.6463
49	2077.0	1125.52	2299.9427
50	2035.0	1140.08	2295.7126
51	1998.0	1158.15	2292.1143

CALCULATED DRIFT RATES

First Reading	Second Reading	Drift Rate (microgals / minute)	Mid Time (minutes)
15	27	0.813	527.40
16	29	0.589	570.84
17	30	0.587	590.77
18	32	0.590	622.06
19	33	0.575	633.83
20	34	0.606	647.59
21	35	0.523	662.16
42	46	-0.644	1029.80
43	47	-1.162	1046.72

CALCULATED DRIFT CORRECTIONS

Reading	Initial Gravity	Drift Corrected Gravity
1	2398.2593	2398.2545
2	2397.1582	2397.1219
3	2394.8208	2394.7711
4	2392.8115	2392.7481
5	2390.9804	2390.8996
6	2398.1547	2398.0522
7	2397.0828	2396.9551
8	2394.7561	2394.6151
9	2392.7275	2392.5723
10	2390.9049	2390.7277
11	2388.9166	2388.7127
12	2387.6514	2387.4339
13	2385.2733	2385.0252
14	2384.0498	2383.7860
15	2380.9592	2380.6186
16	2375.7700	2375.4140
17	2374.7437	2374.3718
18	2371.3872	2371.0045
19	2367.6310	2367.2395
20	2365.3535	2364.9506
21	2362.9142	2362.4971
22	2390.7759	2390.3353
23	2388.8170	2388.3513
24	2387.5315	2387.0583
25	2385.1908	2384.7109
26	2383.9619	2383.4761
27	2381.1359	2380.6382
28	2377.8350	2377.3232
29	2375.9270	2375.4167
30	2374.9005	2374.3915
31	2373.6916	2373.1838
32	2371.5659	2371.0599
33	2367.8063	2367.3011
34	2365.5380	2365.0336
35	2363.0705	2362.5668
36	2360.6344	2360.1318
37	2348.3243	2347.8228
38	2344.9413	2344.4408
39	2338.9018	2338.4034
40	2336.8861	2336.3893
41	2330.5975	2330.1029
42	2329.3984	2328.9047
43	2324.6024	2324.1100
44	2316.6544	2316.1740
45	2312.2766	2311.8115
46	2329.3319	2328.8969
47	2324.4912	2324.0715
48	2305.6463	2305.2462
49	2299.9427	2299.5590
50	2295.7126	2295.3458
51	2292.1143	2291.7686

DRIFT CORRECTED GRAVITY VALUES FOR EACH DEPTH

Depth 3060.0
Average Gravity 2390.3353

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
22	544.14	2390.3353	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 3037.0
Average Gravity 2388.3513

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
23	581.52	2388.3513	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 3022.0
Average Gravity 2387.0583

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
24	594.26	2387.0583	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2995.0
Average Gravity 2384.7109

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
25	605.84	2384.7109	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2981.0
Average Gravity 2383.4761

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
26	615.75	2383.4761	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2948.0
Average Gravity 2380.6284

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
15	418.77	2380.6186	9.8
27	636.02	2380.6382	-9.8

Average Absolute Error 9.8 microgals
Standard Deviation 13.9 microgals

Depth 2910.0
Average Gravity 2377.3232

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
28	676.87	2377.3232	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2888.0
Average Gravity 2375.4154

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
16	437.65	2375.4140	1.4
29	704.02	2375.4167	-1.4

Average Absolute Error 1.4 microgals
Standard Deviation 1.9 microgals

Depth 2876.0
Average Gravity 2374.3817

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
17	457.25	2374.3718	9.9
30	724.29	2374.3915	-9.9

Average Absolute Error 9.9 microgals
Standard Deviation 13.9 microgals

Depth 2862.0
Average Gravity 2373.1838

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
31	743.51	2373.1838	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2837.0
Average Gravity 2371.0322

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
18	470.52	2371.0045	27.7
32	773.61	2371.0599	-27.7

Average Absolute Error 27.7 microgals
Standard Deviation 39.1 microgals

Depth 2794.0
Average Gravity 2367.2703

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
19	481.50	2367.2395	30.8
33	786.17	2367.3011	-30.8

Average Absolute Error 30.8 microgals
Standard Deviation 43.6 microgals

Depth 2768.0
Average Gravity 2364.9921

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
20	495.43	2364.9506	41.5
34	799.76	2365.0336	-41.5

Average Absolute Error 41.5 microgals
Standard Deviation 58.7 microgals

Depth 2740.0
Average Gravity 2362.5320

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
21	512.87	2362.4971	34.8
35	811.46	2362.5668	-34.8

Average Absolute Error 34.8 microgals
Standard Deviation 49.3 microgals

Depth 2712.0
Average Gravity 2360.1318

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
36	831.17	2360.1318	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2573.0
Average Gravity 2347.8228

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
37	847.84	2347.8228	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2538.0
Average Gravity 2344.4408

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
38	865.93	2344.4408	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2472.0
Average Gravity 2338.4034

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
39	899.84	2338.4034	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2450.0
Average Gravity 2336.3893

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
40	925.57	2336.3893	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2380.0
Average Gravity 2330.1029

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
41	963.20	2330.1029	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2367.0
Average Gravity 2328.9008

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
42	978.26	2328.9047	-3.9
46	1081.35	2328.8969	3.9

Average Absolute Error 3.9 microgals
Standard Deviation 5.5 microgals

Depth 2314.0
Average Gravity 2324.0907

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
43	998.89	2324.1100	-19.2
47	1094.55	2324.0715	19.2

Average Absolute Error 19.2 microgals
Standard Deviation 27.2 microgals

Depth 2235.0
Average Gravity 2316.1740

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
44	1041.06	2316.1740	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2193.0
Average Gravity 2311.8115

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
45	1055.43	2311.8115	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2132.0
Average Gravity 2305.2462

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
48	1111.46	2305.2462	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2077.0
Average Gravity 2299.5590

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
49	1125.52	2299.5590	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 2035.0
Average Gravity 2295.3458

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
50	1140.08	2295.3458	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

Depth 1998.0
Average Gravity 2291.7686

Reading Number	Time (minutes)	Gravity (milligals)	Gravity Difference from average (microgals)
51	1158.15	2291.7686	0.0

Average Absolute Error 0.0 microgals
Standard Deviation 0.0 microgals

CALCULATED DENSITIES

WELL northcor et al liard

DEPTH INTERVAL	DENSITY	DENSITY ERROR
3060.0 - 3037.0	2.656	-----
3037.0 - 3022.0	2.657	-----
3022.0 - 2995.0	2.648	-----
2995.0 - 2981.0	2.633	-----
2981.0 - 2948.0	2.656	0.003
2948.0 - 2910.0	2.648	0.003
2910.0 - 2888.0	2.651	0.001
2888.0 - 2876.0	2.658	0.008
2876.0 - 2862.0	2.664	0.008
2862.0 - 2837.0	2.658	0.012
2837.0 - 2794.0	2.641	0.011
2794.0 - 2768.0	2.640	0.023
2768.0 - 2740.0	2.637	0.023
2740.0 - 2712.0	2.662	0.014
2712.0 - 2573.0	2.628	-----
2573.0 - 2538.0	2.532	-----
2538.0 - 2472.0	2.593	-----
2472.0 - 2450.0	2.592	-----
2450.0 - 2380.0	2.613	-----
2380.0 - 2367.0	2.581	0.003
2367.0 - 2314.0	2.602	0.004
2314.0 - 2235.0	2.489	0.003
2235.0 - 2193.0	2.445	-----
2193.0 - 2132.0	2.400	-----
2132.0 - 2077.0	2.450	-----
2077.0 - 2035.0	2.487	-----
2035.0 - 1998.0	2.530	-----

DIRECTIONAL
SURVEY REPORT

SUB-SURFACE DIRECTIONAL SURVEY REPORT

NORTHCOR ENERGY LTD.

NORTHCOR et al LIARD F-25A

1986 December 3rd

WHIPSTOCK
SYSTEMS LIMITED

WHIPSTOCK

1986 December 03

WELL NAME: NORTHCOR et al LIARD F-25

SURVEY PARAMETERS:

***** MINIMUM CURVATURE METHOD *****

MAGNETIC DECLINATION	E(+)/W(-) (deg) ..... =	30.00
TIE-IN CO-ORDINATE	N(+)/S(-) (m) ..... =	.00
TIE-IN CO-ORDINATE	E(+)/W(-) (m) ..... =	.00
TIE-IN DEPTH	TVD (m) ..... =	196.00
SURFACE CO-ORDINATE	N(+)/S(-) (m) ..... =	.00
SURFACE CO-ORDINATE	E(+)/W(-) (m) ..... =	.00
LAST SURVEY CO-ORDINATE ..	N(+)/S(-) (m) ..... =	-22.94
LAST SURVEY CO-ORDINATE ..	E(+)/W(-) (m) ..... =	72.02

TABLE OF SURVEY RESULTS:

MEAS'D DEPTH	DEV. ANGLE (DEG)	TRUE DIRECTION	TRUE VERTICAL DEPTH	CO-ORDINATES LATITUDE	CO-ORDINATES DEPARTURE	VERTICAL SECTION	DOG LEG (°/30m)
196.00	1.10	N21E	196.00	.00	.00	.00	.00
205.00	1.10	N21E	205.00	.16 N	.06 E	.01	.00
228.00	1.50	N09E	227.99	.66 N	.19 E	-.02	.63
237.00	1.50	N12E	236.99	.90 N	.23 E	-.05	.26
243.00	1.40	N12E	242.99	1.04 N	.26 E	-.07	.49
301.00	1.50	N20E	300.97	2.45 N	.67 E	-.11	.12
359.00	1.30	N18E	358.95	3.79 N	1.13 E	-.07	.11
474.00	1.90	N21E	473.91	6.81 N	2.22 E	.05	.16
539.00	1.40	N47E	538.88	8.36 N	3.19 E	.50	.41
618.00	2.00	N56E	617.84	9.79 N	5.03 E	1.83	.25
706.00	2.30	N60E	705.78	11.53 N	7.84 E	3.97	.11
714.00	2.70	N66E	713.78	11.69 N	8.15 E	4.22	1.79
730.00	2.60	N78E	729.76	11.91 N	8.85 E	4.81	1.06
776.00	2.75	N75E	775.71	12.42 N	10.93 E	6.65	.13
808.00	3.13	N75E	807.67	12.84 N	12.52 E	8.03	.36
837.00	3.75	N68E	836.61	13.40 N	14.16 E	9.43	.77
860.00	3.75	N71E	859.56	13.93 N	15.57 E	10.61	.26
880.00	3.50	N64E	879.52	14.41 N	16.74 E	11.58	.76
890.00	3.50	N62E	889.51	14.69 N	17.28 E	12.01	.37
900.00	3.13	N55E	899.49	14.99 N	17.78 E	12.39	1.64
909.00	3.25	N54E	908.48	15.28 N	18.18 E	12.69	.44
919.00	2.88	N57E	918.46	15.58 N	18.62 E	13.02	1.21
938.00	2.75	N51E	937.44	16.13 N	19.38 E	13.57	.51

WHIPSTOCK

WELL NAME: NORTHCOR et al LIARD F-25

MEAS'D DEPTH	DEV. ANGLE (DEG)	TRUE DIRECTION	TRUE VERTICAL DEPTH	CO-ORDINATES LATITUDE	CO-ORDINATES DEPARTURE	VERTICAL SECTION	DOG LEG (°/30m)
948.00	2.88	N52E	947.43	16.43 N	19.76 E	13.84	.42
957.00	2.88	N49E	956.41	16.72 N	20.11 E	14.09	.50
967.00	2.75	N50E	966.40	17.04 N	20.48 E	14.35	.42
976.00	2.88	N46E	975.39	17.34 N	20.81 E	14.57	.78
986.00	2.75	N48E	985.38	17.67 N	21.17 E	14.81	.49
1004.00	2.88	N45E	1003.36	18.28 N	21.81 E	15.24	.33
1015.00	3.25	N43E	1014.34	18.70 N	22.22 E	15.50	1.05
1024.00	2.88	N46E	1023.33	19.05 N	22.56 E	15.71	1.34
1034.00	2.75	N45E	1033.32	19.39 N	22.91 E	15.94	.42
1052.00	2.25	N52E	1051.30	19.91 N	23.49 E	16.34	.98
1061.00	2.50	N55E	1060.29	20.13 N	23.79 E	16.56	.93
1073.00	2.50	N53E	1072.28	20.44 N	24.21 E	16.87	.22
1080.00	2.50	N55E	1079.27	20.62 N	24.46 E	17.05	.37
1090.00	2.25	N57E	1089.27	20.85 N	24.80 E	17.31	.79
1100.00	2.25	N59E	1099.26	21.06 N	25.14 E	17.56	.24
1134.00	2.00	N74E	1133.23	21.57 N	26.28 E	18.49	.54
1167.00	2.25	N75E	1166.21	21.90 N	27.46 E	19.52	.23
1187.00	2.50	N82E	1186.19	22.06 N	28.27 E	20.24	.57
1205.00	2.75	N80E	1204.18	22.19 N	29.08 E	20.98	.44
1223.00	2.75	N65E	1222.16	22.44 N	29.90 E	21.68	1.20
1243.00	2.63	N78E	1242.13	22.74 N	30.78 E	22.43	.93
1259.00	2.63	N76E	1258.12	22.91 N	31.50 E	23.06	.17
1268.00	2.63	N77E	1267.11	23.00 N	31.90 E	23.41	.16
1287.00	2.50	N64E	1286.09	23.28 N	32.70 E	24.09	.94
1316.00	2.00	N61E	1315.07	23.81 N	33.71 E	24.89	.53
1355.00	2.00	N46E	1354.04	24.61 N	34.79 E	25.68	.40
1394.00	1.50	N31E	1393.02	25.52 N	35.55 E	26.12	.52
1412.00	1.00	N39E	1411.02	25.84 N	35.77 E	26.24	.88
1442.00	.50	N60E	1441.02	26.11 N	36.05 E	26.42	.56
1461.00	.75	S38W	1460.02	26.06 N	36.04 E	26.43	1.94
1490.00	1.00	S38W	1489.01	25.71 N	35.77 E	26.28	.26
1548.00	1.50	S71W	1547.00	25.06 N	34.74 E	25.49	.44
1567.00	1.00	S55W	1566.00	24.89 N	34.37 E	25.19	.96
1586.00	1.25	S72W	1584.99	24.73 N	34.03 E	24.92	.65
1616.00	1.13	S60W	1614.99	24.48 N	33.47 E	24.46	.28
1639.00	1.50	S70W	1637.98	24.26 N	32.99 E	24.07	.57
1655.00	2.50	S68W	1653.97	24.06 N	32.47 E	23.63	1.88
1673.00	2.75	S75W	1671.95	23.80 N	31.69 E	22.97	.68
1702.00	2.88	S71W	1700.92	23.38 N	30.33 E	21.80	.24

WHIPSTOCK

WELL NAME: NORTHCOR et al LIARD F-25

MEAS'D DEPTH	DEV. ANGLE (DEG)	TRUE DIREC-TION	TRUE VERTICAL DEPTH	CO-ORDINATES LATITUDE	CO-ORDINATES DEPARTURE	VERTICAL SECTION	DOG LEG (°/30m)
1719.00	2.38	S74W	1717.90	23.15 N	29.58 E	21.16	.91
1740.00	2.88	S71W	1738.88	22.85 N	28.66 E	20.38	.74
1758.00	2.50	S78W	1756.86	22.63 N	27.85 E	19.67	.84
1798.00	2.50	S79W	1796.82	22.28 N	26.14 E	18.15	.03
1818.00	2.38	S82W	1816.80	22.14 N	25.30 E	17.39	.26
1836.00	2.38	S79W	1834.78	22.01 N	24.57 E	16.73	.21
1857.00	1.88	S73W	1855.77	21.83 N	23.81 E	16.06	.78
1877.00	2.25	S76W	1875.76	21.64 N	23.11 E	15.46	.58
1902.00	2.13	S76W	1900.74	21.41 N	22.19 E	14.64	.14
1916.00	2.00	S76W	1914.73	21.28 N	21.70 E	14.21	.28
1953.00	1.75	S71W	1951.71	20.94 N	20.54 E	13.21	.24
1973.00	1.25	S75W	1971.70	20.79 N	20.04 E	12.78	.77
1990.00	1.50	S80W	1988.70	20.70 N	19.64 E	12.43	.49
2010.00	2.13	S85W	2008.69	20.62 N	19.01 E	11.86	.97
2029.00	2.13	S75W	2027.67	20.50 N	18.32 E	11.23	.59
2048.00	2.00	S73W	2046.66	20.31 N	17.66 E	10.66	.23
2075.00	2.25	S78W	2073.64	20.07 N	16.69 E	9.81	.35
2085.00	1.75	S90W	2083.64	20.03 N	16.35 E	9.50	1.95
2107.00	2.25	N68W	2105.62	20.19 N	15.61 E	8.75	1.24
2116.00	2.00	N62W	2114.62	20.33 N	15.31 E	8.42	1.12
2136.00	2.88	N62W	2134.60	20.73 N	14.56 E	7.58	1.32
2155.00	3.38	N61W	2153.57	21.22 N	13.65 E	6.56	.79
2194.00	4.25	N59W	2192.48	22.52 N	11.40 E	4.03	.68
2213.00	4.38	N57W	2211.43	23.28 N	10.19 E	2.64	.31
2233.00	5.50	N52W	2231.36	24.29 N	8.79 E	1.01	1.80
2250.00	5.63	N52W	2248.28	25.30 N	7.49 E	-.54	.23
2267.00	5.75	N45W	2265.19	26.42 N	6.23 E	-2.08	1.24
2290.00	5.80	N40W	2288.08	28.12 N	4.67 E	-4.08	.66
2310.00	5.50	N39W	2307.98	29.64 N	3.42 E	-5.74	.47
2326.00	4.00	N30W	2323.92	30.72 N	2.66 E	-6.79	3.13
2339.00	3.20	N27W	2336.90	31.44 N	2.27 E	-7.38	1.90
2358.00	2.30	N40W	2355.88	32.20 N	1.78 E	-8.08	1.72
2388.00	1.50	N32W	2385.86	33.00 N	1.19 E	-8.88	.84
2400.00	1.50	N51W	2397.85	33.23 N	.98 E	-9.15	1.24
2412.00	.50	S69W	2409.85	33.31 N	.81 E	-9.34	3.31
2429.00	1.40	S44E	2426.85	33.13 N	.89 E	-9.21	2.93
2448.00	3.50	S53E	2445.83	32.62 N	1.51 E	-8.46	3.36
2467.00	6.30	S54E	2464.76	31.65 N	2.82 E	-6.92	4.42
2486.00	8.20	S52E	2483.61	30.21 N	4.73 E	-4.66	3.03

WHIPSTOCK

WELL NAME: NORTHCOR et al LIARD F-25

MEAS'D DEPTH	DEV. ANGLE (DEG)	TRUE DIREC-TION	TRUE VERTICAL DEPTH	CO-ORDINATES LATITUDE	CO-ORDINATES DEPARTURE	VERTICAL SECTION	DOG LEG (°/30m)
2503.00	8.40	S47E	2500.43	28.61 N	6.59 E	-2.40	1.32
2513.00	8.60	S47E	2510.32	27.61 N	7.67 E	-1.07	.60
2523.00	8.80	S45E	2520.21	26.56 N	8.76 E	.29	1.09
2547.00	9.20	S55E	2543.91	24.16 N	11.63 E	3.75	2.02
2566.00	10.00	S64E	2562.65	22.56 N	14.36 E	6.83	2.68
2576.00	10.50	S67E	2572.49	21.83 N	15.98 E	8.60	2.19
2597.00	11.00	S64E	2593.12	20.20 N	19.54 E	12.49	1.07
2616.00	10.00	S64E	2611.80	18.68 N	22.65 E	15.91	1.58
2635.00	9.00	S59E	2630.54	17.19 N	25.41 E	18.99	2.05
2645.00	8.50	S57E	2640.42	16.39 N	26.70 E	20.46	1.76
2654.00	8.00	S59E	2649.33	15.70 N	27.79 E	21.72	1.92
2667.00	7.50	S57E	2662.21	14.77 N	29.28 E	23.41	1.31
2686.00	6.50	S55E	2681.07	13.48 N	31.20 E	25.64	1.62
2703.00	6.00	S53E	2697.97	12.40 N	32.70 E	27.39	.96
2752.00	6.25	S42E	2746.69	8.87 N	36.53 E	32.11	.73
2771.00	6.25	S43E	2765.58	7.35 N	37.93 E	33.91	.17
2790.00	6.00	S43E	2784.47	5.86 N	39.31 E	35.67	.39
2809.00	6.00	S44E	2803.37	4.42 N	40.67 E	37.41	.16
2828.00	6.50	S43E	2822.25	2.92 N	42.10 E	39.23	.81
2847.00	6.75	S45E	2841.13	1.35 N	43.62 E	41.15	.54
2867.00	6.75	S44E	2860.99	.33 S	45.27 E	43.23	.18
2887.00	7.50	S44E	2880.83	2.11 S	46.99 E	45.42	1.12
2906.00	7.25	S44E	2899.68	3.87 S	48.69 E	47.56	.40
2924.00	6.75	S46E	2917.54	5.42 S	50.24 E	49.51	.93
2944.00	7.00	S47E	2937.40	7.07 S	51.97 E	51.67	.42
2963.00	6.75	S48E	2956.26	8.60 S	53.65 E	53.73	.44
2991.00	7.13	S48E	2984.06	10.87 S	56.16 E	56.81	.41
3011.00	7.00	S50E	3003.90	12.48 S	58.02 E	59.07	.42
3029.00	6.63	S53E	3021.78	13.81 S	59.69 E	61.07	.86
3048.00	6.75	S59E	3040.65	15.05 S	61.52 E	63.19	1.12
3076.00	7.50	S56E	3068.43	16.92 S	64.45 E	66.54	.90
3105.00	7.50	S51E	3097.18	19.17 S	67.49 E	70.12	.67
3124.00	7.75	S50E	3116.02	20.77 S	69.43 E	72.46	.45
3149.00	7.75	S50E	3140.79	22.94 S	72.02 E	75.58	.00

TOTAL CALCULATED HORIZONTAL DISPLACEMENT IS : 75.58 m.
ON A BEARING OF: S 72.3330° E, FROM THE SURFACE LOCATION.

VERTICAL SECTION WAS CALCULATED USING THE LAST SURVEY COORDINATES:
N(+)/S(-) = -22.94 AND E(+)/W(-) = 72.02

WHIPSTOCK

1986 December 03

WELL NAME: NORTHCOR et al LIARD F-25A

SURVEY PARAMETERS:

***** MINIMUM CURVATURE METHOD *****

MAGNETIC DECLINATION	E(+)/W(-) (deg) ..... =	30.00
TIE-IN CO-ORDINATE	N(+)/S(-) (m) ..... =	20.31
TIE-IN CO-ORDINATE	E(+)/W(-) (m) ..... =	17.66
TIE-IN DEPTH	TVD (m) ..... =	2046.66
SURFACE CO-ORDINATE	N(+)/S(-) (m) ..... =	.00
SURFACE CO-ORDINATE	E(+)/W(-) (m) ..... =	.00
LAST SURVEY CO-ORDINATE ..	N(+)/S(-) (m) ..... =	-168.83
LAST SURVEY CO-ORDINATE ..	E(+)/W(-) (m) ..... =	-262.65

TABLE OF SURVEY RESULTS:

MEAS'D DEPTH	DEV. ANGLE (DEG)	TRUE DIRECTION	TRUE VERTICAL DEPTH	CO-ORDINATES LATITUDE	CO-ORDINATES DEPARTURE	VERTICAL SECTION	DOG LEG (°/30m)
2048.00	2.00	S73W	2046.66	20.31 N	17.66 E	-25.84	.00
2063.00	2.00	S55W	2061.65	20.08 N	17.20 E	-25.32	1.25
2080.00	2.25	S40W	2078.64	19.66 N	16.74 E	-24.71	1.07
2089.00	4.00	S50W	2087.63	19.32 N	16.38 E	-24.23	6.09
2105.00	5.25	S62W	2103.57	18.62 N	15.31 E	-22.95	2.95
2121.00	7.00	S57W	2119.48	17.74 N	13.85 E	-21.24	3.43
2130.00	7.50	S59W	2128.41	17.14 N	12.88 E	-20.11	1.87
2158.00	8.50	S61W	2156.14	15.20 N	9.51 E	-16.21	1.11
2188.00	9.25	S62W	2185.78	12.99 N	5.44 E	-11.60	.77
2216.00	10.00	S67W	2213.38	10.98 N	1.21 E	-6.96	1.20
2245.00	10.75	S77W	2241.91	9.39 N	3.74 W	-1.93	2.01
2256.00	11.25	S81W	2252.71	8.99 N	5.80 W	.02	2.49
2277.00	11.40	S85W	2273.30	8.49 N	9.89 W	3.73	1.14
2286.00	12.00	S84W	2282.11	8.32 N	11.71 W	5.35	2.11
2295.00	12.00	S82W	2290.92	8.09 N	13.56 W	7.04	1.38
2315.00	12.00	S64W	2310.49	6.89 N	17.49 W	10.99	5.59
2341.00	12.50	S50W	2335.90	3.89 N	22.08 W	16.47	3.47
2360.00	11.80	S50W	2354.48	1.32 N	25.14 W	20.43	1.11
2369.00	11.80	S50W	2363.29	.14 N	26.55 W	22.26	.00
2391.00	12.00	S51W	2384.81	2.75 S	30.05 W	26.77	.39
2409.00	12.50	S51W	2402.40	5.15 S	33.02 W	30.56	.83
2428.00	12.90	S54W	2420.94	7.69 S	36.33 W	34.72	1.22
2457.00	12.75	S56W	2449.21	11.38 S	41.61 W	41.15	.48

WHIPSTOCK

WELL NAME: NORTHCOR et al LIARD F-25A

MEAS'D DEPTH	DEV. ANGLE (DEG)	TRUE DIREC-TION	TRUE VERTICAL DEPTH	CO-ORDINATES LATITUDE	CO-ORDINATES DEPARTURE	VERTICAL SECTION	DOG LEG (°/30m)
2476.00	13.00	S56W	2467.74	13.75 S	45.12 W	45.39	.40
2496.00	13.25	S53W	2487.21	16.39 S	48.81 W	49.92	1.09
2514.00	13.25	S50W	2504.74	18.95 S	52.04 W	54.02	1.15
2533.00	13.50	S55W	2523.22	21.63 S	55.52 W	58.40	1.87
2552.00	14.00	S57W	2541.68	24.15 S	59.27 W	62.92	1.09
2572.00	13.75	S55W	2561.09	26.83 S	63.24 W	67.71	.81
2590.00	14.25	S57W	2578.56	29.26 S	66.85 W	72.06	1.16
2610.00	14.00	S55W	2597.95	31.99 S	70.90 W	76.94	.82
2639.00	13.88	S54W	2626.10	36.05 S	76.59 W	83.92	.28
2658.00	14.13	S52W	2644.54	38.82 S	80.26 W	88.50	.86
2686.00	14.75	S50W	2671.65	43.21 S	85.68 W	95.44	.85
2715.00	15.13	S54W	2699.67	47.81 S	91.57 W	102.88	1.14
2743.00	15.00	S54W	2726.71	52.09 S	97.46 W	110.15	.14
2771.00	16.13	S54W	2753.68	56.50 S	103.54 W	117.65	1.21
2810.00	16.75	S52W	2791.09	63.15 S	112.35 W	128.66	.65
2839.00	16.50	S54W	2818.88	68.14 S	118.98 W	136.93	.65
2866.00	16.50	S51W	2844.76	72.81 S	125.06 W	144.57	.95
2887.00	16.50	S53W	2864.90	76.48 S	129.76 W	150.51	.81
2917.00	16.25	S51W	2893.68	81.68 S	136.42 W	158.93	.62
2945.00	16.25	S52W	2920.56	86.56 S	142.55 W	166.72	.30
2982.00	15.25	S52W	2956.17	92.75 S	150.47 W	176.72	.81
3003.00	15.00	S52W	2976.45	96.12 S	154.79 W	182.18	.36
3020.00	14.50	S52W	2992.89	98.78 S	158.20 W	186.49	.88
3040.00	14.00	S53W	3012.27	101.78 S	162.10 W	191.39	.84
3068.00	14.00	S52W	3039.44	105.90 S	167.47 W	198.14	.26
3097.00	14.25	S50W	3067.56	110.36 S	172.97 W	205.18	.57
3126.00	14.00	S52W	3095.69	114.81 S	178.47 W	212.21	.57
3155.00	14.25	S55W	3123.81	119.02 S	184.16 W	219.27	.80
3170.00	14.50	S53W	3138.34	121.21 S	187.17 W	222.99	1.11
3225.00	16.00	S50W	3191.41	129.14 S	199.24 W	237.43	1.29
3244.00	16.75	S60W	3209.64	131.82 S	203.88 W	242.78	1.18
3273.00	18.00	S61W	3237.31	136.08 S	211.41 W	251.43	1.33
3283.00	18.00	S60W	3246.82	137.60 S	214.10 W	254.51	.93
3293.00	18.75	S60W	3256.31	139.18 S	216.83 W	257.66	2.25
3313.00	18.50	S60W	3275.26	142.37 S	222.37 W	264.04	.38
3331.00	18.00	S57W	3292.36	145.32 S	227.17 W	269.67	1.77
3369.00	17.25	S56W	3328.58	151.67 S	236.77 W	281.18	.64
3398.00	17.00	S56W	3356.29	156.44 S	243.85 W	289.71	.26
3454.00	16.00	S57W	3409.98	165.22 S	257.11 W	305.62	.56

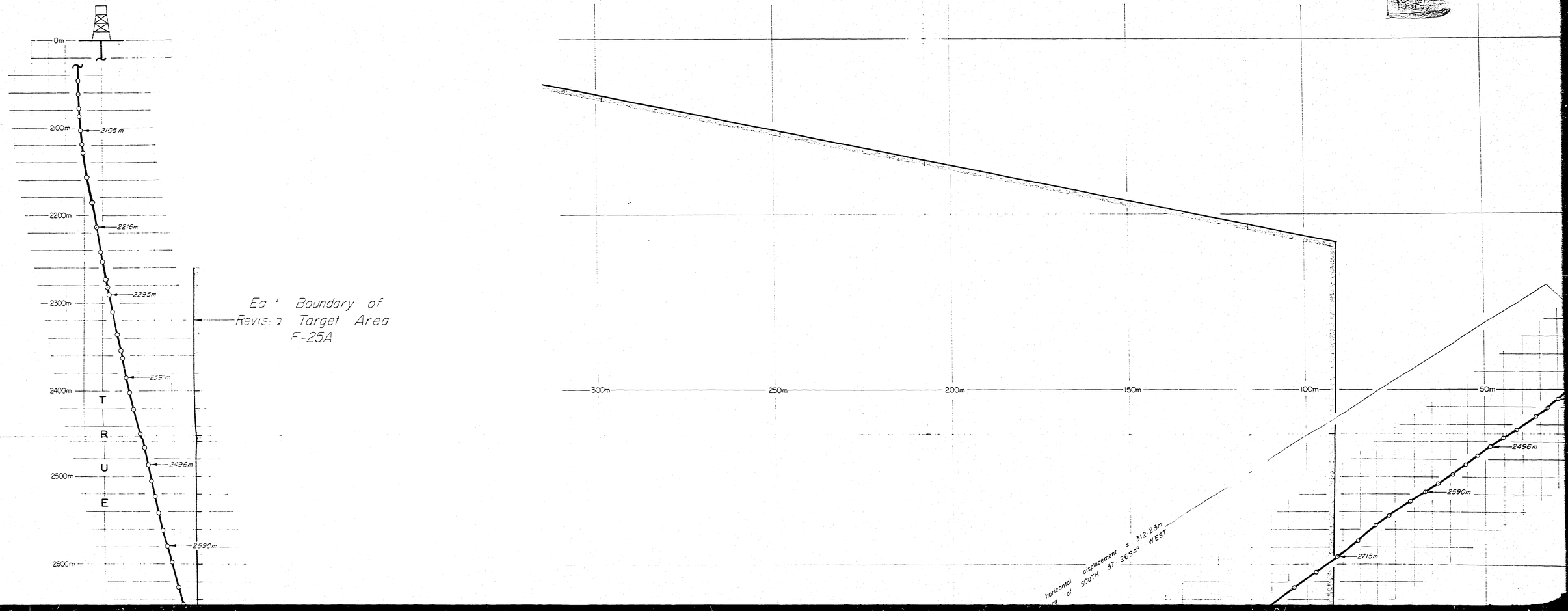
WHIPSTOCK

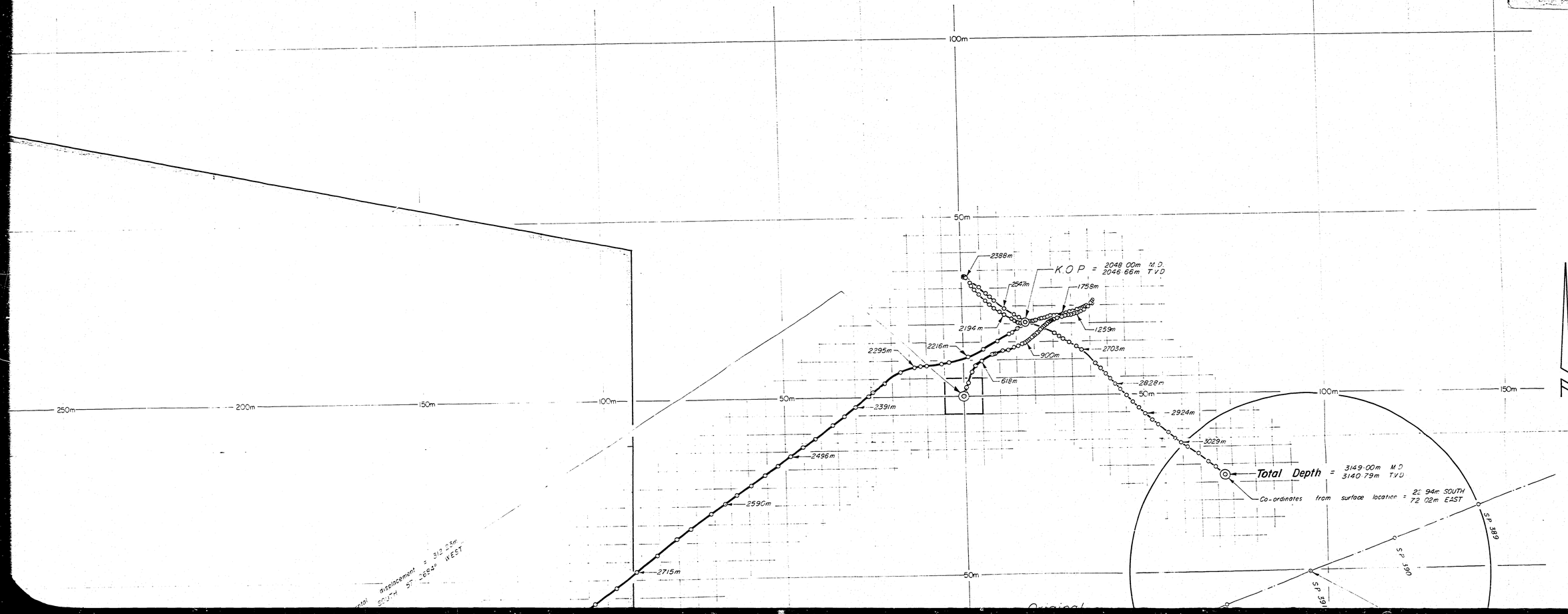
WELL NAME: NORTHCOR et al LIARD F-25A

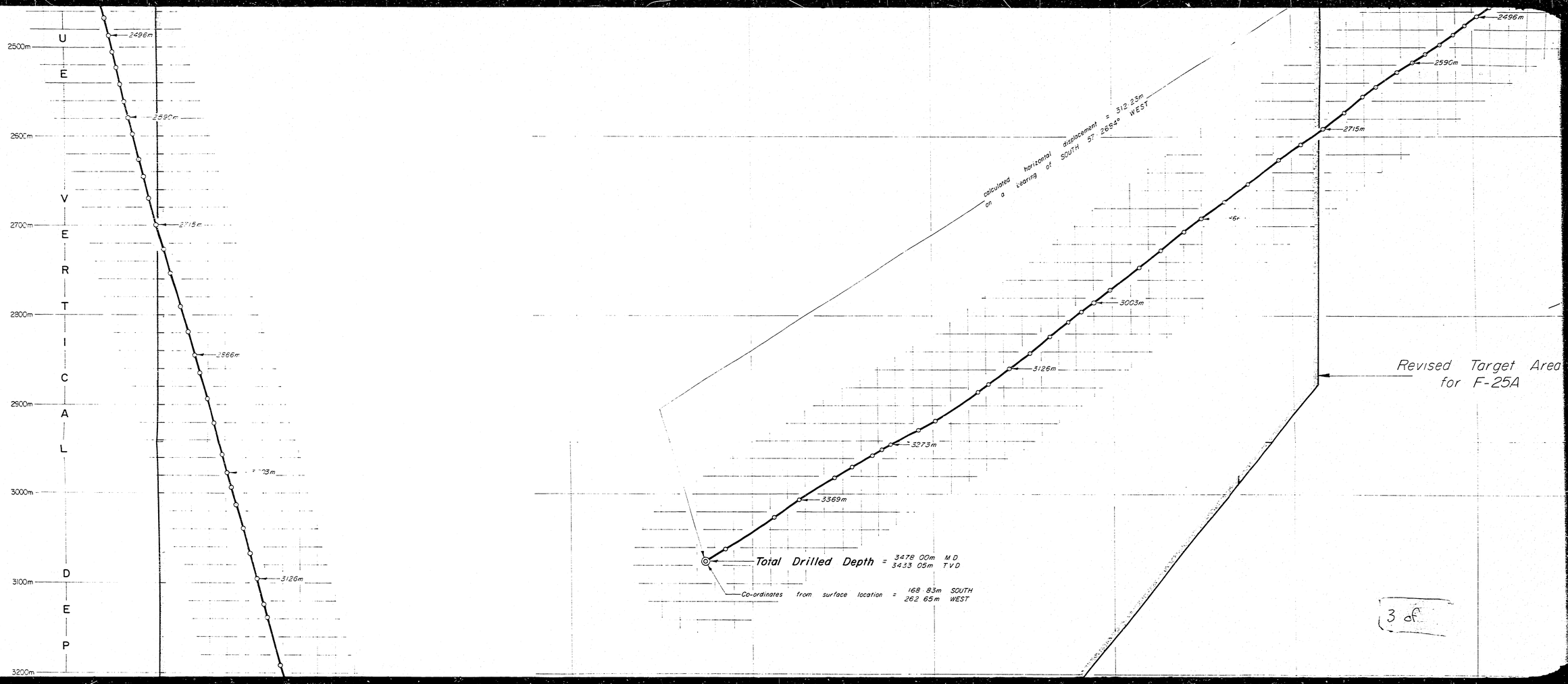
MEAS'D DEPTH	DEV. ANGLE (DEG)	TRUE DIRECTION	TRUE VERTICAL DEPTH	CO-ORDINATES LATITUDE	CO-ORDINATES DEPARTURE	VERTICAL SECTION	DOG LEG (°/30m)
3478.00	16.00	S57W	3433.05	168.83 S	262.65 W	312.23	.00

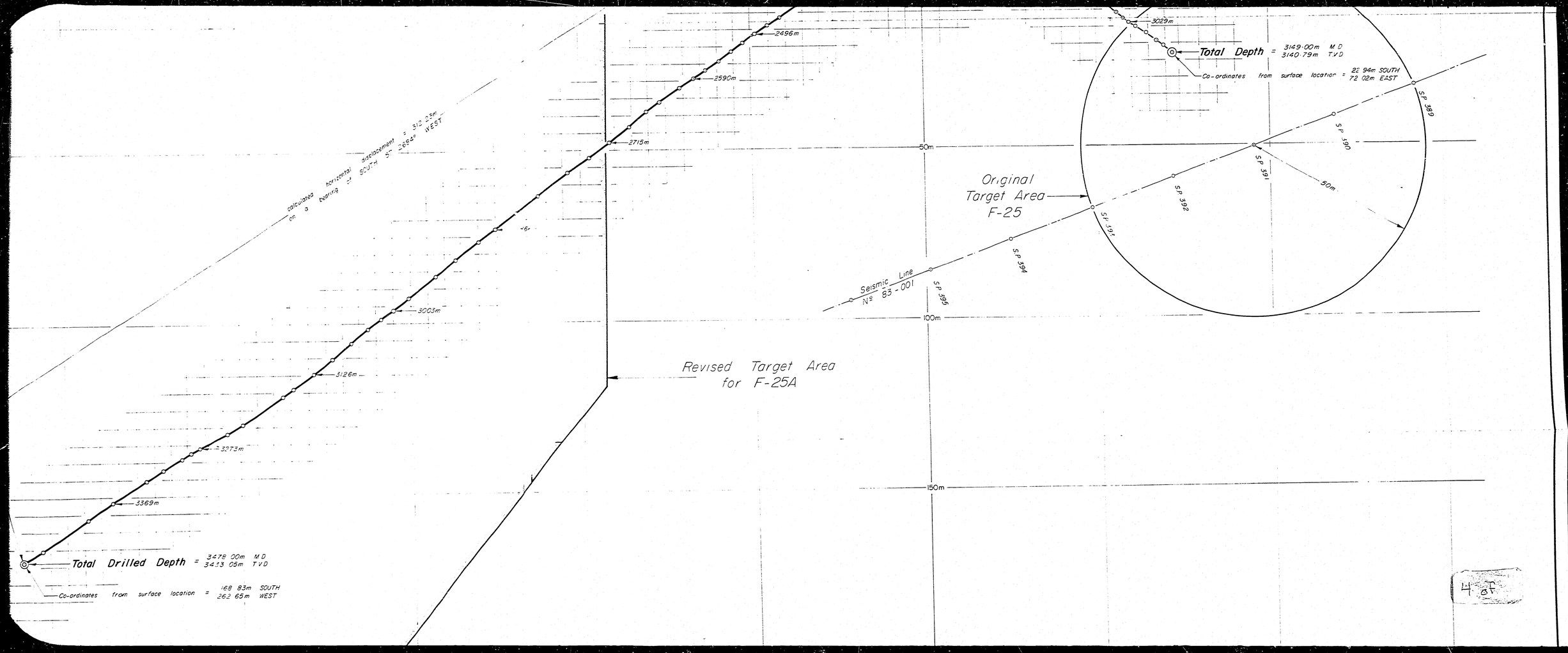
TOTAL CALCULATED HORIZONTAL DISPLACEMENT IS : 312.23 m.
ON A BEARING OF: S 57.2684° W, FROM THE SURFACE LOCATION.

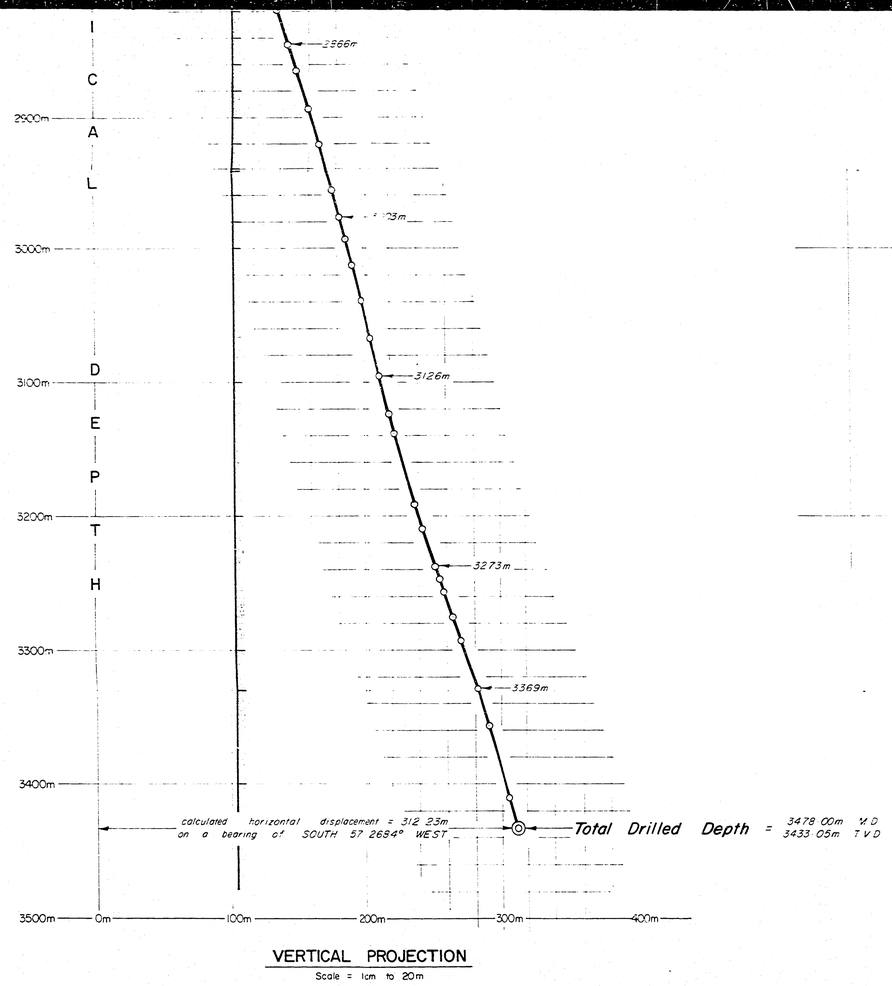
VERTICAL SECTION WAS CALCULATED USING THE LAST SURVEY COORDINATES:
N(+)/S(-) = -168.83 AND E(+)/W(-) = -262.65


0m
2100m
2105 m
2200m
2216m
2235m
2300m
East Boundary of Revised Target Area F-25A
2394m
2400m
T
R
U
2496m
2500m
E
2590m
2600m
300m
250m
200m
150m
100m
50m
2496m
2590m
2715m
horizontal displacement = 312.23m
bearing of SOUTH 57° 26'24" WEST


100m
50m
2388m
K.O.P = 2048.00m M.D
2046.66m T.V.D
254m
1758m
1259m
2194m
2216m
2295m
900m
2703m
618m
2828m
2391m
2924m
3029m
2496m
2590m
Total Depth = 3149.00m M.D
3140.79m T.V.D
Co-ordinates from surface location = 25.94m SOUTH
72.02m EAST
2715m
250m
200m
150m
100m
50m
150m
100m
50m
SP 389
SP 390
displacement = 312.55m
SOUTH 57° 06'54" WEST

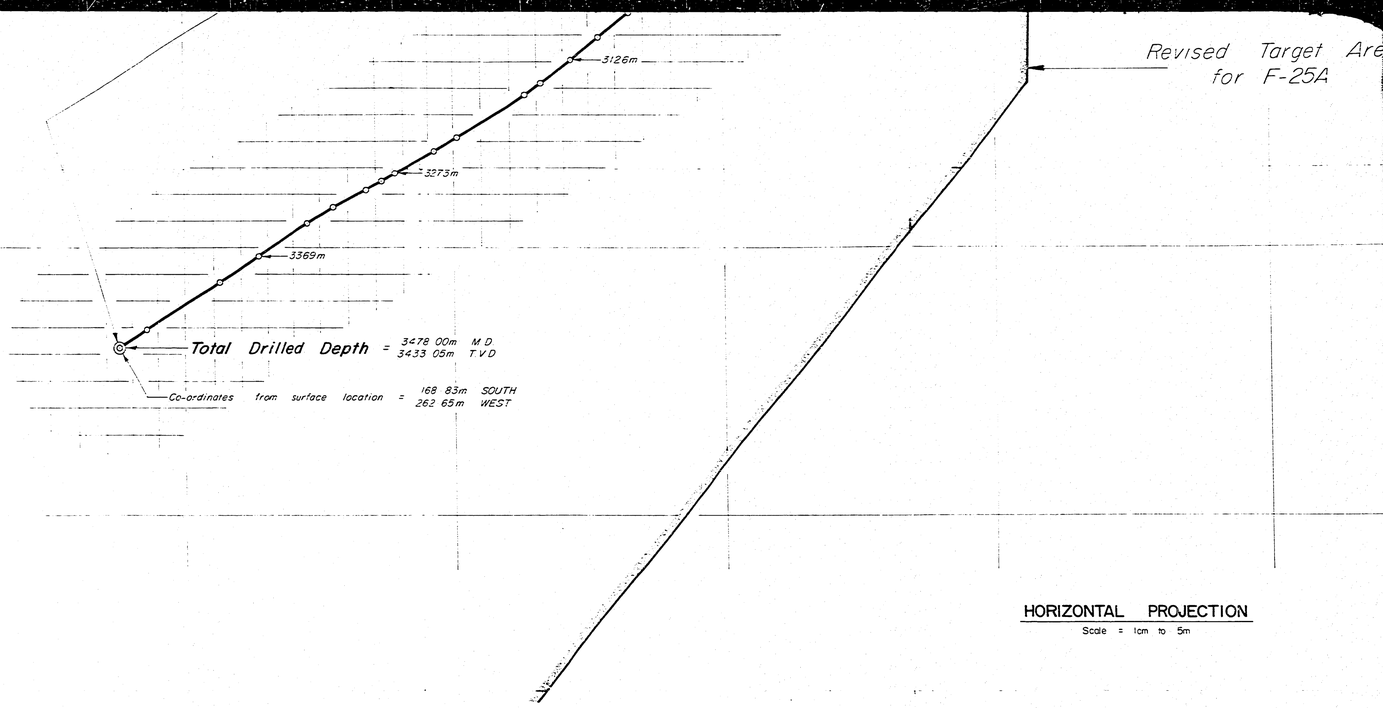

VERTICAL DEPTH
2500m
2600m
2700m
2800m
2900m
3000m
3100m
3200m
2496m
2590m
2715m
2866m
3126m
calculated horizontal displacement = 312.23m
on a bearing of SOUTH 57.2684° WEST
2496m
2590m
2715m
3003m
3126m
3273m
3369m
Total Drilled Depth = 3478.00m M.D.
3433.05m T.V.D.
Co-ordinates from surface location = 168.83m SOUTH
262.65m WEST
Revised Target Area
for F-25A
3 of


2496m
2590m
2715m
3003m
3126m
3273m
3369m
Total Drilled Depth = 3478.00m M.D
3433.05m T.V.D
Co-ordinates from surface location = 168.83m SOUTH
262.65m WEST
calculated horizontal displacement = 312.25m
on a bearing of SOUTH 57° 26' WEST
50m
100m
150m
Revised Target Area
for F-25A
Original
Target Area
F-25
Seismic Line
№ 83-001
S.P. 395
S.P. 394
S.P. 393
S.P. 392
S.P. 391
S.P. 390
S.P. 389
50m
3029m
Total Depth = 3149.00m M.D
3140.79m T.V.D
Co-ordinates from surface location = 22.94m SOUTH
72.02m EAST
4 of



VERTICAL PROJECTION

Scale = 1cm to 20m



HORIZONTAL PROJECTION

Scale = 1cm to 5m

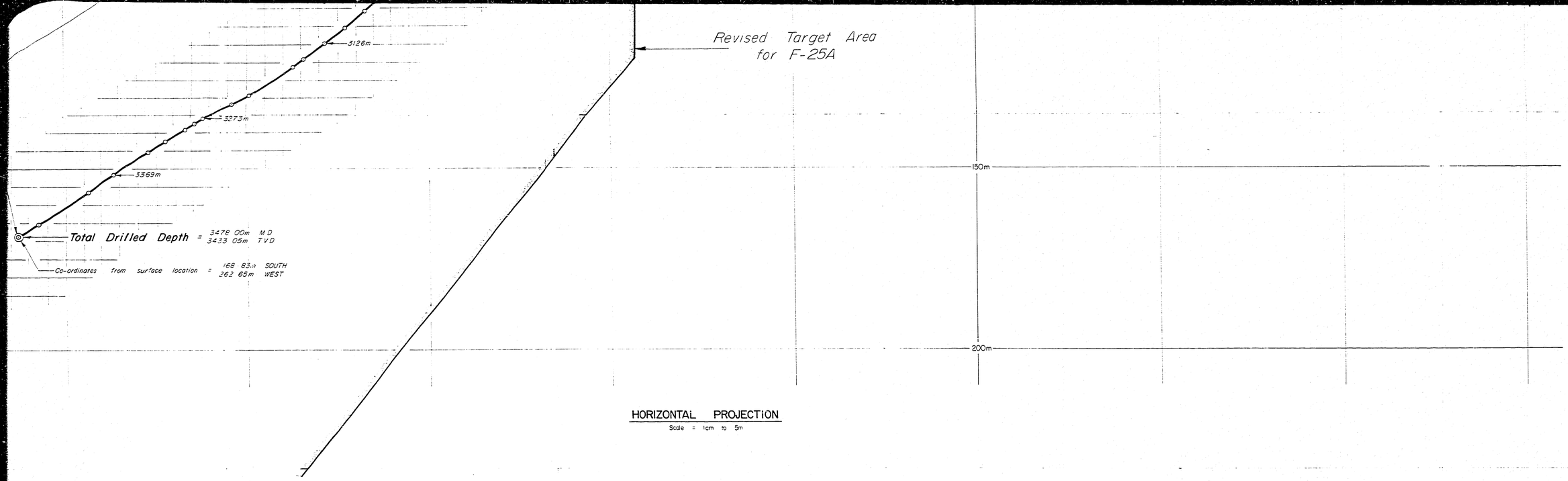
directional drilling completion plan for

NORTHCOR ENERGY LT

for the directionally drilled well

NORTHCOR et al LIARD F

5 of



HORIZONTAL PROJECTION

Scale = 1cm to 5m

directional drilling completion plan for

NORTHCOR ENERGY LTD.

for the directionally drilled well

NORTHCOR et al LIARD F-25A

prepared and submitted by

Whipstock Systems Limited

F. Brezsnyak 1986 December 3rd

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DST GAS
ANALYSIS

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

GAS ANALYSIS

CONTAINER IDENTITY:

LABORATORY NUMBER: F86-1601

LICENCE NUMBER:

OPERATOR NAME: NORTHCOR ENERGY LTD.

LOCATION:

WELL NAME: NORTHCOR ET AL LIARD F25A

ELEVATIONS (metres) K.B.: GRD.:

FIELD OR AREA: WILDCAT

POOL OR ZONE: HANEY

NAME OF SAMPLER: D. LARD

COMPANY: HALLIBURTON TESTERS

TEST TYPE: DST NO.: 2

TEST RECOVERY: 224 M SALT WATER

MULTIPLE RECOVERY: Y [ ] N [X]

SAMPLING POINT: DOWNHOLE SAMPLER #507

AMT. & TYPE OF CUSHION:

MUD RESISTIVITY @ 25°C

TEST INTERVAL (metres): 3227 - 3263

PERFORATIONS (metres):

TYPE OF PRODUCTION: PUMPING | FLOWING | GAS LIFT | SWAB

PRODUCTION RATES: WATER m³/d | OIL m³/d | GAS 10³m³/d

	SEPARATOR	TREATER	RESERVOIR	SOURCE	SAMPLED	RECEIVED
GAUGE PRESSURE kPa						
TEMPERATURE °C						

DATE SAMPLED (Y-M-D): 86/11/23

DATE RECEIVED (Y-M-D): 86/11/28

DATE REPORTED (Y-M-D): 86/12/04

ANALYST: C.J.

OTHER INFORMATION:

COMP	MOLE FRACTION AIR FREE AS RECEIVED	MOLE FRACTION AIR FREE ACID GAS FREE	PETROLEUM LIQUID CONTENT
			ml/m³
H_2	0.0027	0.0027	
He	0.0009	0.0009	
N_2	0.2266	0.2269	
CO_2	0.0014	0.0000	
H_2S	0.0000	0.0000	
C_1	0.7652	0.7663	
C_2	0.0030	0.0030	
C_3	0.0002	0.0002	0.7
IC_4	0.0000	0.0000	0.0
NC_4	0.0000	0.0000	0.0
IC_5	0.0000	0.0000	0.0
NC_5	0.0000	0.0000	0.0
C_6	0.0000	0.0000	0.0
C_{7+}	0.0000	0.0000	0.0
C_8			
C_9			
C_{10+}			
TOTAL	1.0000	1.0000	0.7

GROSS HEATING VALUE MJ/m3 15°C AND 101.325 kPa

MOISTURE AND ACID GAS FREE MEASURED	MOISTURE AND ACID GAS FREE CALCULATED	DETERMINED DEW POINT	VAPOUR PRESSURE PENTANES PLUS
	23.16	°C	0 kPa

RELATIVE DENSITY

MOISTURE FREE AS SAMPLED MEASURED	MOISTURE FREE AS SAMPLED CALCULATED	MOISTURE AND ACID GAS FREE MEASURED	MOISTURE AND ACID GAS FREE CALCULATED
	0.649		0.648

PSEUDO CRITICAL PROPERTIES (CALCULATED)

AS SAMPLED pPc(abs)	AS SAMPLED pTc	ACID GAS FREE pPc(abs)	ACID GAS FREE pTc
4349 kPa	176.3 K	4345 kPa	176.1 K

H_2S g/m³: 0.00

RELATIVE MOLECULAR MASS: TOTAL GAS 18.81 C_{7+} 0.00

C5+ ML/MOL 0.000

GROSS HEATING VALUE AS PER AGA REPORT #5

29.12 MAJ/M3 @ 15C AND 101.325 KPA

Halliburton Testers downhole sampler #507 received at 0+ kPa pressure. Sampler contained trace gas only

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

DATE REPORTED: DECEMBER 4, 1986

LABORATORY REPORT NUMBER: F86-1600

NORTHCOR ENERGY LTD.

SOURCE: NORTHCOR ET AL LIARD. F25A

FIELD OR AREA: WILDCAT

POOL OR ZONE: HANEY

SAMPLED BY: D. LARD OF HALLIBURTON TESTERS

TEST TYPE: DST #1

TEST RECOVERY: 354 M; 300 M WATER CUSHION, 54 M MUD.

MULTIPLE RECOVERY: NO

SAMPLING POINT: DOWNHOLE SAMPLER #503

TEST INTERVAL: 3414 - 3378 Metres

DATE SAMPLED: NOVEMBER 1986

DATE RECEIVED: NOVEMBER 28, 1986

ANALYST: C. JORVEN

Halliburton Testers downhole sampler #503 was received at atmospheric pressure. Sampler contained no gas or liquids.

PRODUCTION
TEST DATA

PRODUCTION TEST DATA

Zone 1	3451.0m - 3456.0m K. B.
Zone 3	3324.6m - 3340.1m K. B.
Zone 4	3250.4m - 3258.4m K. B.

This test data is included in the Flow & Buildup Test report by T. Fekete & Associates Consultants Ltd.

(Zone 2 & 5 - not tested)

3456.0m

FLOW & BUILDUP

3451.0m - 3456.0m

Production Tests

Production testing was conducted on the following Zones:

#1 3451.0m - 3456.0m K.B.
#3 3324.6m - 3340.1m K.B.

No recoverable hydrocarbons were encountered in these zones.

The results of these tests are represented in tabular and graphical form in the Appendix.

Zone #4 (3250.4m - 3258.4m K.B.) was tested as follows:

Test #1 was conducted between 87-01-25 and 87-01-29 inclusive. Two pressure recorders and one temperature recorder were used to obtain data. A deliverability of 82.720 10^3m^3/day at a specified pressure of 3500 kPa was attained.

Test #2 was conducted between 87-02-01 and 87-02-10 after the interval had been acidized with Nitrified 27% HCl. A deliverability of 233.802 10^3m^3/day at a specified pressure of 3500 kPa was attained.

After a second acidization with Nitrified 28% HCl, test #3 was conducted between 87-02-13 and 87-02-21. The second acidization did very little to improve the deliverability rate, 235.457 10^3m^3/day was attained at a specified pressure of 3500 kPa.

Zone #2 (3425m - 3442m) was not tested because water was found in Zone #1, and Zone #5 (3190m - 3210m) has not been tested yet because it could mechanically jeopardize Zone #4.

ST 1C
1st Test

Bews Wireline Services Ltd.

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1. BASIC DATA

PAGE ____ of ____

COMPANY Northcor Energy Ltd.
ADDRESS 880, 555 - 4th Avenue S.W.
FIELD and POOL Liard - Nahanni
TYPE OF TEST Flow & Buildup
ELEVATION ____ m(CF) 723.0 m(KB)
PRODUCING INTERVAL 3451.0 - 3456.0 m KB
MID-POINT OF PRODUCING (MPP) INTERVAL 3453.5 M KB
DATUM DEPTH OF WELL (FROM CF) ____ M
TBG PRESSURE 30 kPa G
CSG PRESSURE 10000 kPa G
TEMPERATURE AT RUN DEPTH See Temp. Recorder °C
PRESSURE AT RUN DEPTH ____ kPa G
GRADIENT AT RUN DEPTH ____ kPa/m

WELL NAME Northcor et al Liard
WELL IDENTIFIER F-25A
STATUS: OIL X GAS ____ OTHER SPECIFY ____
DATE OF TEST ____ 87 (Yr) 01 (Mo) 19 (Day)
TBG 88.9 mm @ ____ mKB
PRODUCING THRU X TBG ____ CSG
POOL DATUM ____ m (subsea)
RUN DEPTH (FROM KB) 3421.8 M
ON BTM 06:17 87 (Yr) 01 (Mo) 19 (Day)
OFF BTM 13:22 87 (Yr) 01 (Mo) 19 (Day)
SHUT IN DATE ____ (Yr) ____ (Mo) ____ (Day)
PRESSURE MPP ____ kPa G
DATUM DEPTH PRESSURE ____ kPa G

2. RECORDER COMPARISON

	TOP	MIDDLE	BTM (TEMPERATURE)
RUN DEPTH	3418.2	3420.0	3421.8 (KB)
PRESSURE AT RUN DEPTH			kPa G
FINAL BUILDUP PRESSURE	2744.0 kPaG	5068.6 kPaG	167.2 °C
GRADIENT AT RUN DEPTH			kPa/m
CLOCK RANGE	72 s	72 hr D S X	72 hr D S X °C
ELEMENT SERIAL/RANGE	20431R/35853	# 5656R/34474	# 16295R/70-233
INNER HOUSING	37906	# 21092	# 28743
CALIBRATION EQUATION	708.9 D+(-14.9)	686.1 D+(-63.9)	2.79 D+(93.32)
DATE OF LAST CALIBRATION	87 01 07	87 01 07 (Yr Mo Day)	86 06 06 (Yr Mo Day)

REMARKS: ____

DOWNHOLE EQUIPMENT: ____

SURVEY COMPANY OTIS TEST BY M. SIMMONS COMPUTED BY R. HOSMAR

INSTRUCTIONS: The original of this report shall be filed with the Energy Resources Conservation Board 640 5th Avenue S.W. Calgary Alberta within thirty days of completion of the survey

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F-25A

Bows Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 19, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 06:17 JANUARY 19, 1987 AT 3418.2 M KB					
	0.00	3.8049	2682.4	14.8	2697.2
	1.00	3.8354	2704.0	14.8	2718.8
	2.32	3.8430	2709.4	14.8	2724.2
OPENED WELL UP AT 08:36 JANUARY 19, 1987					
	1.00	3.8532	2716.6	14.8	2731.4
	2.00	3.8583	2720.2	14.8	2735.0
SHUT WELL IN AT 10:36 JANUARY 19, 1987					
1.00	1.00	3.8659	2725.6	14.8	2740.4
2.00	2.00	3.8684	2727.4	14.8	2742.2
2.77	2.77	3.8710	2729.2	14.8	2744.0
RECORDERS PULLED AT 13:22 JANUARY 19, 1987					

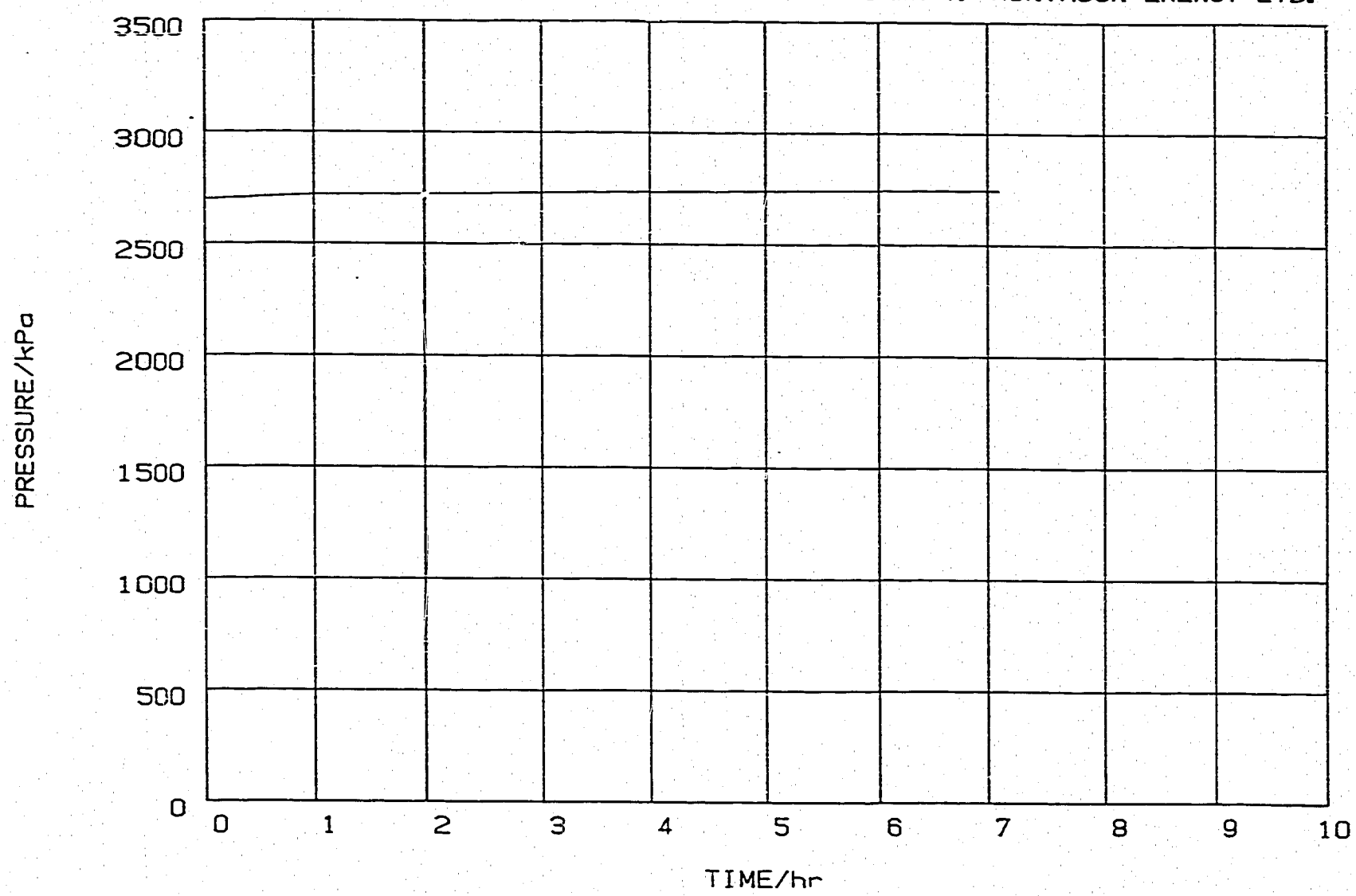
NOTE: TOP RECORDER NUMBER 20431R

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: JANUARY 19, 1987
COMPANY: NORTHCOR ENERGY LTD.



Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 19, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 06:17 JANUARY 19, 1987 AT 3420.0 M KB					
	0.00	7.4676	5059.6	9.0	5068.6
	1.00	7.4676	5059.6	9.0	5068.6
	2.32	7.4676	5059.6	9.0	5068.6
OPENED WELL UP AT 08:36 JANUARY 19, 1987					
	1.00	7.4676	5059.6	9.0	5068.6
	2.00	7.4676	5059.6	9.0	5068.6
HUT WELL IN AT 10:36 JANUARY 19, 1987					
1.00	1.00	7.4676	5059.6	9.0	5068.6
2.00	2.00	7.4676	5059.6	9.0	5068.6
2.77	2.77	7.4676	5059.6	9.0	5068.6
ECORDERS PULLED AT 13:22 JANUARY 19, 1987					

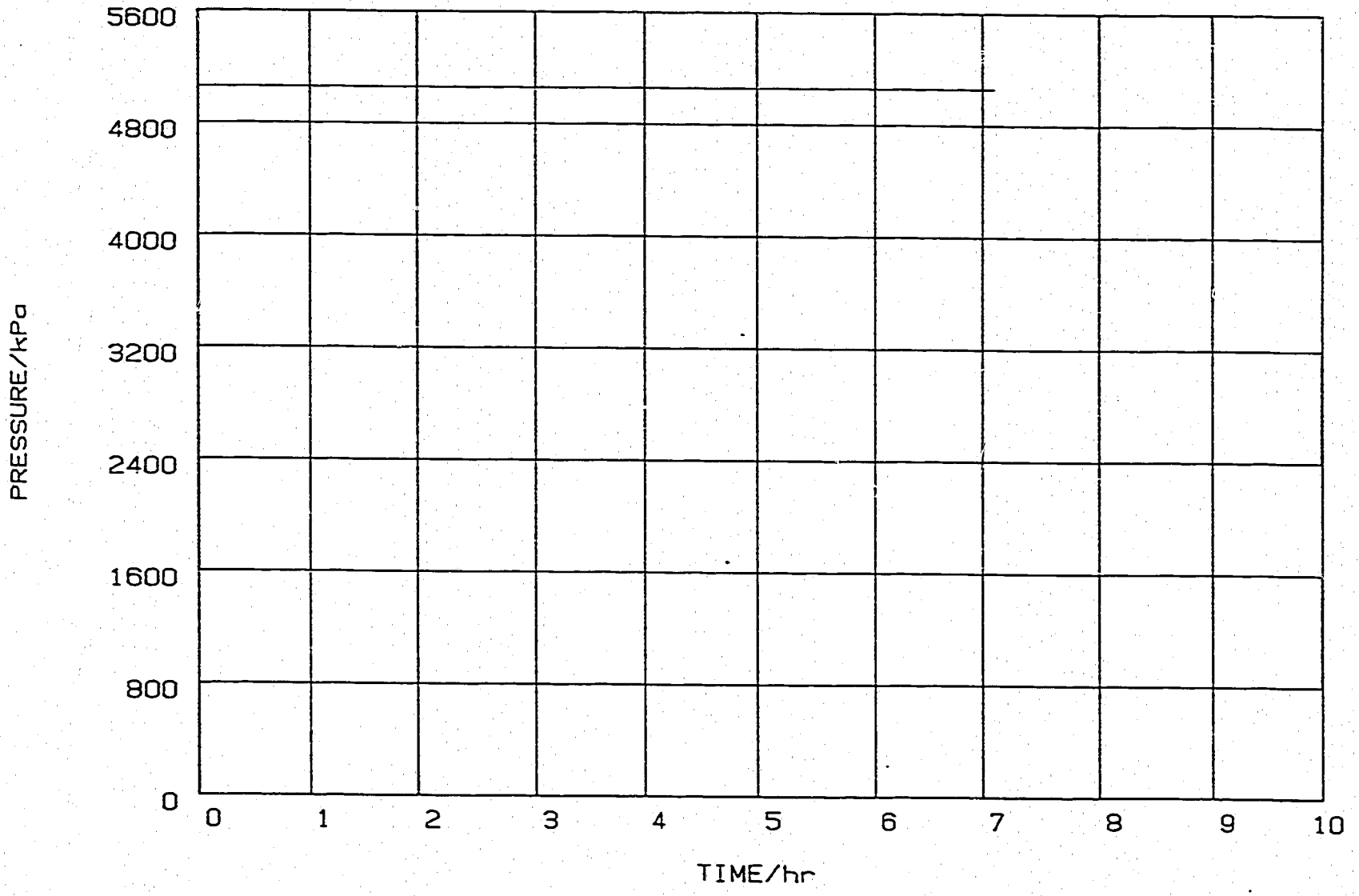
NOTE: MIDDLE RECORDER NUMBER 5656R

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: JANUARY 19, 1987
COMPANY: NORTHCOR ENERGY LTD.



Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 19, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

TEMPERATURE

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED TEMPERATURE (°C)	DEVIATION CORRECTION	CORRECTED TEMPERATURE (°C/Hr)
RECORDERS ON BOTTOM AT 06:17 JANUARY 19, 1987 AT 3421.8 M KB					
	0.00	24.0944	166.9	0.0	166.9
	1.00	24.2214	167.2	0.0	167.2
	2.32	24.2062	167.2	0.0	167.2
OPENED WELL UP AT 08:36 JANUARY 19, 1987					
	1.00	24.2138	167.2	0.0	167.2
	2.00	24.2138	167.2	0.0	167.2
SHUT WELL IN AT 10:36 JANUARY 19, 1987					
1.00	1.00	24.2138	167.2	0.0	167.2
2.00	2.00	24.2138	167.2	0.0	167.2
2.77	2.77	24.2138	167.2	0.0	167.2
RECORDERS PULLED AT 13:22 JANUARY 19, 1987					

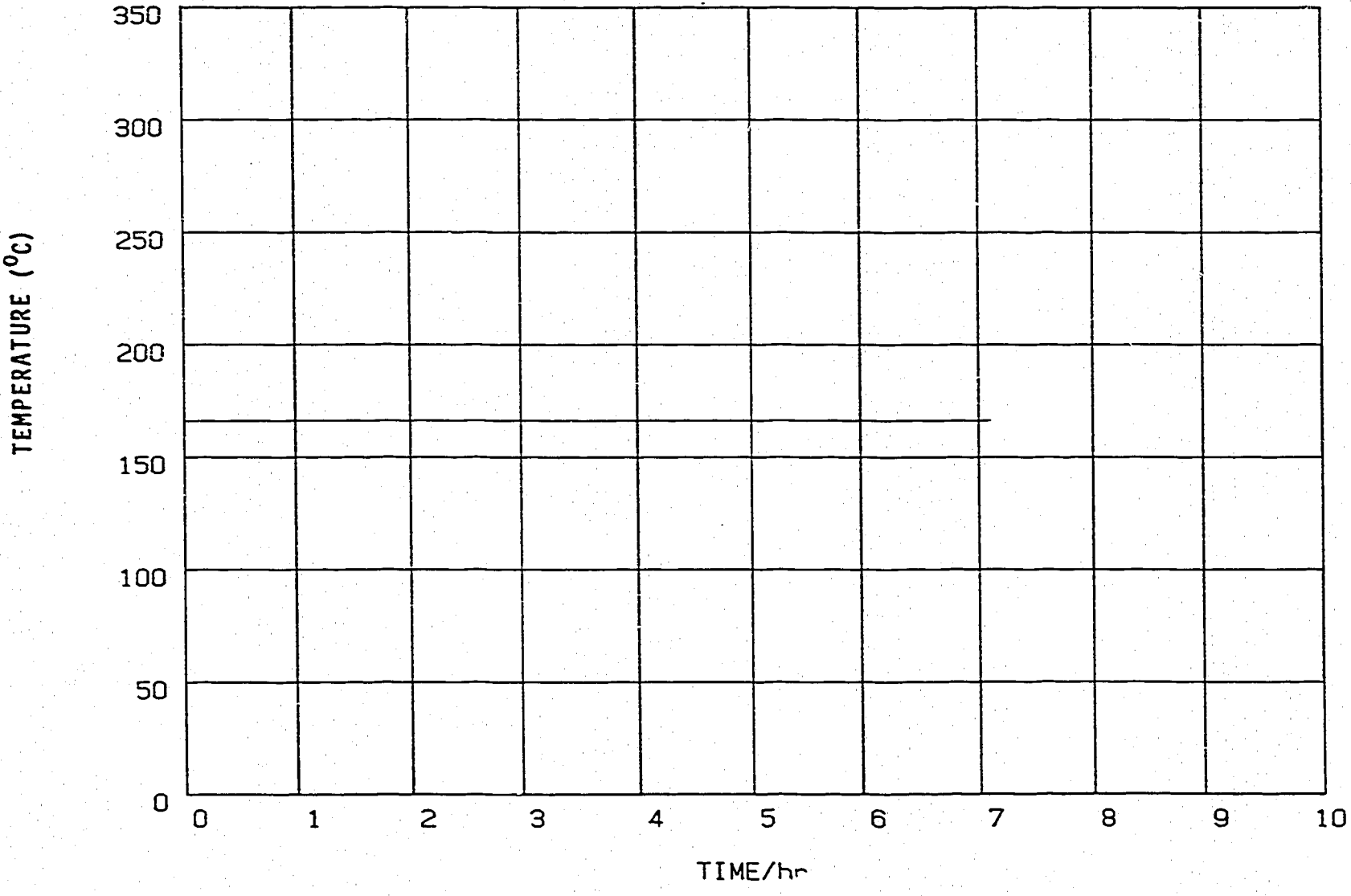
NOTE: BOTTOM RECORDER NUMBER 16295R

BEWS WIRELINE SERVICES LTD

TEMPERATURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: JANUARY 19, 1987
COMPANY: NORTHCOR ENERGY LTD.



FLOW & BUILDUP

3324.6m - 3340.1m

Bews Wireline Services Ltd.

DST 2B

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1. BASIC DATA

PAGE ____ of ____

COMPANY	Northcor Energy Ltd.	WELL NAME	Northcor et al Liard
ADDRESS	880,555 - 4th Avenue S.W.	WELL IDENTIFIER	F-25A
FIELD and POOL	Liard - Nahanni	STATUS: OIL X GAS ____ OTHER SPECIFY	
TYPE OF TEST	Flow & Buildup	DATE OF TEST	87 (Yr) 01 (Mo) 22 - 23 (Day)
ELEVATION	____ m(CF) 723.0 m(KB)	TBG	88.9 mm @ ____ mKB
PRODUCING INTERVAL	3324.6 - 3340.1 m KB	PRODUCING THRU	X TBG ____ CSG
MID-POINT OF PRODUCING (MPP) INTERVAL	3332.4 M KB	POOL DATUM	____ m (subsea)
DATUM DEPTH OF WELL (FROM CF)	____ M	RUN DEPTH (FROM KB)	3301.8 M
TBG PRESSURE	0 kPa G	ON BTM	23:36 87 01 22 (Yr Mo Day)
CSG PRESSURE	11000 kPa G	OFF BTM	08:48 87 01 23 (Yr Mo Day)
TEMPERATURE AT RUN DEPTH	See Temp. Recorder °C	SHUT IN DATE	____ (Yr Mo Day)
PRESSURE AT RUN DEPTH	____ kPa G	PRESSURE MPP	____ kPa G
GRADIENT AT RUN DEPTH	____ kPa/m	DATUM DEPTH PRESSURE	____ kPa G

2. RECORDER COMPARISON

	TOP	MIDDLE	BTM (TEMPERATURE)
RUN DEPTH	3298.2	3300.0	3301.8 (KB)
PRESSURE AT RUN DEPTH			kPa G
FINAL BUILDUP PRESSURE	2035.8 kPaG	3904.5 kPaG	163.2 °C
GRADIENT AT RUN DEPTH			kPa/m
CLOCK RANGE	72 dbl	72 hr	72 hr
ELEMENT SERIAL/RANGE	3775R/42058	• 5656R/34474	• 16295R/70-233 °C
INNER HOUSING	32177	• 21092	• 28743
CALIBRATION EQUATION	823.7 D+(-112.3)	686.1 D+(-63.9)	2.79 D+(93.32)
DATE OF LAST CALIBRATION	86 12 22	87 01 07 (Yr Mo Day)	86 06 06 (Yr Mo Day)

REMARKS: ____

DOWNHOLE EQUIPMENT: ____

SURVEY COMPANY OTIS TEST BY M. SIMMONS COMPUTED BY R. HOSMAR

INSTRUCTIONS: The original of this report shall be filed with the Energy Resources Conservation Board 640 - 5th Avenue S.W. Calgary, Alberta within thirty days of completion of the survey.

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F-25A

Bews Wireline Services Ltd.

1450,633 – 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 22 – 23, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 23:36 JANUARY 22, 1987 AT 3298.2 M KB					
	0.00	2.4130	1875.3	81.0	1956.3
	1.00	2.4282	1887.8	81.0	1968.8
	2.00	2.4536	1908.8	81.0	1989.8
	2.65	2.4917	1940.1	81.0	2021.1
OPENED WELL UP AT 02:15 JANUARY 23, 1987					
	1.00	2.4968	1944.3	81.0	2025.3
	2.00	2.4968	1944.3	81.0	2025.3
SHUT WELL IN AT 04:15 JANUARY 23, 1987					
1.00	1.00	2.5019	1948.5	81.0	2029.5
2.00	2.00	2.5044	1950.6	81.0	2031.6
3.00	3.00	2.5070	1952.7	81.0	2033.7
4.55	4.55	2.5095	1954.8	81.0	2035.8
RECORDERS PULLED AT 08:48 JANUARY 23, 1987					

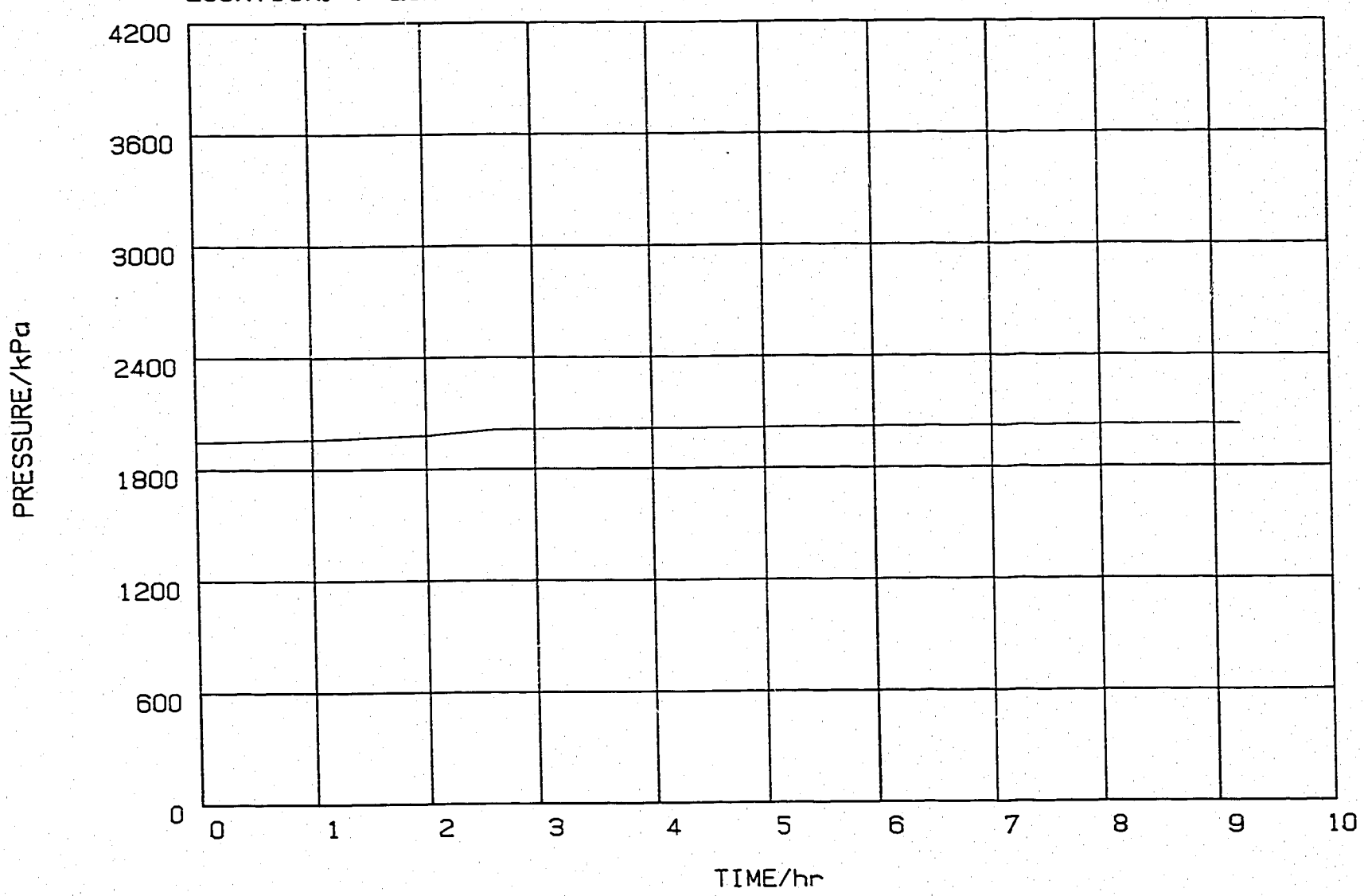
NOTE: TOP RECORDER NUMBER 3775R

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: JANUARY 22 - 23, 1987
COMPANY: NORTHCOR ENERGY LTD.



Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 22 - 23, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 23:36 JANUARY 22, 1987 AT 3300.0 M KB					
	0.00	5.4000	3641.1	9.0	3650.1
	0.03	5.5778	3763.1	9.0	3772.1
	0.50	5.6642	3822.3	9.0	3831.3
	1.00	5.6388	3804.9	9.0	3813.9
	1.50	5.6413	3806.6	9.0	3815.6
	2.65	5.7201	3860.6	9.0	3869.6
PUMPED WELL UP AT 02:15 JANUARY 23, 1987					
	0.50	5.7074	3851.9	9.0	3860.9
	1.00	5.6896	3839.7	9.0	3848.7
	1.50	5.6896	3839.7	9.0	3848.7
	2.00	5.6896	3839.7	9.0	3848.7
SHUT WELL IN AT 04:15 JANUARY 23, 1987					
1.00	1.00	5.7023	3848.4	9.0	3857.4
2.00	2.00	5.7150	3857.2	9.0	3866.2
3.00	3.00	5.7277	3865.9	9.0	3874.9
4.00	4.00	5.7404	3874.6	9.0	3883.6

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
4.55	4.55	5.7709	3895.5	9.0	3904.5

ECORDERS PULLED AT 08:48 JANUARY 23, 1987

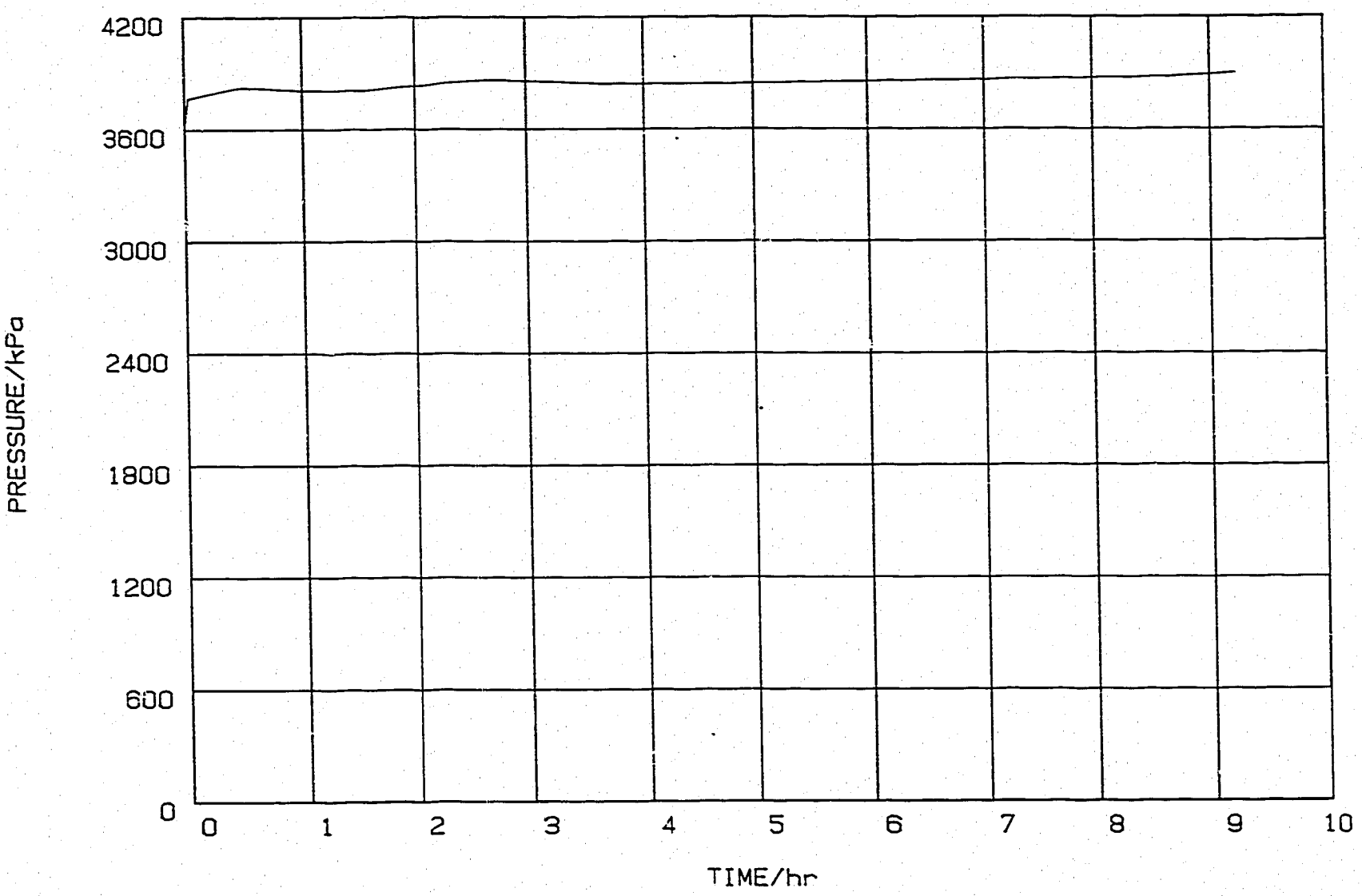
NOTE: MIDDLE RECORDER NUMBER 5656R

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: JANUARY 22 - 23, 1987
COMPANY: NORTHCOR ENERGY LTD.



Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 22 - 23, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED TEMPERATURE (°C)	DEVIATION CORRECTION	CORRECTED TEMPERATURE (°C/Hr)
ECORDERS ON BOTTOM AT 23:36 JANUARY 22, 1987 AT 3301.8 M KB					
	0.00	22.2758	161.9	0.0	161.9
	0.20	22.4536	162.9	0.0	162.9
	0.43	22.4739	162.9	0.0	162.9
	1.00	22.4028	162.7	0.0	162.7
	2.00	22.4282	162.8	0.0	162.8
	2.65	22.4485	162.9	0.0	162.9
PENED WELL UP AT 02:15 JANUARY 23, 1987					
	0.50	22.5501	163.1	0.0	163.1
	1.00	22.5552	163.1	0.0	163.1
	2.00	22.5552	163.1	0.0	163.1
HUT WELL IN AT 04:15 JANUARY 23, 1987					
0.50	0.50	22.4790	162.9	0.0	162.9
1.00	1.00	22.4917	163.0	0.0	163.0
2.00	2.00	22.5044	163.0	0.0	163.0
3.00	3.00	22.5171	163.0	0.0	163.0
4.00	4.00	22.5298	163.0	0.0	163.0

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED TEMPERATURE (^{o}C)	DEVIATION CORRECTION	CORRECTED TEMPERATURE (^{o}C/Hr)
4.55	4.55	22.6035	163.2	0.0	163.2

RECORDERS PULLED AT 08:48 JANUARY 23, 1987

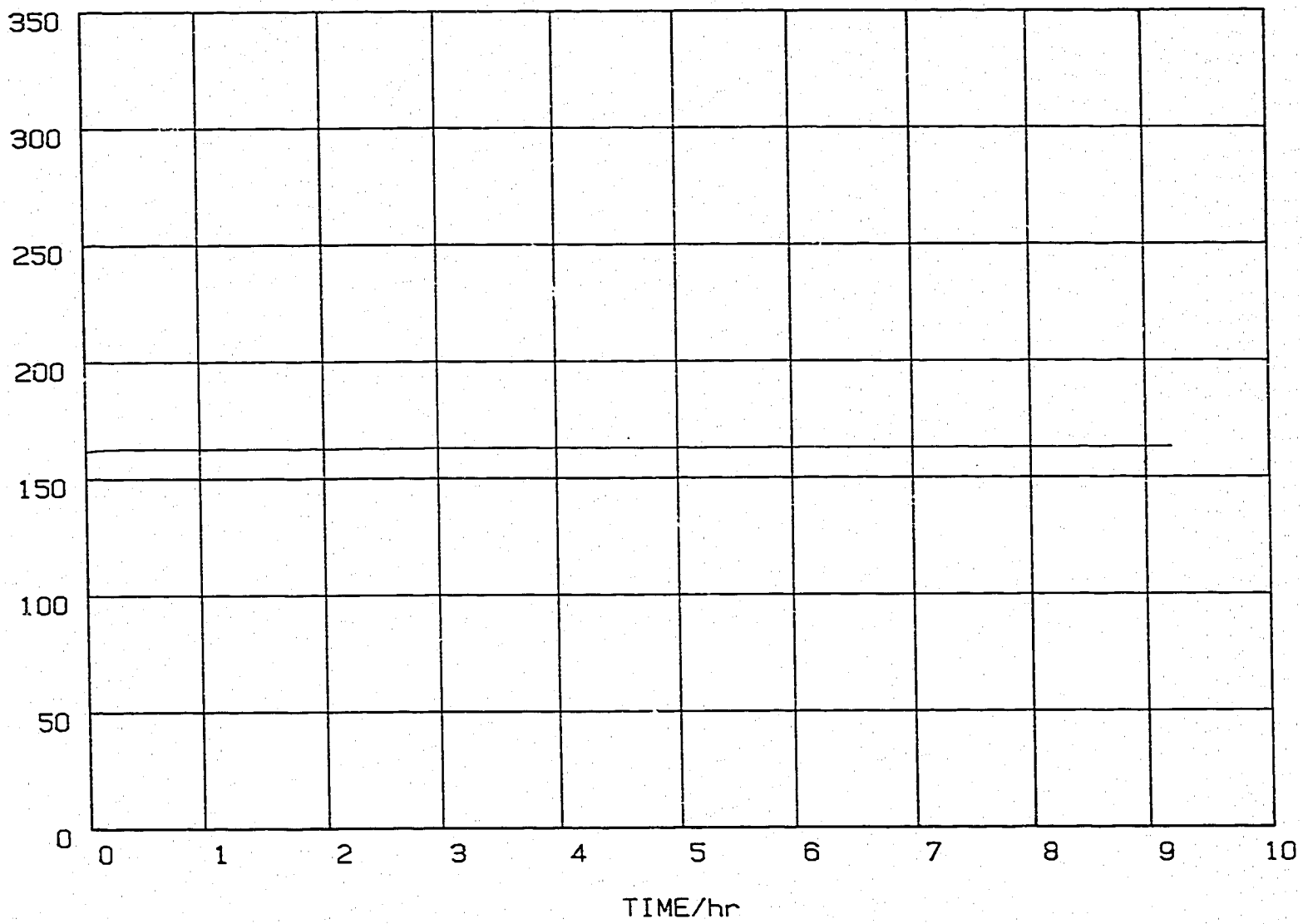
NOTE: BOTTOM RECORDER NUMBER 16295R

BEWS WIRELINE SERVICES LTD

temperature BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: JANUARY 22 - 23, 1987
COMPANY: NORTHCOR ENERGY LTD.



STATIC

3324.6m - 3340.1m

3324.6m-
3340.1m

Bews Wireline Services Ltd.

DST 2B
3rd Run

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1. BASIC DATA

PAGE ____ of ____

COMPANY Northcor Energy Ltd.
ADDRESS 880, 555 - 4th Avenue S.W.
FIELD and POOL Liard - Nahanni
TYPE OF TEST Static
ELEVATION ____ m(CF) 723.0 m(KB)
PRODUCING INTERVAL 3324.6 - 3340.1 m KB
MID-POINT OF PRODUCING (MPP) INTERVAL 3332.4 M KB
DATUM DEPTH OF WELL (FROM CF) ____ M
TBG PRESSURE ____ kPa G
CSG PRESSURE ____ kPa G
TEMPERATURE AT RUN DEPTH ____ °C
PRESSURE AT RUN DEPTH ____ kPa G
GRADIENT AT RUN DEPTH ____ kPa/m

WELL NAME Northcor et al Liard
WELL IDENTIFIER F-25A
STATUS: OIL X GAS ____ OTHER SPECIFY ____
DATE OF TEST 87 (Yr) 01 (Mo) 23 (Day)
TBG 88.9 mm @ ____ mKB
PRODUCING THRU X TBG ____ CSG
POOL DATUM ____ m (subsea)
RUN DEPTH (FROM KB) 3301.8 M
ON BTM 15:30 87 01 23
OFF BTM 15:45 87 01 23
SHUT IN DATE ____ (Yr) ____ (Mo) ____ (Day)
PRESSURE MPP ____ kPa G
DATUM DEPTH PRESSURE ____ kPa G

2. RECORDER COMPARISON

	TOP	MIDDLE	BTM
RUN DEPTH	3298.2	3300.0	3301.8 (KB)
PRESSURE AT RUN DEPTH			kPa G
FINAL BUILDUP PRESSURE	1966.2	2034.7	*1796.5 kPa G
GRADIENT AT RUN DEPTH			kPa/m
CLOCK RANGE	3 S	3 hr D S X	6 hr D S
ELEMENT SERIAL/RANGE	34236R/44816	* 34235R/44816	* 12389R/47574
INNER HOUSING	32177	* 21092	* 28743
CALIBRATION EQUATION	894.1 D+(87.8)	887.9 D+(112.7)	937.0 D+(-82.2)
DATE OF LAST CALIBRATION	86 12 22	86 12 22 (Yr Mo Day)	86 12 22 (Yr Mo Day)

REMARKS: Note: Baseline drawn flush with bottom crossbar on Bottom recorder number 12389R

DOWNHOLE EQUIPMENT: ____

SURVEY COMPANY OTIS TEST BY M. SIMMONS COMPUTED BY R. HOSMAR

INSTRUCTIONS: The original of this report shall be filed with the Energy Resources Conservation Board 640 5th Avenue S.W. Calgary Alberta within thirty days of completion of the survey

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F-25A

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 23, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 15:30 JANUARY 23, 1987 AT 3298.2 M KB					
	0.00	2.1133	1977.3	-58.8	1918.5
	0.08	2.1311	1993.2	-58.8	1934.4
	0.17	2.1488	2009.1	-58.8	1950.3
	0.25	2.1666	2025.0	-58.8	1966.2
RECORDERS PULLED AT 15:45 JANUARY 23, 1987					

NOTE: TOP RECORDER NUMBER 34236R

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8626

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 23, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 15:30 JANUARY 23, 1987 AT 3300.0 M KB					
	0.00	2.2098	2074.8	-73.9	2000.9
	0.08	2.2225	2086.1	-73.9	2012.2
	0.17	2.2352	2097.3	-73.9	2023.4
	0.25	2.2479	2108.6	-73.9	2034.7
RECORDERS PULLED AT 15:45 JANUARY 23, 1987					

NOTE: MIDDLE RECORDER NUMBER 34235R

Bews Wireline Services Ltd.

1450,633 – 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 23, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 15:30 JANUARY 23, 1987 AT 3301.8 M KB					
	0.00	1.8948	1693.3	60.4	1753.7
	0.08	1.9101	1707.5	60.4	1767.9
	0.17	1.9253	1721.8	60.4	1782.2
	0.25	1.9406	1736.1	60.4	1796.5

BASELINE DRAWN FLUSH WITH BOTTOM CROSSBAR

RECORDERS PULLED AT 15:45 JANUARY 23, 1987

NOTE: BOTTOM RECORDER NUMBER 12389R

DST 2B
2nd Run

Bews Wireline Services Ltd.

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1. BASIC DATA

PAGE ____ of ____

COMPANY Northcor Energy Ltd.
ADDRESS 880, 555 - 4th Avenue S.W.
FIELD and POOL Liard - Nahanni
TYPE OF TEST Static
ELEVATION ____ m(CF) 723.0 m(KB)
PRODUCING INTERVAL 3324.6 - 3340.1 mKB
MID-POINT OF PRODUCING (MPP) INTERVAL 3332.4 M KB
DATUM DEPTH OF WELL (FROM CF) ____ M
TBG PRESSURE ____ kPa G
CSG PRESSURE ____ kPa G
TEMPERATURE AT RUN DEPTH ____ °C
PRESSURE AT RUN DEPTH ____ kPa G
GRADIENT AT RUN DEPTH ____ kPa/m

WELL NAME Northcor et al Liard
WELL IDENTIFIER F-25A
STATUS: OIL X GAS ____ OTHER SPECIFY ____
DATE OF TEST ____ 87 (Yr) 01 (Mo) 23 (Day)
TBG 88.9 mm @ ____ mKB
PRODUCING THRU X TBG ____ CSG
POOL DATUM ____ m (subsea)
RUN DEPTH (FROM KB) 3301.8 M
ON BTM 12:00 87 01 23
OFF BTM 12:15 87 01 23
SHUT IN DATE ____ (Yr) (Mo) (Day)
PRESSURE MPP ____ kPa G
DATUM DEPTH PRESSURE ____ kPa G

2. RECORDER COMPARISON	TOP	MIDDLE	BTM
RUN DEPTH	3298.2	3300.0	3301.8 (KB)
PRESSURE AT RUN DEPTH			kPa G
FINAL BUILDUP PRESSURE	2081.8	4265.9	See Remarks kPa G
GRADIENT AT RUN DEPTH			kPa/m
CLOCK RANGE	3 S	3 hr D S X	3 hr D S X
ELEMENT SERIAL/RANGE	3775R/42058	* 20413R/35853	* 5656R/34474
INNER HOUSING	32177	* 21092	* 28743
CALIBRATION EQUATION	823.7 D+(-112.3)	708.9 D+(-14.9)	586.1 D+(-63.9)
DATE OF LAST CALIBRATION	86 12 22	87 01 07 (Yr Mo Day)	87 01 07 (Yr Mo Day)

REMARKS: Note: Bottom recorder number 5656R did not run
No pressures available

DOWNHOLE EQUIPMENT: ____

SURVEY COMPANY OTIS TEST BY M. SIMMONS COMPUTED BY R. HOSMAR

INSTRUCTIONS: The original of this report shall be filed with the Energy Resources Conservation Board 640 5th Avenue S.W. Calgary, Alberta within thirty days of completion of the survey

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F - 25A

Bews Wireline Services Ltd.

1450,633 – 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 23, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 12:00 JANUARY 23, 1987 AT 3298.2 M KB					
	0.00	2.4638	1917.1	81.0	1998.1
	0.08	2.5409	1979.9	81.0	2060.9
	0.17	2.5603	1996.6	81.0	2077.6
	0.25	2.5654	2000.8	81.0	2081.8
RECORDERS PULLED AT 12:15 JANUARY 23, 1987					

NOTE: TOP RECORDER NUMBER 3775R

Bews Wireline Services Ltd.

1450,633 – 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 23, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P–Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 12:00 JANUARY 23, 1987 AT 3300.0 M KB					
	0.00	4.2418	2992.1	14.8	3006.9
	0.08	5.5423	3914.0	13.4	3927.4
	0.17	5.8928	4162.5	13.4	4175.9
	0.25	6.0198	4252.5	13.4	4265.9
RECORDERS PULLED AT 12:15 JANUARY 23, 1987					

NOTE: MIDDLE RECORDER NUMBER 20431R

STIMULATION
REPORTS

ZONE 4 (3250.0m - 3258.0m)

STIMULATION REPORTS

ACID JOB #1

HALLIBURTON SERVICES LIMITED

CEMENTING AND/OR SPECIAL TOOLS SERVICE REPORT

ATTACH TO INVOICE No. 76 802

HALLIBURTON DISTRICT: Grande Prairie

JOB DATE: 1987 (YEAR) 01 (MONTH) 29 (DAY)

OWNER, OPERATOR OR HIS AGENT STATES THE WELL IS IN GOOD CONDITION FOR THE SERVICE JOB TO BE PERFORMED AND SUBMITS THE FOLLOWING DATA.

CUSTOMER	FIELD OR AREA	WELL No. AND LEASE
Northcor Energy Ltd.	Liard	Liard F-25A

CALLED OUT	ON LOCATION	JOB STARTED	JOB COMPLETED	PROVINCE	LSD	SEC	TWP	RANGE	MERIDIAN
DATE / TIME	87-01-29 14:00	87-01-29 14:00	87-02-04 24:00	N.W.T.					W

TYPE OF JOB ✓: SURFACE; INTERMEDIATE; PRODUCTION; LINER; SQUEEZE; PLUG; PUMP ✓; PRESSURE TEST; OTHER

WELL OR HOLE DATA

HOLE DATA: HOLE SIZE ____ mm; TOTAL DEPTH ____ m; TYPE MUD ____; VISC. ____; DENSITY ____

CASING, TUBING OR LINER DATA: NEW ☐ USED ☐ TBG; SIZE 88.9 mm kg/m 13.86 GRADE ____ DEPTH 3010.0 m; SIZE 177.8 mm kg/m 43.16 GRADE ____ DEPTH 3474.0 m

PERFORATIONS: FROM ____ m TO ____ m; FROM ____ m TO ____ m; FROM 3250.0 m TO 3258.0 m; FROM ____ m TO ____ m

WASH FLUID TYPE: ____ VOL ____ m³; DISPLACING FLUID TYPE: ____ VOL ____ m³

TEMP DATA: MIXING WATER ____ °C; SLURRY ____ °C; DISPLACING FLUID ____ °C; RETURNS ____ °C

PRODUCTS

EQUIPMENT	QUAN
BASKETS	
CENTRALIZERS	
CLAMPS	
FLOAT COLLAR	
FLOAT SHOE	
GUIDE SHOE	
INSERT FLOAT	
SCRATCHERS	
OTHER	

EQUIPMENT

PACKER: TYPE RTTS; SIZE 177.8 mm; DEPTH SET 3220.89 m; TAIL PIPE ____ m

TOP PLUG TYPE ____

BOTTOM PLUG TYPE ____

CEMENT HEAD: CONTINUOUS ☐ KNOCK OFF ☐ SWAGE ☐; OTHER ____

CEMENT DATA

TONNE	API CLASS	BRAND	BULK OR SACKED	CEMENT BLEND	ADDITIVES TYPE AND PERCENT	kg/m³	m³/tonne

HALLIBURTON OPERATOR: B. Martens CUSTOMER REP. ____

TREATING LOG

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³ STAGE	VOLUME PUMPED IN m³ TOTAL	VOLUME PUMPED IN m³ IN FORMATION	PRESSURE MPa TUBING	PRESSURE MPa CASING	REMARKS
								REFER TO NEXT PAGE

HALLIBURTON SERVICES LIMITED

FRACTURING AND CHEMICAL SERVICES
SERVICE REPORT

ATTACH TO INVOICE No. 76 802

HALLIBURTON DISTRICT: Grande Prairie

JOB DATE: 1987 (YEAR) 02 (MONTH) 01 (DAY)

OWNER, OPERATOR OR HIS AGENT STATES THE WELL IS IN CONDITION FOR THE SERVICE JOB TO BE PERFORMED AND SUBMITS THE FOLLOWING DATA.

CUSTOMER	FIELD OR AREA	WELL No. AND LEASE
Northcor Energy Ltd.	Liard	Liard F-25A

CALLED OUT (DATE / TIME)	ON LOCATION (DATE / TIME)	JOB STARTED (DATE / TIME)	JOB COMPLETED (DATE / TIME)	PROVINCE	LSD.	SEC.	TWP	RANGE	MERIDIAN
		87-02-01 15:18	87-02-01 22:00	N.W.T.					W

WELL OR HOLE DATA

FORMATION: Nahanni — DATE CASING SET:

TUBING OD 88.9 mm kg/m 13.86 DEPTH 2010.0 m

CASING OD 177.8 mm kg/m 43.16 DEPTH 3474.0 m

LINER OD ____ mm kg/m ____ FROM ____ m TO ____ m

PACKER TYPE RTTS SET AT 3219.89 m

TREAT THRU: TBG ☒ ANNULUS ☐ CGS ☐ TBG AND ANNULUS ☐

MAX. ALLOWABLE PRESSURE: TBG 35 MPa CSG ____ MPa

CAPACITY: TBG 14.2 ANNULUS ____ CSG/OPEN HOLE ____

PERFORATIONS: FROM 3250.0 m TO 3258.0 m cm SHOT ____

FROM ____ m TO ____ m cm SHOT ____

FROM ____ m TO ____ m cm SHOT ____

FROM ____ m TO ____ m cm SHOT ____

FROM ____ m TO ____ m cm SHOT ____

FROM ____ m TO ____ m cm SHOT ____

OPEN HOLE: SIZE ____ mm FROM ____ m TO ____ m

MATERIALS USED

FLUID TYPE (1) 27% HCl — FLUID TYPE (2) N2

m³ 7.5 — m³ 13.500

ADDITIVES:

TYPE	kg/m³	L/m³	TYPE	kg/m³	L/m³
HAI-75		20.0			
LOSURF-300		3.0			
HII-124A		50.0			
HII-124B	10.5				
HC-2		2.0			

	TYPE	MESH	TONNE
PROP AGENT (1)			
(2)			
(3)			

PROP. CONC. kg/m³ (1) MAX ____ MIN ____ AVE ____

(2) MAX ____ MIN ____ AVE ____

(3) MAX ____ MIN ____ AVE ____

DIVERTING AGENT: TYPE ____ AMOUNT ____

TREATMENT SUMMARY

kW AVAILABLE 175 USED 108

INJECTION RATES m³/min

TREAT 0.25/50.0 DISPLACE 150.0 AVERAGE 125.0

PRESSURES MPa

BREAKDOWN FROM 19.0 TO 14.0

MAX. TREAT 28.0 MIN TREAT 12.0 DISP 22.0

INSTANTANEOUS SHUTIN 22.0 15 MIN 21.0

FLUID VOLUMES m³

TOTAL ON LEASE BEFORE JOB		
FILL HOLE		
BREAKDOWN AND PAD		
TREATING FLUID (1)		
TREATING FLUID (2)		
FLUSH FLUID		
TOTAL FLUID INJECTED		
TOTAL ON LEASE AFTER JOB		

HALLIBURTON OPERATOR: B. Martens — CUSTOMER REP.: ____

SUMMARY OF PLANNED TREATMENT: REFER TO TREATING LOG.

RM 168A

HALLIBURTON SERVICES LIMITED

TREATING LOG

INVOICE No. 76 802

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³			PRESSURE MPa		REMARKS
			STAGE	TOTAL	IN FORMATION	TUBING	CASING	
								CHART #1
1	20:36						0.0	Fill casing.
2	20:45		3.4				7.0	Stop.
3	21:20		0.3				18.5	Pressure up on reverse out
4								valve. Valve wouldn't open.
4	21:38							Bleed off.
5	22:10		0.3				19.6	Pressure up on reverse out
								valve, valve won't open.
6	22:15							Bleed off.
								CHART #2
1	22:52						35.0	Pressure test surface lines.
2	22:57						22.0	Kill tubing.
3	23:33	0.32	14.0				5.5	Stop.
								CHART #3 1987 01 30
1	06:15						3.0	Reverse circulate tubing and
								casing.
2	08:42	0.4	63.59				3.0	Stop.
								CHART #4 1987 01 30
1	17:50					14.0		Pressure test tubing to 528 m.
2	17:58							Bleed off.
3	20:15	0.43						Circulate down tubing.
4	22:35		63.59			3.0		Stop.

Form 957

HALLIBURTON SERVICES LIMITED

TREATING LOG

INVOICE No. 76 802

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³			PRESSURE MPa		REMARKS
			STAGE	TOTAL	IN FORMATION	TUBING	CASING	
								CHART #5 1987 01 31
1	05:45					35.0		Pressure test tubing.
2	05:58							Bleed off.
3	06:27					35.0		Pressure test Methanol sub.
4	06:37							Bleed off.
								N₂ and Acid
		N₂/ Acid						
1	15:18	50.0/0		0.0	0/0	0.0		Start fill tubing with N₂
2	15:58	50.0/0		2000.0/ 0.0/	0.0/ 0.0	20.0		Pressure test surface equipment.
3	17:13	0.0		2000.0/ 0.0	0.0	30.0		Finish pressure test.
4	17:14	50.0/ 0.0		2000.0/ 0.0	0.0	20.0		Continue fill hole.
5	17:36	50.0/ 0.25		4500.0/ 0.0	0.0	28.0		Start acid and N₂ at 200 m³/m³.
6	18:47	50.0/ 0.25		6400.0/ 7.5	0.0	18.0		Start water and N₂ at 200 m³/m³.
7	19:00	100.0/ 0.0		6800.0/ 9.5	2.0	13.0		Water away. Start N₂.
8	19:15	150.0 0.0		8300.0/ 9.5	5.0	17.0		Start N₂ at 150 m³/min.
9	19:38	0.0		12050.0/ 9.5	9.5	22.0		Stop.
10	19:48	0.0		12050.0 9.5	9.5	21.0		10 minute bleed down.
								CHART #8 1987 02 01
1	16:47							Pressure up casing.
2	21:00							Change chart.
3	21:00							CHART #9
4	22:30							Flow well.
5	24:00							Change chart.
6	00:01							CHART #10 1987 02 02
7	04:00							Change chart.

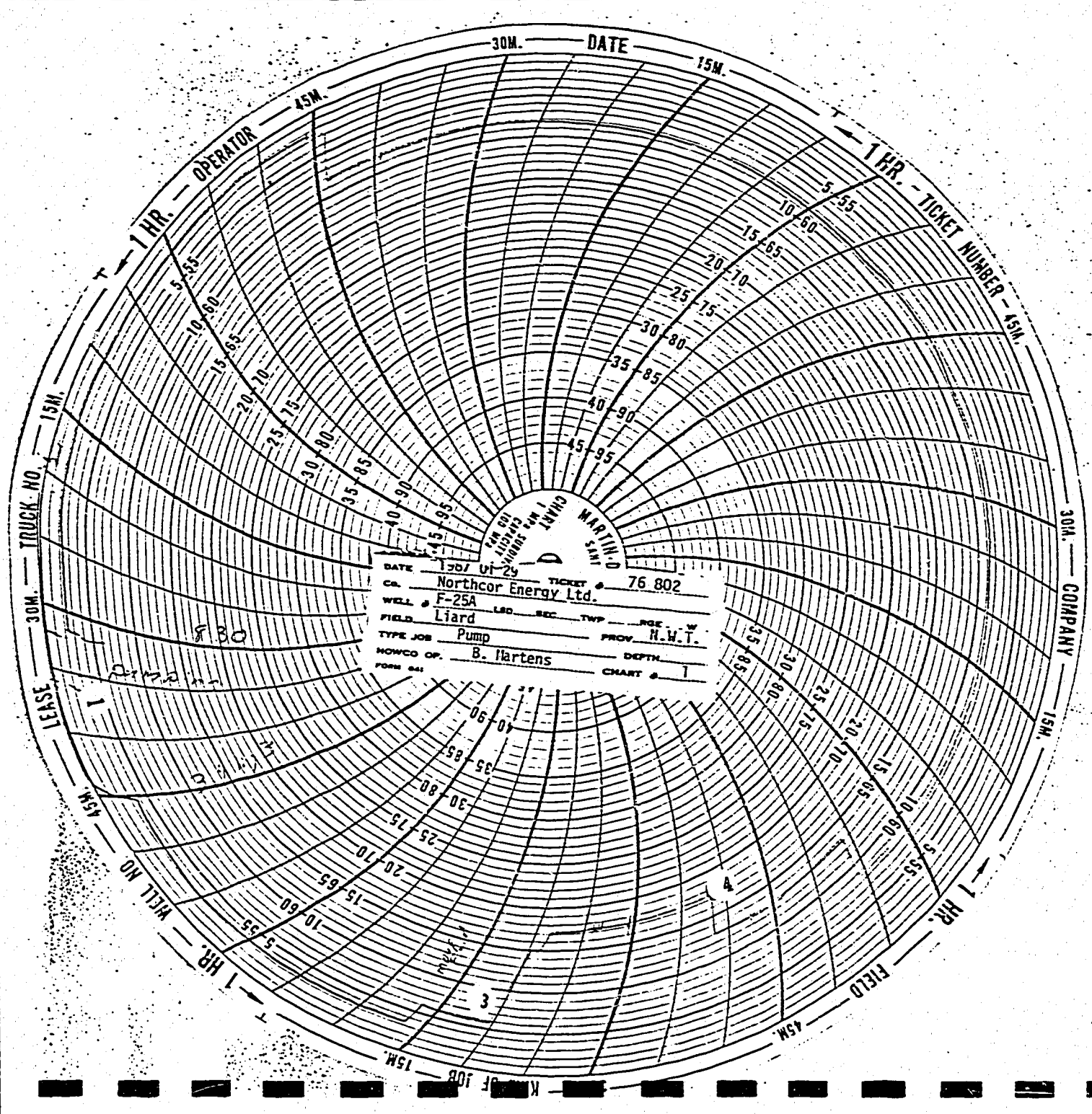
HALLIBURTON SERVICES LIMITED

TREATING LOG

INVOICE No. 76 802

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³			PRESSURE MPa		REMARKS
			STAGE	TOTAL	IN FORMATION	TUBING	CASING	
8	04:00							CHART #11
9	08:00							Change chart.
10	08:00							CHART #12
11	12:00							Change chart.
12	12:00							CHART #13
13	16:00							Change chart.
14	16:00							CHART #14
15	16:46							Shut in casing to replace gauge.
16	20:00							change chart.
17	20:00							CHART #15
18	24:00							change chart.

Form 957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15M.
1 HR.
TICKET NUMBER
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COMPANY
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15M.
1 HR.
FIELD
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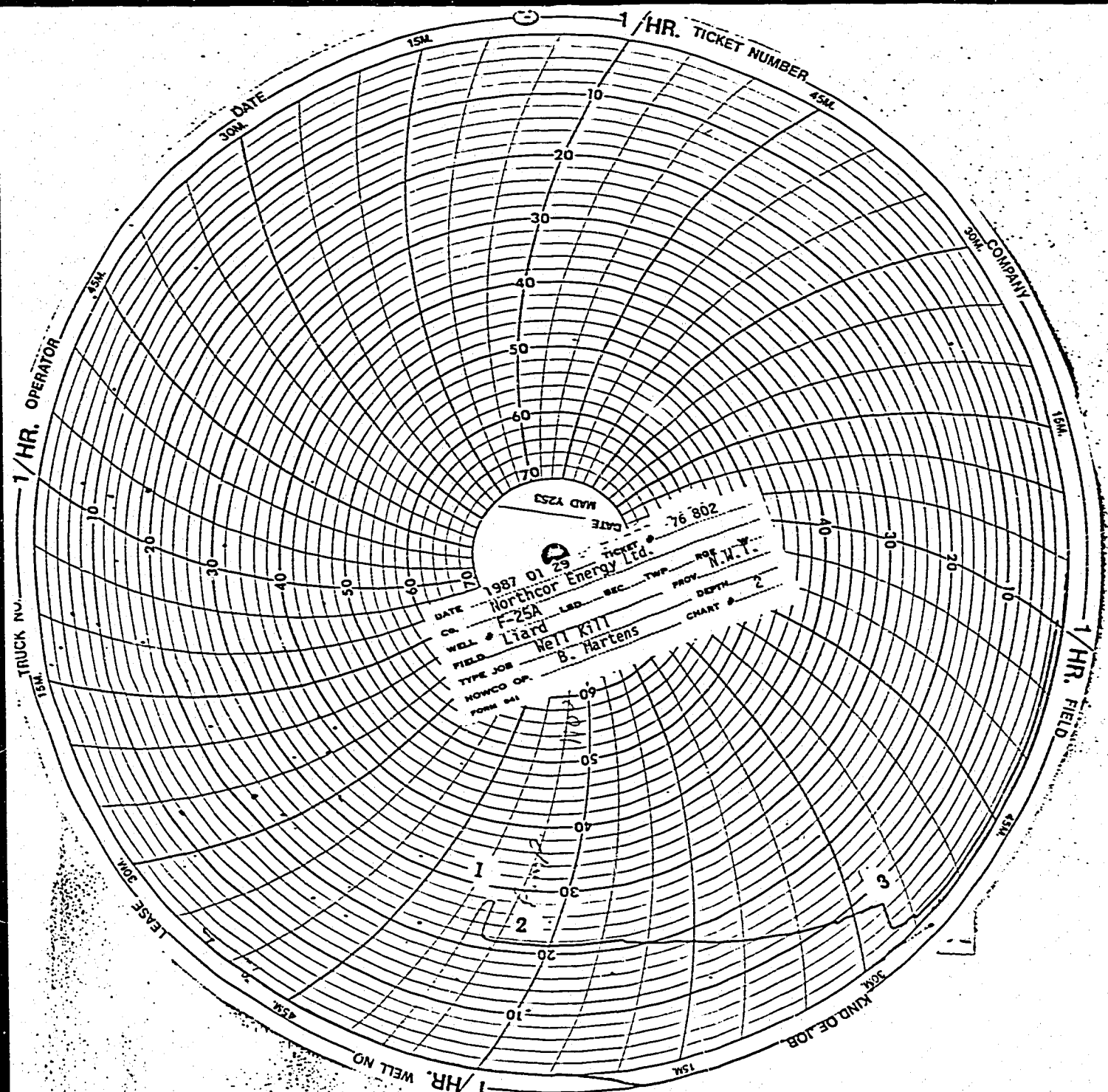
15M.
1 HR.
WELL NO.
45M.
LEASE
30M.
15M.
1 HR.
OPERATOR
45M.
TRUCK NO.
CHART 1 MP. 3000# CAPACITY 100 MP.
MARTIN-D SANT
DATE 1981 VI-29
TICKET # 76 802
CO. Northcor Energy Ltd.
WELL # F-25A
LSD SEC TWP RGE W
FIELD Liard
PROV. N.W.T.
TYPE JOB Pump
HOWCO OP. B. Martens
DEPTH
CHART # 1
FORM 641
KIND OF JOB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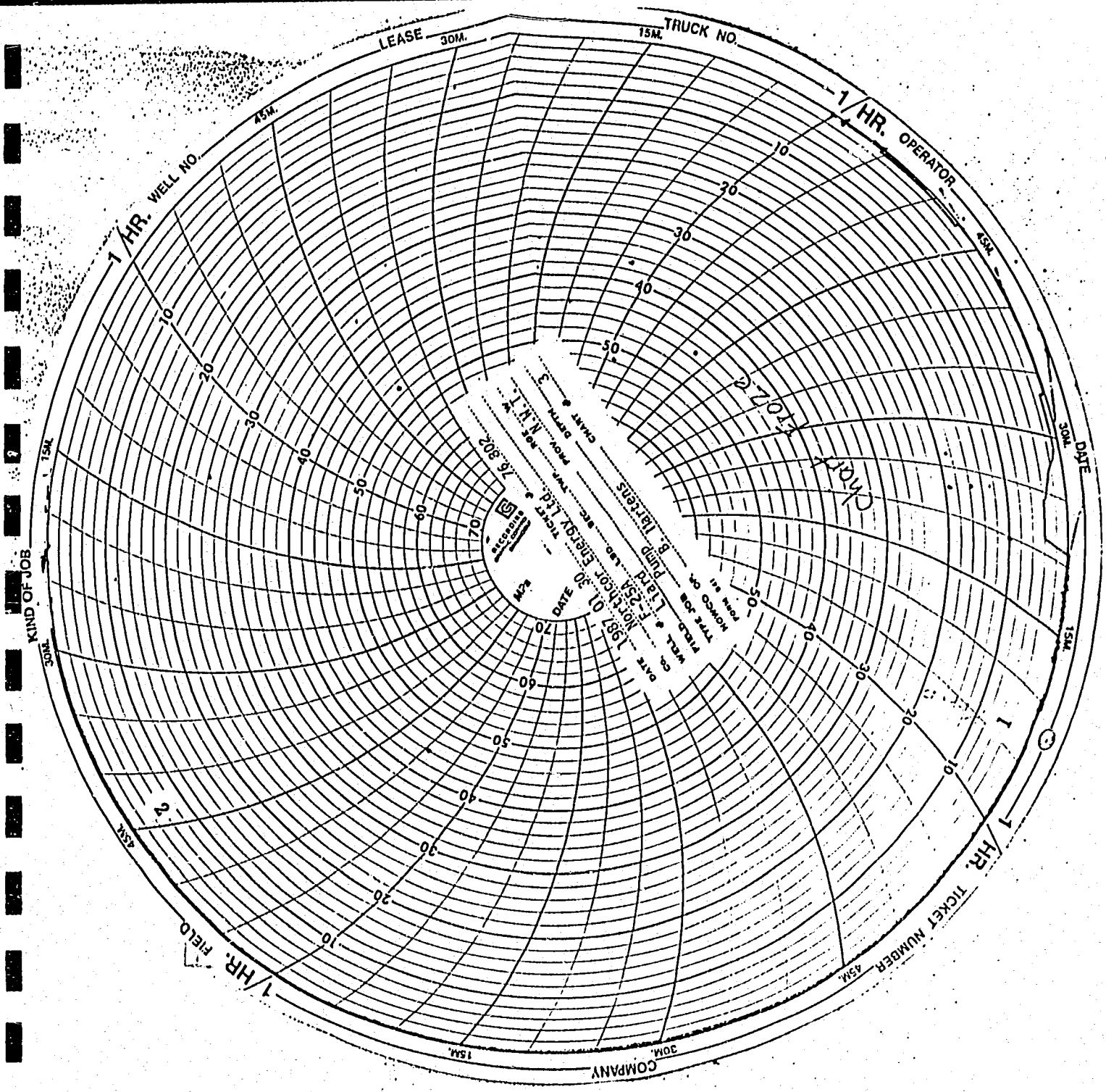
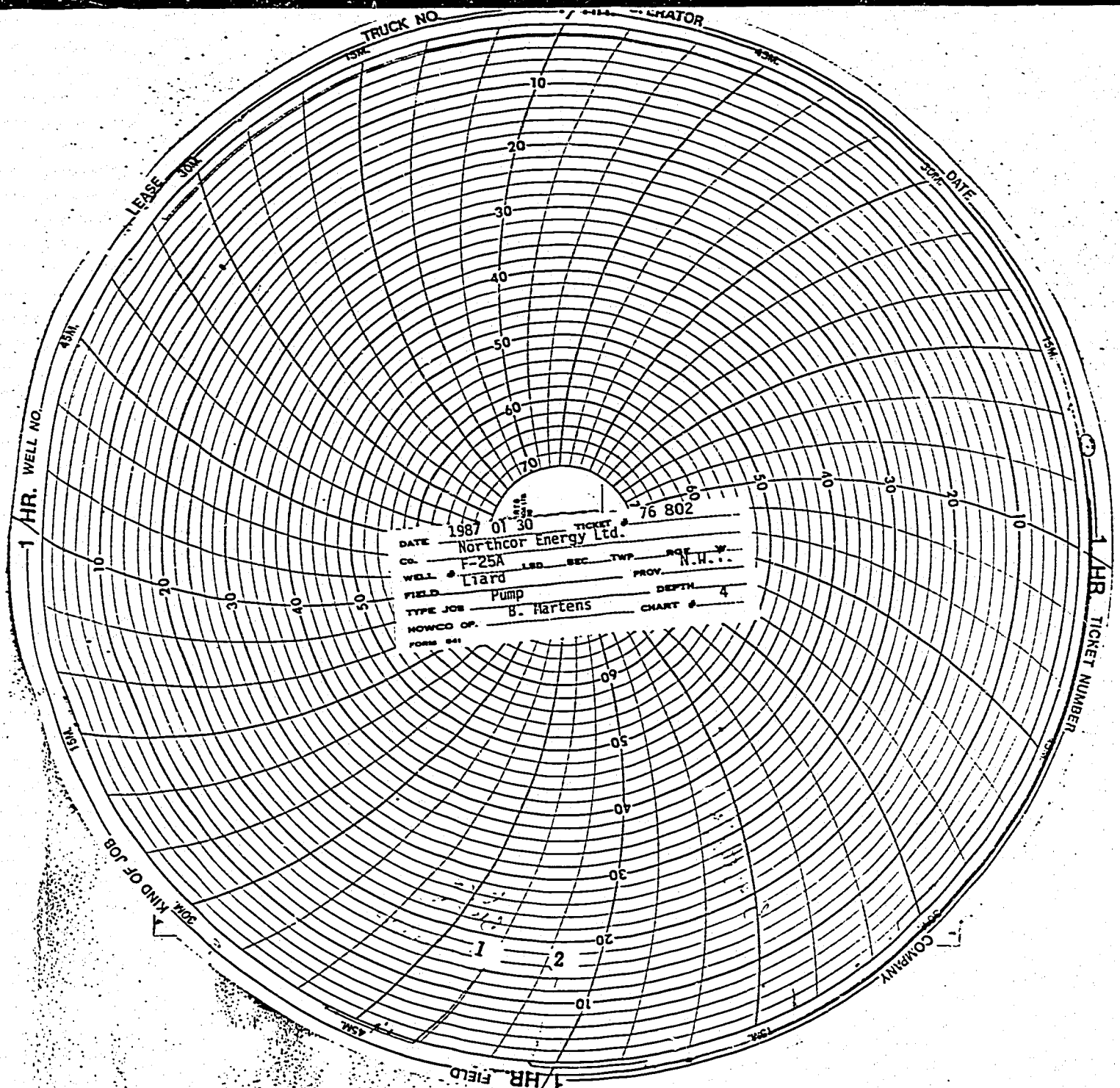
45M.
1/HR. OPERATOR
1/HR. COMPANY
1/HR. FIELD
TRUCK NO.
LEASE
1/HR. WELL NO.
KIND OF JOB
10
20
30
40
50
60
70
DATE 1987 01 29
CO. Northcor Energy Ltd.
WELL # F-25A
FIELD Liard
TYPE JOB Well Kill
NOWCO OP. B. Martens
FORM 641
TICKET # 76 802
LSD SEC TWP PROV N.W.T.
DEPTH 2
CHART #
1
2
3


TRUCK NO.
1/HR.
OPERATOR
DATE
1/HR.
TICKET NUMBER
COMPANY
1/HR.
FIELD
KIND OF JOB
1/HR.
WELL NO.
LEASE
CHART
Nov 01 30 Elmcor Energy Ltd.
F-254 Lahd
Pump
B. Iartens
78,802
TICKET #
DEPTH
CHART #
PROV.
TWP.
SEC.
LSD.
DATE
WELL
FIELD
TYPE JOB
BOP STAC
HOMCO OK
PUMP SIZE
ACCURATE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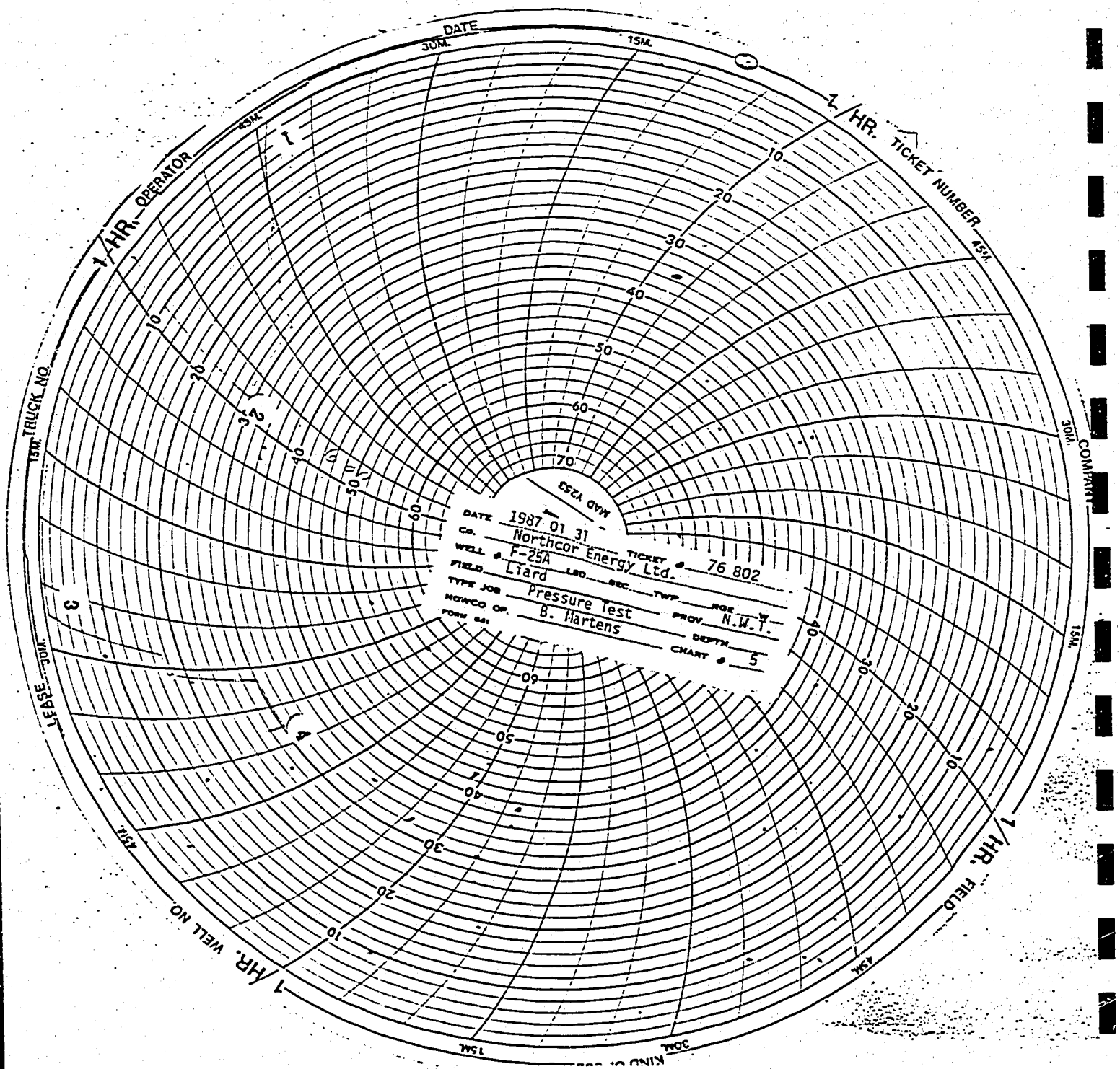
OPERATOR
DATE
LEASE JOB
WELL NO.
1/HR.
1/HR.
TICKET NUMBER
KIND OF JOB
COMPANY
1/HR. FIELD
1987 01 30
76 802
Northcor Energy Ltd.
F-25A
Liard
N.W.T.
Pump
B. Hartens
4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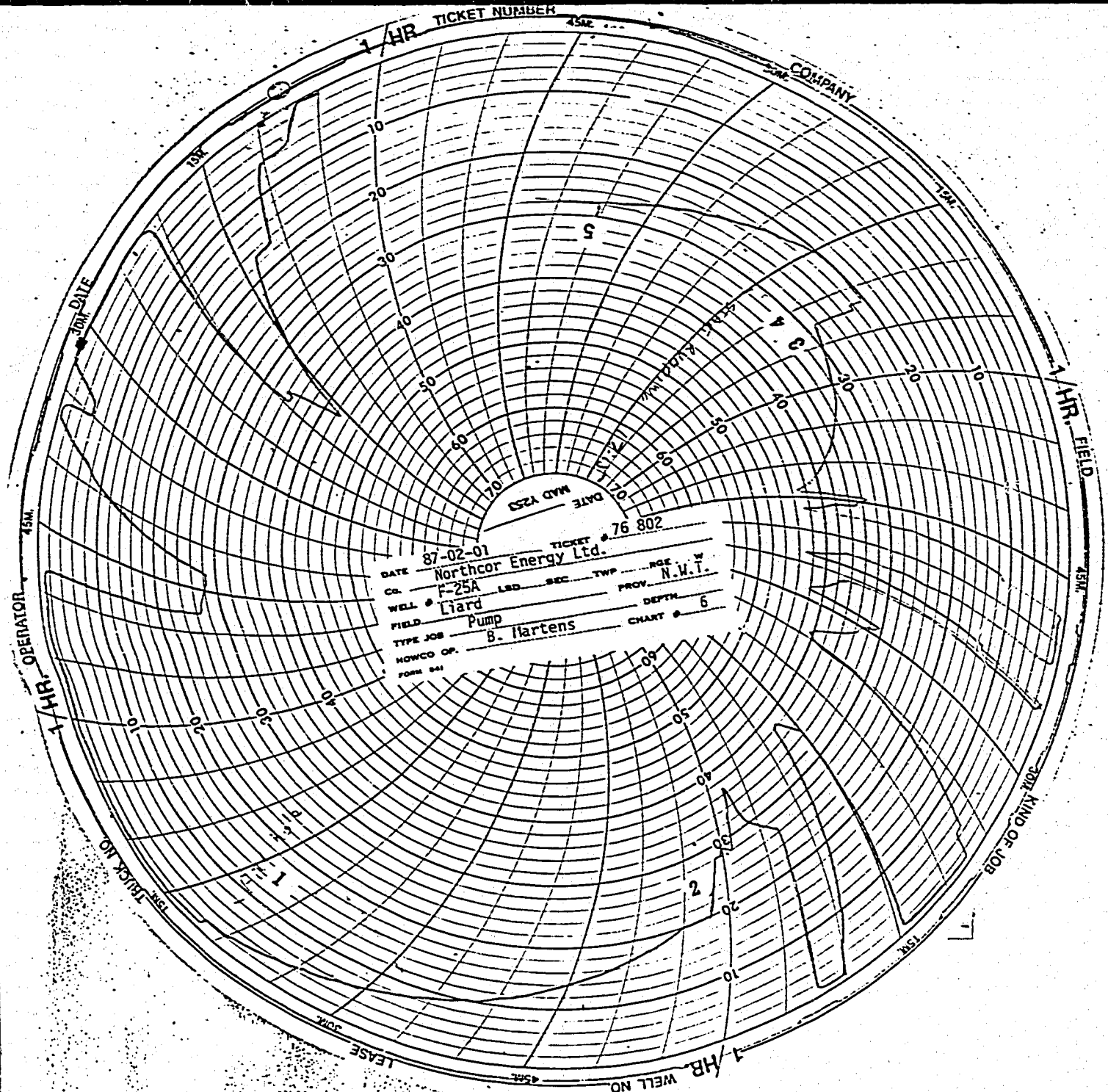
1/HR. TICKET NUMBER
1/HR. OPERATOR
TRUCK NO
LEASE
1/HR. WELL NO.
1/HR. FIELD
COMPANY
MAD V253
DATE 1987 01 31
CO. Northcor Energy Ltd.
TICKET # 76 802
WELL # F-25A
LSD SEC. TWP. RGE. W
FIELD Ltard
PROV. N.W.T.
TYPE JOB Pressure Test
DEPTH
NOWCO OP. B. Martens
CHART # 5
FORM 641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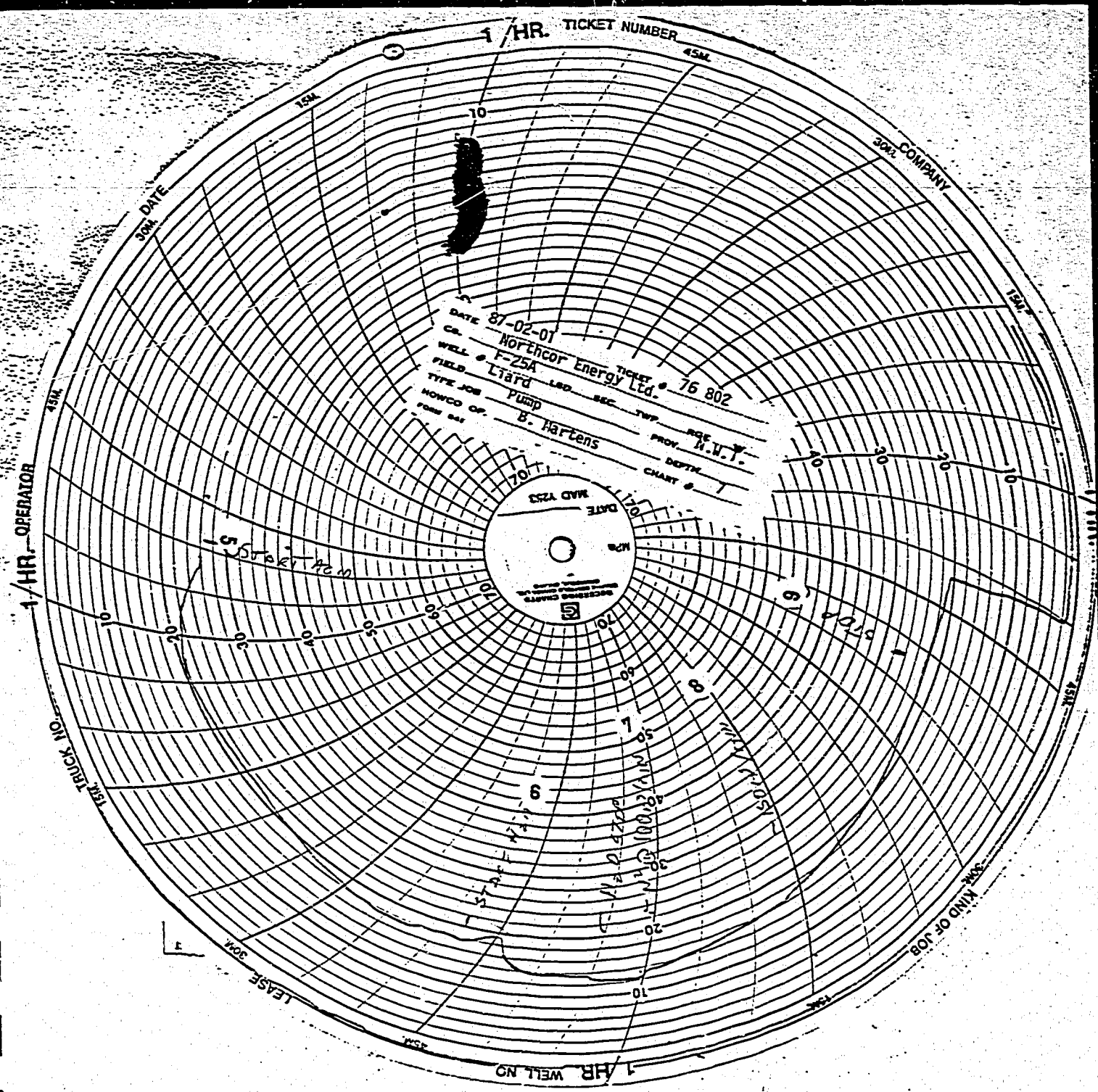
COMPANY
DATE
FIELD
KIND OF JOB
WELL NO
LEASE
TRUCK NO
OPERATOR
1 HR.
45M.
30M.
15M.
DATE 87-02-01
TICKET # 76 802
CO. Northcor Energy Ltd.
WELL # F-25A
FIELD Liard
LSD SEC TWP RGE
PROV. N.W.T.
TYPE JOB Pump
DEPTH
HOWCO OP. B. Martens
CHART # 6
FORM 541
MAD 7252
5
4
3
2
1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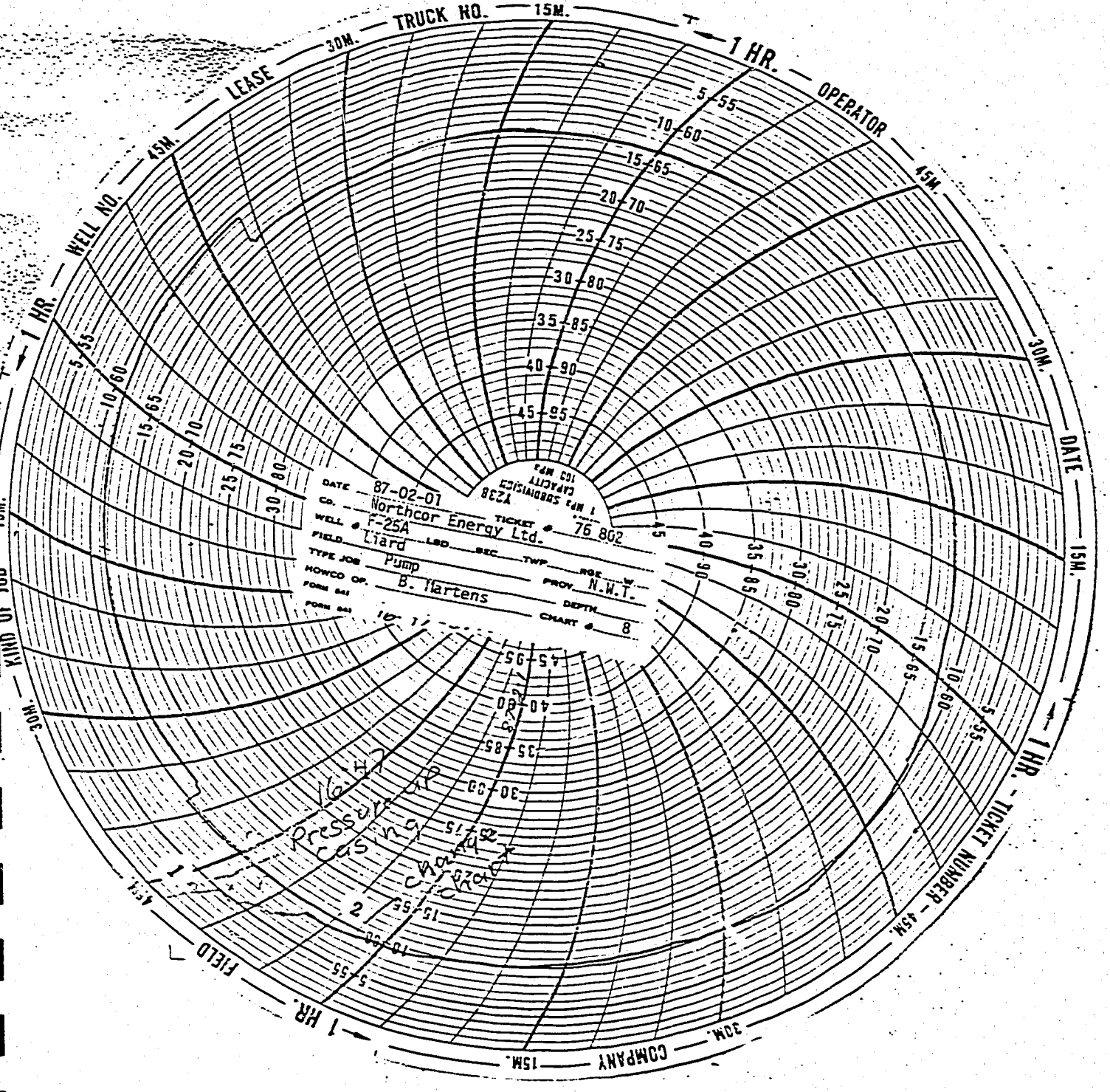
TICKET NUMBER
COMPANY
DATE
OPERATOR
TRUCK NO.
LEASE
KIND OF JOB
1/HR WELL NO
87-02-01
Northcor Energy Ltd.
76 802
F-25A
Liard
Pump
B. Hartens
N.W.T.
Stuck pipe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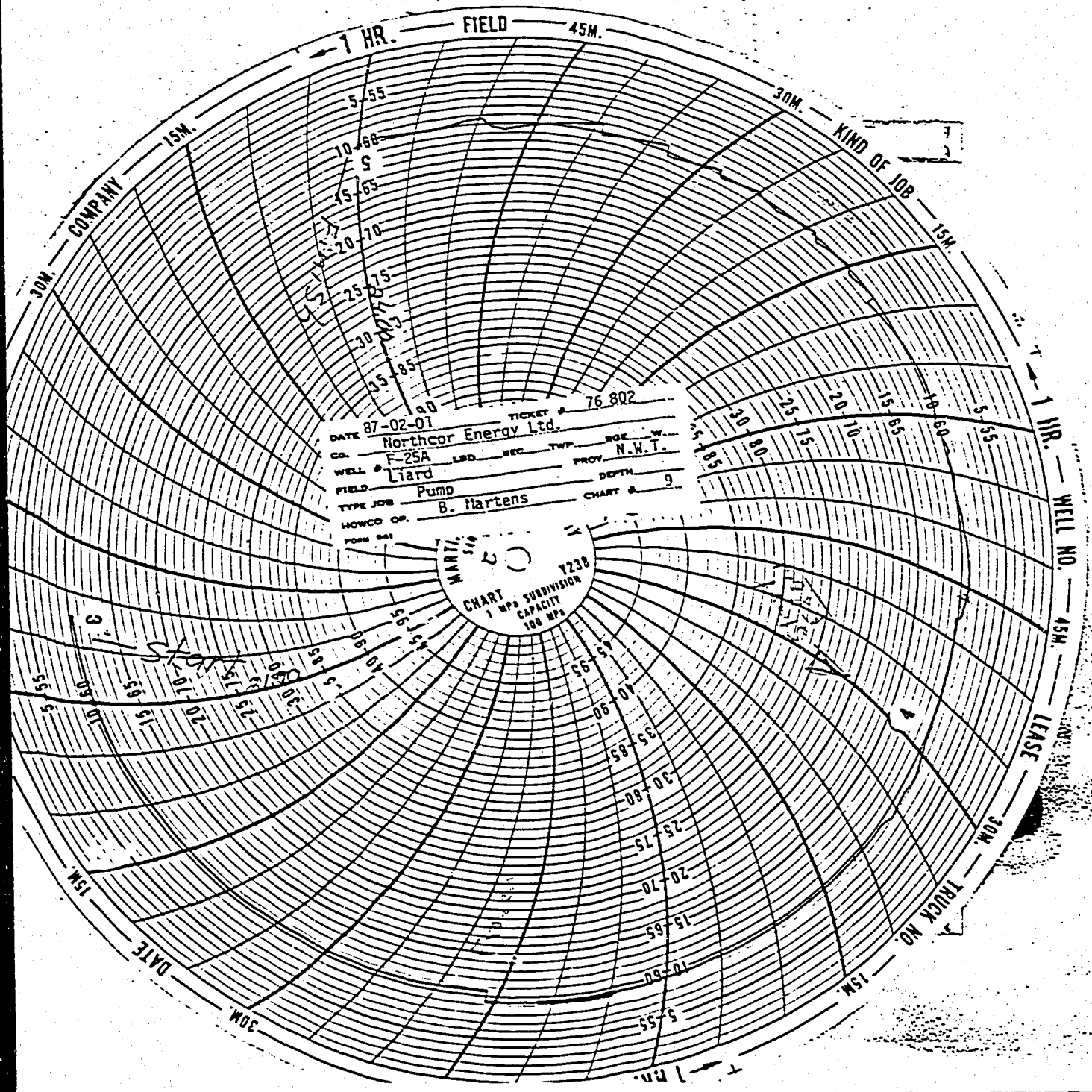
1 HR.
OPERATOR
45M.
DATE
30M.
15M.
1 HR.
TICKET NUMBER
45M.
30M.
COMPANY
15M.
1 HR.
FIELD
KIND OF JOB
WELL NO.
LEASE
DATE 87-02-01
CO. Northcor Energy Ltd.
TICKET # 76 802
WELL # F-25A
FIELD Liard
LSD SEC TWP RGE W
TYPE JOB Pump
PROV. N.W.T.
HOWCO OP. B. Martens
DEPTH
CHART # 8
FORM 641
FORM 641
8E2A
Z38
1 MPa SUBDIVISIONS
CAPACITY
103 MPa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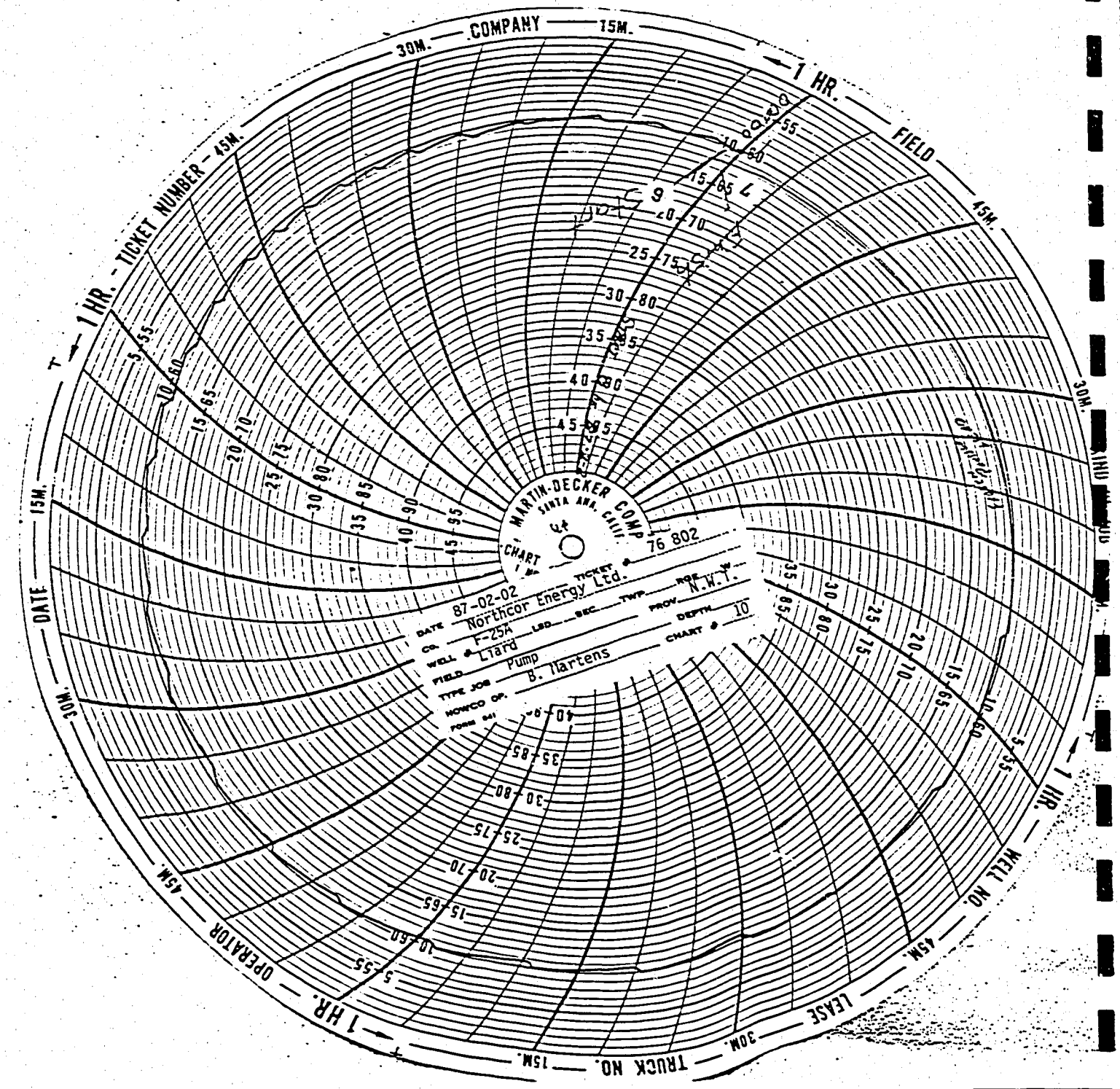
FIELD
45M.
30M.
KIND OF JOB
15M.
COMPANY
15M.
1 HR.
WELL NO.
45M.
LEASE
30M.
TRUCK NO.
15M.
DATE
30M.
1 HR.
DATE 87-02-01
TICKET # 76 802
CO. Northcor Energy Ltd.
WELL # F-25A LSD SEC TWP RGE W
FIELD Liard PROV. N.W.T.
TYPE JOB Pump DEPTH
HOWCO OP. B. Martens CHART # 9
FORM 841
CHART
1 MPa SUBDIVISION
CAPACITY
100 MPa
Y238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1 HR.
FIELD
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1 HR. - TICKET NUMBER - 45M.
DATE
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30M.
1 HR.
OPERATOR
45M.
1 HR.
TRUCK NO.
15M.
30M.
LEASE
45M.
1 HR.
WELL NO.
MARTIN-DECKER COMP
SANTA ANA, CALIF.
CHART
76 802
DATE 87-02-02
CO. Northcor Energy Ltd.
WELL # F-254
FIELD Liard
TYPE JOB Pump
HOWCO OP. B. Martens
FORM 541
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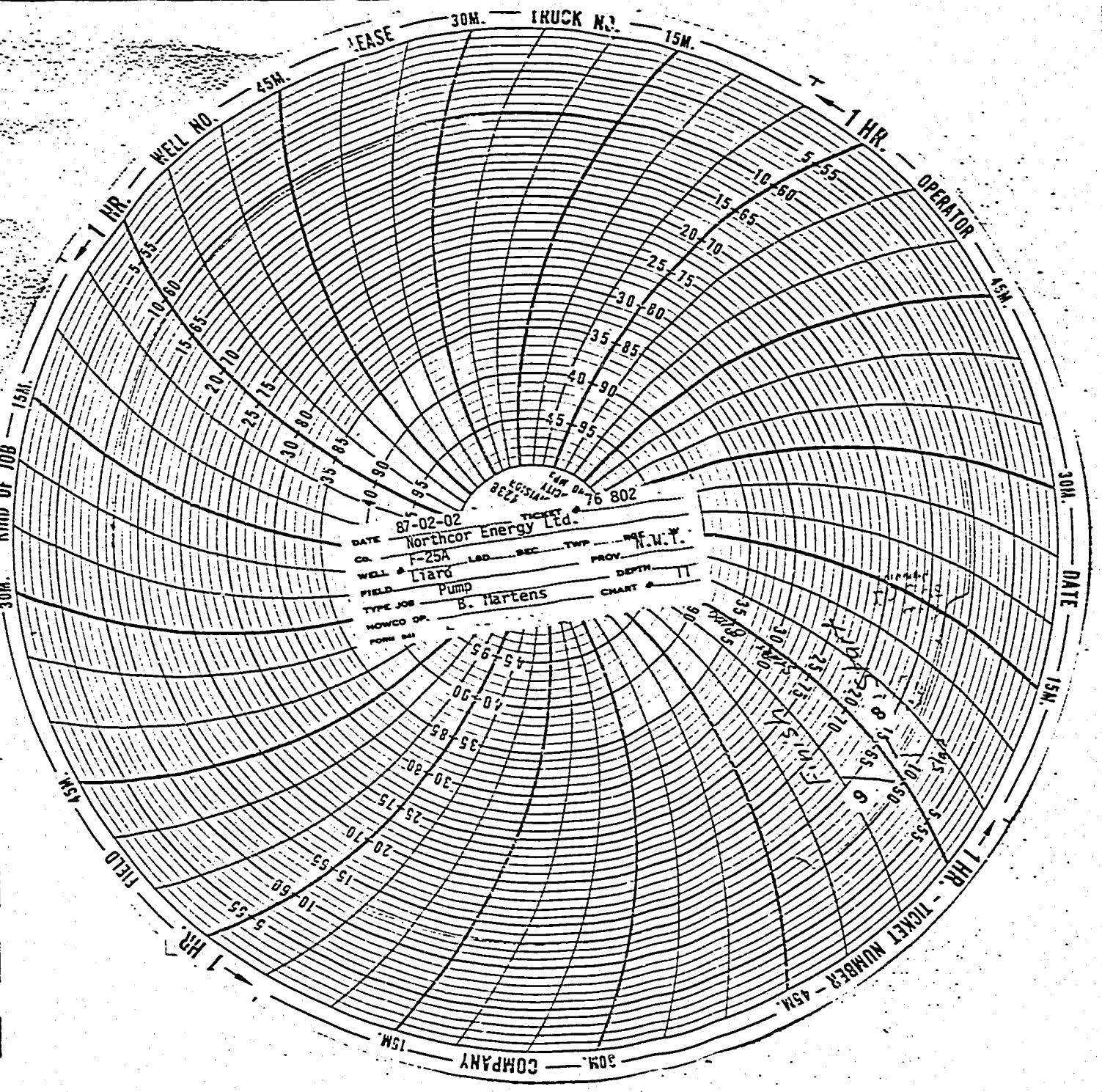
RGE
TWP
SEC
LSD
PROV N.W.T.
DEPTH
CHART # 10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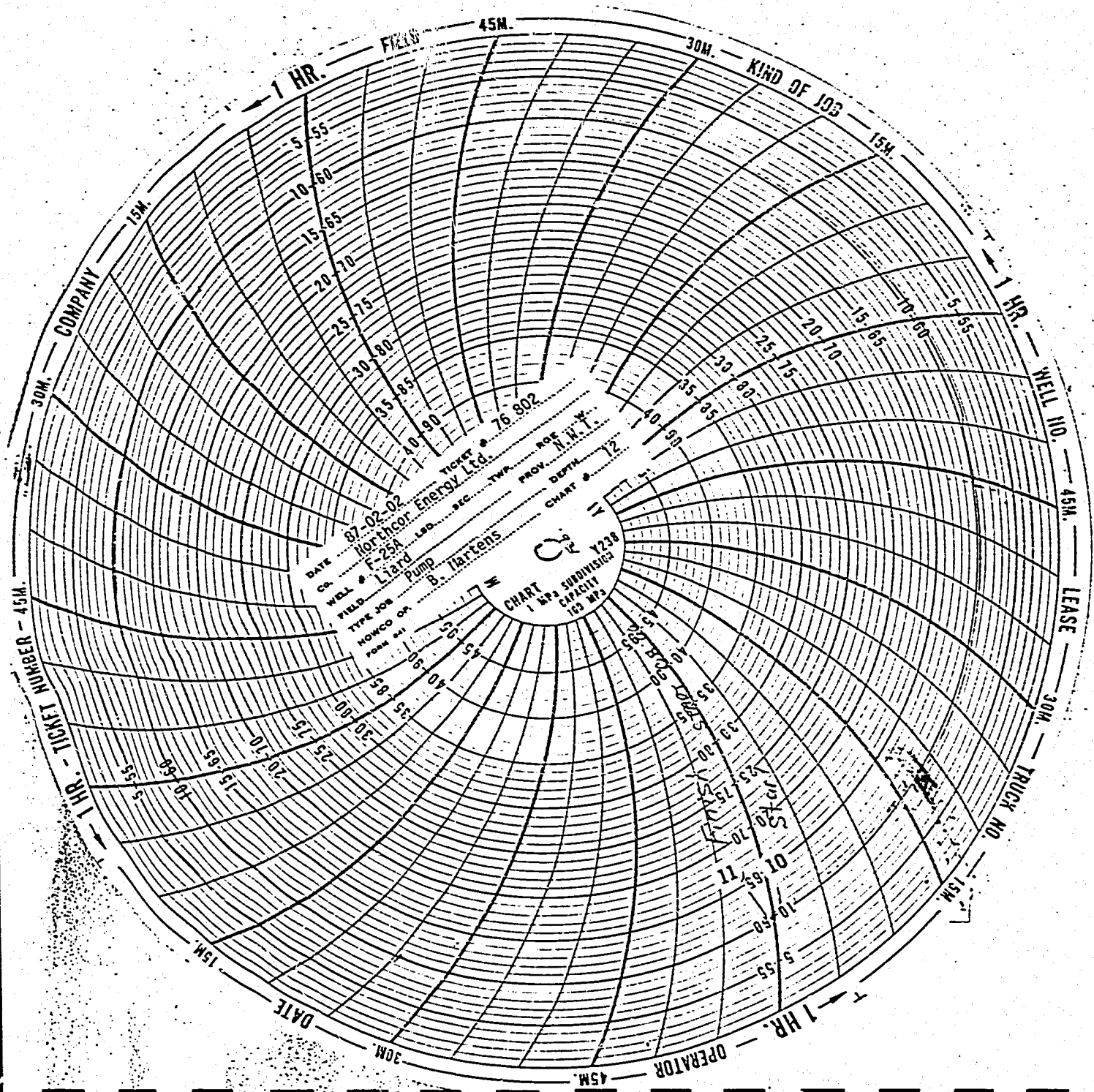
15M.
45M.
WELL NO.
1 HR.
OPERATOR
KIND OF JOB
DATE
FIELD
COMPANY
TICKET NUMBER
DATE 87-02-02
TICKET 76 802
CO. Northcor Energy Ltd.
WELL # F-25A
LSD SEC TWP RGE
PROV. N.W.T.
FIELD Liard
TYPE JOB Pump
DEPTH
HOWCO OP. B. Hartens
CHART #
FORM 561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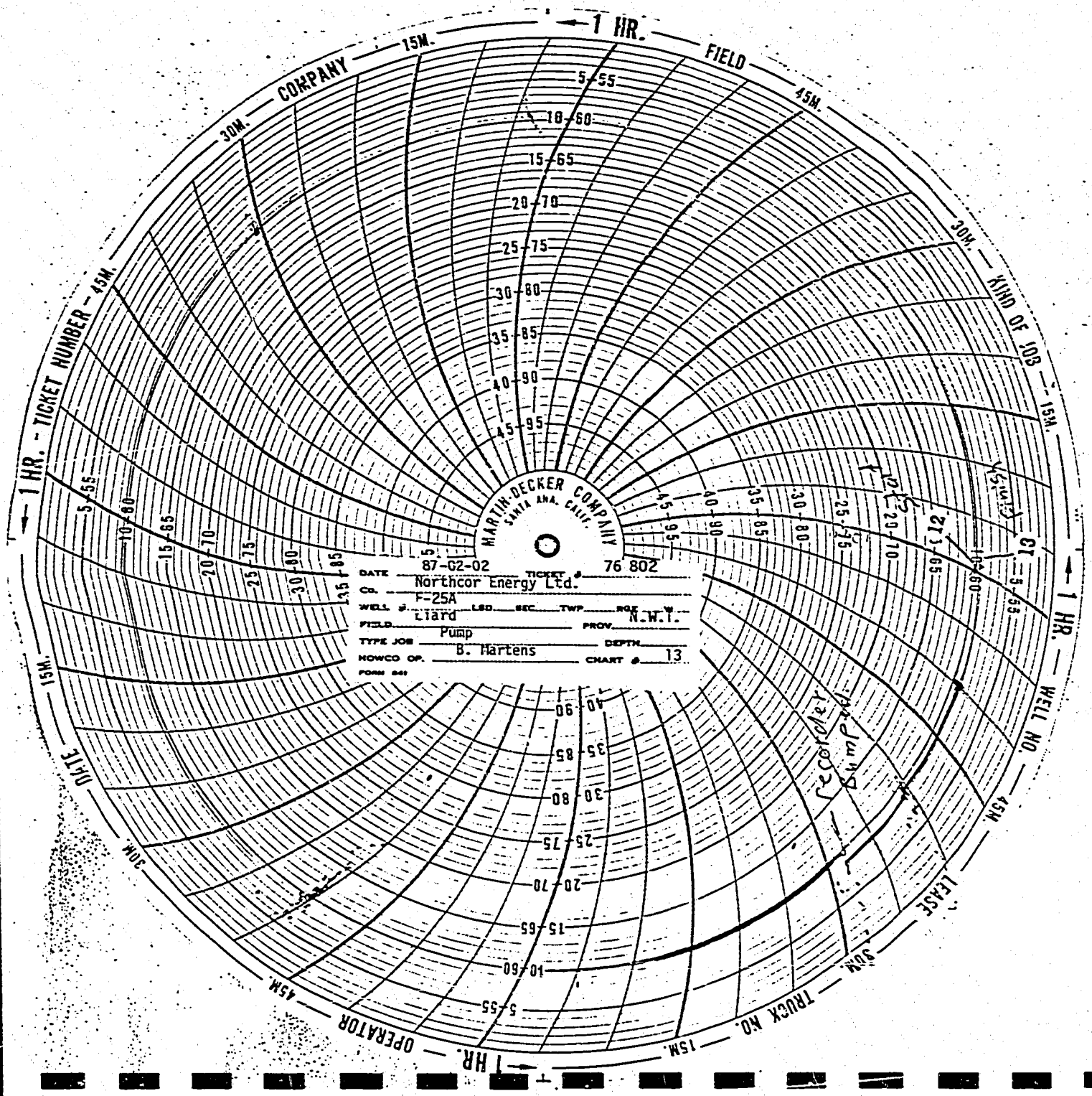
FIELD
45M.
30M.
KIND OF JOB
15M.
1 HR.
WELL NO.
45M.
LEASE
30M.
TRUCK NO
15M.
1 HR.
OPERATOR
45M.
30M.
DATE
15M.
1 HR. - TICKET NUMBER - 45M.
30M. — COMPANY — 15M.
DATE 87-02-02
CO. Northcor Energy Ltd.
WELL # F-25A
FIELD Liard
TYPE JOB Pump
HOWCO OP. B. Martens
FORM 441
TICKET # 76 802
SEC. TWP. RGE. N.W.T.
PROV.
DEPTH 12
CHART #
CHART
1 MPa SUBDIVISIONS
CAPACITY
103 MPa
Y238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WELL NO.
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LEASE
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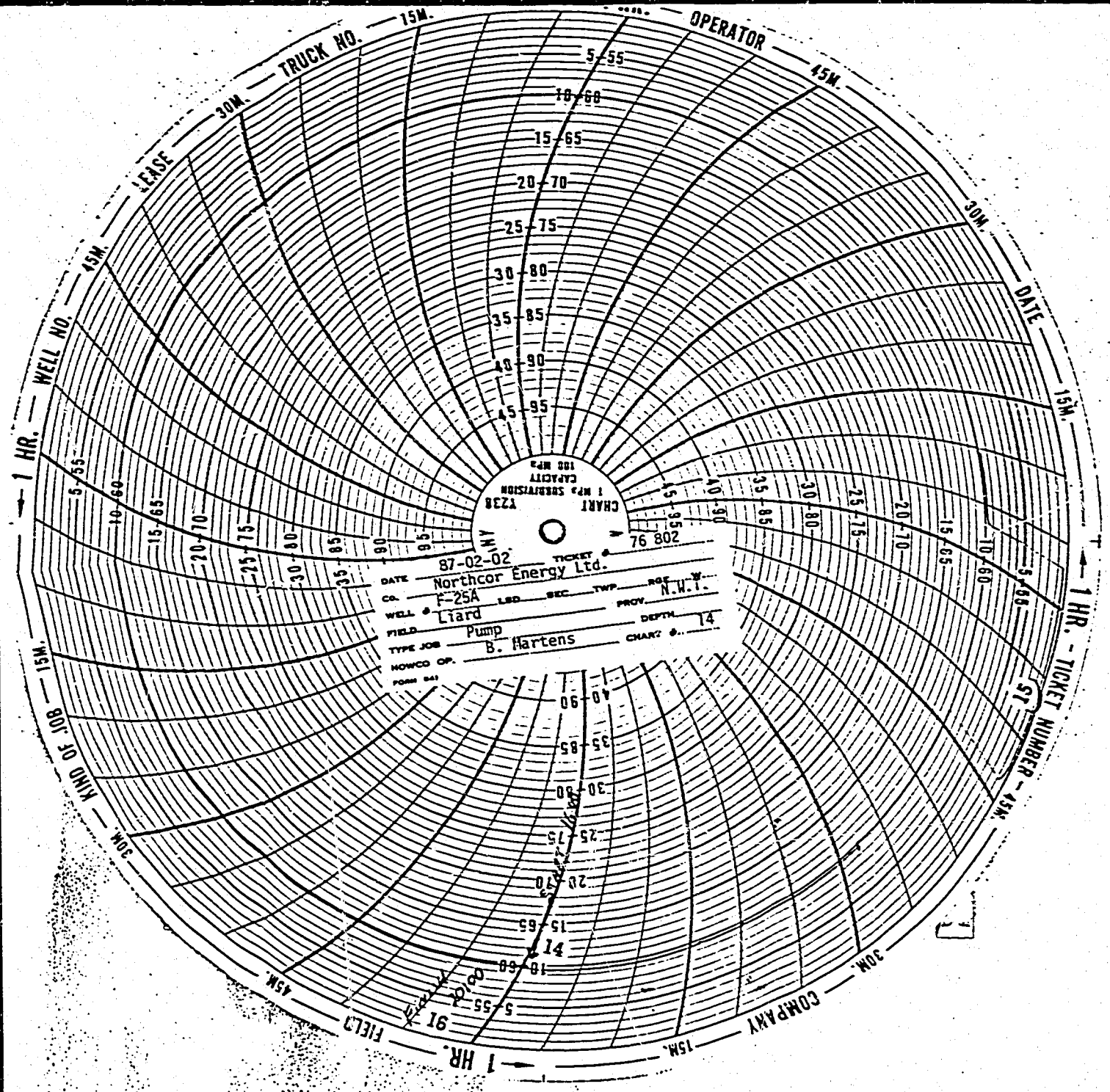
TRUCK NO.
15M.
1 HR.
OPERATOR
45M.
DATE
30M.
15M.
1 HR. - TICKET NUMBER - 45M.
COMPANY
MARTIN-DECKER COMPANY
SANTA ANA, CALIF.
DATE 87-02-02 TICKET # 76 802
CO. Northcor Energy Ltd.
WELL # F-25A LSD SEC TWP RGE W
FIELD Liard PROV. N.W.T.
TYPE JOB Pump DEPTH
NOWCO OP. B. Martens CHART # 13
FORM 841
Recorder Sample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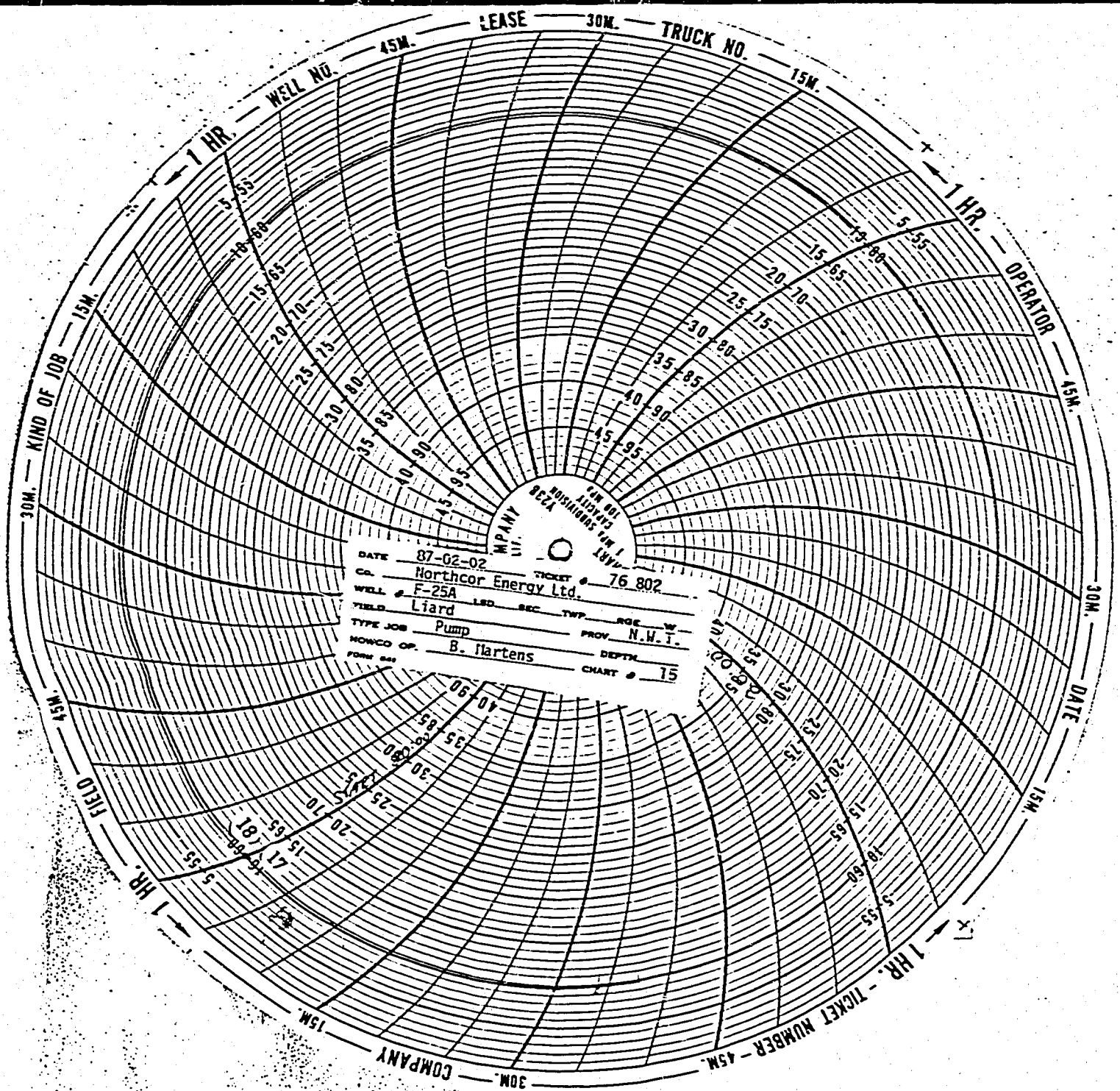
TRUCK NO.
LEASE
WELL NO.
DATE
TICKET NUMBER
COMPANY
FIELD
KIND OF JOB
15M.
30M.
45M.
1 HR.
CHART
76 802
TICKET
DATE 87-02-02
CO. Northcor Energy Ltd.
WELL # F-25A
LSD SEC TWP RGE W
FIELD Liard
PROV. N.W.T.
TYPE JOB Pump
DEPTH 14
HOWCO OP. B. Hartens
CHART #
FORM 941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30M.
TRUCK NO.
15M.
1 HR.
WELL NO.
45M.
1 HR.
OPERATOR
30M.
KIND OF JOB
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DATE
15M.
FIELD
45M.
1 HR.
TICKET NUMBER
45M.
30M.
COMPANY
15M.
1 HR.
DATE 87-02-02
TICKET # 76 802
CO. Northcor Energy Ltd.
WELL # F-25A
LSD SEC TWP RGE W
FIELD Liard
PROV. N.W.T.
TYPE JOB Pump
HOWCO OP. B. Martens
DEPTH
CHART # 15

ACID JOB #2

ACID JOB #2

HALLIBURTON SERVICES LIMITED

CEMENTING AND/OR SPECIAL TOOLS SERVICE REPORT

ATTACH TO INVOICE No. 76 803

HALLIBURTON DISTRICT: Grande Prairie

JOB DATE: 1987 (YEAR) 02 (MONTH) 05 (DAY)

OWNER, OPERATOR OR HIS AGENT STATES THE WELL IS IN GOOD CONDITION FOR THE SERVICE JOB TO BE PERFORMED AND SUBMITS THE FOLLOWING DATA.

CUSTOMER: Northcor Energy Ltd.

FIELD OR AREA: Liard

WELL No. AND LEASE: Liard F-25A

CALLED OUT	ON LOCATION	JOB STARTED	JOB COMPLETED	PROVINCE	LSD	SEC	TWP	RANGE	MERIDIAN
DATE / TIME	87-02-06 / 00:00	87-02-10 / 15:00	87-02-17 / 24:00	N.W.T.					W

TYPE OF JOB ✓

SURFACE | INTERMEDIATE | PRODUCTION | LINER | SQUEEZE | PLUG | PUMP ✓ | PRESSURE TEST | OTHER

WELL OR HOLE DATA

HOLE DATA: HOLE SIZE ____ mm; TOTAL DEPTH ____ m; TYPE MUD ____; VISC. ____; DENSITY ____

CASING, TUBING OR LINER DATA: NEW ☐ USED ☐ TBG; SIZE 177.8 mm kg/m 43.16 GRADE ____ DEPTH 3474.0 m; SIZE 88.9 mm kg/m 13.86 GRADE ____ DEPTH 3010.0 m

PERFORATIONS: FROM 3250.0 m TO 3258.0 m; FROM ____ m TO ____ m; FROM ____ m TO ____ m; FROM ____ m TO ____ m

WASH FLUID TYPE: ____ VOL ____ m³; DISPLACING FLUID TYPE: ____ VOL ____ m³

TEMP DATA: MIXING WATER ____ °C; SLURRY ____ °C; DISPLACING FLUID ____ °C; RETURNS ____ °C

PRODUCTS

EQUIPMENT	QUAN
BASKETS	
CENTRALIZERS	
CLAMPS	
FLOAT COLLAR	
FLOAT SHOE	
GUIDE SHOE	
INSERT FLOAT	
SCRATCHERS	
OTHER	

EQUIPMENT

PACKER: TYPE RTTS; SIZE ____ mm; DEPTH SET ____ m; TAIL PIPE ____ m

TOP PLUG TYPE ____

BOTTOM PLUG TYPE ____

CEMENT HEAD: CONTINUOUS ☐ KNOCK OFF ☐ SWAGE ☐; OTHER ____

CEMENT DATA

TONNE	API CLASS	BRAND	BULK OR SACKED	CEMENT BLEND	ADDITIVES TYPE AND PERCENT	kg/m³	m³/tonne

HALLIBURTON OPERATOR: B. Martens CUSTOMER REP. ____

TREATING LOG

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³ STAGE	VOLUME PUMPED IN m³ TOTAL	VOLUME PUMPED IN m³ IN FORMATION	PRESSURE MPa TUBING	PRESSURE MPa CASING	REMARKS
								Pump as instructed.

FORM No. 1674

HALLIBURTON SERVICES LIMITED

FRACTURING AND CHEMICAL SERVICES
SERVICE REPORT

ATTACH TO INVOICE No. 76 803

HALLIBURTON DISTRICT: Grande Prairie

JOB DATE: 1987 (YEAR) 02 (MONTH) 13 (DAY)

OWNER, OPERATOR OR HIS AGENT STATES THE WELL IS IN CONDITION FOR THE SERVICE JOB TO BE PERFORMED AND SUBMITS THE FOLLOWING DATA.

CUSTOMER	FIELD OR AREA	WELL No. AND LEASE
Northcor Energy Ltd.	Liard	Liard F-25A

CALLED OUT (DATE / TIME)	ON LOCATION (DATE / TIME)	JOB STARTED (DATE / TIME)	JOB COMPLETED (DATE / TIME)	PROVINCE	LSD.	SEC.	TWP	RANGE	MERIDIAN
		87-02-13 09:30	87-02-13 12:30	N.W.T.					W

WELL OR HOLE DATA

FORMATION: Nahanni — DATE CASING SET:

TUBING OD 88.9 mm kg/m 13.86 DEPTH 3010.0 m

CASING OD 177.8 mm kg/m 43.16 DEPTH m

LINER OD mm kg/m FROM m TO m

PACKER TYPE RTTS SET AT m

TREAT THRU: TBG [X] ANNULUS [ ] CGS [ ] TBG AND ANNULUS [ ]

MAX. ALLOWABLE PRESSURE: TBG 35 MPa CSG MPa

CAPACITY: TBG 14.2 ANNULUS CSG/OPEN HOLE

PERFORATIONS: FROM 3250.0 m TO 3258.0 m cm SHOT

FROM m TO m cm SHOT

FROM m TO m cm SHOT

FROM m TO m cm SHOT

FROM m TO m cm SHOT

FROM m TO m cm SHOT

OPEN HOLE: SIZE mm FROM m TO m

MATERIALS USED

FLUID TYPE (1) 28% HCl		FLUID TYPE (2) N2	
m³ 16.0		m³ 12 000	
ADDITIVES: TYPE	kg/m³ / L/m³	ADDITIVES: TYPE	kg/m³ / L/m³
HAI-75	20.0		
LOSURF-300	3.0		
HC-2	10.0		
HII-124A	50.0		
HII-124B	10.5		

	TYPE	MESH	TONNE
PROP AGENT (1)			
(2)			
(3)			

PROP. CONC. kg/m³ (1) MAX MIN AVE

(2) MAX MIN AVE

(3) MAX MIN AVE

DIVERTING AGENT: TYPE AMOUNT

TREATMENT SUMMARY

kW AVAILABLE USED

INJECTION RATES m³/min 0.5

TREAT 100 SCM DISPLACE 100.0 SCM AVERAGE 100.0 SCM

PRESSURES MPa

BREAKDOWN FROM TO

MAX. TREAT 29.0 MIN TREAT 19.0 DISP

INSTANTANEOUS SHUTIN 29.0 15 MIN 23.4

FLUID VOLUMES m³

TOTAL ON LEASE BEFORE JOB		
FILL HOLE		
BREAKDOWN AND PAD		
TREATING FLUID (1)		
TREATING FLUID (2)		
FLUSH FLUID		
TOTAL FLUID INJECTED		
TOTAL ON LEASE AFTER JOB		

HALLIBURTON OPERATOR B. Martens CUSTOMER REP.

SUMMARY OF PLANNED TREATMENT: Take N2 feedrate. Pump acid and N2. Displace with N2.

FORM 168A

HALLIBURTON SERVICES LIMITED

TREATING LOG

INVOICE No. 76 803

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³			PRESSURE MPa		REMARKS
			STAGE	TOTAL	IN FORMATION	TUBING	CASING	CHART #1 87-02-10
	15:00							Called up to rig to pump down
								casing to open PCT.
1	18:30							Start pumping down casing.
2			1.05				11.0	Stop.
							10.5	Continue holding pressure on
								PCT.
3	22:05							Change chart.
4	22:05							New chart #2.
								87-02-11
5	00:00						10.0	Continue holding pressure.
6	01:27						18.0	Rupture reverse out sub.
7	01:30	0.45					2.0	Reverse circulate to kill well.
								Killed after 14.15 m³ pumped.
8	02:00						3.0	Change chart.
9	02:00						2.0	New chart #3.
10	02:20		2.25				4.0	Stop.
	04:15							Pull packer at 04:15.
								Go back to camp.

Form 957

HALLIBURTON SERVICES LIMITED

TREATING LOG

INVOICE No. 76 803

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³			PRESSURE MPa		REMARKS
			STAGE	TOTAL	IN FORMATION	TUBING	CASING	1987 02 11 CHART #4
	09:30							Called back to rig to fill hole
								while string is pulled.
1	10:40		0.36	0.36			0.0	Pump.
2	11:00		0.36	0.72			0.0	Pump.
3	11:30		0.36	1.08			0.0	Pump.
4	11:45		0.36	1.44			0.0	Pump.
5	11:58		0.36	1.80			0.0	Pump. Lunch time.
6	12:42	0.36		2.16			0.0	Pump.
7	12:58		0.36	2.52			0.0	Pump.
8	13:10		0.36	2.88			0.0	Pump.
9	13:19		0.36	3.24			0.0	Pump.
10	13:31		0.36	3.60			0.0	Pump.
11	13:45		0.36	3.96			0.0	Pump.
12	13:54		0.36	4.32			0.0	Pump.
13	14:06		0.36	4.68			0.0	Pump.
								CHART #5
14	14:20		0.36	5.04			0.0	Pump.
15	14:34		0.36	5.40			0.0	Pump.
16	14:52		0.36	5.76			0.0	Pump.
17	15:02		0.36	6.12			0.0	Pump.
18	15:12		0.36	6.48			0.0	Pump.
19	15:31		0.36	6.84			0.0	Pump.
20	15:42		0.1	6.94			0.0	Pump.
21	15:49		0.1	7.04			0.0	Pump.
22	16:23		0.3	7.34			0.0	Pump.

Form 957

HALLIBURTON SERVICES LIMITED

TREATING LOG

INVOICE No. 76 803

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³			PRESSURE MPa		REMARKS
			STAGE	TOTAL	IN FORMATION	TUBING	CASING	
23	16:37		0.36	7.70			0.0	Pump.
24	16:46		0.36	8.06			0.0	Pump.
25	16:50		0.36	8.42			0.0	Pump.
26	16:57		0.36	8.78			0.0	Pump.
27	17:04		0.36	9.14			0.0	Pump.
28	17:15		0.36	9.50			0.0	Pump.
29	17:37		0.36	9.86			0.0	Pump.
30	17:48		0.50	10.36			0.0	Pump.
								Standby until string goes back
								into casing.
								87-02-12
	08:30							String in hole.
	10:30							Set packer. Rig in Otis head.
								CHART #6
1	11:29							Fill surface lines.
2	11:40							Pressure test Howco, Otis
								head, and Norward lines 33 MPa.
3	11:46							Bleed off.
								Wait to open PCT valve.
								CHART #7
1	16:13		6.6				0.0	Fill annulus.
2	16:06		0.03				5.0	Pressure up annulus.
3A	16:18		0.02				10.5	Pressure up to open PCT.
								Stop pumping.
3B	16:20						13.0	Bleed down annulus to

HALLIBURTON SERVICES LIMITED

TREATING LOG

INVOICE No. 76 803

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³			PRESSURE MPa		REMARKS
			STAGE	TOTAL	IN FORMATION	TUBING	CASING	
								required pressure.
4	16:34						0.0	Bleed off annulus.
5	16:43		0.02				10.5	Open PCT valve.
6	16:47		0.02					Pump as required to maintain
								pressure.
7	19:59						10.5	Pump as required. Continued
								Otis rigged in.
								CHART #8 Change chart.
8	20:00							Pump as required to maintain
								pressure. Otis pumping also.
9	24:00							Change chart.
								CHART #9 1987 02 13
10	00:01							Otis maintaining annulus.
11	00:50							Flow well to Norward.
12	04:00							Well flow chart.
								Change chart.
13	04:00							Continue maintaining pressure.
14	08:00							Continue maintaining pressure.
15	08:30							Change chart.
								CHART #11
16	08:30							Maintain pressure.
								Start acid job 10:16.
								Finish acid job 12:30.
17	12:00							Change chart.

HALLIBURTON SERVICES LIMITED

TREATING LOG

INVOICE No. 76 803

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³			PRESSURE MPa		REMARKS
			STAGE	TOTAL	IN FORMATION	TUBING	CASING	
								CHART #12
18	12:00							Maintain pressure.
19	15:15							Rig out Howco lines.
								Otis maintaining pressure.

Form 957

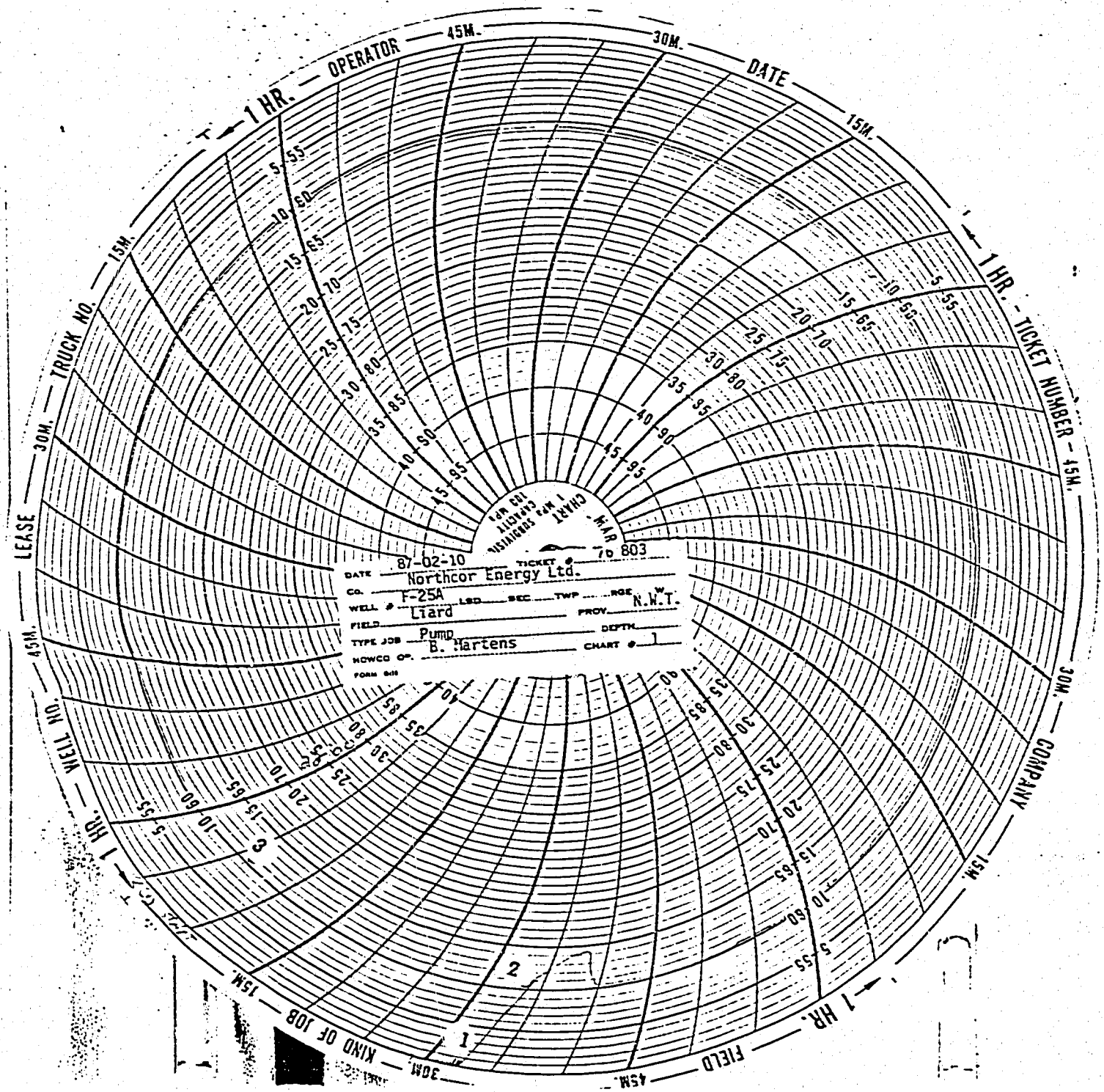
HALLIBURTON SERVICES LIMITED

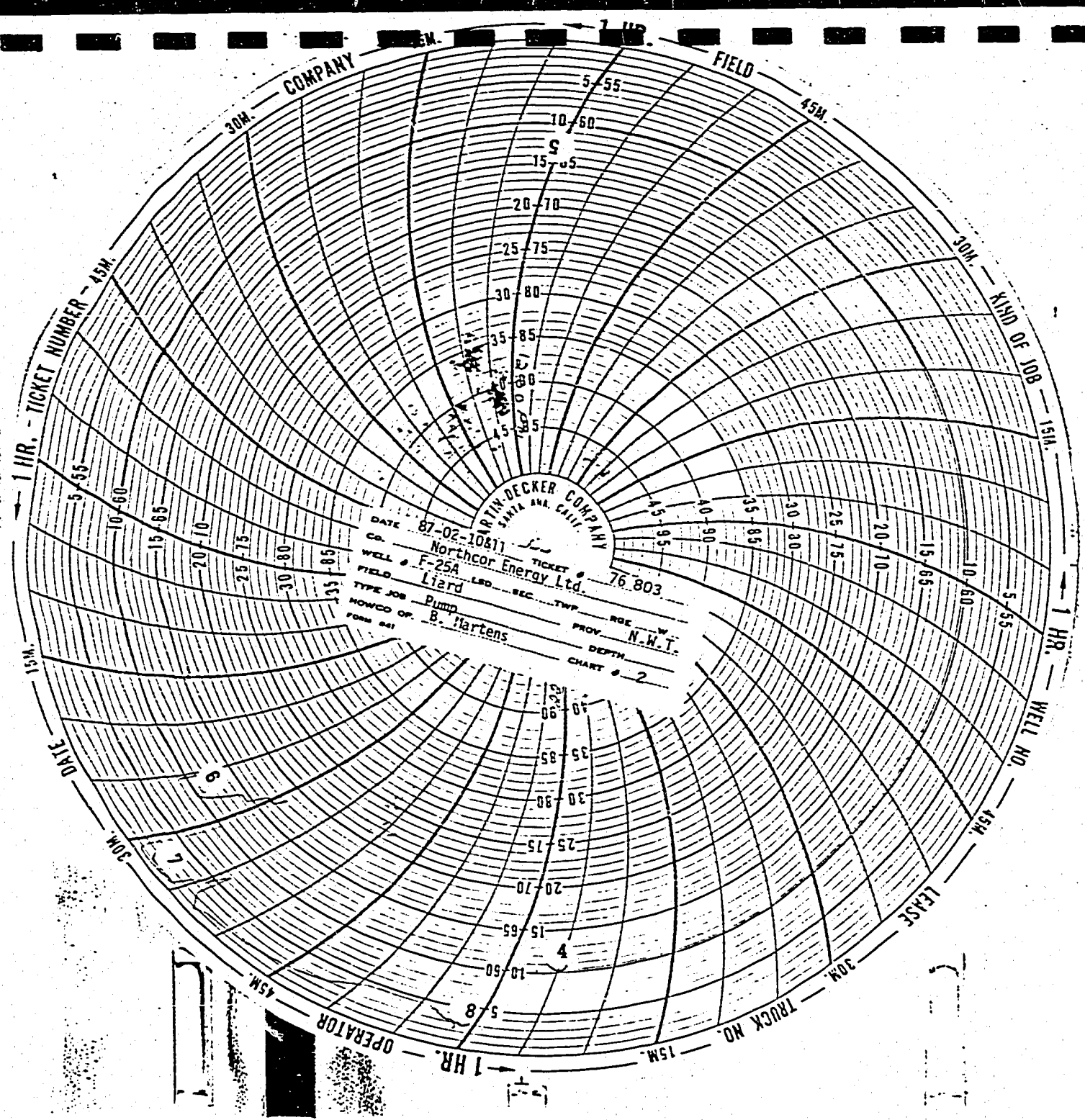
TREATING LOG

INVOICE No. 76 803

CHART POSITION	TIME	RATE m³/min	VOLUME PUMPED IN m³			PRESSURE MPa		REMARKS 87-02-13 28% HCl & N2 Squeeze
			STAGE	TOTAL	IN FORMATION	TUBING	CASING	
	09:30							Safety meeting.
1	09:42							Pressure test lines.
2	10:16	100.0				19.0		N2 feedrate.
3	10:26		1000.0	1000.0		21.5		Start acid.
4	10:37		1100.0	2100.0		22.0		Lost suction. Pick up pumps.
5	10:50	100.0 0.5				21.0		Restart acid and N2.
6	11:13					19.5		Acid at perforations.
7	11:37		4800.0 16.0	6900.0 16.0		20.0		Start H2O flush.
8	11:44	100.0	2.0	18.0		20.0		Start N2 displacement.
9	12:04	265.0	2000.0	8900.0 18.0		24.0		Increase N2 rate.
10	12:13		2385.0	11215.0 18.0	18.0	29.0		Stop.
11	12:28					23.4		15 minute shut in.

Form 257


OPERATOR
DATE
TICKET NUMBER
COMPANY
FIELD
KIND OF JOB
WELL NO.
TRUCK NO.
LEASE
1 HR.
45M.
30M.
15M.
CHART
1 MPa CAPACITY
150 MPa
87-02-10
To 803
Northcor Energy Ltd.
F-25A
Liard
N.W.T.
Pump
B. Martens
1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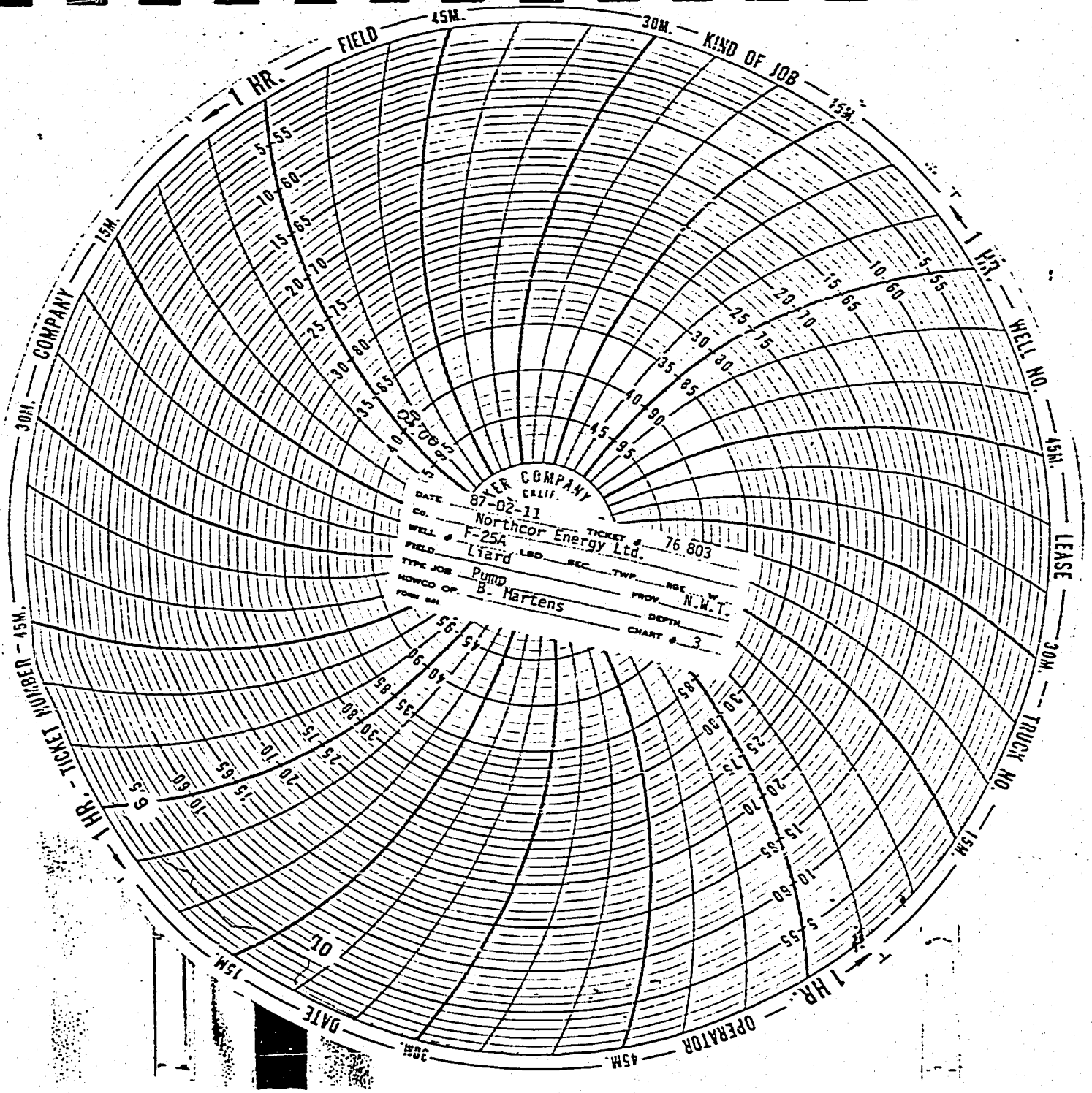
COMPANY
FIELD
30M.
45M.
KIND OF JOB
15M.
1 HR.
WELL NO.
45M.
LEASE
30M.
TRUCK NO.
15M.
1 HR.
OPERATOR
45M.
30M.
DATE
15M.
1 HR. - TICKET NUMBER - 45M.
MARTIN-DECKER COMPANY
SANTA ANA, CALIF.
DATE 87-02-10&11
TICKET # 76 803
CO. Northcor Energy Ltd.
WELL # F-25A
LSD SEC TWP RGE W
FIELD Liard
PROV. N.W.T.
TYPE JOB Pump
DEPTH
HOWCO OP. B. Martens
CHART # 2
FORM 841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FIELD
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30M.
KIND OF JOB
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1 HR.
WELL NO.
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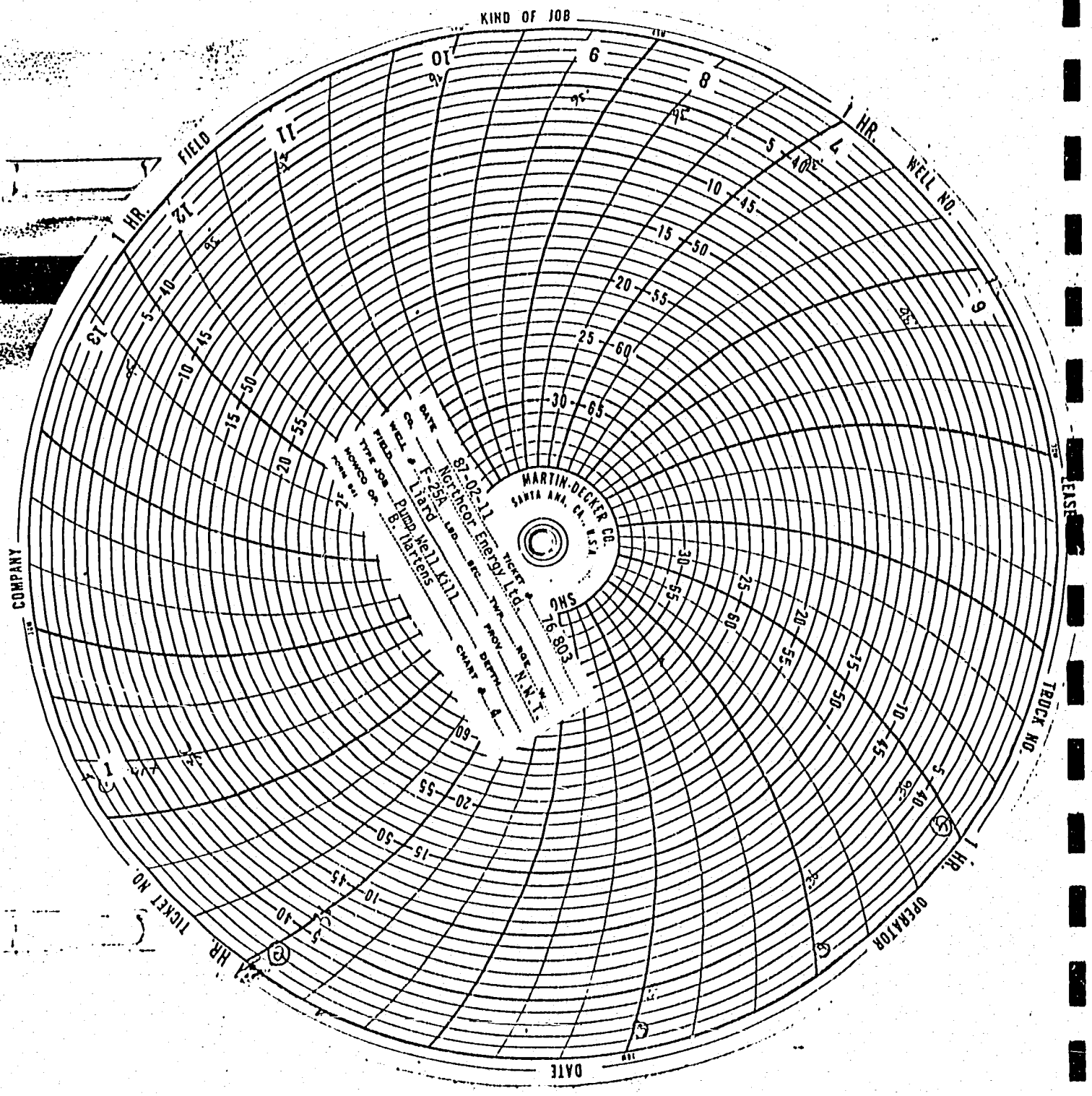
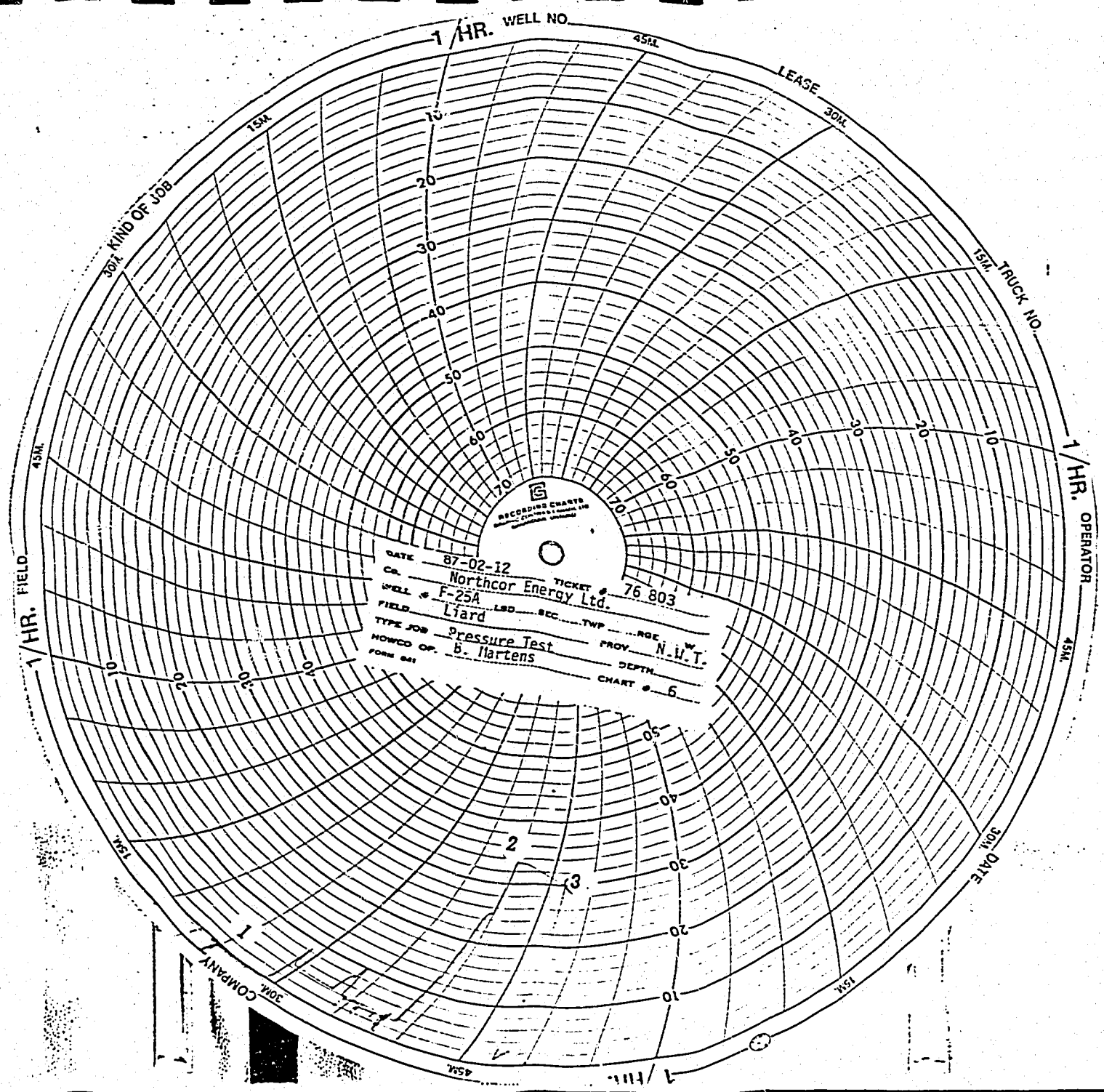
LEASE
30M.
TRUCK NO.
15M.
1 HR.
OPERATOR
45M.
30M.
DATE
15M.
OIL
1 HR.
TICKET NUMBER
45M.
30M.
COMPANY
15M.
DATE 87-02-11
CO. Northcor Energy Ltd.
WELL # F-25A
FIELD Liard
TYPE JOB Pump
HOWCO OP. B. Martens
FORM 541
TICKET # 76 803
LSD SEC TWP RGE W
PROV N.W.T.
DEPTH
CHART # 3


KIND OF JOB
WELL NO.
LEASE
TRUCK NO.
OPERATOR
DATE
TICKET NO.
COMPANY
FIELD
1 HR.
MARTIN-DECKER CO.
SANTA ANA, CA., U.S.A.
DATE 87-02-11
CO. Northcor Energy Ltd.
WELL # F-25A
FIELD Liard
TYPE JOB Pump Well Kill
B. Hartens
TICKET # 75,803
SEC. TWP. RGE. N.W.T.
DEPTH
CHART # 4
SHO

1 HR.
TICKET NO.
COMPANY
DATE
OPERATOR
FIELD
KIND OF JOB
TRUCK NO.
LEASE
WELL NO.
SHOWS SUBDIVISIONS
1255
SHPA
MARK
DATE 87-02-11
TICKET # 16803
CO. Northcor Energy Ltd.
WELL # F-25A
FIELD Liard
LSD SEC TWP RGE W
PROV N.W.T.
DEPTH
CHART # 5
TYPE JOB Well Kill
HOWCO OP. B. Martens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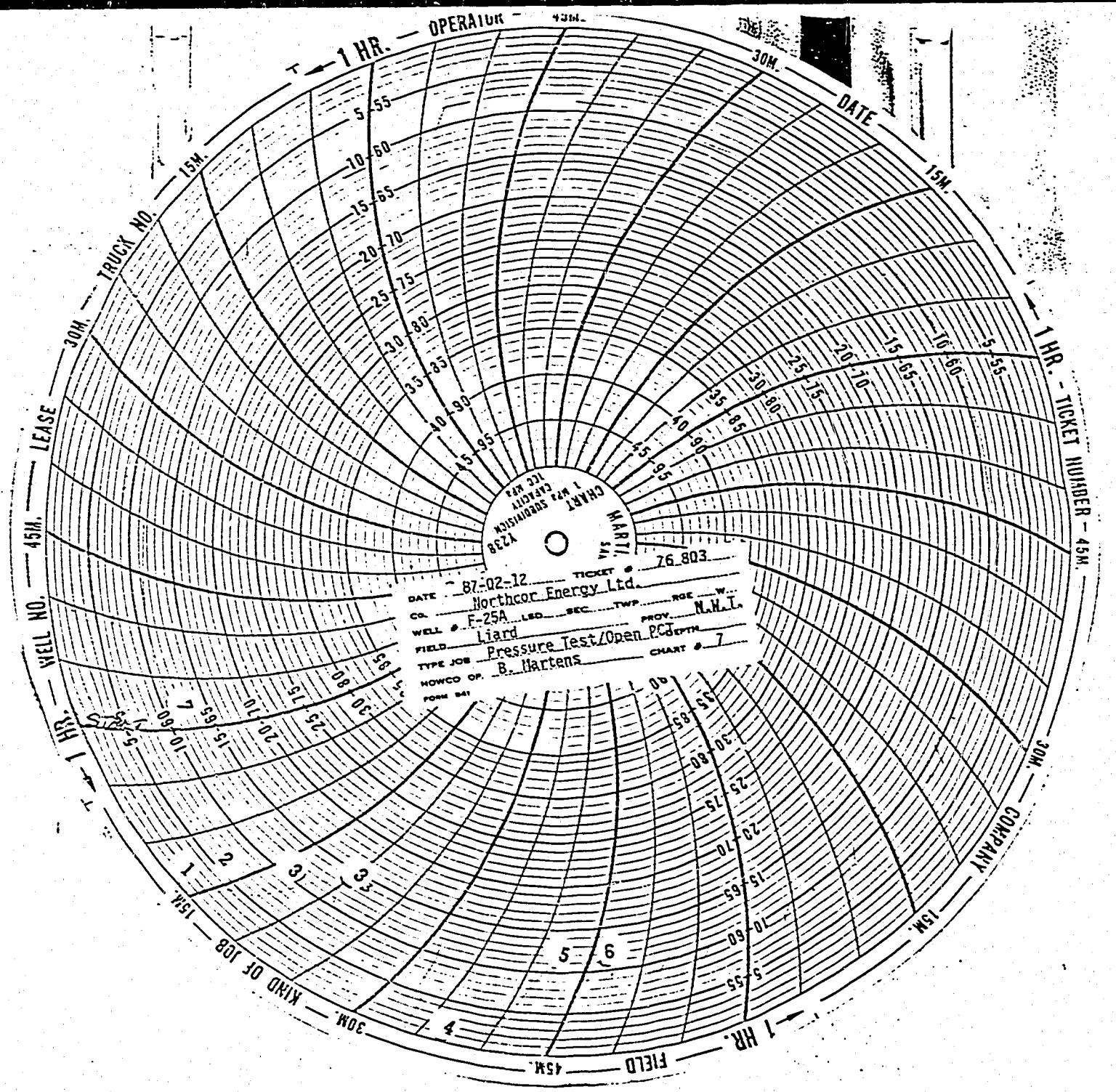
45M.
LEASE
30M.
15M.
TRUCK NO.
1/HR. OPERATOR
45M.
30M. KIND OF JOB
15M.
1/HR. FIELD
45M.
15M.
30M. COMPANY
45M.
1/HR.
DATE
10
20
30
40
50
60
70
RECORDING CHARTS
DATE 87-02-12
TICKET # 76 803
CO. Northcor Energy Ltd.
WELL # F-25A
LSD SEC TWP RGE W
FIELD Liard
PROV. N.W.T.
TYPE JOB Pressure Test
DEPTH
HOWCO OP. B. Martens
CHART # 6
FORM 841
1
2
3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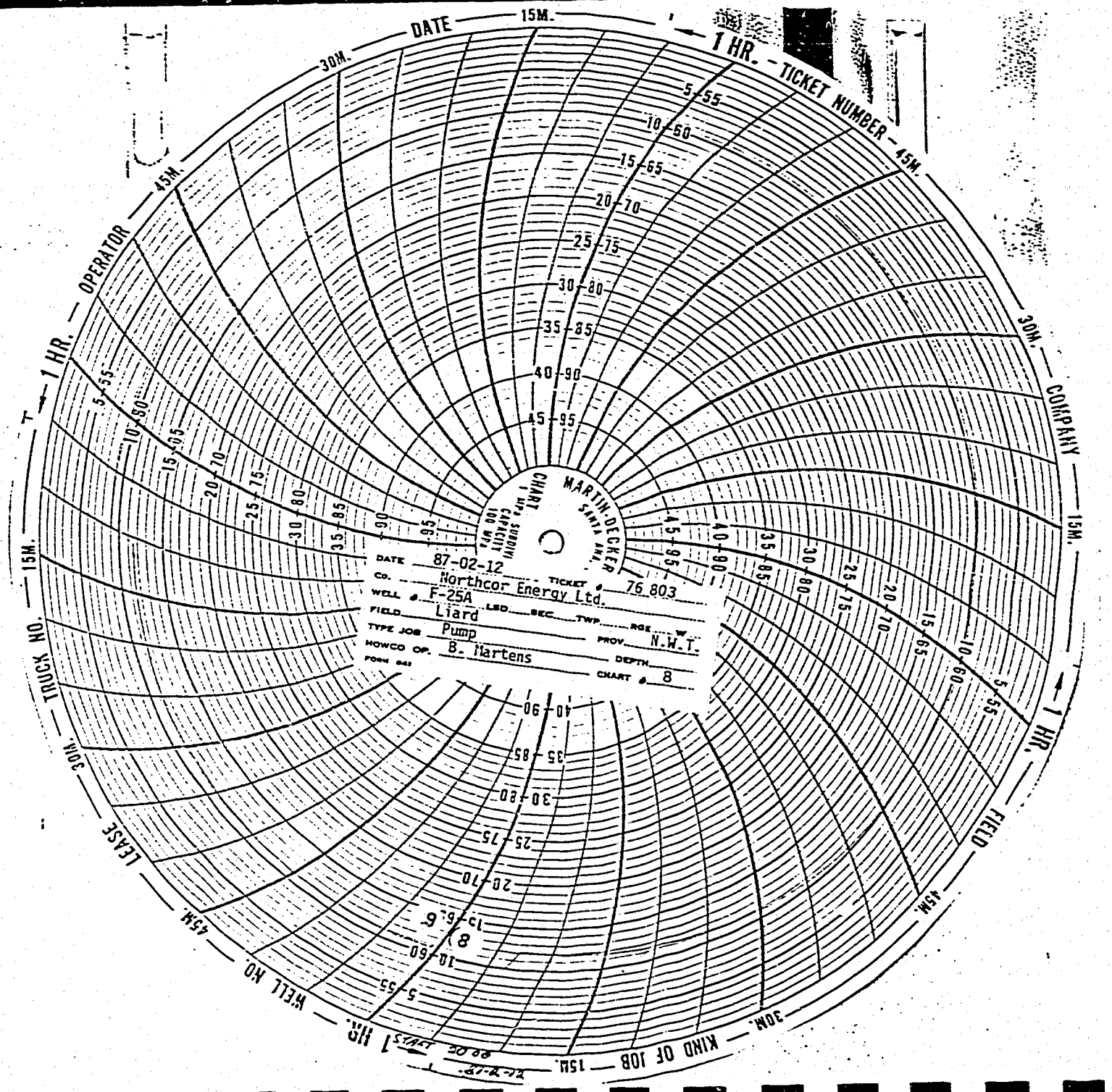
30M. — DATE
15M. — 1 HR. - TICKET NUMBER - 45M.
30M. — COMPANY
15M. — 1 HR.
FIELD — 45M.
30M. — KIND OF JOB — 15M.
1 HR. — WELL NO. — 45M. — LEASE — 30M. — TRUCK NO. — 15M.
CHART
HALLIBURTON
Y238
1 MP2 SUBDIVISION
CEMENTING UNIT
ICE MP2
DATE 87-02-12 TICKET # 76 803
CO. Northcor Energy Ltd.
WELL # F-25A LSD SEC TWP RGE W
FIELD Liard PROV. N.W.T.
TYPE JOB Pressure Test/Open PCT DEPTH
HOWCO OP. B. Martens CHART # 7
FORM 941
START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1 HR.
TICKET NUMBER
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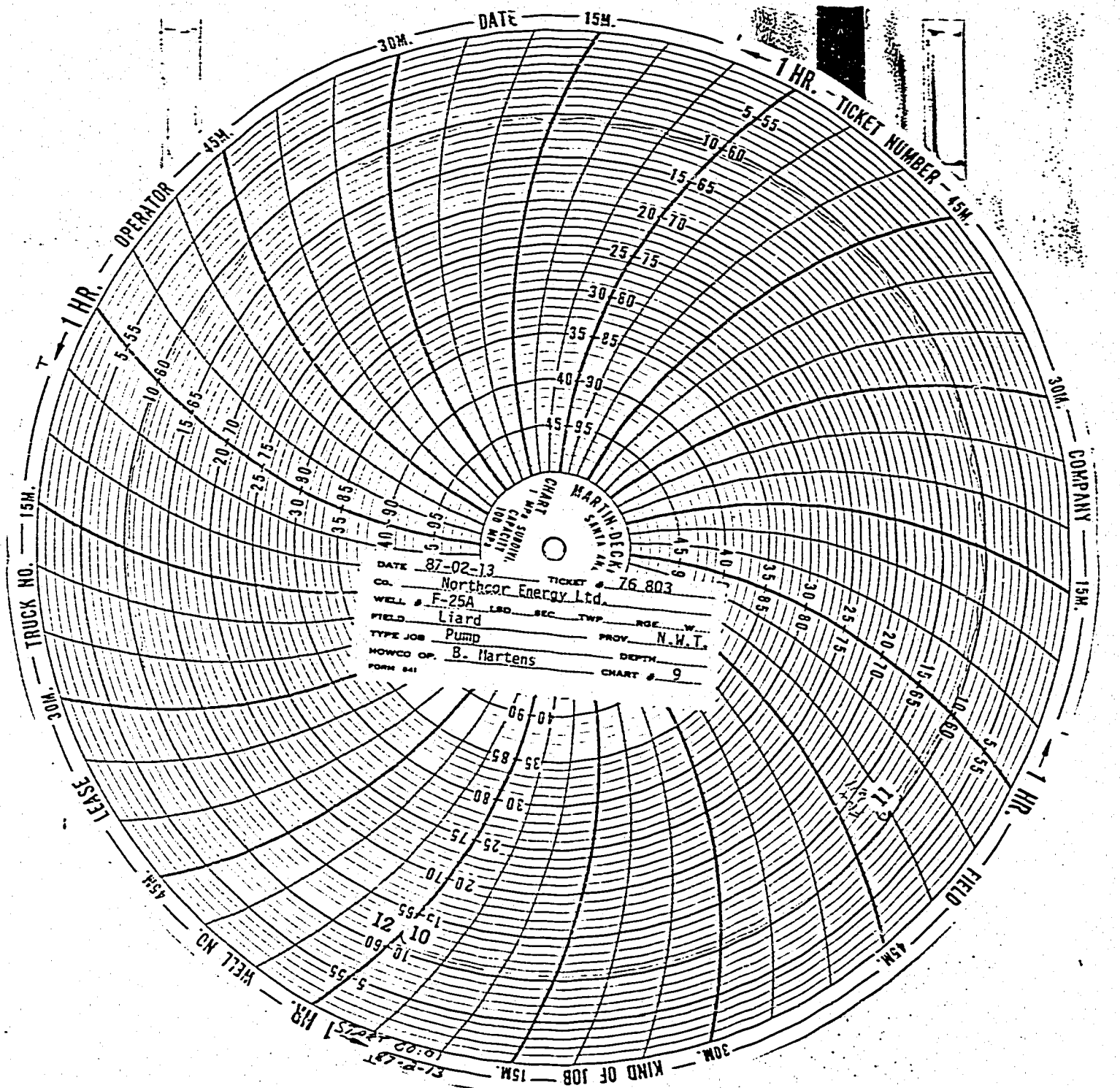
30M.
COMPANY
15M.
1 HR.
FIELD
45M.
30M.
KIND OF JOB
15M.
1 HR.
WELL NO.
45M.
30M.
LEASE
TRUCK NO.
15M.
1 HR.
OPERATOR
45M.
MARTIN-DECKER
SANTA ANA
CHART
DATE 87-02-12
TICKET # 76 803
CO. Northcor Energy Ltd.
WELL # F-25A
LSD SEC TWP RGE W
FIELD Liard
PROV N.W.T.
TYPE JOB Pump
HOWCO OP. B. Martens
DEPTH
FORM 641
CHART # 8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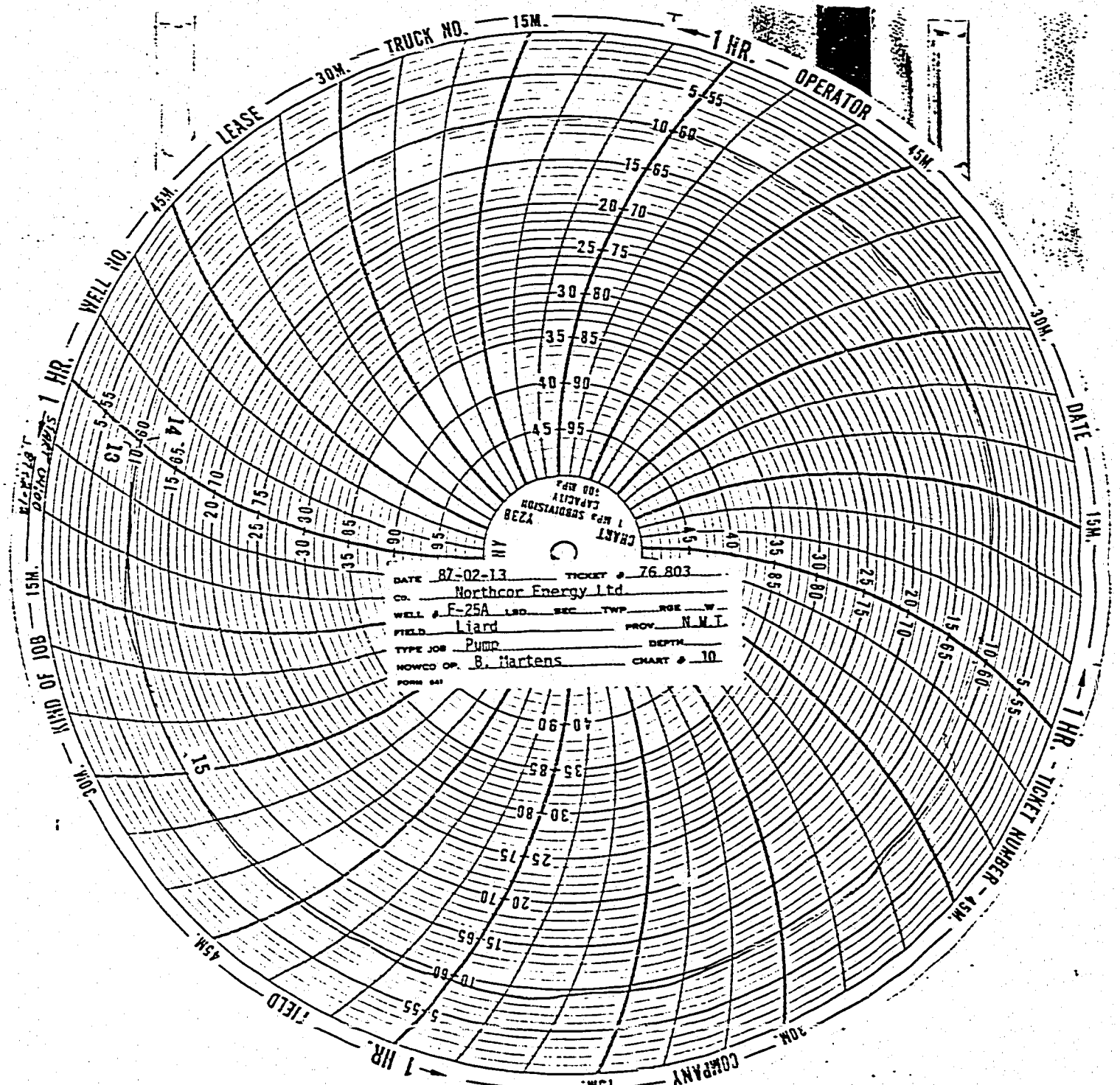
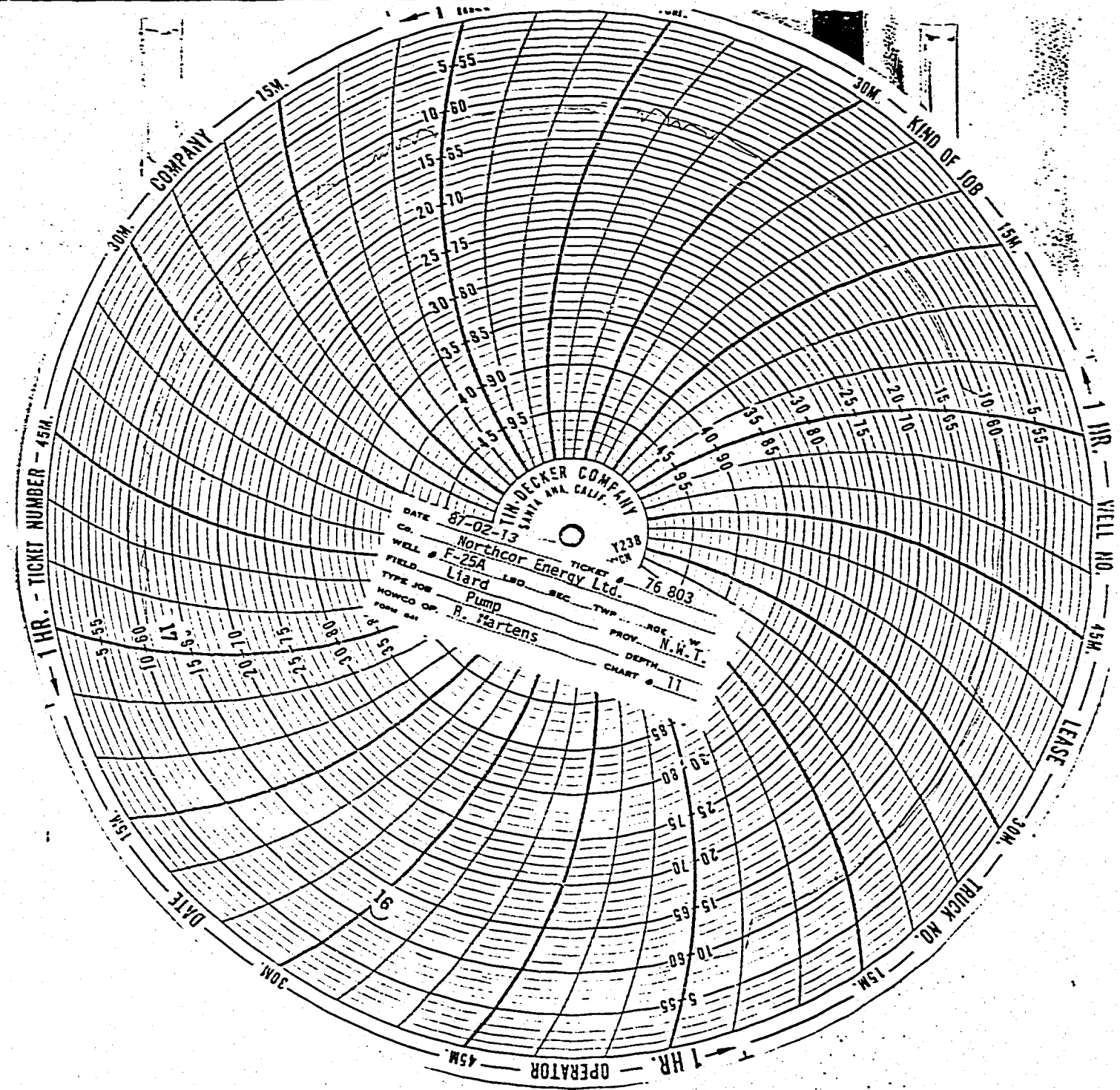
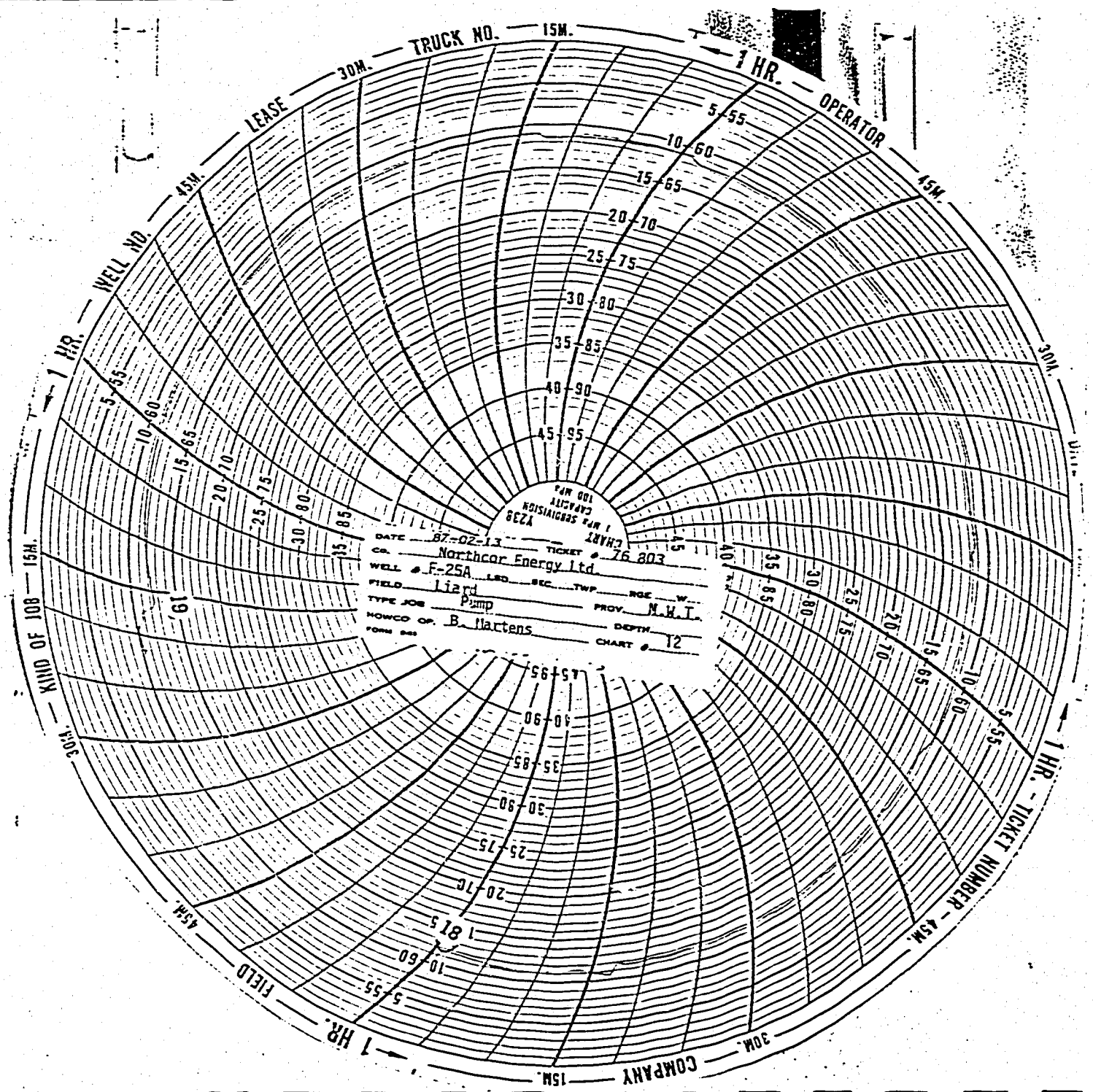
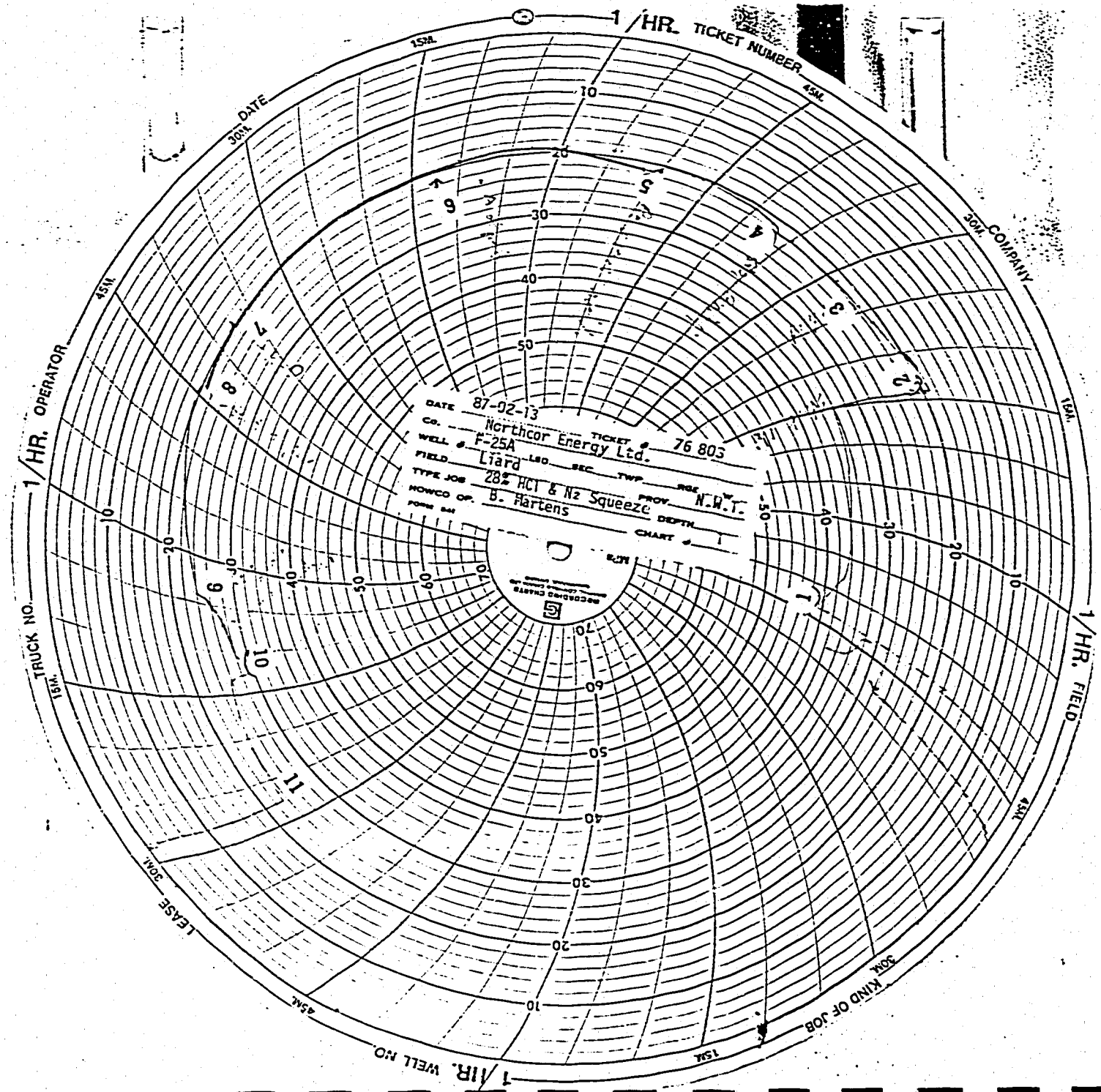
15M.
1 HR.
TICKET NUMBER
45M.
30M.
COMPANY
15M.
1 HR.
FIELD
45M.
30M.
KIND OF JOB
15M.
HR.
WELL NO.
45M.
30M.
LEASE
15M.
TRUCK NO.
1 HR.
OPERATOR
45M.
MARTIN-DECKY
CHART 1 MIN. SUBDIV. CAPACITY 100 MIN.
DATE 87-02-13
TICKET # 76 803
CO. Northcor Energy Ltd.
WELL # F-25A
LSD SEC TWP RGE W
FIELD Liard
TYPE JOB Pump
PROV. N.W.T.
NOWCO OP. B. Martens
DEPTH
FORM 541
CHART # 9
Start 20:02
87-2-13

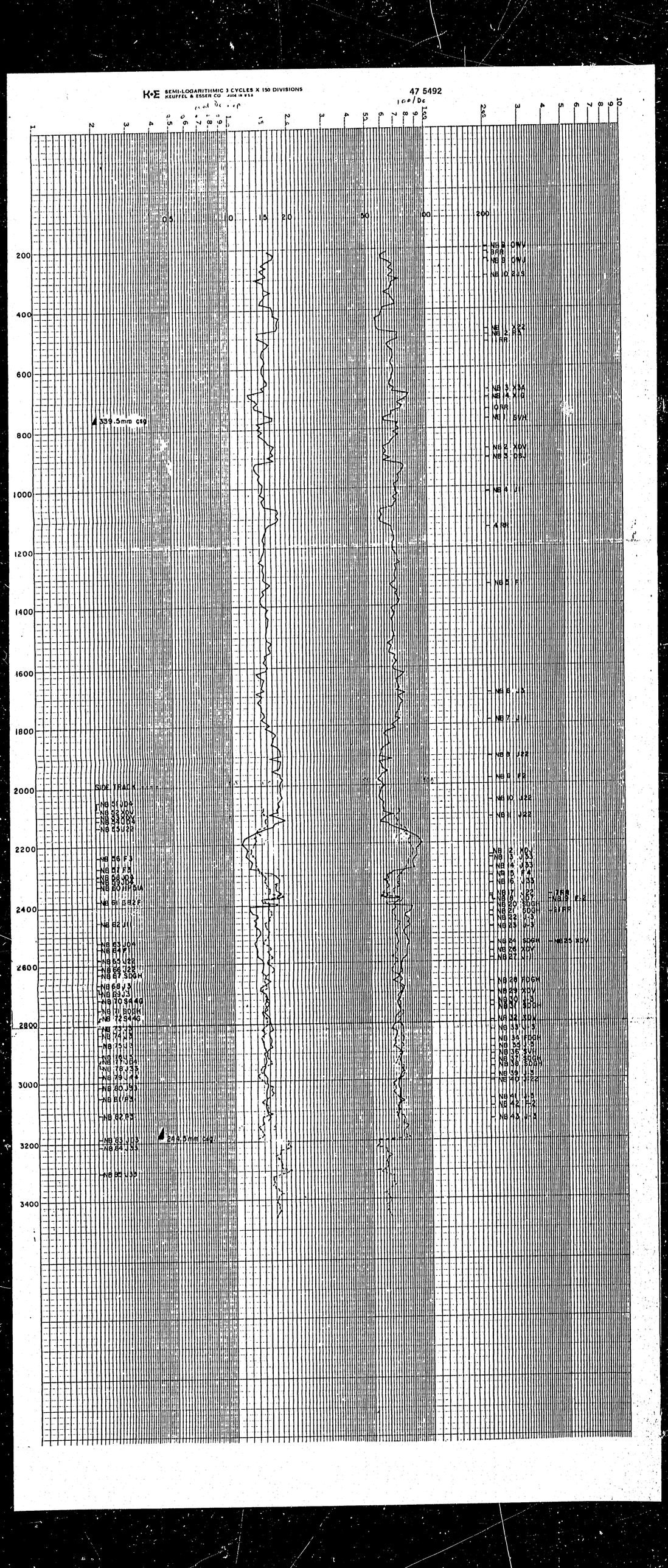

TRUCK NO.
15M.
1 HR.
OPERATOR
45M.
30M.
DATE
15M.
1 HR.
TICKET NUMBER
45M.
30M.
COMPANY
15M.
1 HR.
FIELD
45M.
30M.
KIND OF JOB
15M.
1 HR.
WELL NO.
45M.
LEASE
30M.
DATE 87-02-13 TICKET # 76 803
CO. Northcor Energy Ltd
WELL # F-25A LSD SEC TWP RGE W
FIELD Liard PROV. N.W.T.
TYPE JOB Pump DEPTH
HOWCO OP. B. Martens CHART # 10
CHART
AH
Y238
1 HP SUBDIVISION
CAPACITY
300 HPH


COMPANY
KIND OF JOB
WELL NO.
LEASE
TRUCK NO.
OPERATOR
DATE
TICKET NO.
1 HR.
30M.
15M.
45M.
TIM DECKER COMPANY
SANTA ANA, CALIF.
DATE 87-02-13
TICKET # 76 803
Co. Northcor Energy Ltd.
WELL # F-25A
FIELD Liard
TYPE JOB Pump
HOWCO OP. R. Martens
PROV. N.W.T.
CHART # 11


TRUCK NO.
LEASE
WELL NO.
KIND OF JOB
1 HR.
15M.
30M.
45M.
OPERATOR
TICKET NUMBER
COMPANY
FIELD
CHART
DATE 87-02-13
TICKET # 76 803
CO. Northcor Energy Ltd.
WELL # F-25A
LSD SEC TWP RGE W
FIELD Liard
PROV. N.W.T.
TYPE JOB Pump
DEPTH
HOWCO OP. B. Martens
CHART # T2
FORM 2403
Y239
1 MPa SENSITIVITY
CAPACITY
100 MPa


1/HR. TICKET NUMBER
15M.
30M.
45M.
DATE
1/HR. OPERATOR
TRUCK NO.
LEASE
1/HR. WELL NO.
KIND OF JOB
1/HR. FIELD
COMPANY
87-02-13
Northcor Energy Ltd.
F-25A
Liard
28% HCl & N2 Squeeze
B. Martens
76 803
N.W.T.

DC EXPONENT / 100 DC PRESSURE PLOT


K•E SEMI-LOGARITHMIC 3 CYCLES X 150 DIVISIONS
KEUFFEL & ESSER CO MADE IN U.S.A.
47 5492
100/Dc
339.5mm c49
248.5mm c49
SIDE TRACK
NB 1 ONV
NB 2 ONJ
NB 3 X24
NB 4 X2
NB 7 SVA
NB 2 XOV
NB 5 J2
NB 8 F
NB 8 J22
NB 9 F2
NB 10 J22
NB 11 J22
NB 2 XO2
NB 5 J33
NB 14 J33
NB 15 F4
NB 6 J33
NB 17 X22
NB 18 X21
NB 20 SDGH
NB 21 SDGH
NB 22 J3
NB 23 J3
NB 24 SDGH
NB 26 XOV
NB 27 J11
NB 28 SDGH
NB 29 XOV
NB 30 J3
NB 31 SDGH
NB 32 XOV
NB 33 J13
NB 34 FDGH
NB 35 J15
NB 36 SV
NB 37 SDGH
NB 38 SDGH
NB 39 J3
NB 40 J22
NB 41 J15
NB 42 F2
NB 43 J13
NB 25 XOV
NB 26 F3
NB 31 F5
NB 60 HF61A
NB 61 SB2F
NB 62 J11
NB 63 J04
NB 64 F1
NB 65 J22
NB 66 J22
NB 67 SDGH
NB 68 J3
NB 69 J3
NB 70 S44G
NB 71 SDGH
NB 72 S44G
NB 73 J3
NB 74 J3
NB 75 J3
NB 76 J3
NB 77 J04
NB 78 J33
NB 79 J44
NB 80 J33
NB 81 J33
NB 82 F5
NB 83 J03
NB 84 J33
NB 85 J35

DC EXPONENT / SHALE DENSITY PLOT

FLOW AND BUILDUP TESTS
ON WELL
NORTHCOR ET AL LIARD F-25A
NAHANNI FORMATION
NOVEMBER 11, 1986 - FEBRUARY 21, 1987

94 11-N10-6-1

OTTAWA COPY

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
MAR 27 1987
ENGINEERING AND CONTROL BRANCH
TECHNIQUE ET DU CONTRÔLE

Prepared for:

PAJAK ENGINEERING LTD.

Prepared by:

T. FEKETE AND ASSOCIATES CONSULTANTS LTD.

T. Fekete Consultants Ltd.

T. Fekete and Associates Consultants Ltd.

Reservoir Engineering & Geology — Oil & Gas Property Evaluation — Well Test Interpretation — Software Development

Pajak Engineering Ltd.
1660 Elveden House
717 - 7th Avenue S.W.
Calgary, Alberta
T2P 0Z3

Attention: Mr. Syd Robertson

Dear Sir:

Re: Northcor et al Liard F-25A - Nahanni Formation
Perforated Interval 3250.4 - 3258.4 m K.B. MD

The evaluation of the test data presented for the subject well has been completed. The following conclusions were derived from the test data:

1) The average reservoir pressure is 28796 kPa (4176.5 psia) as determined from DST #2 and three subsequent tests and shows no signs of depletion after a cumulative volume of approximately 2193 E3m3 of gas production.

2) The reservoir temperature is 157 °C.

3) The flow capacity and effective permeability to gas are 28 mDm and 3.3 mD, respectively.

4) The apparent skin factor s' was approximately +7.3 prior to stimulating this zone and was improved to approximately -1.6 after stimulating with acid showing a marked improvement.

5) The stabilized wellhead deliverability against 3500 kPa line pressure is approximately 235.5 E3m3/d assuming a reciprocal slope value of nt = 0.750.

6) The original DST #2, two drawdowns and two buildups were analyzed in this report and the calculated results are quite consistent.

700, 633 - 6th Avenue S.W., Calgary, Alberta, Canada T2P 2Y5
Telephone: (403) 265-1550 Telex: 03-821567

The report marked "ORIGINAL" contains the subsurface pressure recorder charts and the meter run charts from the test.

A detailed discussion of the test and analysis follow in this report. If you should need any clarification of our results please do not hesitate to contact the undersigned at 265-1550.

Yours truly,
T. FEKETE AND ASSOCIATES CONSULTANTS LTD.

(ORIGINAL SIGNED BY)

Rand Hosmar

(ORIGINAL SIGNED BY)

L. Mattar, P. Eng.
Vice President, Engineering

RH/dh

Northcor et al Liard F-25A Nahanni

DISCUSSION

An original drillstem test of this formation was performed November 22, 1986 when DST #2 was conducted over the interval 3227 - 3263 m K.B. mD. The interval 3250.8 - 3258.8 m k.B. mD was perforated on January 25, 1987 and a 50 hour flow and buildup test was conducted. The well was acidized twice, February 1 and 13 and approximately 100 hour flow and buildup tests were conducted following each treatment. A marked improvement in this well's flowing condition occured following the first acid treatment while no change is apparent following the second acid treatment. The final water/gas ratio on the last two tests was approximatley 0.13 m3/E3m3 and declining slightly. Water of condensation for this reservoir is in the order of 0.03 m3/E3m3.

For the first two flow and buildup tests three mechanical gauges were run, 2 pressure gauges (Top #15236 & Middle #40684) and 1 temperature gauge (Bottom # 16295). On the first test clock failures occured on the top and bottom gauges. The middle gauge ran fully and was used for analysis. The same gauges were rerun with new clocks for the second test. Clock failure occured on the top and middle gauges while the bottom clock on the temperature gauge ran fully. The middle gauge ran longest of the pressure gauges and was again used for our analysis. For the final flow and buildup test three new mechanical pressure gauges were run (Top #48898, Middle #25664 and Bottom #15230) and these guages were pulled every two days to ensure they were working properly. The middle gauge failed during the first two days of buildup and was replaced with gauge # 19639 for the rest of the buildup. The top recorder was used for analysis purposes for this final test.

Deliverability

The stabilzied flow conditions were calculated assuming the well to be in the center of a 259 hectare drainage area and resulted in stabilized rates only slightley lower than the final measured values.

The deliverability plots were constructed assuming reciprocal slope values of n and nt = 0.750 for each flow test. Sandface and wellhead absolute open flow potentials for each test may be found in the AOF and deliverability section (Section 2) of this report. The well's stabilized wellhead deliverability against 3500 kPa line pressure was improved to 235.457 E3m3/d from 82.720 E3m3/d by the acid treatments.

Buildups

Type curve and Horner plots were constructed for the original DST and the first and last pressure buildups. No plots could be made of the second buildup as both pressure recorder clocks expired during the flow period. The type curve plots and its derivative show that the initial data is dominated by storage effects and that the later time data represents the semilog (radial) data.

Drawdowns

Normalized type curve and drawdown plots were constucted for the last two pressure drawdowns after acid treatment. The drawdown after perforating could not be analyzed as the well was cleaning up. The type curve plots and its derivative show that the initial data is dominated by storage effects and that the later time data represents the semilog (radial) data.

Analysis of Buildups and Drawdowns

The well appears to achieve a near static pressure at the end of each buildup which corresponds within gauge accuracy to the initial reservoir pressure of Pi = 28796 kPa (absolute) derived from the original DST #2. A summary of these final measured pressures is included at the start of the Pressure Buildup Analysis section (Section 3) of this report. For calculation purposes we have assumed Pi = $\bar{p}R$ = 28796 kPa (absolute) at the mid-point of the perforations 3254.4 mK.B. mD. A semilog straightline drawdown through the terminal portion of the data yields the following results:

Test Description & Analysis Method	kh-mD.m	k-mD	s'
DST #2 FSIP's - Pressure Buildup	27.95	3.29	-4.3
Prior to Acidizing - Pressue Buildup	27.94	3.29	+7.3
After 1st Acid - Normalized Drawdown	27.96	3.29	-1.6
After 2nd Acid - Normalized Drawdown	27.93	3.29	-0.6
After 2nd Acid - Pressure Buildup	27.94	3.29	-1.6

Skin Factor

The highly negative apparent skin factor derived from the analysis of DST #2 ($s' = 4.3$) was absent from the initial flow test after perforating where a positive apparent skin was derived ($s' = +7.3$). It was decided that the well was damaged and therefore a nitrifed acid treatment was performed. The analysis of the drawdown data following this stimulation indicated that it was successful in removing the damage ($s' = -1.6$). As this resulting apparent skin was not as highly negative as that resulting from the initial DST and acidizing equipment was present on the lease it was decided to go ahead with a further larger nitrified acid treatment. Analysis of the drawdown and buildup data following this treatment indicate that likely no further improvement was achieved ($s' = 1.6$). It is likely that some portion of the apparent skin factor is a result of a pressure loss caused by turbulence.

General Comments

1. For the first two tests following the DST all pressures were obtained from the middle recorder # 40684. For the final test all pressures were obtained form the top recorder # 48898. All pressures were corrected, based on the final static gradients at the end of each test to the mid-point of the perforations, 3254.4 m K.B. (3219 m K.B. TVD).

2. All reported pressures are absolute pressures.

3. The pressure buildup analysis and normalized drawdown analyses give consistent values of kh and reasonable interpretations of s'.

4. Thickness, porosity and water saturation values of 8.5m, 5.3% and 17% were used for all calculations.

5. The cumulative production for each individual test period was used to calculate the effective flow time used in constructing the Horner pressure buildup plots as the well appeared to achieve static conditions at the end of each buildup.

6. Duplicate high pressure gas and water samples were obtained at the end of each flow test. Copies of these analyses are included in the fluid analysis section of this report (Section 7).

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OPERATIONS SUMMARY - Initial Flow Test

DATE	TIME	OPERATION
January 25, 1987	0715 hours	Perforated 3250.4 - 3258.4 m K.B.
	0952 hours	Two pressure and one temperature recorder landed in `XN´ nipple at 3234.8 m K.B.
	1300 hours	Open to flow on initial flow test on various choke settings.
	1700 hours	Final adjustment to rate made - Choke @ 7.144 mm.
January 26, 1987	1330 hours	Gas and water samples were obtained.
	1730 hours	Clock stops on top recorder.
January 27, 1987	0010 hours	Lack of air supply to ESD valve shuts well in for 6 minutes.
	1500 hours	Shut well in at surface and downhole.
January 28, 1987	1110 hours	Clock stops on bottom recorder.
January 29, 1987	1537 hours	Recorders off bottom.
	1930 hours	Completed static gradient surveys run to 3234.8 m K.B.

-End of Test-

OPERATIONS SUMMARY - Test After First Acid Stimulation

DATE	TIME	OPERATION
February 1, 1987	1930 hours	Completed nitrified acid squeeze treatment.
	2124 hours	Two pressure and one temperature recorder landed in "XN" nipple at 3231.9 m K.B.
	2230 hours	Open to flow on second flow test on various choke settings.
February 2, 1987	0030 hours	Final adjustment to rate made choke set at 12.7 mm.
February 3, 1987	1730 hours	Clock stops on top recorder.
February 4, 1987	0330 hours	Clock stops on middle recorder.
	0800 hours	Gas and water samples are obtained.
February 6, 1987	0830 hours	Shut well in at surface and downhole.
February 10, 1987	2000 hours	Recorders off bottom.
	2330 hours	Completed static gradient survey run to 3231.9 m K.B.

-End of Test

OPERATIONS SUMMARY - Temperature Survey

DATE	TIME	OPERATION
February 12, 1987	1700 hours	Open well to flow to ensure PCT valve is open and to unload liquid in wellbore.
	1830 hours	Shut well in to allow Schlumberger to run temperature logging tool.
February 13, 1987	0015 hours	Logging tools on bottom.
	0100 hours	Open well to flow on a 12.7 mm choke.
	0240 hours	Increase choke to a 14.2875 mm setting.
	0345 hours	Shut well in to allow Schlumberger to come out of hole with logging tools.
	0630 hours	Reopen well on a 14.2875 mm choke to cleanup.
	0830 hours	Shut well in and rig up for second acid stimulation.

-End of Test-

OPERATIONS SUMMARY - Test After Second Acid Stimulation

DATE	TIME	OPERATION
February 13, 1987	1300 hours	Completed second nitrified acid squeeze treatment.
	1433 hours	Three pressue recorders landed in `XN´ nipple @ 3221.6 m K.B.
	1500 hours	Open to flow on final flow test on various choke settings.
	1751 hours	Final adjustment to rate made - choke set at 19.05 mm.
February 15, 1987	1500 hours	Shut in to recover and check pressure recorders.
	1526 hours	Recorders off bottom - top clock has been stopped for 10.5 hours. Replaced top and middle clock and reran recorders.
	1752 hours	Recorders back on bottom.
	1830 hours	Reopened well to flow.
February 17, 1987	1745 hours	Gas and water samples were obtained.
	1830 hours	Shut well in for final buildup.
	1845 hours	Pulling tools release and fall downhole onto recorders.
	N/A hours	Recover pulling tools.
	2220 hours	Start jarring recorders to pull them.
	2235 hours	Recorders off bottom - charts appeared alright so reran same recorders and clocks.
February 18, 1987	0014 hours	Recorders back at bottom.
February 19, 1987	1853 hours	Recorders off bottom - middle recorder failed due to `O´ ring leak so replaced it completely for next run.

OPERATIONS SUMMARY - Test After Second Acid Stimulation (cont'd)

DATE	TIME	OPERATION
February 19, 1987	2039 hours	Recorders back on bottom.
February 21, 1987	1905 hours	Recorders off bottom.
	2309 hours	Completed final static gradient survey run to 3260.0 m K.B.

-End of Test-

GAS WELL DELIVERABILITY TEST SUMMARY

GENERAL DATA

Well Name Northcor et al Liard Location F-25A

Field or Area Liard, N.W.T. Elev (GL) 716.60m (KB) 723.0m

Pool or Zone Nahanni Reservoir Temperature 157 °C

Perf/~~Open Hole~~ Interval 3250.4-3258.4 m K.B. mD m (~~GR~~/KB)

(3215.7-3223.4 m K.B. TVD) m (~~GR~~/KB)

Csg ID 157.1 mm Tbg ID 76.0 mm OD 88.9 mm Packer Varied m (CF/KB)

Gas Prop: G 0.764 p_c 5113.2 kPa T_c 210.8 K Mol % : N_2 4.22 CO_2 19.78 H_2S 0.38

Licensee Northcor Energy Ltd.

Operator Northcor Energy Ltd.

Type of Test 3 Flows & Buildup Final Date February 21, 1987

PRODUCTION DATA - AVERAGE

Rate	Dur. hrs.	Gas Rate $10^3m^3/d$	Cond Rate m^3/d	Cond/ Gas Ratio $m^3/10^3m^3$	Gas Equiv. $10^3m^3/d$	Total Gas Rate $10^3m^3/d$	Water Rate m^3/d	Water/ Gas Ratio $m^3/10^3m^3$
EXT	50	66.363	0	0	0	66.363	48.480	0.731
EXT	106	217.003	0	0	0	217.003	70.044	0.323
CU	6.25	200.289	0	0	0	200.289	188.882	0.943
Ext	96	254.880	0	0	0	254.880	49.643	0.195

Gas Produced Through: Tbg [X] Annulus [ ] to: Pipeline [ ] Vent [ ] Flare [X]

Flare Stack: Height ____ m Diameter ____ mm

TOTAL VOLUME OF GAS PRODUCED DURING CLEANUP AND TEST 2168.366 10^3m^3

Equipment		Remarks
Line Heater	[X]	
LP Separator	[ ]	
HP Separator	[X]	
Flow Prover	[ ]	
Orifice Meter	[X]	
Production Tank	[X]	
BOOT	[X]	
METHANOL INJECTOR	[X]	
	[ ]	

Average Reservoir Pressure 28796 kPa

Stabilized Absolute Open Flow Potential 267.570 $10^3m^3/d$

Stabilized Wellhead Open Flow Potential ~~174.886~~ $10^3m^3/d$

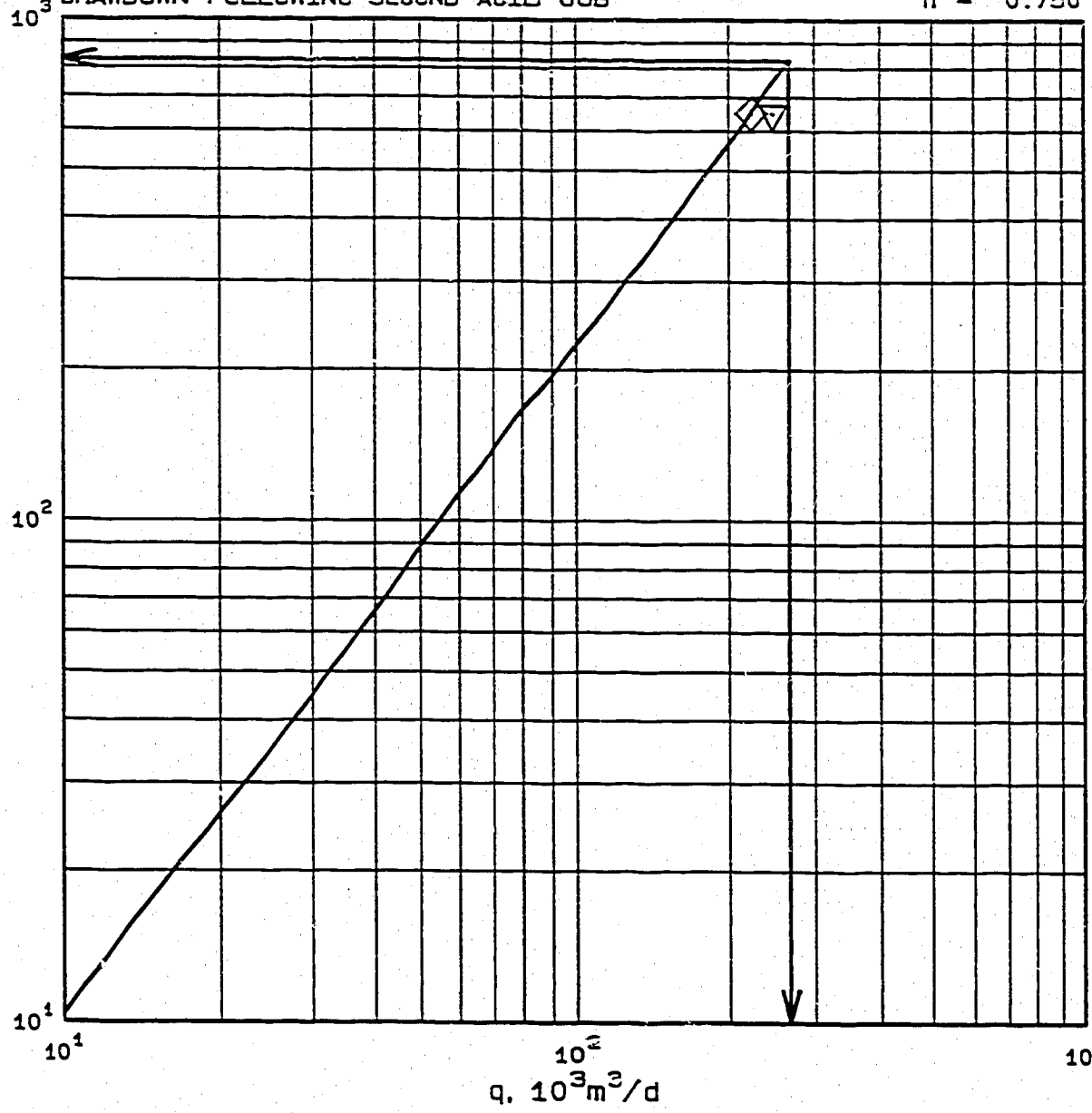
Fekete Consultants Ltd.

SANDFACE DELIVERABILITY

(Simplified Analysis)

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JOB

Stab C = 5.476 x 10^{-5} $10^3m^3/d/kPa^2$
Stab AOF = 267.570 $10^3m^3/d$
p_R = 28796 kPa
n = 0.750



▽ Extended
◇ Stabilized

T. Fekete Associates Inc.
Consultants Ltd.

SANDFACE DELIVERABILITY
SIMPLIFIED ANALYSIS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JOB

PRESSURES AND RATES

	Time	Pressure	p^2	$del\ p^2$	Rate
	hr	kPa	$10^6\ kPa^2$	$10^6\ kPa^2$	$10^3\ m^3/d$
Initial Shut-in	---	28796	829.210		
Extended Flow	96.00	13393	179.372	649.837	247.623
Stabilized Shut-in	97.00	28796	829.210		
Stabilized Flow	---	13393	179.372	649.837	222.865

ANALYSIS RESULTS

Inverse Slope n = 0.750

Intercept C - Transient = --- $10^3\ m^3/d/kPa^2$

Extended = 6.0840E-05

Stabilized = 5.4757E-05

Sandface AOF - Transient = --- $10^3\ m^3/d$

Extended = 297.294

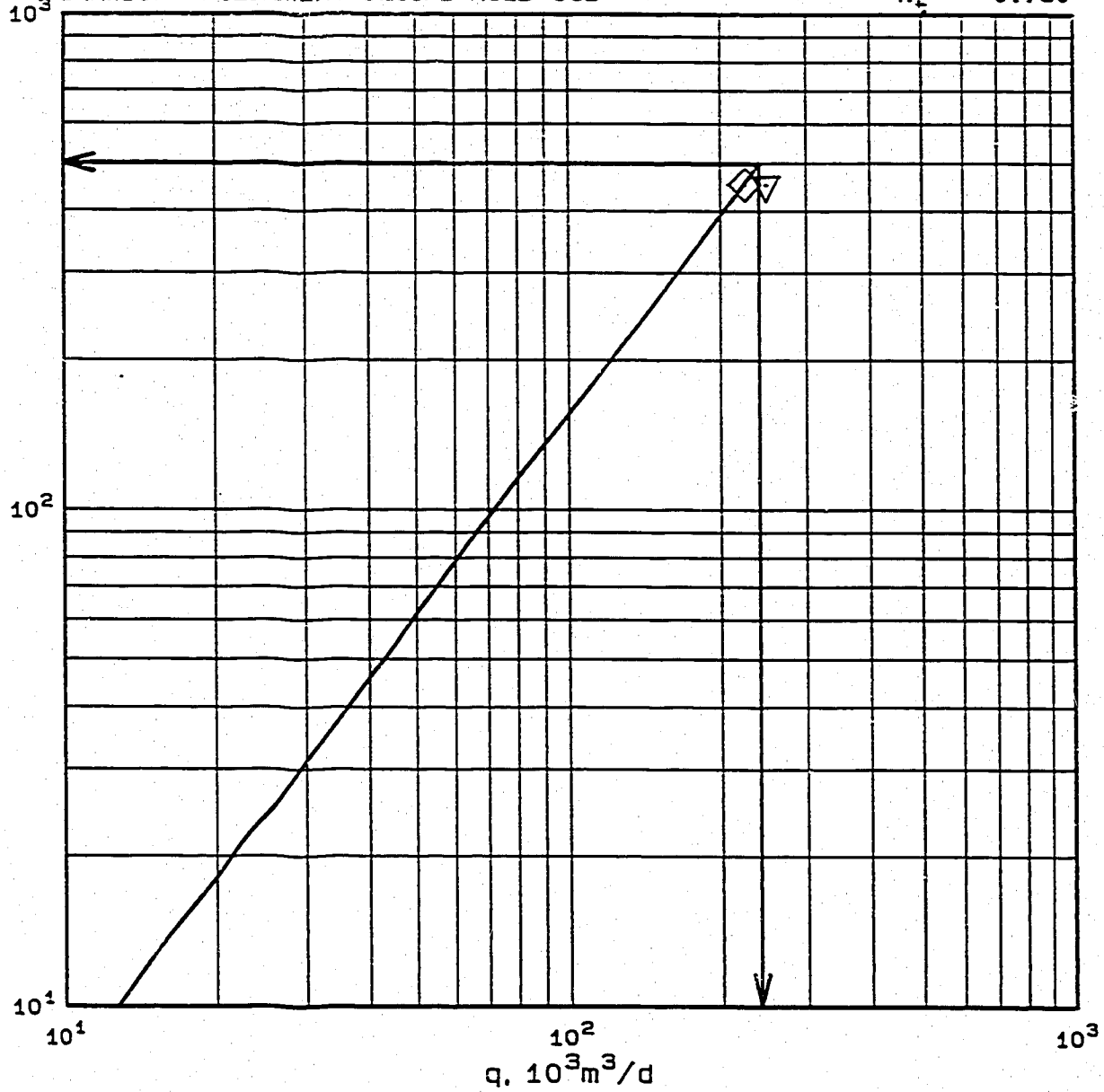
Stabilized = 267.570

T. Feketa Consultants Ltd.

WELLHEAD DELIVERABILITY

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JOB

Stab C_t = 7.154 x 10^{-5} $10^3m^3/d/kPa^2$
Stab AOF = 239.586 $10^3m^3/d$
p_{ts} = 22340 kPa
n_t = 0.750



▽ Extended
◇ Stabilized

T. Fekete Consultants Ltd.

WELLHEAD DELIVERABILITY
SIMPLIFIED ANALYSIS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JOB

PRESSURES AND RATES

	Time	Pressure	p^2	$del\ p^2$	Rate
	hr	kPa	$10^6\ kPa^2$	$10^6\ kPa^2$	$10^3\ m^3/d$
Initial Shut-in	---	22340	499.076		
Extended Flow	96.00	6830	46.649	452.427	247.623
Stabilized Shut-in	97.00	22340	499.076		
Stabilized Flow	---	6830	46.649	452.427	222.865

ANALYSIS RESULTS

Inverse Slope nt = 0.750

Intercept Ct - Transient = --- $10^3\ m^3/d/kPa^2$

- Extended = 7.9823E-05

- Stabilized = 7.1842E-05

Wellhead AOF - Transient = --- $10^3\ m^3/d$

Extended = 266.535

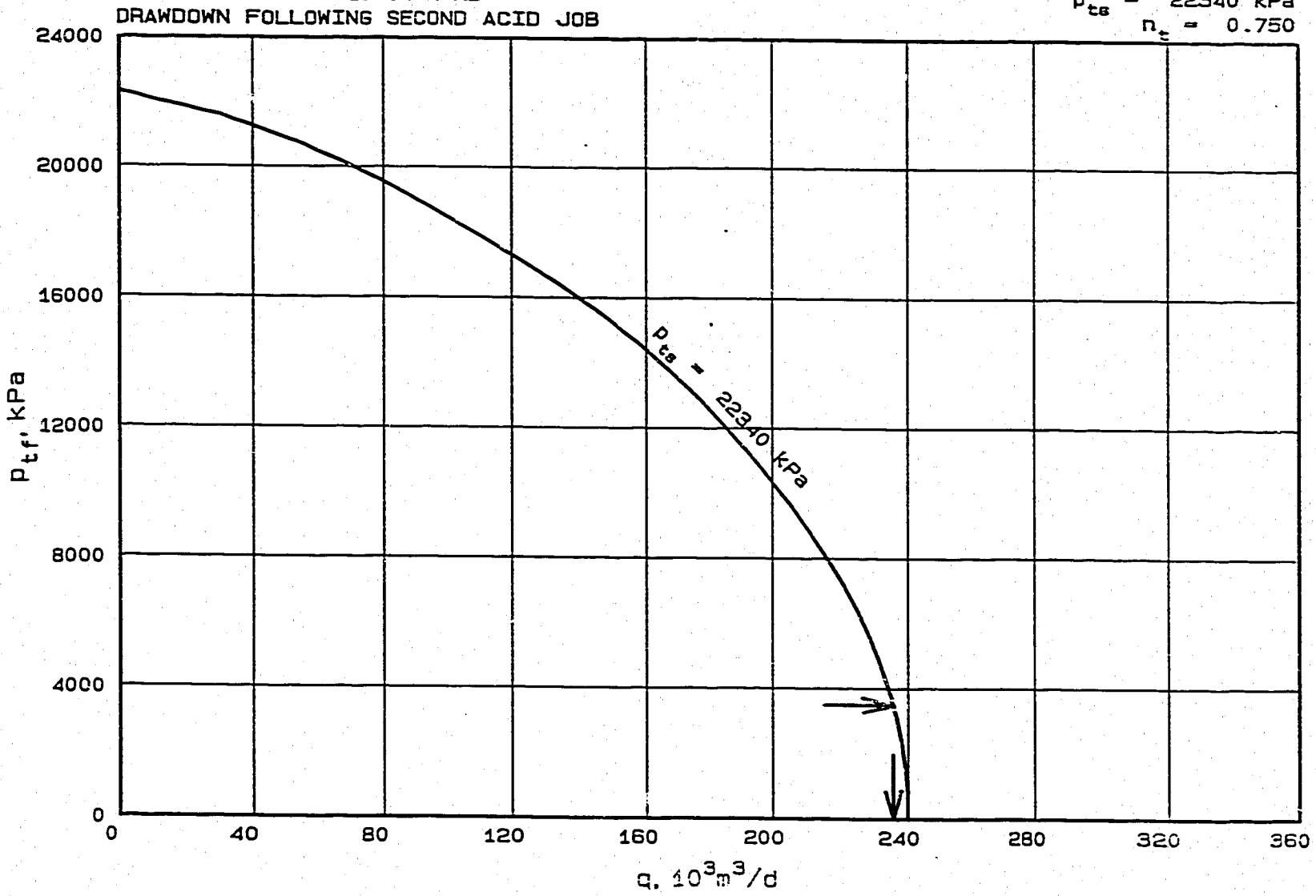
Stabilized = 239.886

T. Fekete Consultants Ltd.

WELLHEAD DELIVERABILITY CURVE

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JOB

Stab C_t = 7.184 x 10^{-5} $10^3m^3/d/kPa^2$
Stab AOF = 239.866 $10^3m^3/d$
p_{ts} = 22340 kPa
n_t = 0.750



Fekete Associates Inc.

WELLHEAD DELIVERABILITY CURVE
SIMPLIFIED ANALYSIS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JOB

ANALYSIS RESULTS

Inverse Slope	nt	=	0.750
Stabilized Intercept	Ct	=	7.1842E-05 10^3 $m^3/d/kPa^2$
Stabilized Wellhead	AOF	=	239.886 10^3 m^3/d

DELIVERABILITY CURVE

	Pressure kPa	Flow Rate 10^3 m^3/d
	0.0	239.886
	2000.0	238.443
*	3500.0	235.457
	4000.0	234.095
	6000.0	226.788
	8000.0	216.423
	10000.0	202.849
	12000.0	185.832
	14000.0	165.023
	16000.0	139.858
	18000.0	109.345
	20000.0	71.344
	22000.0	17.381
	22340.0	0.000

* Deliverability at specified pressure

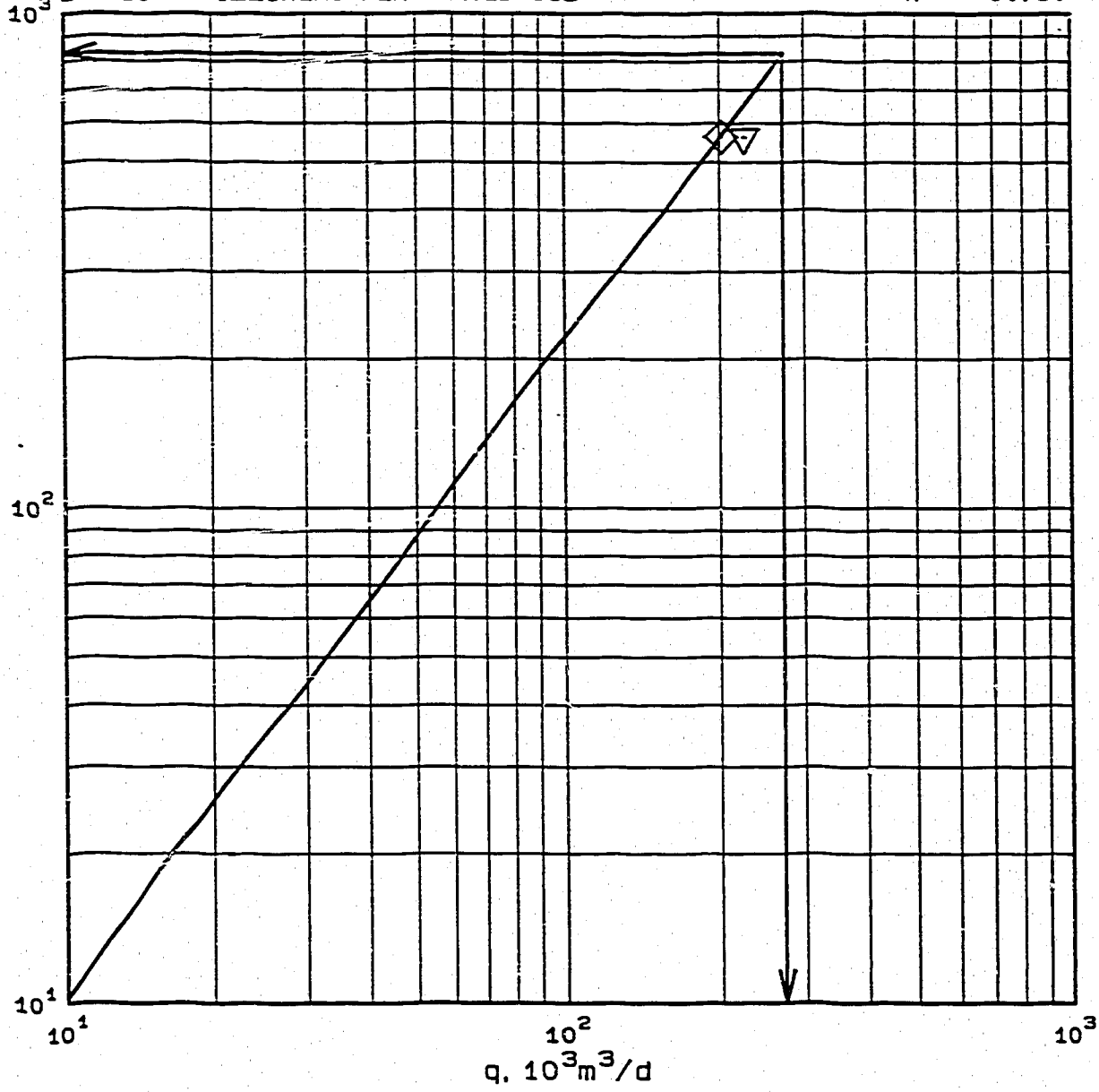
T. Fekete Consultants Ltd

SANDFACE DELIVERABILITY

(Simplified Analysis)

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

Stab C = 5.530 x 10^{-5} $10^3m^3/d/kPa^2$
Stab AOF = 270.241 $10^3m^3/d$
p_R = 28796 kPa
n = 0.750



▽ Extended
◇ Stabilized

T. Fekete Associates Inc. Consultants Ltd.

SANDFACE DELIVERABILITY
SIMPLIFIED ANALYSIS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

PRESSURES AND RATES

	Time	Pressure	p^2	$del\ p^2$	Rate
	hr	kPa	$10^6\ kPa^2$	$10^6\ kPa^2$	$10^3\ m^3/d$
Initial Shut-in	---	28796	829.210		
Extended Flow	106.00	16345	267.159	562.050	224.565
Stabilized Shut-in	111.00	28796	829.210		
Stabilized Flow	---	16345	267.159	562.050	201.876

ANALYSIS RESULTS

Inverse Slope n = 0.750

Intercept C - Transient = --- $10^3\ m^3/d/kPa^2$

Extended = 6.1519E-05

Stabilized = 5.5304E-05

Sandface AOF - Transient = --- $10^3\ m^3/d$

Extended = 300.614

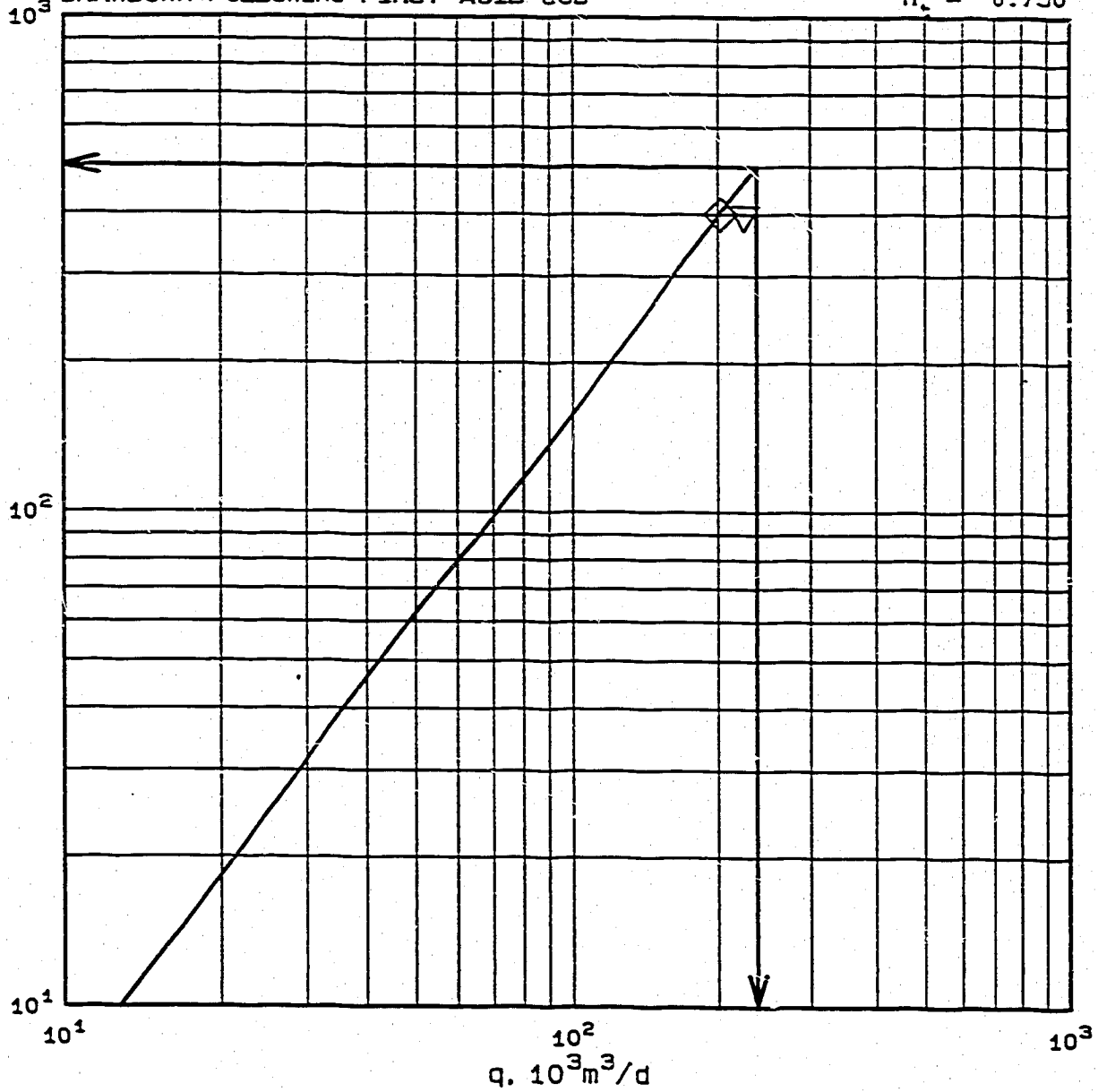
Stabilized = 270.241

T. Fekete Consultants Ltd.

WELLHEAD DELIVERABILITY

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

Stab C_t = 7.134 x 10^{-5} $10^3m^3/d/kPa^2$
Stab AOF = 238.201 $10^3m^3/d$
p_{ts} = 22340 kPa
n_t = 0.750



▽ Extended
◇ Stabilized

T. Fekete Consultants Ltd.

WELLHEAD DELIVERABILITY
SIMPLIFIED ANALYSIS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

PRESSURES AND RATES

	Time	Pressure	p^2	$del\ p^2$	Rate
	hr	kPa	$10^6\ kPa^2$	$10^6\ kPa^2$	$10^3\ m^3/d$
Initial Shut-in	---	22340	499.076		
Extended Flow	106.00	9940	98.804	400.272	224.565
Stabilized Shut-in	111.00	22340	499.076		
Stabilized Flow	---	9940	98.804	400.272	201.876

ANALYSIS RESULTS

Inverse Slope nt = 0.750

Intercept Ct - Transient = --- $10^3\ m^3/d/kPa^2$

- Extended = 7.9355E-05

- Stabilized = 7.1338E-05

Wellhead AOF - Transient = --- $10^3\ m^3/d$

Extended = 264.972

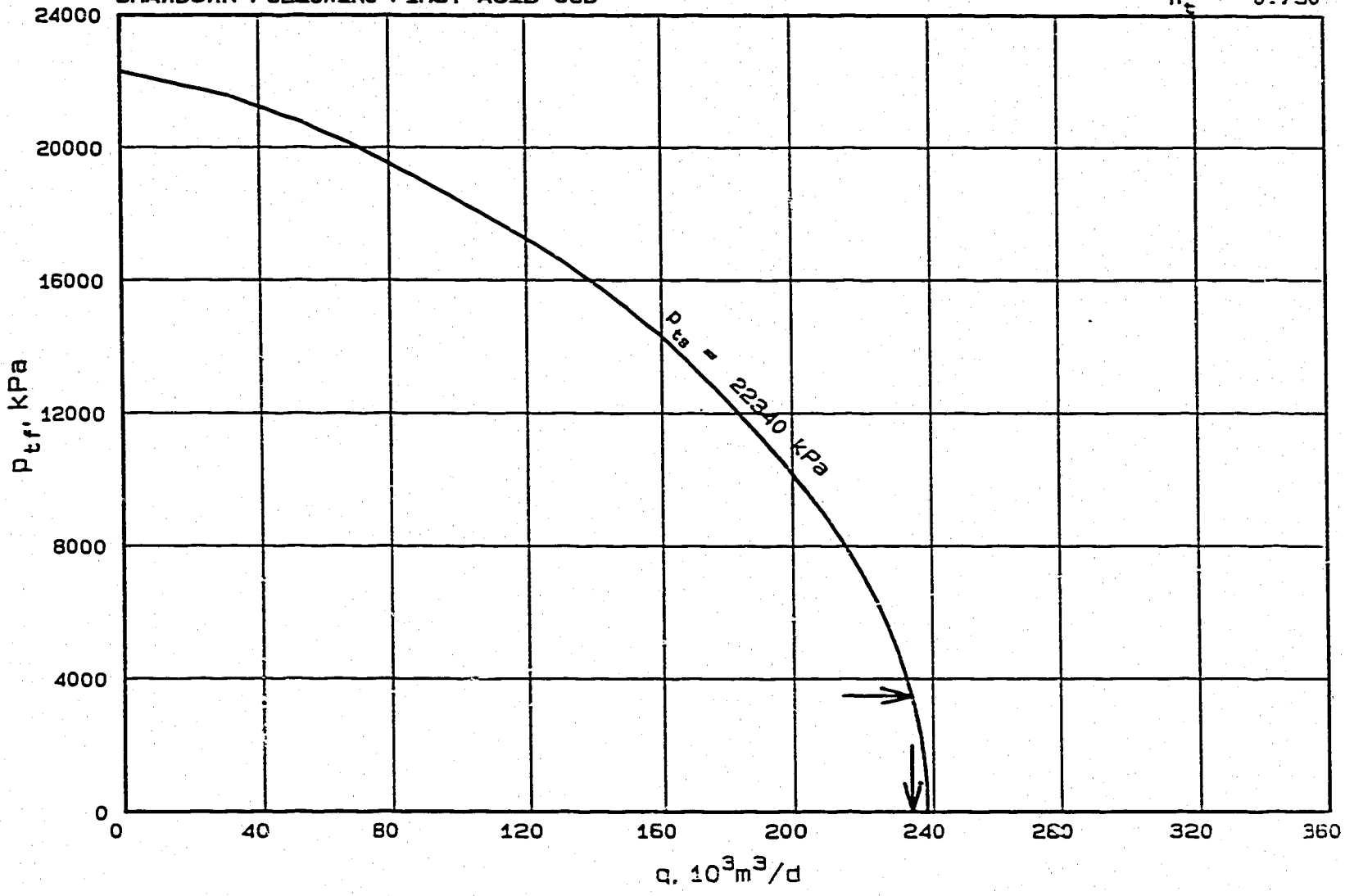
Stabilized = 238.201

T. Fekete Consultants Ltd

WELLHEAD DELIVERABILITY CURVE

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

Stab C_t = 7.134 x 10^{-5} $10^3m^3/d/kPa^2$
Stab AOF = 238.201 $10^3m^3/d$
p_{ts} = 22340 kPa
n_t = 0.750



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WELLHEAD DELIVERABILITY CURVE
SIMPLIFIED ANALYSIS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

ANALYSIS RESULTS

Inverse Slope	nt =	0.750
Stabilized Intercept	Ct =	7.1338E-05 10^3 $m^3/d/kPa^2$
Stabilized Wellhead	AOF =	238.201 10^3 m^3/d

DELIVERABILITY CURVE

	Pressure kPa	Flow Rate 10^3 m^3/d
	0.0	238.201
	2000.0	236.767
*	3500.0	233.802
	4000.0	232.450
	6000.0	225.194
	8000.0	214.903
	10000.0	201.423
	12000.0	184.527
	14000.0	163.863
	16000.0	138.875
	18000.0	108.577
	20000.0	70.842
	22000.0	17.259
	22340.0	0.000

* Deliverability at specified pressure

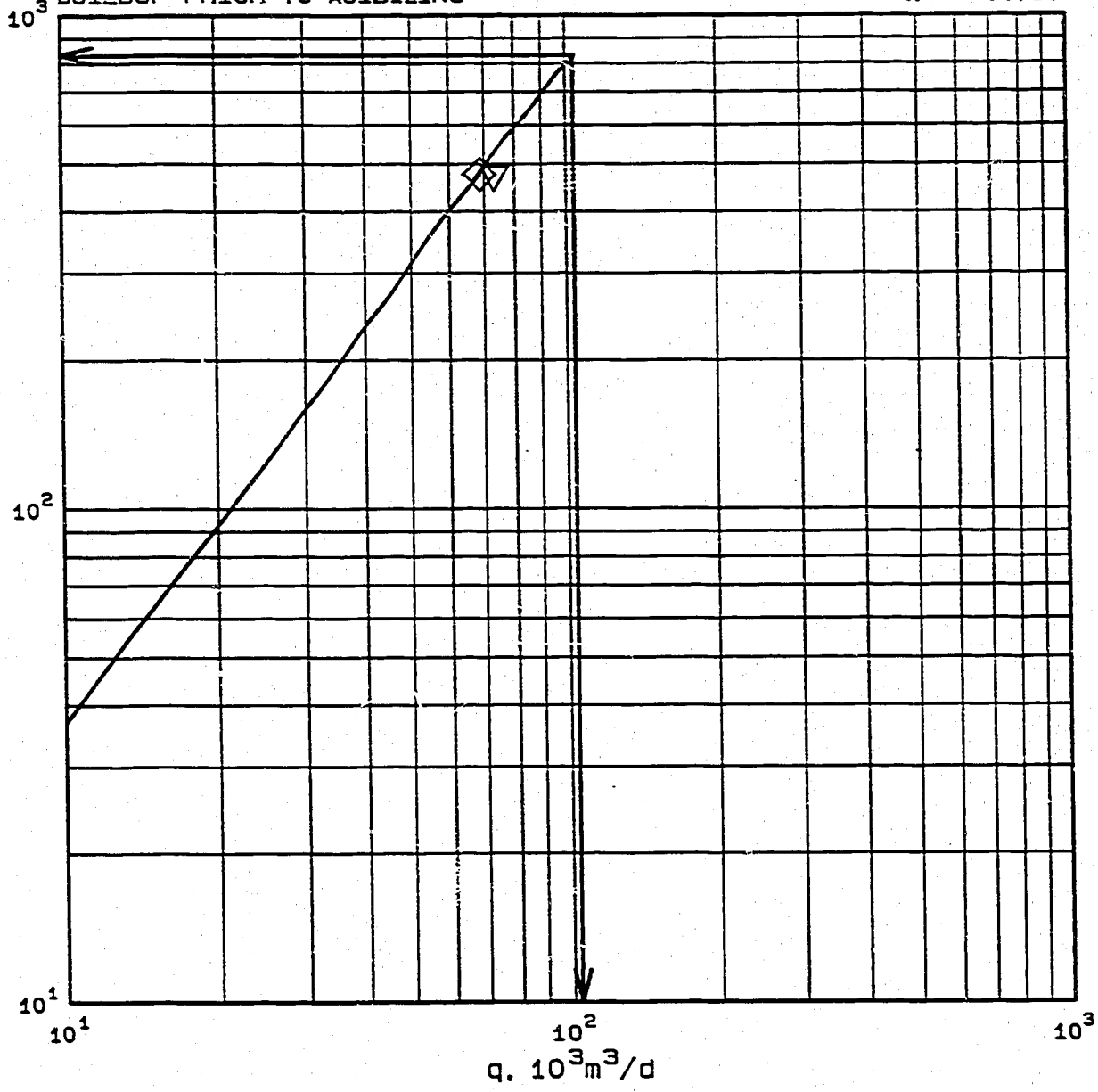
T. Fekete Consultants Ltd.

SANDFACE DELIVERABILITY

(Simplified Analysis)

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

Stab C = 2.122 x 10^{-5} $10^3m^3/d/kPa^2$
Stab AOF = 103.625 $10^3m^3/d$
p_R = 28796 kPa
n = 0.750



▽ Extended
◇ Stabilized

T. Foketo Consultants Ltd

SANDFACE DELIVERABILITY SIMPLIFIED ANALYSIS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

PRESSURES AND RATES

	Time	Pressure	p^2	$del\ p^2$	Rate
	hr	kPa	$10^6\ kPa^2$	$10^6\ kPa^2$	$10^3\ m^3/d$
Initial Shut-in	---	28796	829.210		
Extended Flow	50.00	18788	352.989	476.221	73.457
Stabilized Shut-in	52.00	28796	829.210		
Stabilized Flow	---	18788	352.989	476.221	68.403

ANALYSIS RESULTS

Inverse Slope n = 0.750

Intercept C - Transient = --- $10^3\ m^3/d/kPa^2$

Extended = 2.2786E-05

Stabilized = 2.1219E-05

Sandface AOF - Transient = --- $10^3\ m^3/d$

Extended = 111.346

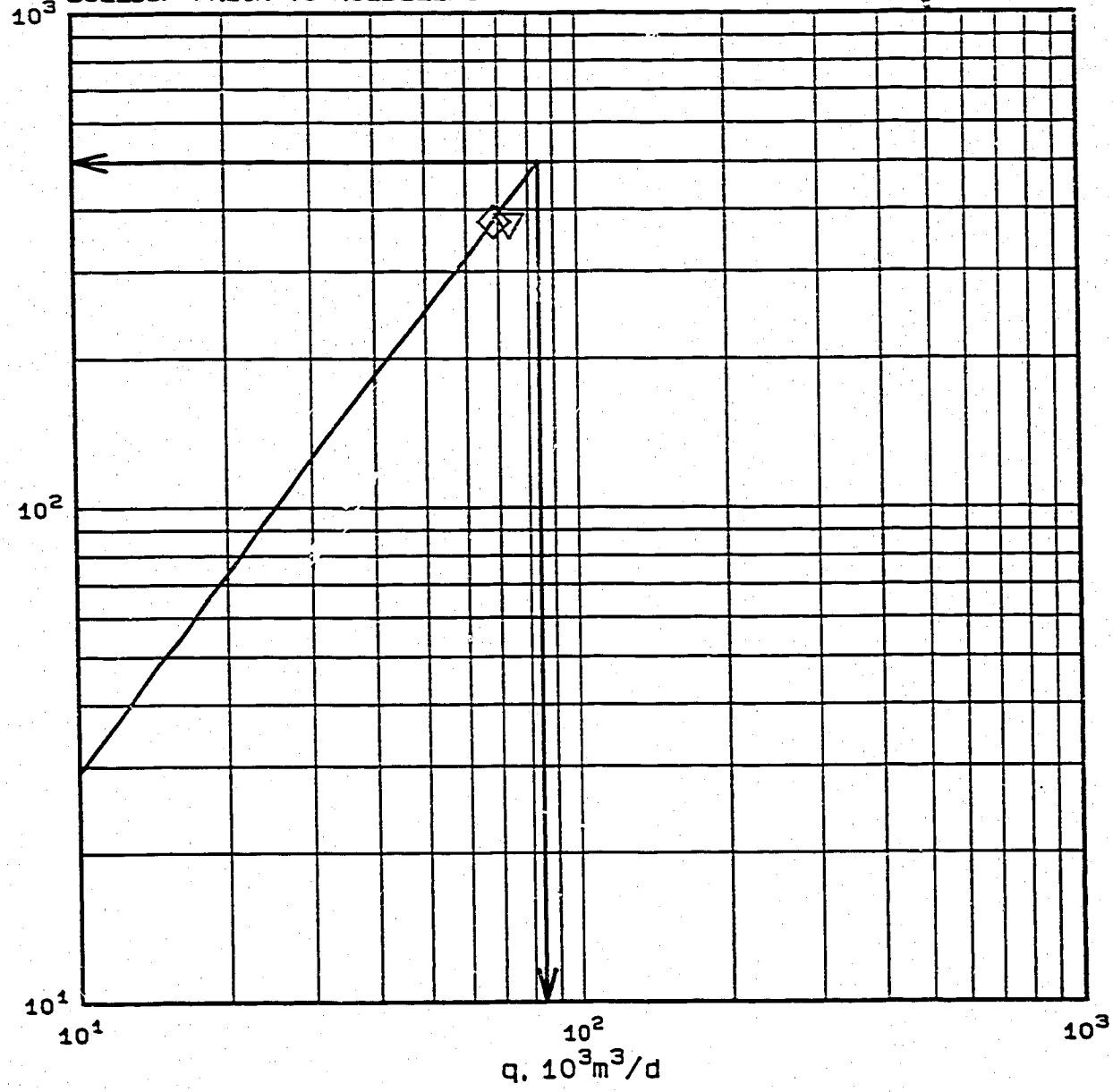
Stabilized = 103.685

T. Fekete Consultants Ltd.

WELLHEAD DELIVERABILITY

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

Stab C_t = 2.524 x 10^{-5} $10^3m^3/d/kPa^2$
Stab AOF = 84.276 $10^3m^3/d$
p_{ts} = 22340 kPa
n_t = 0.750



▽ Extended
◇ Stabilized

T. Fekete Consultants Ltd.

WELLHEAD DELIVERABILITY
SIMPLIFIED ANALYSIS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

PRESSURES AND RATES

	Time	Pressure	p^2	Δp^2	Rate
	hr	kPa	10^6 kPa^2	10^6 kPa^2	10^3 m^3/d
Initial Shut-in	---	22340	499.076		
Extended Flow	50.00	11010	121.220	377.856	73.457
Stabilized Shut-in	52.00	22340	499.076		
Stabilized Flow	---	11010	121.220	377.856	68.403

ANALYSIS RESULTS

Inverse Slope nt = 0.750

Intercept Ct - Transient = --- 10^3 m^3/d/kPa^2

- Extended = 2.7104E-05

- Stabilized = 2.5240E-05

Wellhead AOF - Transient = --- 10^3 m^3/d

Extended = 90.503

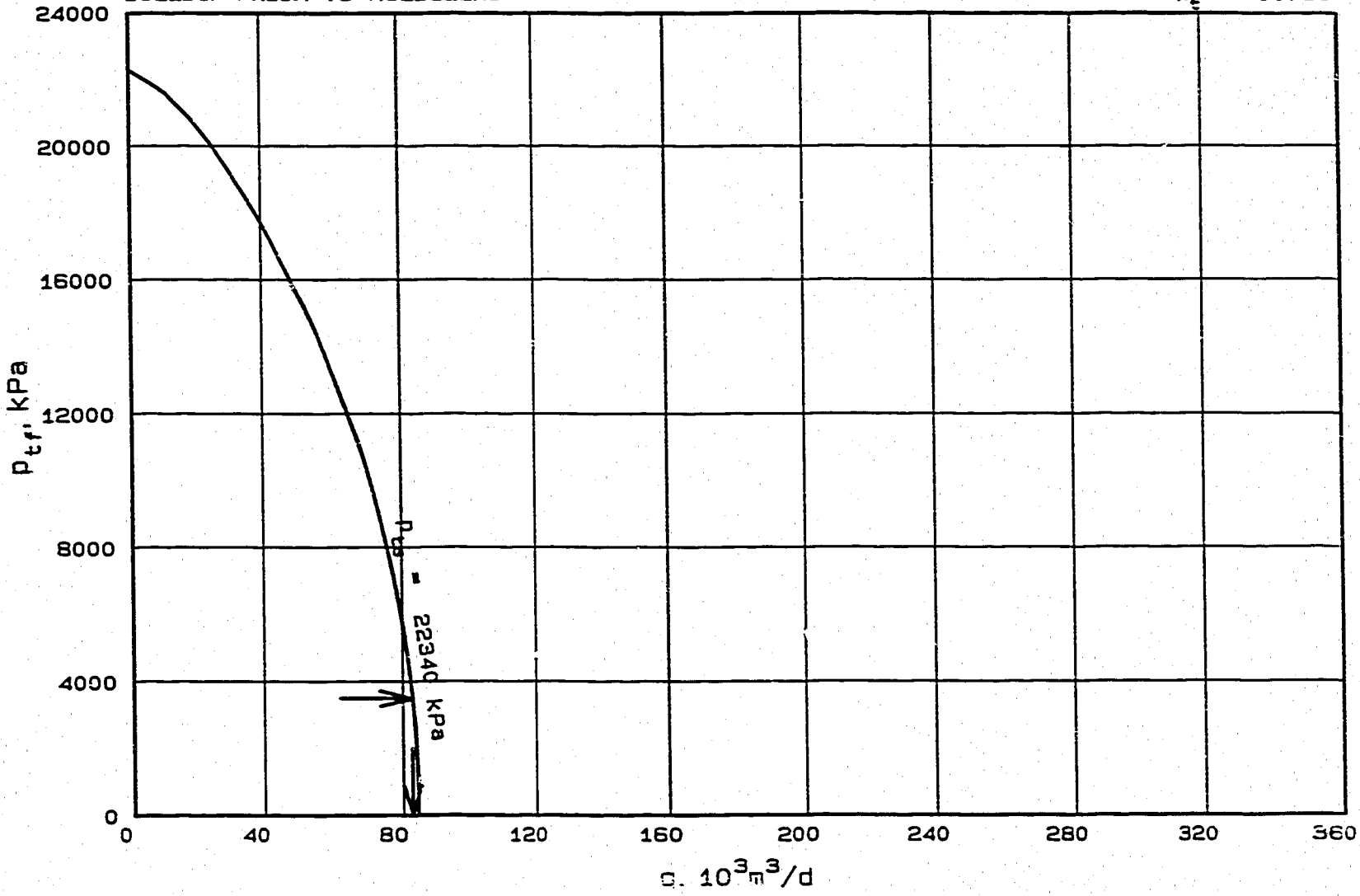
Stabilized = 84.276

T. Fekete Consultants Ltd.

WELLHEAD DELIVERABILITY CURVE

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

Stab C_t = 2.524 x 10^{-5} $10^3m^3/d/kPa^2$
Stab AOF = 84.276 $10^3m^3/d$
p_{ts} = 22340 kPa
n_t = 0.750



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WELLHEAD DELIVERABILITY CURVE
SIMPLIFIED ANALYSIS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

ANALYSIS RESULTS

Inverse Slope	nt =	0.750
Stabilized Intercept	Ct =	2.5240E-05 10^3 $m^3/d/kPa^2$
Stabilized Wellhead	AOF =	84.276 10^3 m^3/d

DELIVERABILITY CURVE

	Pressure kPa	Flow Rate 10^3 m^3/d
	0.0	84.276
	2000.0	83.769
*	3500.0	82.720
	4000.0	82.242
	6000.0	79.675
	8000.0	76.033
	10000.0	71.264
	12000.0	65.286
	14000.0	57.975
	16000.0	49.135
	18000.0	38.415
	20000.0	25.064
	22000.0	6.106
	22340.0	0.000

* Deliverability at specified pressure

T. Fekete Consultants Ltd.

NORTHCOR ET AL LIARD F-25 A NAHANNI FORMATION (PERFORATIONS 3250.4 - 3258.4 m KB MD)

DATE OF TEST	RESERVOIR PRESSURE @ MPP 3254.4 mKB MD (3219.09 m KB TVD)	CUMULATIVE GAS PRODUCTION	DESCRIPTION OF TYPE OF TEST
November 11, 1986	28707 kPa (absolute)	est 2.2 E3m3	Extrapolation of ISIPS from DST #2.
November 11, 1986	28796 kPa (absolute)	est 25 E3m3	Extrapolation of FSIPS from DST #2.
January 29, 1987	28739 kPa (absolute)	163.257 E3m3	Final pressure measured on buildup after perforating with no stimulation.
February 10, 1987	28789 kPa (absolute)	1121.687 E3m3	Pressure measured on final static gradient survey after first acid job.
February 21, 1987	28859 kPa (absolute)	2193.366 E3m3	Final pressure measured on buildup following second acid job.

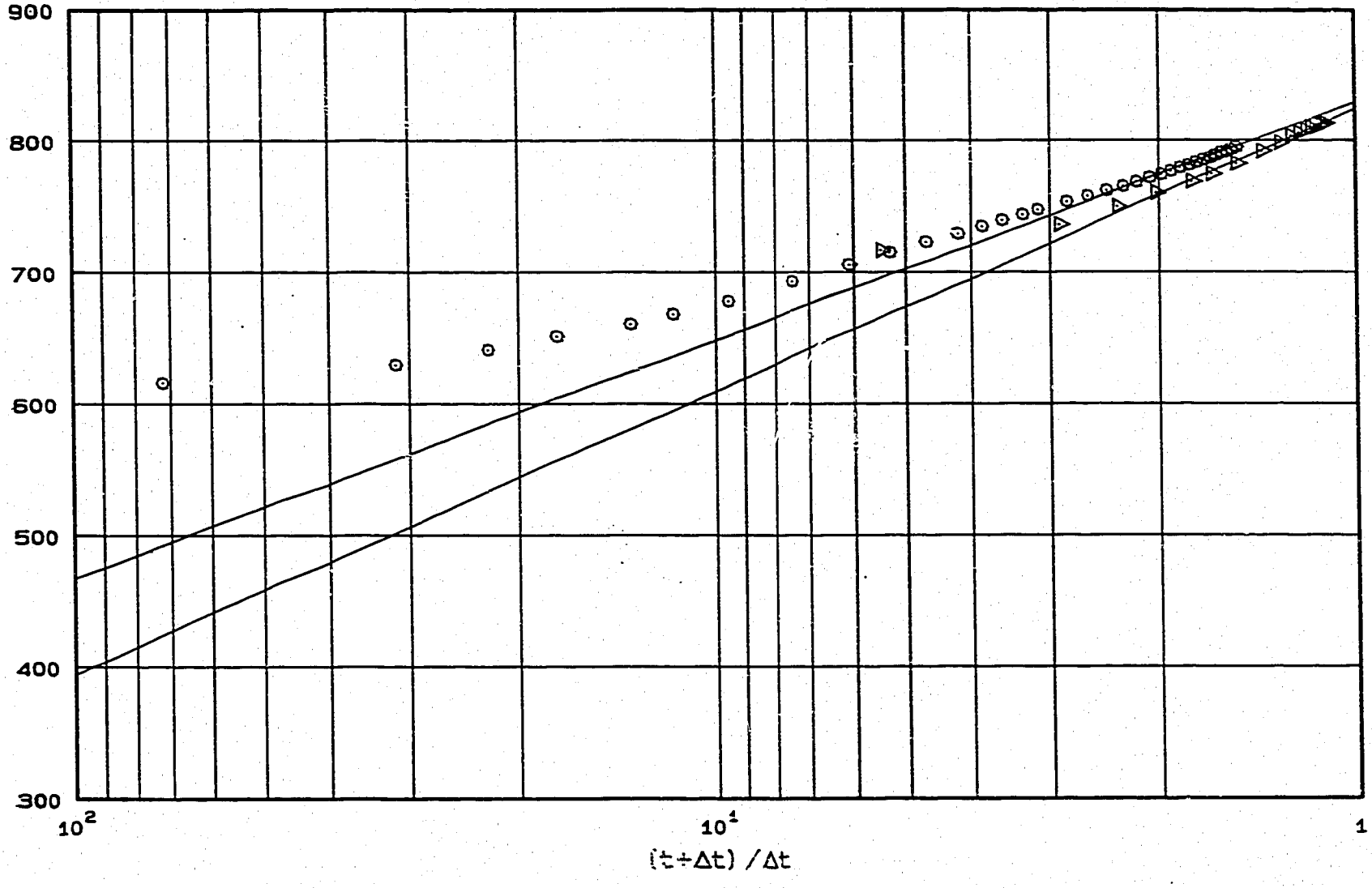
Throughout this report we have assumed $p_i - \bar{p}_R$ = 28796 kPa (absolute) for calculation purposes.

Tek-Tel Consultants Ltd

HORNER PRESSURE BUILDUP PLOT

Northcor et al Liard F-25A
DST #2
3227-3263 mK.B.
Nahanni

m = 181.000 10^6kPa^2
p^* = 28796 kPa
kh = 27.95 mD.m
s' = -4.3

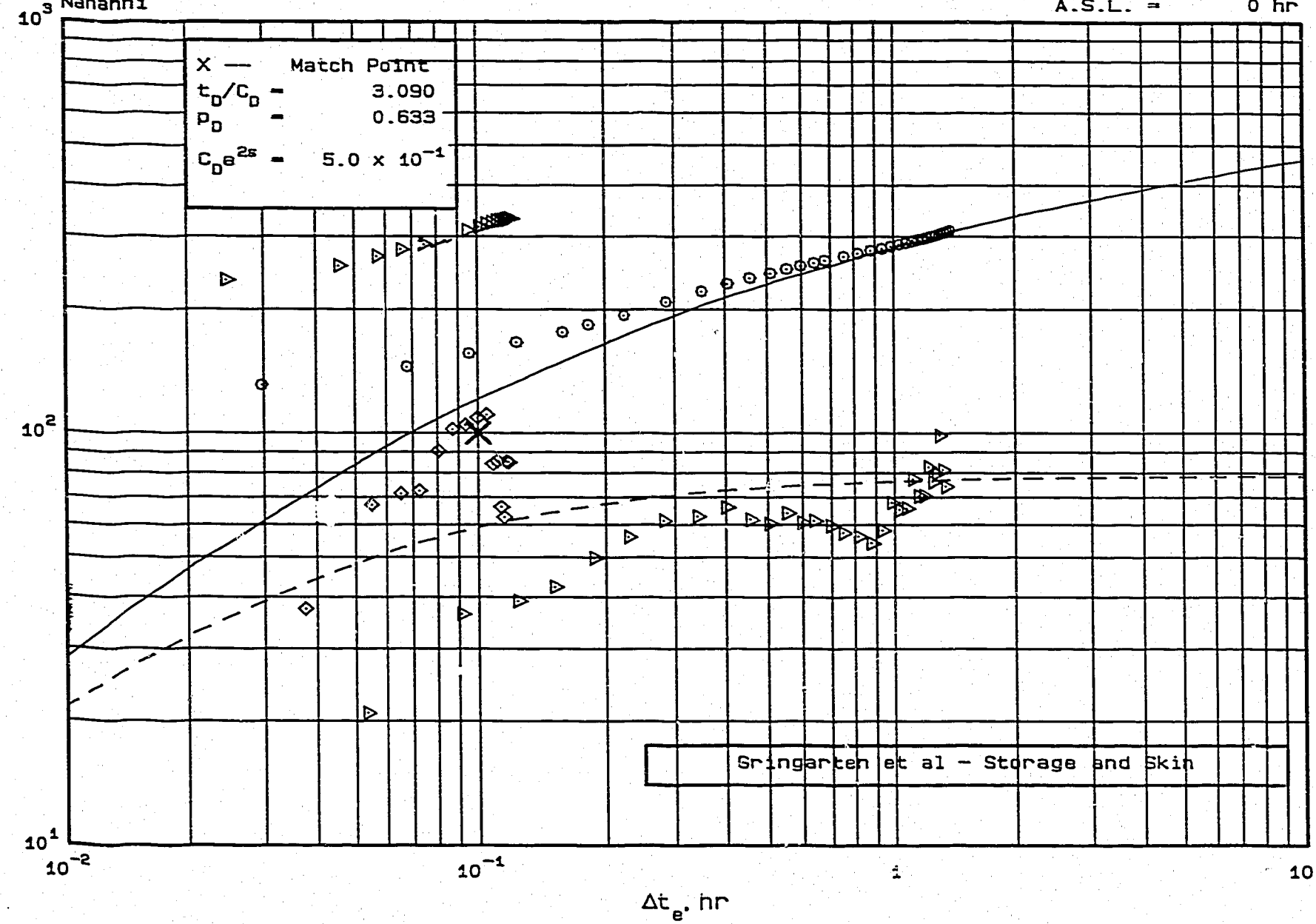


Tekta Consultants Ltd

TYPE CURVE PRESSURE BUILDUP PLOT

Northcor et al Liard F-25A
DST #2
3227-3263 mK.B.
Nahanni

kh = 27.82 mD.m
C_D = 2095
s = -4.2
A.S.L. = 0 hr



Tekta Consultants Ltd

GAS PRESSURE BUILDUP ANALYSIS - HORNER

(In Terms of P^2)

Northcor et al Liard F-25A
DST #2

3227-3263 mK.B.
Nahanni

PRODUCTION AND TIMES

Cumulative Production		=	--- 10^3 m^3
Actual Flow Time		=	2.00 hr
Horner Flow Time		=	2.13 hr
Final Flow Rate	qo	=	0.0 m^3/d
Final Flow Rate	qg	=	358.441 10^3 m^3/d
Final Flow Rate	qw	=	0.0 m^3/d

RESERVOIR PARAMETERS

Wellbore Radius	rw	= 0.079 m	Reservoir Temp	TR =	430 K
Net Pay	h	= 8.5 m	Water Saturation	Sw =	0.170
Total Porosity	phit	= 0.053	Oil Saturation	So =	0.000

FLUID PROPERTIES

Compressibility	cav	= 0.00002977 1/kPa
Comp. Factor	Zav	= 1.016
Viscosity	uav	= 21.656 uPa.s

PRESSURES

Horner Extrap.	p*	=	28796 kPa
Initial Reservoir	pi	=	--- kPa
Final Flowing	pwfo	=	22023 kPa
1 Hour Shut-in	pws1	=	27193 kPa
Average Test	pav	=	28207 kPa

T. Fekete Consultants Ltd.

GAS PRESSURE BUILDUP ANALYSIS - HORNER

(In Terms of P^2)

Northcor et al Liard F-25A
DST #2

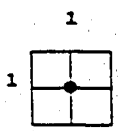
3227-3263 mK.B.
Nahanni

SEMILOG STRAIGHT LINE RESULTS

Slope	m	=	$181.000\ 10^6\ kPa^2$
Flow Capacity	kh	=	27.95 mD.m
Permeability	k	=	3.29 mD
App. Skin Factor	s	=	-4.3
Pressure Drop Due to Skin		=	--- kPa
Flow Efficiency	FE	=	3.0
Damage Ratio	DR	=	0.3
Radius of Inv.	rinv	=	57 m

STABILIZED RATE PREDICTIONS

Drainage Area	A	=	259 ha
Shape/Well Configuration		=	R1A
Time to Stabilization	ts	=	645 hr
Stabilized Rate	qs	=	$182.850\ 10^3\ m^3/d$



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PRESSURE BUILDUP DATA
IN TERMS OF PRESSURE SQUARED

Northcor et al Liard F-25A
DST #2

3227-3263 mK.B.
Nahanni

Shut-in time hr	Horner time	Equiv time hr	Super time	Super Equiv time hr	Gauge Press RRD kPa	pws MPP kPa	2 pws	2 del p
0.00	---	---	---	---	21798	22023	484.995	---
0.03	72.10	0.03	---	---	24471	24817	615.879	130.884
0.07	31.47	0.07	---	---	24751	25097	629.855	144.860
0.10	22.33	0.10	---	---	24980	25326	641.401	156.406
0.13	17.41	0.12	---	---	25179	25525	651.521	166.526
0.17	13.55	0.16	---	---	25364	25710	660.999	176.004
0.20	11.67	0.18	---	---	25513	25859	668.683	183.688
0.25	9.53	0.22	---	---	25703	26049	678.545	193.550
0.33	7.46	0.29	---	---	25991	26337	693.632	208.637
0.42	6.08	0.35	---	---	26228	26574	706.172	221.177
0.50	5.27	0.41	---	---	26405	26751	715.611	230.616
0.58	4.68	0.46	---	---	26552	26898	723.497	238.502
0.67	4.18	0.51	---	---	26669	27015	729.805	244.810
0.75	3.84	0.55	---	---	26772	27118	735.381	250.386
0.83	3.57	0.60	---	---	26856	27202	739.943	254.949
0.92	3.32	0.64	---	---	26936	27282	744.302	259.307
1.00	3.13	0.68	---	---	27003	27349	747.962	262.968
1.17	2.82	0.76	---	---	27113	27459	753.991	268.996
1.33	2.60	0.82	---	---	27196	27542	758.556	273.561
1.50	2.42	0.88	---	---	27269	27615	762.583	277.588
1.67	2.28	0.94	---	---	27327	27673	765.789	280.795
1.83	2.17	0.98	---	---	27387	27733	769.114	284.119
2.00	2.07	1.03	---	---	27446	27792	772.390	287.395
2.17	1.98	1.08	---	---	27490	27836	774.837	289.843
2.33	1.92	1.11	---	---	27536	27882	777.400	292.406
2.50	1.85	1.15	---	---	27584	27930	780.079	295.084
2.67	1.80	1.19	---	---	27615	27961	781.812	296.817
2.83	1.75	1.22	---	---	27654	28000	783.994	299.000
3.00	1.71	1.25	---	---	27689	28035	785.956	300.961
3.17	1.67	1.28	---	---	27718	28064	787.582	302.588
3.33	1.64	1.30	---	---	27749	28095	789.324	304.329
3.50	1.61	1.33	---	---	27786	28132	791.404	306.409
3.67	1.58	1.35	---	---	27802	28148	792.304	307.309
3.83	1.56	1.37	---	---	27830	28176	793.881	308.887
4.00	1.53	1.39	---	---	27861	28207	795.629	310.634

Note : Units of pressure squared are : 10^6 kPa^2

T. Fekete Consultants Ltd.

RADIAL BUILDUP TIME PARAMETERS IN TERMS OF PSEUDO TIME

Northcor et al Liard F-25A
DST #2

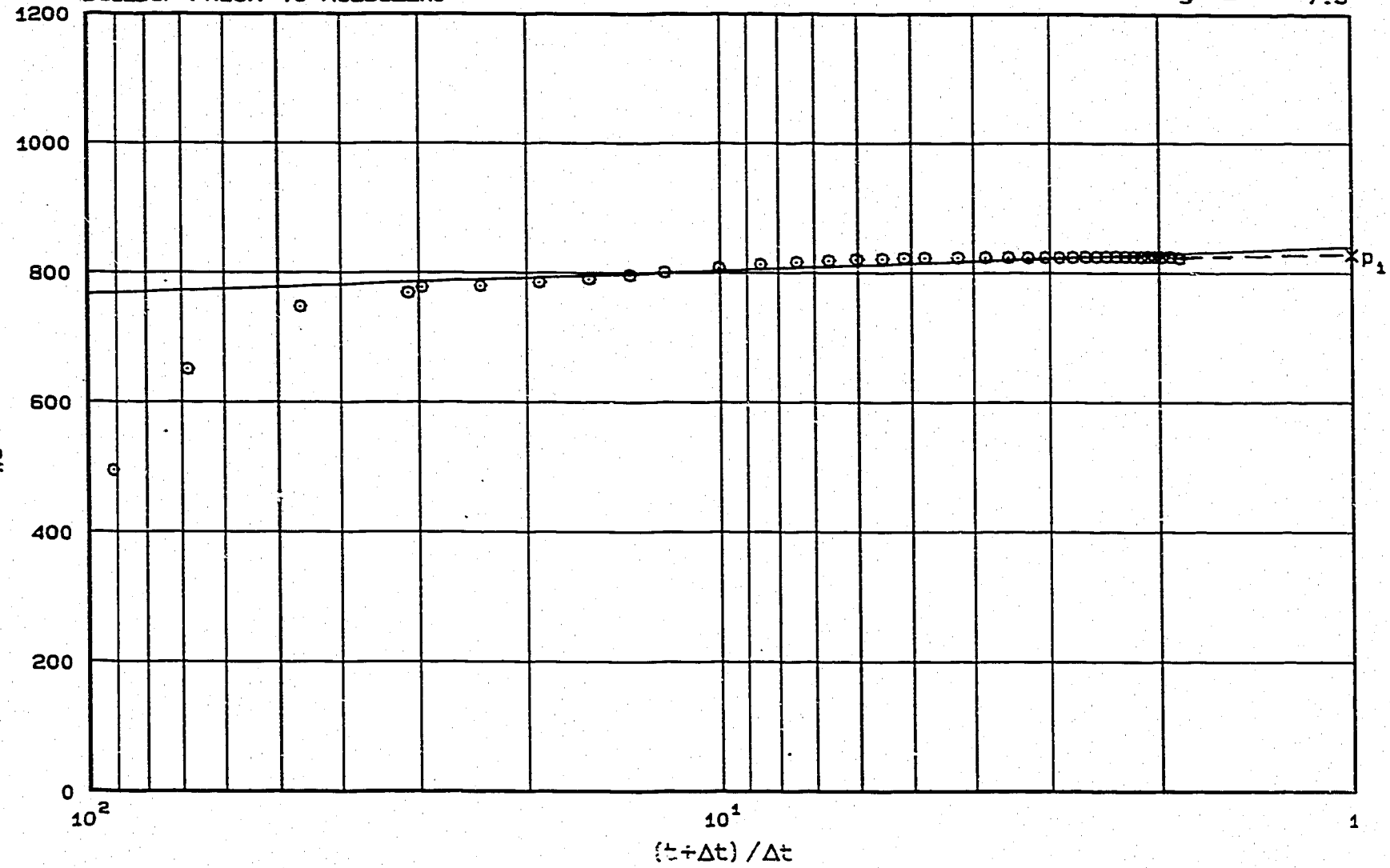
3227-3263 mK.B.
Nahanni

Shut-in Time hr	Pseudo Time hr	Pseudo Horner Time	Pseudo Equivalent Time hr	Pseudo Super Time	Pseudo Super Equivalent Time hr
0.03	0.02	87.49	0.02	—	—
0.07	0.06	36.70	0.06	—	—
0.10	0.09	25.72	0.08	—	—
0.13	0.11	19.87	0.11	—	—
0.17	0.15	15.31	0.14	—	—
0.20	0.18	13.11	0.16	—	—
0.25	0.22	10.62	0.20	—	—
0.33	0.30	8.23	0.26	—	—
0.42	0.38	6.63	0.32	—	—
0.50	0.45	5.70	0.37	—	—
0.58	0.53	5.03	0.42	—	—
0.67	0.61	4.47	0.48	—	—
0.75	0.69	4.09	0.52	—	—
0.83	0.77	3.78	0.56	—	—
0.92	0.85	3.50	0.61	—	—
1.00	0.93	3.29	0.65	—	—
1.17	1.09	2.95	0.72	—	—
1.33	1.25	2.71	0.79	—	—
1.50	1.41	2.51	0.85	—	—
1.67	1.58	2.35	0.91	—	—
1.83	1.74	2.23	0.96	—	—
2.00	1.90	2.12	1.01	—	—
2.17	2.07	2.03	1.05	—	—
2.33	2.23	1.96	1.09	—	—
2.50	2.40	1.89	1.13	—	—
2.67	2.56	1.83	1.16	—	—
2.83	2.72	1.78	1.20	—	—
3.00	2.89	1.74	1.23	—	—
3.17	3.06	1.70	1.26	—	—
3.33	3.22	1.66	1.28	—	—
3.50	3.39	1.63	1.31	—	—
3.67	3.56	1.60	1.33	—	—
3.83	3.72	1.57	1.36	—	—
4.00	3.89	1.55	1.38	—	—

HORNER PRESSURE BUILDUP PLOT

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 – 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

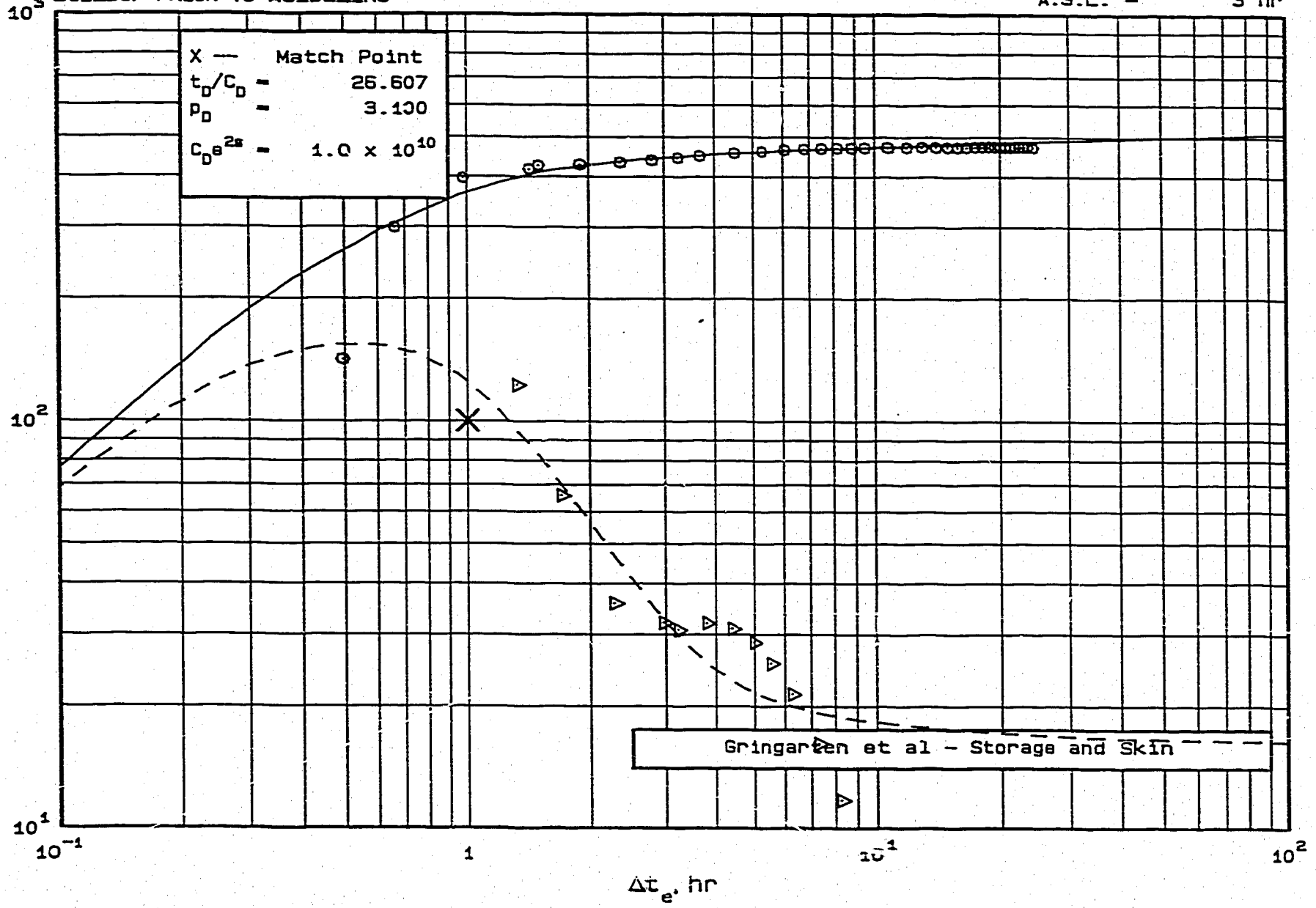
m = 37.000 10^6kPa^2
p^* = 28981 kPa
kh = 27.94 mD.m
s' = 7.3



TYPE CURVE PRESSURE BUILDUP PLOT

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS-3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

kh = 27.84 mD.m
C_D = 2415
s = 7.6
A.S.L. = 3 hr



Tiffany Graphics Ltd

GAS PRESSURE BUILDUP ANALYSIS - HORNER

(In Terms of P^2)

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

PRODUCTION AND TIMES

Cumulative Production		=	138.257	$10^3 m^3$
Actual Flow Time		=	50.00	hr
Horner Flow Time		=	45.17	hr
Final Flow Rate	qo	=	0.0	m^3/d
Final Flow Rate	qg	=	73.457	$10^3 m^3/d$
Final Flow Rate	qw	=	45.4	m^3/d

RESERVOIR PARAMETERS

Wellbore Radius	rw	= 0.079 m	Reservoir Temp	TR =	430 K
Net Pay	h	= 8.5 m	Water Saturation	Sw =	0.170
Total Porosity	phit	= 0.053	Oil Saturation	So =	0.000

FLUID PROPERTIES

Compressibility	cav	= 0.00002983	1/kPa
Comp. Factor	Zav	= 1.007	
Viscosity	uav	= 21.793	uPa.s

PRESSURES

Horner Extrap.	p*	=	28981	kPa
Initial Reservoir	pi	=	28796	kPa
Final Flowing	pwfo	=	18788	kPa
1 Hour Shut-in	pws1	=	27899	kPa
Average Test	pav	=	28340	kPa

T. Fekete Consultants Ltd.

GAS PRESSURE BUILDUP ANALYSIS - HORNER

(In Terms of P^2)

NORTHCOR ET AL LIARD F-25A
NAHANNI

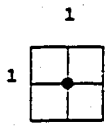
PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

SEMILOG STRAIGHT LINE RESULTS

Slope	m	=	$37.000\ 10^6\ kPa^2$
Flow Capacity	kh	=	27.94 mD.m
Permeability	k	=	3.29 mD
App. Skin Factor	s	=	7.3
Pressure Drop Due to Skin		=	5450 kPa
Flow Efficiency	FE	=	0.5
Damage Ratio	DR	=	2.0
Radius of Inv.	rinv	=	282 m

STABILIZED RATE PREDICTIONS

Drainage Area	A	=	259 ha	
Shape/Well Configuration		=	R1A	
Time to Stabilization	ts	=	651 hr	
	qs	=	$68.403\ 10^3\ m^3/d$	@ s= 7.3
	qs	=	$126.321\ 10^3\ m^3/d$	@ s= 0.0
	qs	=	$235.767\ 10^3\ m^3/d$	@ s= -4.0



T. Feketa Consultants Ltd.

PRESSURE BUILDUP DATA
IN TERMS OF PRESSURE SQUARED

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

Shut-in time hr	Horner time	Equiv time hr	Super time	Super Equiv time hr	Gauge Press RRD kPa	pws MPP kPa	p_{ws}^2	Δp^2
0.00	---	---	---	---	18647	18788	352.993	---
0.50	91.34	0.49	---	---	21931	22243	494.751	141.758
0.67	68.42	0.66	---	---	25214	25526	651.587	298.594
1.00	46.17	0.98	---	---	27046	27358	748.460	395.467
1.50	31.11	1.45	---	---	27429	27741	769.535	416.543
1.58	29.59	1.53	---	---	27586	27898	778.276	425.283
2.00	23.59	1.92	---	---	27624	27936	780.420	427.427
2.50	19.07	2.37	---	---	27722	28034	785.894	432.901
3.00	16.06	2.81	---	---	27816	28128	791.190	438.197
3.50	13.91	3.25	---	---	27921	28233	797.097	444.104
4.00	12.29	3.67	---	---	28005	28317	801.835	448.843
5.00	10.03	4.50	---	---	28131	28442	808.976	455.983
6.00	8.53	5.30	---	---	28218	28530	813.950	460.957
7.00	7.45	6.06	---	---	28283	28594	817.640	464.647
8.00	6.65	6.80	---	---	28326	28638	820.135	467.142
9.00	6.02	7.50	---	---	28356	28668	821.837	468.844
10.00	5.52	8.19	---	---	28375	28687	822.938	469.946
11.00	5.11	8.85	---	---	28387	28699	823.638	470.646
12.00	4.76	9.48	---	---	28394	28706	824.040	471.048
14.00	4.23	10.69	---	---	28403	28715	824.546	471.553
16.00	3.82	11.82	---	---	28410	28722	824.948	471.955
18.00	3.51	12.87	---	---	28413	28725	825.143	472.150
20.00	3.26	13.86	---	---	28408	28720	824.844	471.851
22.00	3.05	14.79	---	---	28412	28724	825.045	472.052
24.00	2.88	15.67	---	---	28413	28725	825.143	472.150
26.00	2.74	16.50	---	---	28415	28727	825.246	472.253
28.00	2.61	17.29	---	---	28429	28741	826.051	473.058
30.00	2.51	18.03	---	---	28433	28745	826.252	473.259
32.00	2.41	18.73	---	---	28431	28743	826.149	473.156
34.00	2.33	19.40	---	---	28431	28743	826.149	473.156
36.00	2.25	20.03	---	---	28431	28743	826.149	473.156
38.00	2.19	20.64	---	---	28431	28743	826.149	473.156
40.00	2.13	21.21	---	---	28426	28738	825.850	472.857
42.00	2.08	21.76	---	---	28433	28745	826.252	473.259
44.00	2.03	22.29	---	---	28431	28743	826.149	473.156
46.00	1.98	22.79	---	---	28420	28732	825.545	472.552
48.62	1.93	23.42	---	---	28427	28739	825.947	472.955
51.83	1.87	24.14	---	---	28396	28708	824.144	471.151
init	---	---	---	---	---	28796	829.210	---

Note : Units of pressure squared are : 10^6 kPa^2

T. Fekete Consultants Ltd

RADIAL BUILDUP TIME PARAMETERS IN TERMS OF PSEUDO TIME

NORTHCOR ET AL LIARD F-25A
NAHANNI

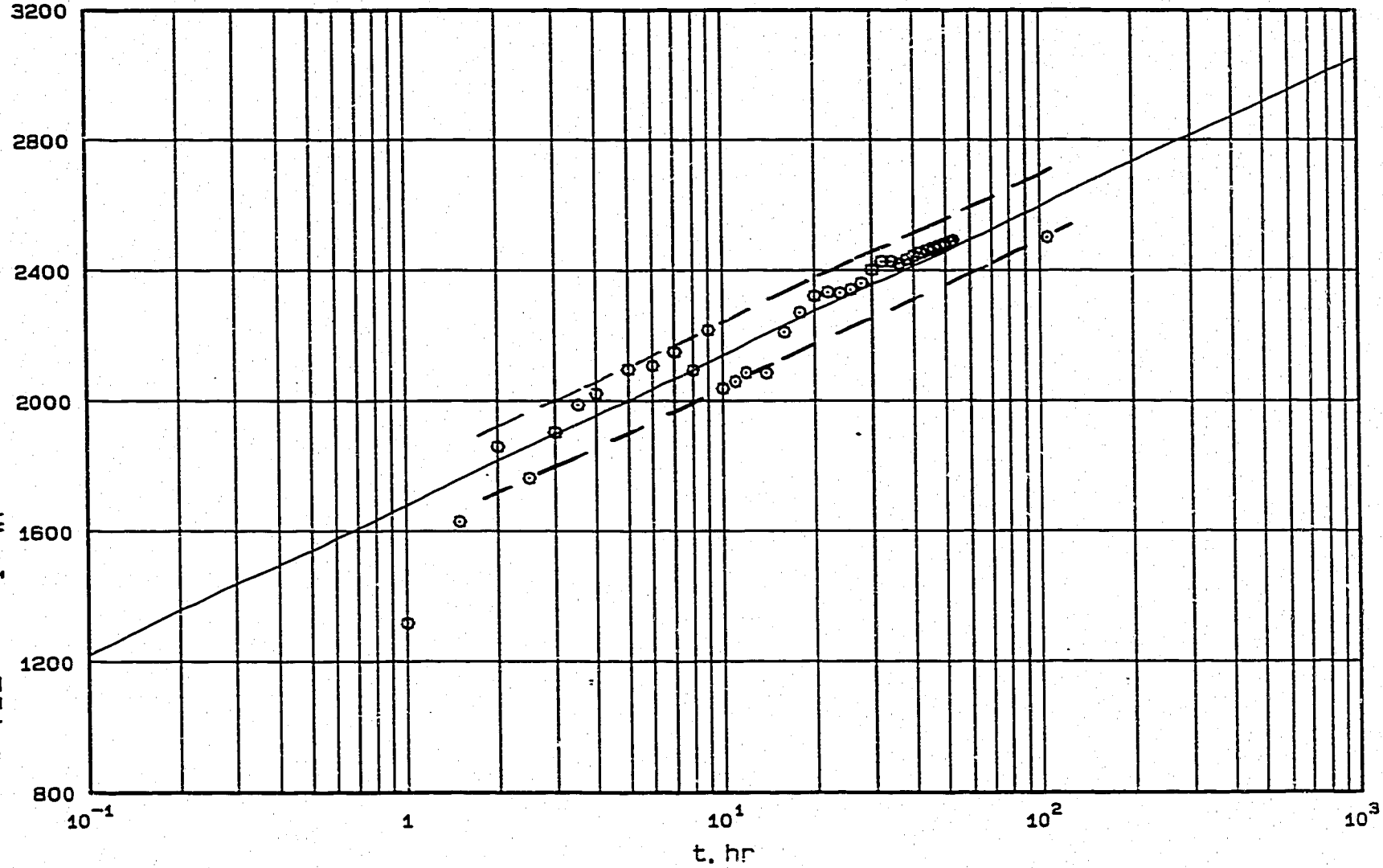
PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

Shut-in Time hr	Pseudo Time hr	Pseudo Horner Time	Pseudo Equivalent Time hr	Pseudo Super Time	Pseudo Super Equivalent Time hr
0.50	0.36	128.12	0.35	---	---
0.67	0.50	92.23	0.49	---	---
1.00	0.80	57.77	0.78	---	---
1.50	1.27	36.56	1.24	---	---
1.58	1.35	34.54	1.31	---	---
2.00	1.75	26.79	1.69	---	---
2.50	2.23	21.22	2.13	---	---
3.00	2.72	17.61	2.56	---	---
3.50	3.21	15.09	2.99	---	---
4.00	3.70	13.22	3.42	---	---
5.00	4.68	10.66	4.24	---	---
6.00	5.66	8.98	5.03	---	---
7.00	6.65	7.79	5.80	---	---
8.00	7.65	6.91	6.54	---	---
9.00	8.64	6.23	7.25	---	---
10.00	9.63	5.69	7.94	---	---
11.00	10.63	5.25	8.60	---	---
12.00	11.63	4.89	9.25	---	---
14.00	13.62	4.32	10.46	---	---
16.00	15.61	3.89	11.60	---	---
18.00	17.61	3.57	12.67	---	---
20.00	19.60	3.30	13.67	---	---
22.00	21.59	3.09	14.61	---	---
24.00	23.59	2.92	15.50	---	---
26.00	25.58	2.77	16.33	---	---
28.00	27.57	2.64	17.12	---	---
30.00	29.57	2.53	17.87	---	---
32.00	31.56	2.43	18.58	---	---
34.00	33.56	2.35	19.25	---	---
36.00	35.56	2.27	19.90	---	---
38.00	37.55	2.20	20.51	---	---
40.00	39.55	2.14	21.09	---	---
42.00	41.54	2.09	21.64	---	---
44.00	43.54	2.04	22.17	---	---
46.00	45.53	1.99	22.68	---	---
48.62	48.14	1.94	23.31	---	---
51.83	51.35	1.88	24.03	---	---

SEMILOG PRESSURE DRAWDOWN PLOT

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 – 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

m = 459.000 10^3kPa^2/10^3m^3/d
p_i = 28796 kPa
kh = 27.96 mD.m
s' = -1.6

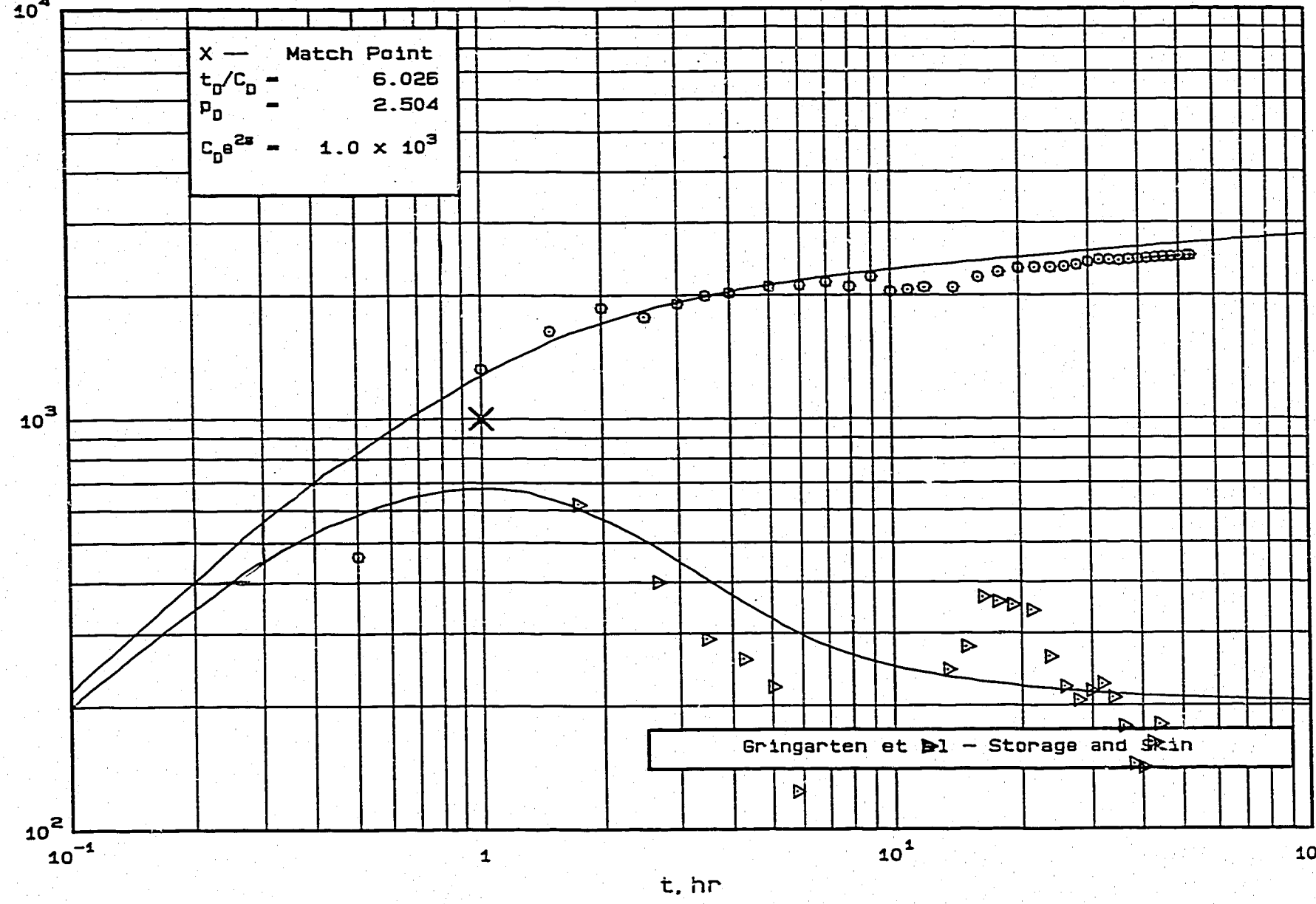


Tekta Consultants Ltd

TYPE CURVE PRESSURE DRAWDOWN PLOT

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

kh = 27.91 mD.m
C_D = 8877
s = -1.1
A.S.L. = 6 hr



GAS PRESSURE DRAWDOWN ANALYSIS

(In Terms of P^2)

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

PRODUCTION AND TIMES

Initial Flow Rate	qg =	237.016	10^3 m^3/d
Final Flow Rate	qg =	224.565	10^3 m^3/d
Actual Flow Time	=	106.00	hr

RESERVOIR PARAMETERS

Wellbore Radius	rw	= 0.079 m	Reservoir Temp	TR =	430 K
Net Pay	h	= 8.5 m	Water Saturation	Sw =	0.170
Total Porosity	phit	= 0.053	Oil Saturation	So =	0.000

FLUID PROPERTIES

Compressibility	cav =	0.00003875	1/kPa
Comp. Factor	Zav =	0.982	
Viscosity	uav =	20.384	uPa.s

PRESSURES

Initial Reservoir	pi =	28796	kPa
Final Flowing	pwfo =	16345	kPa
1 Hour delp^2/q	=	1679.630	10^3 kPa^2/10^3 m^3/d
Average Test	pav =	23413	kPa

T. Fekete Consultants Ltd

GAS PRESSURE DRAWDOWN ANALYSIS

(In Terms of P^2)

NORTHCOR ET AL LIARD F-25A
NAHANNI

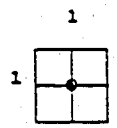
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

SEMILOG STRAIGHT LINE RESULTS

Slope	m	=	459.000 10^3 kPa ^{2}/10 m ^{3}/d
Flow Capacity	kh	=	27.96 mD.m
Permeability	k	=	3.29 mD
App. Skin Factor	s	=	-1.6
Pressure Drop Due to Skin		=	--- kPa
Flow Efficiency	FE	=	1.3
Damage Ratio	DR	=	0.8
Radius of Inv.	rinv	=	374 m

STABILIZED RATE PREDICTIONS

Drainage Area	A	=	259 ha
Shape/Well Configuration		=	R1A
Time to Stabilization	ts	=	783 hr
Stabilized Rate	qs	=	201.876 10^3 m ^{3}/d



T. Feketa Consultants Ltd

PRESSURE DRAWDOWN DATA
IN TERMS OF PRESSURE SQUARED

NORTHCOR ET AL LIARD F-25A — PERFS 3250.4 - 3258.4 M KB
NAHANNI — DRAWDOWN FOLLOWING FIRST ACID JO

Flow time hr	Super time hr	Gas Flow Rate 10^3 m^3/d	Gauge Press RRD kPa	pwf MPP kPa	$\Delta p^2/q$ 10^2 kPa^2/10^3 m^3/d
init	---	---	28454	28796	---
0.50	0.50	237.016	26690	26829	461.542
1.00	1.40	159.921	24731	24870	1317.480
1.50	2.12	143.131	24270	24409	1630.610
2.00	2.91	131.942	24023	24162	1850.000
2.50	2.49	154.794	23445	23584	1763.630
3.00	3.06	135.180	22964	23103	1904.050
3.50	3.50	157.166	22593	22732	1988.240
4.00	3.93	159.099	22386	22525	2022.770
5.00	4.78	163.590	21912	22051	2096.480
6.00	5.41	170.931	21513	21652	2108.410
7.00	6.30	174.000	21190	21329	2151.030
8.00	6.53	185.418	20859	20998	2094.150
9.00	8.03	181.973	20495	20634	2217.170
10.00	7.52	198.893	20450	20589	2037.810
11.00	8.04	207.681	19897	20036	2059.830
12.00	9.05	210.368	19618	19757	2086.190
14.00	10.50	220.759	19068	19207	2085.070
16.00	13.46	215.023	18673	18812	2210.580
18.00	15.48	215.281	18302	18441	2272.180
20.00	17.52	215.393	18003	18142	2321.710
22.00	19.05	218.001	17759	17898	2334.210
24.00	20.62	220.576	17611	17750	2330.870
26.00	22.70	220.985	17515	17654	2341.960
28.00	24.83	220.985	17392	17531	2361.660
30.00	27.52	219.101	17264	17403	2402.260
32.00	29.86	218.055	17172	17311	2428.540
34.00	31.23	219.431	17072	17211	2429.020
36.00	32.48	221.385	16986	17125	2420.900
38.00	34.66	221.385	16903	17042	2433.680
40.00	36.77	221.385	16828	16967	2445.250
42.00	38.83	221.385	16762	16901	2455.230
44.00	40.89	221.385	16714	16853	2462.570
46.00	42.93	221.385	16670	16809	2469.370
48.00	44.96	221.385	16621	16760	2476.670
50.00	46.99	221.385	16580	16719	2482.900
52.00	49.01	221.385	16542	16681	2488.610
53.00	50.03	221.385	16515	16654	2492.750
106.00	102.27	224.565	16206	16345	2502.910

Note : Units of $\Delta p^2/q$ are : 10^2 kPa^2/10^3 m^3/d

T. Fekete Consultants Ltd.

LINEAR AND BILINEAR DRAWDOWN TIME PARAMETERS

NORTHCOR ET AL LIARD F-25A NAHANNI

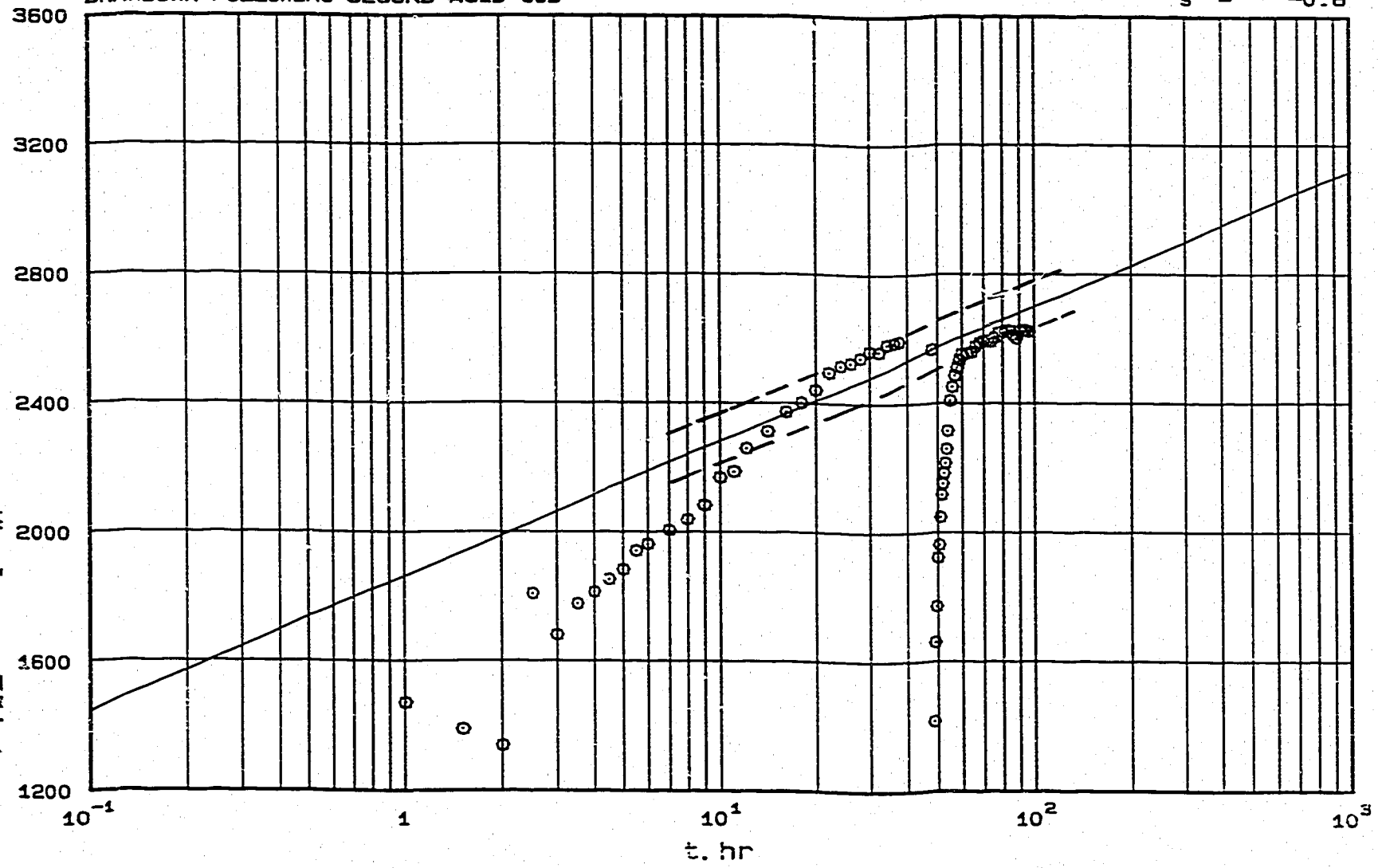
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING FIRST ACID JOB

Flow time hr	Root time 1/2 hr	Super Root time 1/2 hr	Quad Root time 1/4 hr	Super Quad Root time 1/4 hr
0.50	0.71	0.71	0.84	0.84
1.00	1.00	1.14	1.00	1.08
1.50	1.22	1.41	1.11	1.20
2.00	1.41	1.64	1.19	1.29
2.50	1.58	1.62	1.26	1.26
3.00	1.73	1.77	1.32	1.33
3.50	1.87	1.89	1.37	1.37
4.00	2.00	2.01	1.41	1.41
5.00	2.24	2.21	1.50	1.48
6.00	2.45	2.37	1.57	1.53
7.00	2.65	2.55	1.63	1.59
8.00	2.83	2.68	1.68	1.61
9.00	3.00	2.87	1.73	1.69
10.00	3.16	2.87	1.78	1.68
11.00	3.32	2.96	1.82	1.70
12.00	3.46	3.12	1.86	1.75
14.00	3.74	3.34	1.93	1.82
16.00	4.00	3.71	2.00	1.92
18.00	4.24	3.97	2.06	1.99
20.00	4.47	4.22	2.11	2.05
22.00	4.69	4.41	2.17	2.10
24.00	4.90	4.60	2.21	2.14
26.00	5.10	4.81	2.26	2.19
28.00	5.29	5.02	2.30	2.24
30.00	5.48	5.25	2.34	2.29
32.00	5.66	5.46	2.38	2.34
34.00	5.83	5.61	2.41	2.37
36.00	6.00	5.75	2.45	2.39
38.00	6.16	5.92	2.48	2.43
40.00	6.32	6.09	2.51	2.47
42.00	6.48	6.26	2.55	2.50
44.00	6.63	6.42	2.58	2.53
46.00	6.78	6.57	2.60	2.56
48.00	6.93	6.72	2.63	2.59
50.00	7.07	6.87	2.66	2.62
52.00	7.21	7.02	2.69	2.65
53.00	7.28	7.09	2.70	2.66
106.00	10.30	10.12	3.21	3.18

SEMILOG PRESSURE DRAWDOWN PLOT

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JOB

m = 419.000 10^3kPa^2/10^3m^3/d
p_i = 26796 kPa
kh = 27.93 mD.m
s' = -0.6

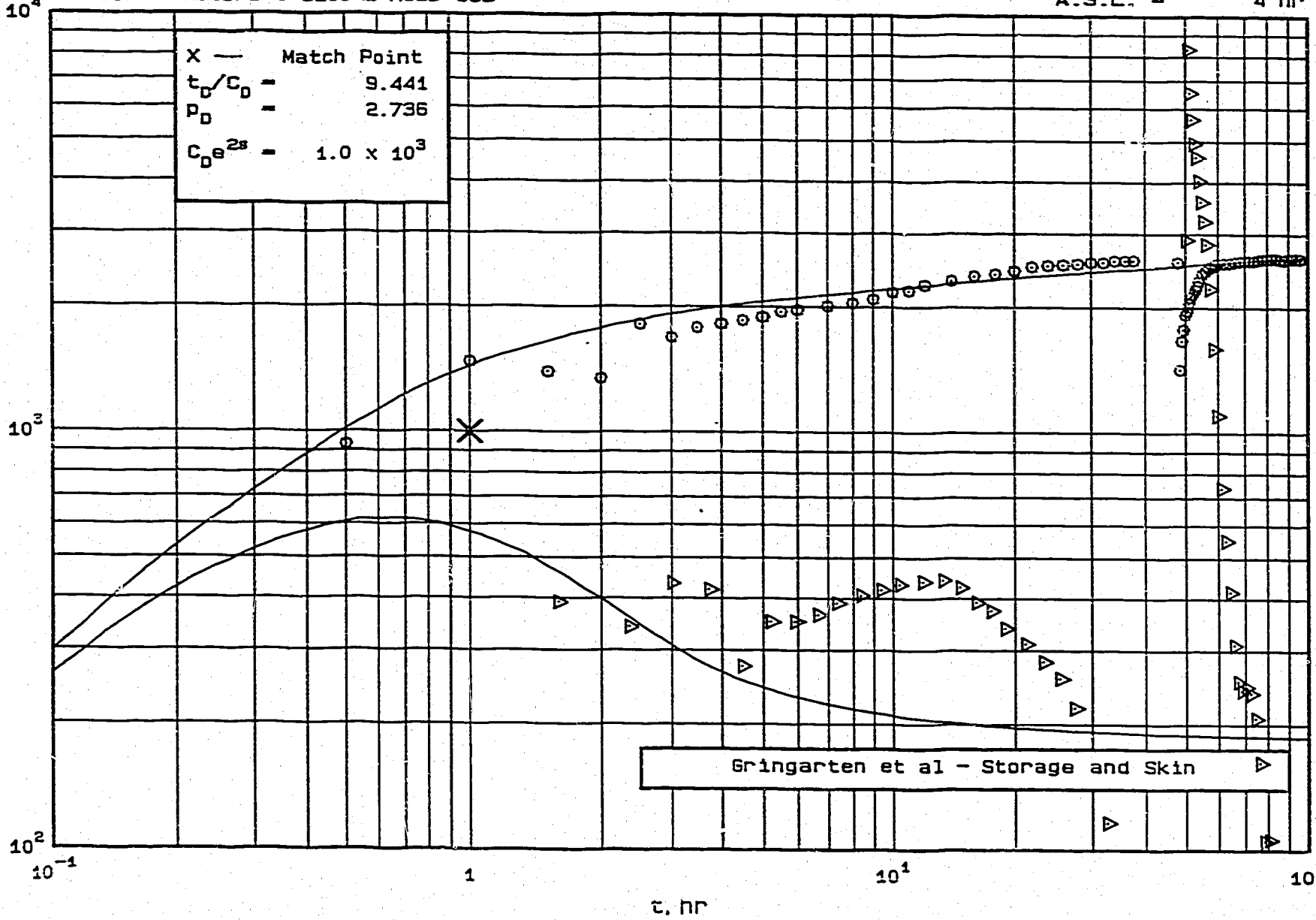


Tidyco Consultants Ltd

TYPE CURVE PRESSURE DRAWDOWN PLOT

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 — 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JOB

kh = 27.81 mD.m
C_D = 4450
s = -0.7
A.S.L. = 4 hr



Tiacke Consultants Ltd

GAS PRESSURE DRAWDOWN ANALYSIS

(In Terms of P^2)

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JOB

PRODUCTION AND TIMES

Initial Flow Rate	qg =	265.464	10^3 m^3/d
Final Flow Rate	qg =	247.623	10^3 m^3/d
Actual Flow Time	=	96.00	hr

RESERVOIR PARAMETERS

Wellbore Radius	rw	= 0.079 m	Reservoir Temp	TR =	430 K
Net Pay	h	= 8.5 m	Water Saturation	Sw =	0.170
Total Porosity	phit	= 0.053	Oil Saturation	So =	0.000

FLUID PROPERTIES

Compressibility	cav =	0.00005344	1/kPa
Comp. Factor	Zav =	0.965	
Viscosity	uav =	18.907	uPa.s

PRESSURES

Initial Reservoir	pi =	28796	kPa
Final Flowing	pwfo =	13394	kPa
1 Hour delp^2 /q	=	1863.860	10^3 $kPa^2/10^3$ m^3/d
Average Test	pav =	18025	kPa

T. Fekete Consultants Ltd.

GAS PRESSURE DRAWDOWN ANALYSIS

(In Terms of P^2)

NORTHCOR ET AL LIARD F-25A
NAHANNI

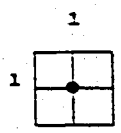
PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JOB

SEMILOG STRAIGHT LINE RESULTS

Slope	m	=	419.000 10^3 kPa ^{2}/10^3 m ^{3}/d
Flow Capacity	kh	=	27.93 mD.m
Permeability	k	=	3.29 mD
App. Skin Factor	s	=	-0.6
Pressure Drop Due to Skin		=	--- kPa
Flow Efficiency	FE	=	1.1
Damage Ratio	DR	=	0.9
Radius of Inv.	rinv	=	316 m

STABILIZED RATE PREDICTIONS

Drainage Area	A	=	259 ha
Shape/Well Configuration		=	R1A
Time to Stabilization	ts	=	995 hr
Stabilized Rate	qs	=	222.865 10^3 m ^{3}/d



PRESSURE DRAWDOWN DATA
IN TERMS OF PRESSURE SQUARED

NORTHCOR ET AL LIARD F-25A — PERFS 3250.4 - 3258.4 M KB
NAHANNI — DRAWDOWN FOLLOWING SECOND ACID J

Flow time hr	Super time hr	Gas Flow Rate 10^3 m^3/d	Gauge Press RRD kPa	pwf MPP kPa	$\Delta p^2/q$
init	---	---	---	28796	---
0.50	0.50	265.464	23977	24141	928.268
1.00	1.00	264.263	20819	20983	1471.730
1.50	1.25	316.454	19572	19736	1389.460
2.00	1.68	332.735	19414	19578	1340.140
2.50	3.30	261.986	18670	18834	1811.130
3.00	2.92	291.625	18244	18408	1681.460
3.50	3.68	282.415	17912	18076	1779.180
4.00	4.16	281.861	17650	17814	1816.040
4.50	4.69	280.766	17400	17564	1854.620
5.00	5.19	280.225	17179	17343	1885.730
5.50	5.91	275.510	16976	17140	1943.410
6.00	6.36	275.510	16806	16970	1964.460
7.00	7.33	274.989	16488	16652	2007.060
8.00	8.33	274.473	16235	16399	2041.300
9.00	9.50	272.007	16025	16189	2084.970
10.00	11.22	263.979	15842	16006	2170.690
11.00	12.05	263.867	15692	15856	2189.730
12.00	13.77	257.714	15536	15700	2261.110
14.00	15.73	255.325	15274	15438	2314.220
16.00	18.09	251.637	15059	15223	2374.330
18.00	20.02	250.828	14878	15042	2403.830
20.00	22.38	248.382	14751	14915	2442.820
22.00	25.22	244.251	14637	14801	2498.000
24.00	27.14	243.417	14543	14707	2517.960
26.00	28.91	243.417	14459	14623	2528.080
28.00	31.05	242.580	14394	14558	2544.620
30.00	33.39	241.295	14335	14499	2565.280
32.00	34.50	242.956	14212	14376	2562.360
34.00	37.14	241.500	14144	14308	2585.880
36.00	38.99	241.500	14102	14266	2590.850
37.55	40.46	241.500	14066	14230	2595.100
48.00	49.48	245.102	13968	14132	2568.300
48.50	8.56	397.350	16156	16320	1416.550
49.00	16.13	355.994	15241	15405	1662.660
49.50	20.27	343.629	14661	14825	1773.510
50.00	28.86	318.840	14516	14680	1924.810
50.50	30.56	314.955	14344	14508	1964.500
51.00	36.20	303.570	14220	14384	2049.970
51.50	41.86	293.367	14234	14398	2119.900
52.00	44.16	288.894	14220	14384	2154.110

Note : Units of $\Delta p^2/q$ are : 10^3 kPa^2/10^3 m^3/d

T. Fekete Associates Consultants Ltd.

Flow time hr	Super time hr	Gas Flow Rate 10^3 m^3/d	Gauge Press RRD kPa	pwf MPP kPa	2 del p /q
52.50	45.44	286.385	14083	14247	2186.680
53.00	47.37	283.379	14007	14171	2217.500
53.50	49.87	279.837	13856	14020	2260.780
54.00	54.88	273.671	13804	13968	2317.030
55.00	62.06	264.010	13725	13889	2410.160
56.00	64.53	259.923	13684	13848	2452.430
57.00	66.81	256.674	13646	13810	2487.570
58.00	68.32	254.485	13615	13779	2512.320
59.00	70.22	252.277	13598	13762	2536.170
60.00	71.54	250.721	13577	13741	2554.210
62.00	71.15	250.762	13550	13714	2556.750
64.00	71.78	250.783	13512	13676	2560.690
66.00	74.50	249.263	13486	13650	2579.150
68.00	76.46	248.451	13465	13629	2589.890
70.00	77.97	248.169	13438	13602	2595.790
72.00	78.87	248.564	13395	13559	2596.370
74.00	79.70	249.208	13367	13531	2592.700
76.00	82.81	248.129	13343	13507	2606.590
78.00	85.77	247.046	13328	13492	2619.660
80.00	87.22	247.046	13307	13471	2621.950
82.00	89.26	246.738	13290	13454	2627.080
84.00	90.89	246.738	13281	13445	2628.060
86.00	90.45	248.264	13267	13431	2613.420
88.00	91.02	249.353	13254	13418	2603.410
90.00	96.47	247.170	13242	13406	2627.700
92.00	98.05	247.170	13235	13399	2628.460
94.00	99.80	247.170	13230	13394	2629.000
96.00	100.89	247.623	13230	13394	2624.190

Note : Units of del p^2/q^3 are : 1.0 kPa^2/10^3 m^3/d

LINEAR AND BILINEAR DRAWDOWN TIME PARAMETERS

NORTECOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
DRAWDOWN FOLLOWING SECOND ACID JO

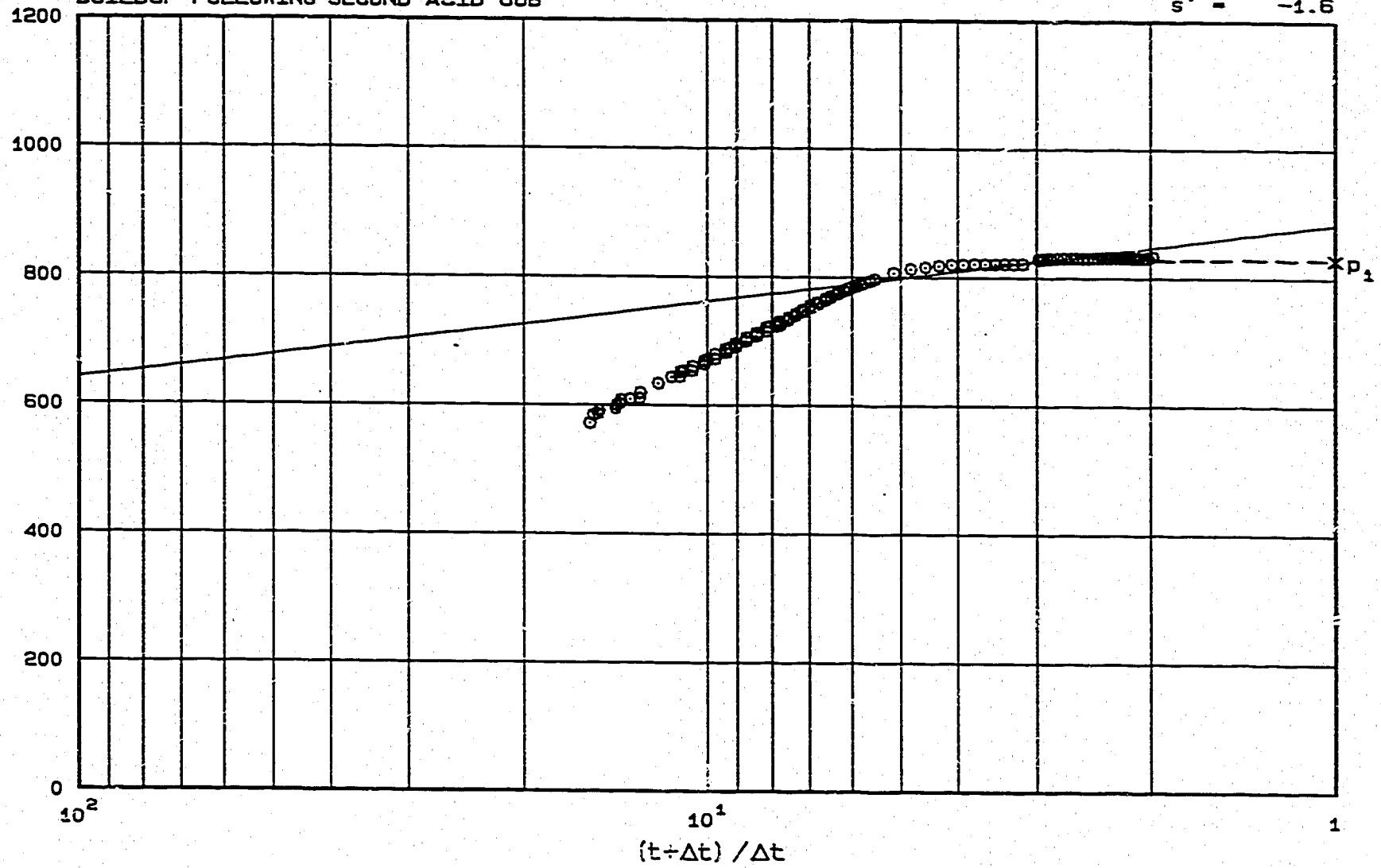
Flow time hr	Root time 1/2 hr	Super Root time 1/2 hr	Quad Root time 1/4 hr	Super Quad Root time 1/4 hr
0.50	0.71	0.71	0.84	0.84
1.00	1.00	1.00	1.00	1.00
1.50	1.22	1.14	1.11	1.06
2.00	1.41	1.32	1.19	1.14
2.50	1.58	1.71	1.26	1.32
3.00	1.73	1.72	1.32	1.31
3.50	1.87	1.90	1.37	1.38
4.00	2.00	2.03	1.41	1.43
4.50	2.12	2.15	1.46	1.47
5.00	2.24	2.27	1.50	1.51
5.50	2.35	2.40	1.53	1.55
6.00	2.45	2.50	1.57	1.58
7.00	2.65	2.69	1.63	1.64
8.00	2.83	2.87	1.68	1.70
9.00	3.00	3.06	1.73	1.75
10.00	3.16	3.28	1.78	1.82
11.00	3.32	3.43	1.82	1.86
12.00	3.46	3.63	1.86	1.91
14.00	3.74	3.91	1.93	1.98
16.00	4.00	4.19	2.00	2.05
18.00	4.24	4.42	2.06	2.11
20.00	4.47	4.67	2.11	2.17
22.00	4.69	4.93	2.17	2.23
24.00	4.90	5.13	2.21	2.27
26.00	5.10	5.32	2.26	2.31
28.00	5.29	5.51	2.30	2.35
30.00	5.48	5.71	2.34	2.40
32.00	5.66	5.85	2.38	2.42
34.00	5.83	6.04	2.41	2.46
36.00	6.00	6.20	2.45	2.49
37.55	6.13	6.32	2.48	2.52
48.00	6.93	7.04	2.63	2.65
48.50	6.96	4.63	2.64	1.96
49.00	7.00	5.24	2.65	2.17
49.50	7.04	5.49	2.65	2.25
50.00	7.07	5.94	2.66	2.38
50.50	7.11	6.06	2.67	2.41
51.00	7.14	6.31	2.67	2.48
51.50	7.18	6.55	2.68	2.54
52.00	7.21	6.67	2.69	2.57

Flow time hr	Root time 1/2 hr	Super Root time 1/2 hr	Quad Root time 1/4 hr	Super Quad Root time 1/4 hr
52.50	7.25	6.76	2.69	2.59
53.00	7.28	6.86	2.70	2.61
53.50	7.31	6.97	2.70	2.64
54.00	7.35	7.14	2.71	2.68
55.00	7.42	7.42	2.72	2.75
56.00	7.48	7.57	2.74	2.78
57.00	7.55	7.71	2.75	2.80
58.00	7.62	7.81	2.76	2.82
59.00	7.68	7.92	2.77	2.84
60.00	7.75	8.02	2.78	2.86
62.00	7.87	8.12	2.81	2.87
64.00	8.00	8.22	2.83	2.88
66.00	8.12	8.38	2.85	2.91
68.00	8.25	8.51	2.87	2.93
70.00	8.37	8.62	2.89	2.95
72.00	8.49	8.72	2.91	2.96
74.00	8.60	8.81	2.93	2.98
76.00	8.72	8.95	2.95	3.00
78.00	8.83	9.09	2.97	3.03
80.00	8.94	9.19	2.99	3.04
82.00	9.06	9.30	3.01	3.06
84.00	9.17	9.41	3.03	3.08
86.00	9.27	9.46	3.05	3.08
88.00	9.38	9.53	3.06	3.09
90.00	9.49	9.71	3.08	3.12
92.00	9.59	9.80	3.10	3.14
94.00	9.70	9.90	3.11	3.15
96.00	9.80	9.99	3.13	3.16

HORNER PRESSURE BUILDUP PLOT

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
BUILDUP FOLLOWING SECOND ACID JOB

m = 121.600 10^6kPa^2
p^* = 29723 kPa
kh = 27.94 mD.m
s' = -1.6

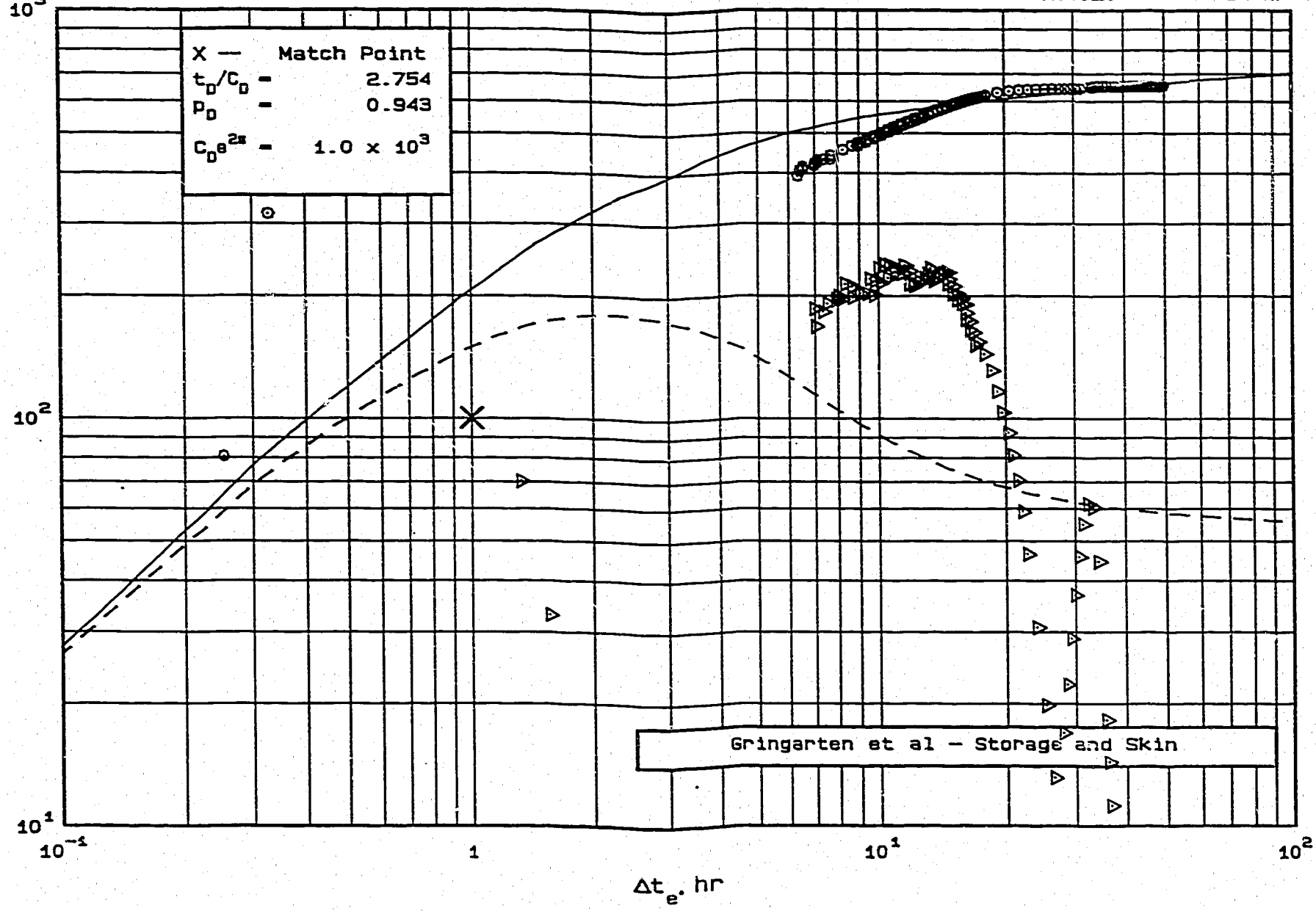


Trekker Consultants Ltd

TYPE CURVE PRESSURE BUILDUP PLOT

NORTHCOR ET AL LIARD F-25A
NAHANNI
PERFS 3250.4 - 3258.4 M KB
BUILDUP FOLLOWING SECOND ACID JOB

kh = 27.82 mD.m
C_D = 22200
s = -1.6
A.S.L. = 14 hr



Trekker Consultants Ltd

GAS PRESSURE BUILDUP ANALYSIS - HORNER

(In Terms of P^2)

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP FOLLOWING SECOND ACID JOB

PRODUCTION AND TIMES

Cumulative Production	=	1019.520	$10^3 m^3$
Actual Flow Time	=	96.00	hr
Horner Flow Time	=	98.81	hr
Final Flow Rate qo	=	0.0	m^3/d
Final Flow Rate qg	=	247.623	$10^3 m^3/d$
Final Flow Rate qw	=	29.7	m^3/d

RESERVOIR PARAMETERS

Wellbore Radius	rw	= 0.079 m	Reservoir Temp	TR =	430 K
Net Pay	h	= 8.5 m	Water Saturation	Sw =	0.170
Total Porosity	phit	= 0.053	Oil Saturation	So =	0.000

FLUID PROPERTIES

Compressibility	cav	= 0.00003199	1/kPa
Comp. Factor	Zav	= 1.000	
Viscosity	uav	= 21.393	uPa.s

PRESSURES

Horner Extrap.	p*	= 29723	kPa
Initial Reservoir	pi	= 28796	kPa
Final Flowing	pwfo	= 13393	kPa
1 Hour Shut-in	pws1	= 25305	kPa
Average Test	pav	= 27034	kPa

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GAS PRESSURE BUILDUP ANALYSIS - HORNER

(In Terms of P^2)

NORTHCOR ET AL LIARD F-25A
NAHANNI

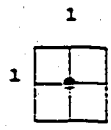
PERFS 3250.4 - 3258.4 M KB
BUILDUP FOLLOWING SECOND ACID JOB

SEMILOG STRAIGHT LINE RESULTS

Slope	m	=	121.600 10^6 kPa^2
Flow Capacity	kh	=	27.94 mD.m
Permeability	k	=	3.29 mD
App. Skin Factor	s	=	-1.6
Pressure Drop Due to Skin		=	---- kPa
Flow Efficiency	FE	=	1.3
Damage Ratio	DR	=	0.8
Radius of Inv.	rinv	=	381 m

STABILIZED RATE PREDICTIONS

Drainage Area	A	=	259 ha
Shape/Well Configuration		=	R1A
Time to Stabilization	ts	=	683 hr
Stabilized Rate	qs	=	215.589 10^3 m^3/d



T. Fekete Consultants Ltd.

PRESSURE BUILDUP DATA
IN TERMS OF PRESSURE SQUARED

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP FOLLOWING SECOND ACID JOB

Shut-in time hr	Horner time	Equiv time hr	Super time	Super Equiv time hr	Gauge Press RRD kPa	pws MPP kPa	2 pws	2 del p
0.00	---	---	---	---	13230	13393	179.375	---
0.25	396.25	0.25	---	---	15674	16126	260.038	80.663
0.33	300.43	0.33	---	---	21833	22284	496.581	317.206
6.76	15.62	6.33	---	---	23456	23908	571.569	392.193
6.86	15.40	6.41	---	---	23722	24174	584.368	404.993
6.98	15.16	6.52	---	---	23781	24232	587.199	407.824
7.00	15.12	6.54	---	---	23888	24340	592.411	413.036
7.51	14.16	6.98	---	---	23946	24397	595.228	415.853
7.55	14.09	7.01	---	---	24060	24512	600.823	421.448
7.65	13.92	7.10	---	---	24116	24567	603.557	424.182
7.68	13.87	7.13	---	---	24219	24670	608.604	429.229
8.00	13.35	7.40	---	---	24244	24695	609.863	430.488
8.31	12.89	7.67	---	---	24265	24717	610.915	431.540
8.34	12.85	7.69	---	---	24443	24894	619.721	440.346
9.00	11.98	8.25	---	---	24739	25191	634.571	455.196
9.52	11.38	8.68	---	---	24933	25384	644.347	464.972
9.84	11.04	8.95	---	---	24944	25395	644.906	465.531
9.88	11.00	8.98	---	---	25092	25543	652.440	473.065
10.00	10.88	9.08	---	---	25125	25576	654.127	474.752
10.33	10.57	9.35	---	---	25142	25593	655.007	475.632
10.37	10.53	9.39	---	---	25275	25726	661.822	482.447
10.86	10.10	9.78	---	---	25337	25789	665.047	485.672
10.87	10.09	9.79	---	---	25443	25894	670.520	491.145
11.00	9.98	9.90	---	---	25477	25928	672.266	492.891
11.34	9.71	10.17	---	---	25500	25952	673.480	494.105
11.35	9.71	10.18	---	---	25629	26080	680.172	500.797
11.84	9.35	10.57	---	---	25690	26141	683.373	503.998
11.85	9.34	10.58	---	---	25787	26238	688.454	509.078
12.00	9.23	10.70	---	---	25822	26273	690.292	510.916
12.30	9.03	10.94	---	---	25855	26307	692.032	512.657
12.31	9.03	10.95	---	---	25952	26403	697.140	517.764
12.81	8.71	11.34	---	---	26029	26480	701.180	521.805
12.84	8.70	11.36	---	---	26119	26571	705.997	526.622
13.33	8.41	11.75	---	---	26177	26628	709.072	529.696
13.35	8.40	11.76	---	---	26260	26712	713.510	534.134
13.86	8.13	12.16	---	---	26317	26768	716.526	537.151
13.87	8.12	12.16	---	---	26418	26869	721.954	542.579
14.00	8.06	12.26	---	---	26443	26894	723.282	543.907
14.39	7.87	12.56	---	---	26461	26912	724.245	544.870
14.46	7.83	12.61	---	---	26496	26948	726.173	546.798
14.58	7.78	12.71	---	---	26517	26968	727.284	547.909

Note : Units of pressure squared are : 10^6 kPa^2

T. Fekete Consultants Ltd.

Shut-in time hr	Horner time	Equiv time hr	Super time	Super Equiv time hr	Gauge Press RRD kPa	pws MPP kPa	2 pws	2 del p
14.60	7.77	12.72	---	---	26600	27051	731.746	552.371
15.09	7.55	13.09	---	---	26652	27104	734.611	555.235
15.11	7.54	13.11	---	---	26725	27176	738.535	559.160
15.57	7.35	13.45	---	---	26771	27222	741.037	561.662
15.60	7.33	13.47	---	---	26831	27282	744.302	564.927
16.00	7.18	13.77	---	---	26873	27325	746.628	567.253
16.05	7.16	13.81	---	---	26879	27330	746.929	567.554
16.08	7.15	13.83	---	---	26937	27388	750.130	570.755
16.54	6.97	14.17	---	---	26987	27438	752.844	573.469
16.58	6.96	14.20	---	---	27058	27509	756.740	577.364
17.07	6.79	14.56	---	---	27101	27552	759.124	579.749
17.08	6.79	14.56	---	---	27160	27611	762.389	583.014
17.60	6.61	14.94	---	---	27212	27663	765.242	585.866
17.67	6.59	14.99	---	---	27259	27710	767.872	588.497
18.00	6.49	15.23	---	---	27294	27746	769.813	590.438
18.05	6.47	15.26	---	---	27294	27746	769.813	590.438
18.06	6.47	15.27	---	---	27336	27787	772.106	592.731
18.58	6.32	15.64	---	---	27382	27833	774.670	595.295
18.62	6.31	15.67	---	---	27422	27873	776.932	597.557
19.12	6.17	16.02	---	---	27467	27918	779.426	600.051
19.13	6.17	16.03	---	---	27501	27952	781.309	601.934
19.55	6.05	16.32	---	---	27533	27984	783.115	603.740
19.62	6.04	16.37	---	---	27561	28012	784.695	605.319
20.00	5.94	16.63	---	---	27596	28047	786.623	607.248
20.10	5.92	16.70	---	---	27597	28048	786.701	607.326
20.11	5.91	16.71	---	---	27623	28074	788.172	608.797
20.56	5.81	17.02	---	---	27654	28105	789.908	610.533
20.63	5.79	17.07	---	---	27677	28129	791.224	611.849
21.07	5.69	17.37	---	---	27714	28165	793.279	613.903
21.56	5.58	17.70	---	---	27761	28212	795.911	616.536
22.00	5.49	17.99	---	---	27813	28264	798.865	619.490
24.00	5.12	19.31	---	---	27973	28424	807.912	628.537
26.00	4.80	20.58	---	---	28076	28528	813.830	634.454
28.00	4.53	21.82	---	---	28132	28583	817.011	637.636
30.00	4.29	23.01	---	---	28175	28627	819.488	640.113
32.00	4.09	24.17	---	---	28200	28651	820.868	641.493
34.00	3.91	25.30	---	---	28215	28667	821.774	642.399
36.00	3.74	26.39	---	---	28222	28673	822.129	642.754
38.00	3.60	27.45	---	---	28223	28674	822.210	642.835
40.00	3.47	28.47	---	---	28225	28676	822.330	642.955

Note : Units of pressure squared are : 10^6 kPa^2

Shut-in time hr	Horner time	Equiv time hr	Super time	Super Equiv time hr	Gauge Press RRD kPa	pws MPP kPa	2 pws	2 del p
42.00	3.35	29.47	---	---	28226	28678	822.405	643.030
44.00	3.25	30.44	---	---	28228	28679	822.485	643.110
46.00	3.15	31.39	---	---	28235	28686	822.881	643.506
50.15	2.97	33.27	---	---	28345	28797	829.250	649.875
50.50	2.96	33.42	---	---	28352	28804	829.642	650.266
51.00	2.94	33.64	---	---	28359	28810	830.039	650.664
51.50	2.92	33.86	---	---	28366	28817	830.437	651.062
52.50	2.88	34.28	---	---	28373	28824	830.834	651.459
53.50	2.85	34.71	---	---	28380	28831	831.226	651.851
55.50	2.78	35.54	---	---	28387	28838	831.624	652.249
57.50	2.72	36.35	---	---	28387	28838	831.624	652.249
59.75	2.65	37.23	---	---	28387	28838	831.624	652.249
61.50	2.61	37.91	---	---	28394	28845	832.023	652.647
63.50	2.56	38.66	---	---	28394	28845	832.023	652.647
65.50	2.51	39.39	---	---	28394	28845	832.023	652.647
67.50	2.46	40.10	---	---	28400	28852	832.421	653.045
69.50	2.42	40.80	---	---	28400	28852	832.421	653.045
71.50	2.38	41.48	---	---	28400	28852	832.421	653.045
73.50	2.34	42.15	---	---	28407	28859	832.819	653.444
75.50	2.31	42.80	---	---	28407	28859	832.819	653.444
77.50	2.28	43.43	---	---	28407	28859	832.819	653.444
79.50	2.24	44.06	---	---	28407	28859	832.819	653.444
81.50	2.21	44.66	---	---	28407	28859	832.819	653.444
83.50	2.18	45.26	---	---	28407	28859	832.819	653.444
85.50	2.16	45.84	---	---	28407	28859	832.819	653.444
87.50	2.13	46.41	---	---	28407	28859	832.819	653.444
89.50	2.10	46.96	---	---	28407	28859	832.819	653.444
91.50	2.08	47.51	---	---	28407	28859	832.819	653.444
93.50	2.06	48.04	---	---	28407	28859	832.819	653.444
95.50	2.03	48.56	---	---	28407	28859	832.819	653.444
96.58	2.02	48.84	---	---	28407	28859	832.819	653.444
99.73	1.99	49.64	---	---	28443	28894	834.852	655.477
init	---	---	---	---	---	28796	829.210	---

Note : Units of pressure squared are : 10^6 kPa^2

RADIAL BUILDUP TIME PARAMETERS IN TERMS OF PSEUDO TIME

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP FOLLOWING SECOND ACID JOB

Shut-in Time hr	Pseudo Time hr	Pseudo Horner Time	Pseudo Equivalent Time hr	Pseudo Super Time	Pseudo Super Equivalent Time hr
0.25	0.13	759.13	0.13	—	—
0.33	0.18	539.20	0.18	—	—
6.76	5.31	19.61	5.04	—	—
6.86	5.39	19.32	5.11	—	—
6.98	5.49	18.99	5.20	—	—
7.00	5.51	18.93	5.22	—	—
7.51	5.94	17.63	5.61	—	—
7.55	5.98	17.53	5.64	—	—
7.65	6.06	17.30	5.71	—	—
7.68	6.09	17.23	5.73	—	—
8.00	6.36	16.54	5.98	—	—
8.31	6.63	15.91	6.21	—	—
8.34	6.65	15.86	6.23	—	—
9.00	7.22	14.68	6.73	—	—
9.52	7.68	13.87	7.12	—	—
9.84	7.96	13.42	7.36	—	—
9.88	7.99	13.37	7.39	—	—
10.00	8.10	13.20	7.48	—	—
10.33	8.39	12.78	7.73	—	—
10.37	8.42	12.73	7.76	—	—
10.86	8.86	12.16	8.13	—	—
10.87	8.87	12.15	8.14	—	—
11.00	8.98	12.00	8.23	—	—
11.34	9.29	11.64	8.49	—	—
11.35	9.29	11.63	8.50	—	—
11.84	9.73	11.15	8.86	—	—
11.85	9.74	11.14	8.87	—	—
12.00	9.88	11.00	8.98	—	—
12.30	10.15	10.74	9.20	—	—
12.31	10.16	10.73	9.21	—	—
12.81	10.61	10.31	9.58	—	—
12.84	10.64	10.29	9.61	—	—
13.33	11.09	9.91	9.97	—	—
13.35	11.11	9.90	9.98	—	—
13.86	11.58	9.54	10.36	—	—
13.87	11.58	9.53	10.37	—	—
14.00	11.71	9.44	10.47	—	—
14.39	12.07	9.19	10.75	—	—
14.46	12.13	9.15	10.80	—	—
14.58	12.24	9.07	10.89	—	—

Shut-in Time hr	Pseudo Time hr	Pseudo Horner Time	Pseudo Equivalent Time hr	Pseudo Super Time	Pseudo Super Equivalent Time hr
14.60	12.26	9.06	10.91	---	---
15.09	12.72	8.77	11.27	---	---
15.11	12.74	8.76	11.28	---	---
15.57	13.17	8.51	11.62	---	---
15.60	13.19	8.49	11.64	---	---
16.00	13.57	8.28	11.93	---	---
16.05	13.62	8.26	11.97	---	---
16.08	13.64	8.24	11.99	---	---
16.54	14.08	8.02	12.32	---	---
16.58	14.12	8.00	12.35	---	---
17.07	14.58	7.78	12.71	---	---
17.08	14.59	7.77	12.71	---	---
17.60	15.09	7.55	13.09	---	---
17.67	15.15	7.52	13.14	---	---
18.00	15.47	7.39	13.37	---	---
18.05	15.52	7.37	13.41	---	---
18.06	15.52	7.36	13.42	---	---
18.58	16.02	7.17	13.79	---	---
18.62	16.06	7.15	13.82	---	---
19.12	16.54	6.97	14.17	---	---
19.13	16.55	6.97	14.18	---	---
19.55	16.96	6.83	14.47	---	---
19.62	17.03	6.80	14.52	---	---
20.00	17.39	6.68	14.79	---	---
20.10	17.49	6.65	14.86	---	---
20.11	17.50	6.65	14.87	---	---
20.56	17.94	6.51	15.18	---	---
20.63	18.00	6.49	15.23	---	---
21.07	18.43	6.36	15.53	---	---
21.56	18.91	6.23	15.87	---	---
22.00	19.34	6.11	16.17	---	---
24.00	21.30	5.64	17.52	---	---
26.00	23.27	5.25	18.84	---	---
28.00	25.25	4.91	20.11	---	---
30.00	27.23	4.63	21.35	---	---
32.00	29.22	4.38	22.55	---	---
34.00	31.21	4.17	23.72	---	---
36.00	33.20	3.98	24.85	---	---
38.00	35.19	3.81	25.95	---	---
40.00	37.18	3.66	27.01	---	---

Shut-in Time hr	Pseudo Time hr	Pseudo Horner Time	Pseudo Equivalent Time hr	Pseudo Super Time	Pseudo Super Equivalent Time hr
42.00	39.16	3.52	28.05	—	—
44.00	41.15	3.40	29.05	—	—
46.00	43.14	3.29	30.03	—	—
50.15	47.28	3.09	31.98	—	—
50.50	47.63	3.07	32.14	—	—
51.00	48.13	3.05	32.37	—	—
51.50	48.64	3.03	32.59	—	—
52.50	49.64	2.99	33.04	—	—
53.50	50.64	2.95	33.48	—	—
55.50	52.64	2.88	34.34	—	—
57.50	54.64	2.81	35.19	—	—
59.75	56.90	2.74	36.11	—	—
61.50	58.65	2.68	36.81	—	—
63.50	60.66	2.63	37.59	—	—
65.50	62.66	2.58	38.35	—	—
67.50	64.67	2.53	39.09	—	—
69.50	66.67	2.48	39.81	—	—
71.50	68.68	2.44	40.52	—	—
73.50	70.68	2.40	41.21	—	—
75.50	72.69	2.36	41.88	—	—
77.50	74.69	2.32	42.54	—	—
79.50	76.70	2.29	43.18	—	—
81.50	78.70	2.26	43.81	—	—
83.50	80.71	2.22	44.42	—	—
85.50	82.71	2.19	45.03	—	—
87.50	84.72	2.17	45.61	—	—
89.50	86.73	2.14	46.19	—	—
91.50	88.73	2.11	46.75	—	—
93.50	90.74	2.09	47.30	—	—
95.50	92.74	2.07	47.84	—	—
96.58	93.83	2.05	48.13	—	—
99.73	96.99	2.02	48.95	—	—

FLOW RATE AND PRODUCTION CALCULATIONS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

Delt hr	Gas Prod 10^3 m^3	Gas Rate 10^3 m^3/d	Water Prod m^3	Water Rate m^3/d	WGR m^3/10^3 m^3
WELL OPENED TO FLOW JANUARY 25, 1987 @ 1300 HRS					
0.50	2.729	130.984	---	---	---
0.50	3.344	160.526	---	---	---
0.50	1.969	94.503	0.4	17.6	0.19
0.50	1.073	51.495	0.3	12.0	0.23
0.50	0.852	40.912	0.4	17.6	0.43
0.50	0.737	35.356	0.3	12.5	0.35
BLEW WELL DOWN FOR 5 MINUTES					
0.50	1.574	75.534	2.0	96.8	1.28
0.50	1.383	66.407	1.7	80.8	1.22
1.00	2.543	61.041	2.5	59.7	0.98
1.00	2.513	60.300	2.7	64.5	1.07
1.00	2.268	54.433	2.7	65.7	1.21
1.00	2.350	56.410	2.4	57.7	1.02
1.00	2.379	57.102	2.3	55.2	0.97
1.00	2.403	57.661	2.4	57.7	1.00
1.00	2.412	57.888	2.2	53.9	0.93
1.00	2.440	58.565	2.2	52.7	0.90
2.00	4.918	59.018	4.7	55.9	0.95
2.00	4.981	59.774	4.4	53.2	0.89
2.00	5.000	60.002	4.5	53.7	0.89
2.00	5.081	60.969	4.3	51.7	0.85
2.00	5.135	61.622	4.2	50.8	0.82
2.00	5.189	62.267	4.1	49.5	0.80
2.00	5.296	63.557	4.0	48.2	0.76
2.00	5.385	64.623	4.0	48.4	0.75
2.00	5.480	65.763	4.1	49.5	0.75
2.00	5.558	66.698	3.7	44.4	0.67
2.00	5.599	67.193	3.9	46.4	0.69

Delt hr	Gas Prod 10^3 m^3	Gas Rate 10^3 m^3/d	Water Prod m^3	Water Rate m^3/d	WGR m^3/10^3 m^3
2.00	5.872	70.460	3.8	45.1	0.64
2.00	5.760	69.114	3.7	44.6	0.65
2.00	5.803	69.641	3.6	43.3	0.62
2.00	5.937	71.246	4.0	48.3	0.68
2.00	6.013	72.160	3.7	43.9	0.61
2.00	6.079	72.942	3.8	45.1	0.62
2.00	6.079	72.942	3.5	42.3	0.58
2.00	6.121	73.457	3.8	45.4	0.62
WELL SHUT IN JANUARY 27, 1987 @ 1500 HRS BLEW DOWN SEPARATOR AND RECOVER 0.79 M3 OF WATER					
TOTAL 50.00	138.257	66.363	101.0	48.1	0.73

FLOW RATE AND PRODUCTION CALCULATIONS

NORTHCOR ET AL LIARD F-25A — PERFS 3250.4 - 3258.4 M KB
NAHANNI — BUILDUP FOLLOWING FIRST ACID JOB

Delt hr	Gas Prod 10^3 m^3	Gas Rate 10^3 m^3/d	Water Prod m^3	Water Rate m^3/d	WGR m^3/10^3 m^3
WELL OPENED TO FLOW FEBRUARY 1, 1987 @ 2230 HRS					
0.50	4.938	237.016	2.0	95.3	0.40
0.50	3.332	159.921	2.0	95.3	0.60
0.50	2.982	143.131	4.7	223.2	1.56
0.50	2.749	131.942	4.7	223.2	1.69
0.50	3.225	154.794	5.3	253.3	1.64
0.50	3.233	155.180	5.3	253.3	1.63
0.50	3.274	157.166	5.6	269.6	1.72
0.50	3.315	159.099	5.6	269.6	1.69
1.00	6.816	163.590	10.4	249.5	1.53
1.00	7.122	170.931	9.4	225.7	1.32
1.00	7.250	174.000	8.6	205.7	1.18
1.00	7.726	185.418	8.3	198.1	1.07
1.00	7.582	181.973	8.3	198.1	1.09
1.00	8.287	198.893	7.6	181.8	0.91
1.00	8.653	207.681	4.8	114.1	0.55
1.00	8.765	210.368	6.1	146.7	0.70
2.00	18.397	220.759	14.1	169.3	0.77
2.00	17.919	215.023	9.9	118.5	0.55
2.00	17.940	215.281	8.7	104.7	0.49
2.00	17.949	215.393	8.8	105.3	0.49
2.00	18.167	218.001	7.6	91.5	0.42
2.00	18.381	220.576	7.1	85.3	0.39
2.00	18.415	220.985	6.5	77.7	0.35
2.00	18.415	220.985	6.6	79.0	0.36
2.00	18.258	219.101	5.7	69.0	0.31
2.00	18.171	218.055	5.5	66.5	0.30
2.00	18.286	219.431	5.6	67.7	0.31
2.00	18.449	221.385	5.1	61.4	0.28

Delt hr	Gas Prod 10^3 m^3	Gas Rate 10^3 m^3/d	Water Prod m^3	Water Rate m^3/d	WGR $m^3/10^3$ m^3
4.00	36.897	221.385	9.9	59.1	0.27
4.00	36.897	221.385	9.0	54.2	0.24
4.00	36.897	221.385	8.5	50.8	0.23
4.00	36.897	221.385	4.3	26.0	0.12
4.00	36.800	220.800	11.5	69.0	0.31
4.00	36.869	221.216	7.2	42.9	0.19
4.00	37.198	223.186	8.0	48.0	0.21
4.00	37.361	224.165	6.3	37.6	0.17
4.00	37.198	223.186	6.6	39.3	0.18
4.00	37.034	222.203	6.1	36.9	0.17
4.00	37.097	222.583	6.2	37.0	0.17
4.00	37.157	222.939	5.7	34.2	0.15
4.00	37.324	223.943	5.9	35.7	0.16
4.00	37.581	225.487	5.4	32.1	0.14
4.00	37.656	225.937	5.7	34.0	0.15
4.00	37.427	224.565	5.5	33.0	0.15
4.00	37.427	224.565	5.1	30.7	0.14
2.00	18.714	224.565	2.9	34.5	0.15
TOTAL 106.00	958.430	217.003	309.4	70.0	0.32
TOTAL TO DATE 156.00	1096.687		410.4		0.37

FLOW RATE AND PRODUCTION CALCULATIONS

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
CLEANUP AND TEMPERATURE SURVEY

Delt hr	Gas Prod 10^3 m^3	Gas Rate 10^3 m^3/d	Water Prod m^3	Water Rate m^3/d	WGR m^3/10^3 m^3
WELL OPENED TO FLOW FEBRUARY 12, 1987 @ 1700 HRS					
0.50	2.251	108.043	7.1	341.9	3.16
0.50	2.251	108.043	7.1	341.9	3.16
0.50	2.908	139.566	7.1	341.9	2.45
WELL SHUT IN @ 1830 HRS					
WELL REOPENED TO FLOW FEBRUARY 13, 1987 @ 0100 HRS					
0.50	4.044	194.099	2.8	136.7	0.70
0.50	3.639	174.691	2.8	136.7	0.78
0.50	3.365	161.509	3.6	171.8	1.06
0.50	4.132	198.336	3.6	171.8	0.87
0.50	4.419	212.128	3.7	177.2	0.84
0.25	2.246	215.580	1.8	177.2	0.82
WELL SHUT IN @ 0345 HRS					
WELL REOPENED TO FLOW FEBRUARY 13, 1987 @ 0630 HRS					
0.50	6.328	303.720	1.9	92.8	0.31
0.50	6.007	288.340	1.9	92.8	0.32
0.50	5.353	256.930	2.8	133.4	0.52
0.50	5.217	250.415	2.8	133.4	0.53
WELL SHUT IN @ 0830 HRS					
TOTAL					
6.25	52.159	200.289	49.2	188.9	0.94
TOTAL TO DATE					
162.25	1148.846		459.6		0.40

T. Fekete and Associates Consultants Ltd.

FLOW RATE AND PRODUCTION CALCULATIONS

NORTHCOR ET AL LIARD F-25A — PERFS 3250.4 - 3258.4 M KB
NAHANNI — BUILDUP FOLLOWING SECOND ACID JOB

Delt hr	Gas Prod 10^3 m^3	Gas Rate 10^3 m^3/d	Water Prod m^3	Water Rate m^3/d	WGR m^3/10^3 m^3
WELL OPENED TO FLOW FEBRUARY 13, 1987 @ APPROXIMATELY 1500 HRS					
0.50	5.530	265.464	—	—	—
0.50	5.505	264.263	0.5	23.6	0.09
0.50	6.593	316.454	4.0	190.6	0.60
0.50	6.932	332.735	4.0	190.6	0.57
0.50	5.458	261.986	2.9	138.7	0.53
0.50	6.076	291.625	2.9	138.7	0.48
0.50	5.884	282.415	2.7	127.4	0.45
0.50	5.872	281.861	2.7	127.4	0.45
0.50	5.849	280.766	2.7	130.7	0.47
0.50	5.838	280.225	2.7	130.7	0.47
0.50	5.740	275.510	2.5	118.4	0.43
0.50	5.740	275.510	2.5	118.4	0.43
1.00	11.458	274.989	5.8	139.4	0.51
1.00	11.436	274.473	4.4	105.3	0.38
1.00	11.334	272.007	2.8	66.5	0.24
1.00	10.999	263.979	3.6	86.5	0.33
1.00	10.994	263.867	3.4	82.8	0.31
1.00	10.738	257.714	3.2	77.7	0.30
2.00	21.277	255.325	6.1	73.4	0.29
2.00	20.970	251.637	5.7	68.3	0.27
2.00	20.902	250.828	5.0	59.8	0.24
2.00	20.698	248.382	5.0	60.2	0.24
2.00	20.354	244.251	4.9	58.3	0.24
2.00	20.285	243.417	4.7	55.8	0.23
2.00	20.285	243.417	4.4	52.4	0.22
2.00	20.215	242.580	4.1	48.9	0.20
2.00	20.108	241.295	3.9	46.6	0.19
2.00	20.246	242.956	4.5	53.9	0.22

Delt hr	Gas Prod 10^3 m^3	Gas Rate 10^3 m^3/d	Water Prod m^3	Water Rate m^3/d	WGR m^3/10^3 m^3
2.00	20.125	241.500	3.6	43.3	0.18
2.00	20.125	241.500	4.2	50.8	0.21
2.00	20.125	241.500	3.3	40.1	0.17
2.00	20.125	241.500	3.7	43.9	0.18
2.00	20.304	243.647	3.3	39.8	0.16
2.00	20.335	244.017	3.4	41.4	0.17
2.00	20.335	244.017	3.2	38.9	0.16
2.00	20.425	245.102	4.1	48.7	0.20
SHUT IN FEBRUARY 15, 1987 @ 1500 HRS TO RETREIVE RECORDERS					
REOPENED TO FLOW AT 1830 HRS					
0.50	8.278	397.350	0.1	5.0	0.01
0.50	7.417	355.994	0.4	19.8	0.06
0.50	7.159	343.629	0.4	19.8	0.06
0.50	6.642	318.840	0.4	20.6	0.06
0.50	6.562	314.955	0.4	20.1	0.06
0.50	6.324	303.570	0.4	20.1	0.07
0.50	6.112	293.367	0.6	30.3	0.10
0.50	6.019	288.894	0.6	30.3	0.11
0.50	5.966	286.385	0.7	32.6	0.11
0.50	5.904	283.379	0.7	32.6	0.12
0.50	5.830	279.837	0.7	32.1	0.11
0.50	5.701	273.671	0.7	32.1	0.12
1.00	11.000	264.010	1.4	32.6	0.12
1.00	10.830	259.923	1.6	38.1	0.15
1.00	10.695	256.674	1.8	43.9	0.17
1.00	10.604	254.485	1.8	43.9	0.17
1.00	10.512	252.277	2.0	48.9	0.19
1.00	10.447	250.721	1.8	42.1	0.17
2.00	20.897	250.762	3.4	40.5	0.16
2.00	20.899	250.783	3.4	40.4	0.16
2.00	20.772	249.263	3.4	40.3	0.16
2.00	20.704	248.451	3.3	40.0	0.16
2.00	20.681	248.169	3.1	36.7	0.15
2.00	20.714	248.564	3.2	38.2	0.15
2.00	20.767	249.208	3.0	36.1	0.14
2.00	20.677	248.129	2.9	34.2	0.14
2.00	20.587	247.046	2.7	33.0	0.13
2.00	20.587	247.046	2.6	31.7	0.13
2.00	20.561	246.738	3.0	35.7	0.14

Delt hr	Gas Prod $10^3 m^3$	Gas Rate $10^3 m^3/d$	Water Prod m^3	Water Rate m^3/d	WGR $m^3/10^3 m^3$
2.00	20.561	246.738	2.9	35.1	0.14
2.00	20.689	248.264	2.5	30.6	0.12
2.00	20.779	249.353	2.5	30.6	0.12
2.00	20.598	247.170	2.4	28.8	0.12
2.00	20.598	247.170	2.4	29.1	0.12
2.00	20.598	247.170	2.6	31.0	0.13
2.00	20.635	247.623	2.5	29.7	0.12
WELL SHUT IN FEBRUARY 17, 1987 @ 1830 HRS					
TOTAL					
96.00	1019.520	254.880	198.6	49.6	0.19
TOTAL TO DATE					
258.25	2168.366		658.1		0.30

GAS FLOW RATE - ORIFICE METER
(SUPPLEMENT)

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP PRIOR TO ACIDIZING

Pipe Diameter 97.3 mm

Delt hr	Orifice Diameter mm	Meter Pressure gauge kPa	Diff Pressure kPa	Meter Temp C	Gas Rate 10^3 m^3/d
WELL OPENED TO FLOW JANUARY 25, 1987 @ 1300 HRS					
0.50	50.8	3500	18.00	25.0	130.984
0.50	50.8	4870	19.00	25.0	160.526
0.50	50.8	4350	8.00	42.0	94.503
0.50	31.8	2850	26.00	40.0	51.495
0.50	31.8	2850	16.00	33.0	40.912
0.50	31.8	2850	12.00	34.0	35.356
BLEW WELL DOWN FOR 5 MINUTES					
0.50	31.8	4050	37.00	28.0	75.534
0.50	31.8	3700	32.00	32.0	66.407
1.00	31.8	3750	27.00	35.0	61.041
1.00	31.8	4100	24.00	35.0	60.300
1.00	31.8	2850	28.50	35.0	54.433
1.00	31.8	2870	30.50	36.0	56.410
1.00	31.8	2870	31.25	36.0	57.102
1.00	31.8	2880	31.75	36.0	57.661
1.00	31.8	2880	32.00	36.0	57.888
1.00	31.8	2880	32.75	36.0	58.565
2.00	31.8	2870	33.50	37.0	59.018
2.00	31.8	2900	34.00	37.0	59.774
2.00	31.8	2880	34.50	37.0	60.002
2.00	31.8	2930	35.00	37.0	60.969
2.00	31.8	2930	35.75	37.0	61.622
2.00	31.8	2970	36.00	37.0	62.267
2.00	31.8	2970	37.50	37.0	63.557
2.00	31.8	2990	38.50	37.0	64.623
2.00	31.8	2980	40.00	37.0	65.763
2.00	31.8	2990	41.00	37.0	66.698
2.00	31.8	2980	41.75	37.0	67.193
2.00	38.1	2940	22.00	36.0	70.460

Delt	Orifice Diameter	Meter Pressure gauge	Diff Pressure	Meter Temp	Gas Rate
hr	mm	kPa	kPa	C	10^3 m^3/d
2.00	38.1	2940	21.25	37.0	69.114
2.00	38.1	2950	21.50	37.0	69.641
2.00	38.1	2950	22.50	37.0	71.246
2.00	38.1	2960	23.00	37.0	72.160
2.00	38.1	2960	23.50	37.0	72.942
2.00	38.1	2960	23.50	37.0	72.942
2.00	38.1	2970	23.75	37.0	73.457
WELL SHUT IN JANUARY 27, 1987 @ 1500 HRS					
BLEW DOWN SEPARATOR					
TOTAL					
50.00	---	---	---	---	66.363

GAS FLOW RATE - ORIFICE METER
(SUPPLEMENT)

NORTHCOR ET AL LIARD F-25A — PERFS 3250.4 - 3258.4 M KB
NAHANNI — BUILDUP FOLLOWING FIRST ACID JOB

Pipe Diameter 97.3 mm

Delt hr	Orifice Diameter mm	Meter Pressure gauge kPa	Diff Pressure kPa	Meter Temp C	Gas Rate 10^3 m^3/d
WELL OPENED TO FLOW FEBRUARY 1, 1987 @ 2230 HRS					
0.50	50.8	4400	48.50	36.0	237.016
0.50	50.8	4300	22.00	29.0	159.921
0.50	47.6	4150	24.50	32.0	143.131
0.50	47.6	4150	21.00	34.0	131.942
0.50	47.6	4200	29.00	38.0	154.794
0.50	47.6	4200	29.50	41.0	155.180
0.50	47.6	4200	30.50	43.0	157.166
0.50	47.6	4200	31.50	45.0	159.099
1.00	47.6	4300	33.00	49.0	163.590
1.00	47.6	4350	36.00	52.0	170.931
1.00	47.6	4400	37.00	53.0	174.000
1.00	47.6	4400	42.00	53.0	185.418
1.00	50.8	4450	30.50	55.0	181.973
1.00	50.8	4500	36.00	55.0	198.893
1.00	50.8	4600	38.50	56.0	207.681
1.00	50.8	4600	39.50	56.0	210.368
2.00	50.8	4650	43.00	56.0	220.759
2.00	50.8	4700	40.50	57.0	215.023
2.00	50.8	4750	40.00	56.0	215.281
2.00	57.1	3950	28.50	54.0	215.393
2.00	57.1	4200	27.50	55.0	218.001
2.00	57.1	4000	29.50	54.0	220.576
2.00	57.1	4000	29.50	53.0	220.985
2.00	57.1	4000	29.50	53.0	220.985
2.00	57.1	4000	29.00	53.0	219.101
2.00	57.1	4100	28.00	53.0	218.055
2.00	57.1	4150	28.00	53.0	219.431
2.00	57.1	4150	28.50	53.0	221.385
4.00	57.1	4150	28.50	53.0	221.385

Delt hr	Orifice Diameter mm	Meter Pressure gauge kPa	Diff Pressure kPa	Meter Temp C	Gas Rate 10^3 m^3 /d
4.00	57.1	4150	28.50	53.0	221.385
4.00	57.1	4150	28.50	53.0	221.385
4.00	57.1	4150	28.50	53.0	221.385
4.00	57.1	4200	28.00	53.0	220.800
4.00	57.1	4200	28.00	52.0	221.216
4.00	57.1	4200	28.50	52.0	223.186
4.00	57.1	4200	28.75	52.0	224.165
4.00	57.1	4200	28.50	52.0	223.186
4.00	57.1	4200	28.25	52.0	222.203
4.00	57.1	4250	28.00	52.0	222.583
4.00	57.1	4300	27.75	52.0	222.939
4.00	57.1	4300	28.00	52.0	223.943
4.00	57.1	4320	28.25	52.0	225.487
4.00	57.1	4300	28.50	52.0	225.937
4.00	57.1	4250	28.50	52.0	224.565
4.00	57.1	4250	28.50	52.0	224.565
2.00	57.1	4250	28.50	52.0	224.565
TOTAL					
106.00	---	---	---	---	217.003

GAS FLOW RATE - ORIFICE METER
(SUPPLEMENT)

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
CLEANUP AND TEMPERATURE SURVEY

Pipe Diameter 97.3 mm

Delt hr	Orifice Diameter mm	Meter Pressure gauge kPa	Diff Pressure kPa	Meter Temp C	Gas Rate 10^3 m^3/d
WELL OPENED TO FLOW FEBRUARY 12, 1987 @ 1700 HRS					
0.50	57.1	1900	13.50	24.0	108.043
0.50	57.1	1900	13.50	24.0	108.043
0.50	57.1	1900	22.50	24.0	139.566
WELL SHUT IN @ 1830 HRS					
WELL REOPENED TO FLOW FEBRUARY 13, 1987 @ 0100 HRS					
0.50	57.1	3700	22.00	24.0	194.099
0.50	54.0	3800	23.00	30.0	174.691
0.50	50.8	3800	26.00	33.0	161.509
0.50	50.8	4200	36.00	38.0	198.336
0.50	50.8	4200	41.50	40.0	212.128
0.25	50.8	4250	42.50	41.0	215.580
WELL SHUT IN @ 0345 HRS					
WELL REOPENED TO FLOW FEBRUARY 13, 1987 @ 0630 HRS					
0.50	57.1	4200	47.00	24.0	303.720
0.50	57.1	4100	45.00	32.0	288.340
0.50	57.1	4100	36.50	37.0	256.930
0.50	57.1	4200	34.50	42.0	250.415
WELL SHUT IN @ 0830 HRS					
TOTAL					
6.25	---	---	---	---	200.289

GAS FLOW RATE – ORIFICE METER
(SUPPLEMENT)

NORTHCOR ET AL LIARD F-25A
NAHANNI

PERFS 3250.4 - 3258.4 M KB
BUILDUP FOLLOWING SECOND ACID JOB

Pipe Diameter 97.3 mm

Delt hr	Orifice Diameter mm	Meter Pressure gauge kPa	Diff Pressure kPa	Meter Temp C	Gas Rate 10^3 m^3/d
WELL OPENED TO FLOW FEBRUARY 13, 1987 @ APPROXIMATELY 1500 HRS					
0.50	57.1	4360	36.00	35.0	265.464
0.50	63.5	4300	22.00	34.0	264.263
0.50	63.5	4300	31.00	30.0	316.454
0.50	63.5	4300	35.00	35.0	332.735
0.50	63.5	2800	34.00	36.0	261.986
0.50	63.5	4000	29.50	39.0	291.625
0.50	63.5	4000	28.00	42.0	282.415
0.50	63.5	4000	28.00	43.0	281.861
0.50	63.5	4000	28.00	45.0	280.766
0.50	63.5	4000	28.00	46.0	280.225
0.50	63.5	3900	28.00	48.0	275.510
0.50	63.5	3900	28.00	48.0	275.510
1.00	63.5	3900	28.00	49.0	274.989
1.00	63.5	3900	28.00	50.0	274.473
1.00	63.5	3900	27.50	50.0	272.007
1.00	63.5	3900	26.00	51.0	263.979
1.00	57.1	3950	42.00	51.0	263.867
1.00	57.1	3900	40.75	52.0	257.714
2.00	57.1	3900	40.00	52.0	255.325
2.00	57.1	3900	39.00	53.0	251.637
2.00	57.1	3900	38.75	53.0	250.827
2.00	57.1	3900	38.00	53.0	248.382
2.00	57.1	3900	36.75	53.0	244.251
2.00	57.1	3900	36.50	53.0	243.417
2.00	57.1	3900	36.50	53.0	243.417
2.00	57.1	3900	36.25	53.0	242.580
2.00	57.1	3900	36.00	54.0	241.295
2.00	57.1	3400	42.00	54.0	242.956
2.00	57.1	3400	41.50	54.0	241.500

T. Fekete Consultants Ltd.

Delt hr	Orifice Diameter mm	Meter Pressure gauge kPa	Diff Pressure kPa	Meter Temp C	Gas Rate 10^3 m^3/d
2.00	57.1	3400	41.50	54.0	241.500
2.00	57.1	3400	41.50	54.0	241.500
2.00	57.1	3400	41.50	54.0	241.500
2.00	57.1	3360	42.75	54.0	243.647
2.00	57.1	3370	42.75	54.0	244.017
2.00	57.1	3370	42.75	54.0	244.017
2.00	57.1	3380	43.00	54.0	245.102
SHUT IN FEBRUARY 15, 1987 @ 1500 HRS TO RETREIVE RECORDERS					
REOPENED TO FLOW AT 1830 HRS					
0.50	63.5	4600	48.00	43.0	397.350
0.50	63.5	4100	44.00	46.0	355.994
0.50	63.5	3520	48.00	46.0	343.629
0.50	63.5	3400	43.00	47.0	318.840
0.50	63.5	3370	42.50	48.0	314.955
0.50	63.5	3340	40.00	49.0	303.570
0.50	63.5	3340	37.50	50.0	293.367
0.50	63.5	3340	36.50	51.0	288.894
0.50	63.5	3340	36.00	52.0	286.385
0.50	63.5	3340	35.25	52.0	283.379
0.50	63.5	3340	34.50	53.0	279.837
0.50	63.5	3340	33.00	53.0	273.671
1.00	63.5	3310	31.00	53.0	264.010
1.00	63.5	3300	30.25	54.0	259.923
1.00	63.5	3300	29.50	54.0	256.674
1.00	63.5	3300	29.00	54.0	254.485
1.00	63.5	3300	28.50	54.0	252.277
1.00	63.5	3300	28.25	55.0	250.721
2.00	63.5	3330	28.00	55.0	250.762
2.00	63.5	3360	27.75	55.0	250.783
2.00	63.5	3380	27.25	55.0	249.263
2.00	63.5	3420	26.75	55.0	248.451
2.00	63.5	3190	28.75	56.0	248.169
2.00	63.5	3200	28.75	56.0	248.564
2.00	63.5	3200	29.00	57.0	249.208
2.00	63.5	3200	28.75	57.0	248.129
2.00	63.5	3200	28.50	57.0	247.046
2.00	63.5	3200	28.50	57.0	247.046
2.00	63.5	3220	28.25	57.0	246.738
2.00	63.5	3220	28.25	57.0	246.738

Delt	Orifice Diameter	Meter Pressure gauge	Diff Pressure	Meter Temp	Gas Rate
hr	mm	kPa	kPa	C	10^3 m^3/d
2.00	63.5	3220	28.50	56.0	248.264
2.00	63.5	3220	28.75	56.0	249.353
2.00	63.5	3220	28.25	56.0	247.170
2.00	63.5	3220	28.25	56.0	247.170
2.00	63.5	3220	28.25	56.0	247.170
2.00	63.5	3260	28.00	56.0	247.623
WELL SHUT IN FEBRUARY 17, 1987 @ 1830 HRS					
TOTAL					
96.00	—	—	—	—	254.880

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 13, 1987 PAGE 1 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): N. Norgaard, B. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: DST #1A PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m^3	TANK m^3	TANK °C
0100					Rig up Otis test head													
0230					Rig up flow line and deadweight line													
0330					Pressure test flow line and test head, main choke leaking by													
0615					Pull test string													

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 15, 1987 PAGE - OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): N. Norgaard, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
GAS TO: FLARE ☒ PIPELINE ☐ OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: DST #1B

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover: Recorder	STATIC PRESSURE or prover: D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
					Rig up Otis test head													
1930																		
					Rig up flow line and deadweight line to test head													
2000																		
					Halliburton pressure test flow line and test head to 34,500 kPa													
2045																		
					Halliburton pressure test annulus - leaking down hole													
2130																		
					Pull test string													

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 18, 1987 PAG 3 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): N. Norgaard, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: DST #1C PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING.				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
ST. Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	10³m³/d	10³m³/d	TANK m³	TANK m³	TANK °C
1845					Rig up Otis test head													
1923					Pressure test annulus													
1935					Rig up flow line and deadweight line to test head													
2015					Pressure test flow line and test head													
2100					Blow down lines													
2223					Drop perforating bar													
2230					No response as to Gunns firing													
2235					Bubbles at bubble hose													
2240					Bubbles at bubble hose													
2245	42																	
2250	42																	
2255	42																	
2300	45		10000															
2305	50		10000															
2310	50		10000															
2315	50		10000															
2320	50		10000		Otis wireline run in to get bar													

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE January 18-19, 1987 PAGE 4 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): R. Knowles, N. Norgaard

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☑ L.P. METER SIZE DIFF. RANGE:

OPERATION: DST #1C PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m^3	TANK m^3	TANK °C
2325	50		10000															
2330	50		10000															
2345	45		9800															
2400	45		9700															
	January 19, 1987																	
0015	40		9500															
0030	40		9300															
					Otis wireline out of Hole with bar													
0037																		
0045	35		9300															
0100	35		9300															
0115	35		9200															
					Otis wireline run in hole with gauge ring													
0120																		
0130	35		9200															
0145	30		10000															
0200	30		10000															
					Otis wireline out of hole, gauge ring didn't set													
0210																		
0215	TSTM		10000															
0230	TSTM		10000															

REMARKS: Slight blow on tubing.

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 19, 1987 PAG. ___ OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Bills

TEST OPERATOR(S): N. Norgaard, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0–50 kPa
L.P. METER SIZE _____ DIFF. RANGE: _____
OR: _____ CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: DST #1C

GAS TO: FLARE ☒
PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover: Recorder	STATIC PRESSURE or prover: D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{gs} kPa	°C	p_{gs} kPa	mm	p_{gs} kPa	p_{gs} kPa	kPa	°C	mm	p_{gs} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
0245	TSTM		10500															
0300	TSTM		10400															
0305					Otis wireline run in hole with gauge ring													
0315	TSTM		10300															
0330	TSTM		10200		Otis wireline out of hole													
0345	TSTM		10100															
0346					Otis wireline run in hole with recorders													
0400	TSTM		10000															
0415	TSTM		10000															
0430	TSTM		10000															
0445	TSTM		10000															
0500	TSTM		10000															
0515	TSTM		10000															
0530	TSTM		10000															
0545	TSTM		10000															
0600	TSTM		10000															
0615	TSTM		10000															

REMARKS: Slight blow on tubing

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 19, 1987 PAGE 5 OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Bills

TEST OPERATOR(S): N. Norgaard, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: DST #1C

GAS TO: FLARE ☒
PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm	p_{g2} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
					Recorders on bottom at 3426 m KB													
0617																		
0630	TSTM		10000															
					Otis Wireline out of hole													
0643																		
0645	TSTM		10000															
0700	TSTM		10000															
0715	TSTM		10000															
0730	TSTM		10000															
0745	TSTM		10000															
0800	TSTM		10000															
0815	TSTM		10000															
					Open ESD pressure up to choke													
0825																		
0830	TSTM		10000															
					Open to flow to flare pit choke at 64/64													
0836																		
0840	0	0	10000															
0845	0	0	10000															
0850	0	0	10000															
0855	0	0	10000															

REMARKS: Slight blow on tubing

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 19, 1987 PAG 7 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): N. Norgaard, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: DST #1C PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm	p_{g2} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
				64/64														
0900	0	0	10000															
0915	0	0	10000															
0930	0	0	10000															
0945	0	0	10000															
1000	0	0	9900															
1015	0	0	9900															
1030	0	0	9900															
					Shut-in well at ESD and master valve (top master)													
1036	0	-1	9900															
1045	0		10000															
1100	0		10000															
1115	0		9800															
1130	0		9800															
1145	0		9900															
1200	Slight Blow		9900															
1215	Slight Blow		10000															
1230	Slight Blow		10000															
1245	Slight Blow		10000															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 19, 1[illegible]7 PAG. 8 OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Bilis
TEST OPERATOR(S): N. Norgaard, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: DST #1C
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA: TUBING Pressure	Flow Temp.	CASING Pressure	Choke Size	H.P. SEP GAS METERING: STATIC PRESSURE or prover Recorder	D.W.	Diff.	Temp.	Orifice Plate Size	L.P. SEP. GAS METERING: Static Pressure	Diff.	Temp.	Orifice Plate Size	H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI WORK	P_{gs} kPa	°C	P_{gs} kPa	mm	P_{gs} kPa	P_{gs} kPa	kPa	°C	mm	P_{gs} kPa	kPa	°C	mm	10³m³/d	10³m³/d	TANK m³	TANK m³	TANK °C
1300	Slight Blow		10000															
1301					Otis Wireline run into get recorders, doing static gradient													
					On the way out of hole													
1315	Slight Blow		10000															
1320	Slight Blow		10000		First stop													
1327	Slight Blow		10000		Second stop													
1334	Slight Blow		10000		Third stop													
1341	Slight Blow		10000		Fourth stop													
1348	Slight Blow		10000		Fifth stop													
1355	Slight Blow		10000		Sixth stop													
1402	Slight Blow		10000		Seventh stop													
1409	Slight Blow		10000		Eighth stop													
1416	Slight Blow		10000		Nineth stop													
1425	Slight Blow		9900		Tenth stop													
1447	Slight Blow		9900		Eleventh stop													
1452					Otis Wireline out of hole, close swabbing valve, rig off test tree													
1500	Slight Blow		9800															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE January 19, 1987 PAG. 7 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): N. Norgaard, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: DST #1C PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	wet °F
SI Units	p_{gs} kPa	°C	p_{gs} kPa	mm	p_{gs} kPa	p_{gs} kPa	kPa	°C	mm	p_{gs} kPa	kPa	°C	mm	10³m³/d	10³m³/d	TANK m³	TANK m³	TANK °C
1515	Slight Blow		9900															
1530	Slight Blow		9900															
1531					Halliburton pressure up annulus to reverse out													
1555					Open choke to 32/64 directly to pit, traces of gas													
1602					Water to surface													
1610					Blow down lines													
1630					Rig off flow line and deadweight line													

REMARKS: 2 Stock Water Samples taken during reverse out
Salinity by refractometer - Sample #1 - 2%=12121 PPM, Sample #2 - 4% = 24242 PPM

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 21, 1987 PAG. 10 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): N. Norgaard, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: DST #2A PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	P_{ga} kPa	°C	P_{ga} kPa	mm	P_{ga} kPa	P_{ga} kPa	kPa	°C	mm	P_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
					Rig up Otis test head, rig up flow line and deadweight line														
1015																		
					Halliburton pressure test annulus														
1115																		
					Annulus pressure would not hold, rig off deadweight and flow line, reset packer														
1250																		
					Pressure test annulus, would not hold														
1340																		
					Start to pull tubing string														

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. [redacted] FIELD NOTES DATE January 22, 1987 PAG [redacted] OF [redacted]

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles
REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:
OPERATION: DST #2 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER/m³	METER/m³	METER °C
ST. Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK/m³	TANK/m³	TANK °C
1500					Rig up Otis test head													
1530					Halliburton pressure test annulus													
1600					Pressure test flow line													
1804					Drop bar to perforate													
1811					No response as to guns firing													
1815	0				No bubbles at bubble hose													
1820	0		11000		Rig up Otis Wireline to pick up bar													
1825	0		11000															
1830	0		11000		Otis Wireline running in													
1835	0		11000															
1840	0		11000															
1845	0		11000															
1900	0		11000															
1915					Otis out of hole with bar, impression block shows signs of bar hitting firing head													
1927					Otis run in with collar stop													
1930	0		11000															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 2[illegible], 1987 PAG. [illegible] OF [illegible]

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: DST #2B PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size					
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
1945	0		11000															
2000	0		11000															
2015	0		11000															
2025					Otis Wireline out of hole, collar stop set													
2030	0		11000															
2045	0		11000															
2100	0		11000															
2115	0		10900															
2130	0		10950															
2145	0		11000															
2150					Otis Wireline run in with recorders, running static gradient													
2200	0		11000															
2215	0		11000															
2230	0		11200															
2245	0		11300															
2300	0		11100															
2315	0		11100															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 22-23, 1987 PAG 3 OF 46

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TC: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: DST #2B PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm	p_{g2} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$			
2330	0		11100															
2336					Recorders on bottom set at 3304 m KB													
2345	0		11100															
2357					Otis Wireline out of hole													
2400	0		11000															
	January 23, 1987				Bleed off annulus, PCT closed													
0015					Halliburton pressure up annulus to open PCT													
0200	10				PCT open													
0202	15				Open ESD pressure up to choke													
0210					Open to flow to flare pit, choke at 64/64													
0215	15	0	11000															
0216	0	0	11000															
0217	0	0	11000															
0218	0	0	11000															
0219	0	0	11000															
0220	0	0	11000															
0230	0	0	11000															
0245	0	0	11000															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

[redacted] [redacted] [redacted] [

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 23, 1987 PAG 5 OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Bills
TEST OPERATOR(S): T. Hoff, B. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0–50 kPa
L.P. METER SIZE _____ DIFF. RANGE: _____
OR: _____ CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: DST #2B
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Metric	p_{gs} kPa	°C	p_{gs} kPa	mm	p_{gs} kPa	p_{gs} kPa	kPa	°C	mm	p_{gs} kPa	kPa	°C	mm	10³m³/d	10³m³/d	TANK m³	TANK m³	TANK °C
1030	0		11000															
1045	0		11000															
1100	0		11000															
1115			11200		Light blow													
1130			11200		Light blow													
1142					Otis run in hole with recorders 3 hr. clocks													
1145	0		11100															
1200	0		11100															
1215	0		11000															
1230	0																	
1240					Otis out of hole with recorders													
1245	0		11000															
1300	0		11000															
1315	0		10800															
1330	0		10900															
1400	0		11000															
1430	0		11000															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 23, 1987 PAG. 1 OF 1

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Zone #3 PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
					Pressure up lubricator over 13,600, pressure was 12,500 when bled off													
1500	0		11000															
					Run in hole with recorders													
1510																		
					Out of hole													
1600	0		11000															
					Pressure up lubricator													
1610	14600																	
1610:30	13900																	
1611	13750																	
1612	13650																	
1613	13500																	
1614	13370																	
1615	13250																	
					Bleed off lubricator													
1615:45	13200		11000															
1630	0		11000															
1700	0		11000															
1730	0		11000															
					Wireline completely rigged out													
1800	0		11000															
					Prepare to reverse circulate out well													
1830																		
					Burst plate malfunction, circulating valve wouldn't open, rig pulling out of hole													

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 24, 1987 PAGE 17 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 87.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Zone #3, DST #2B PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	10³m³/d	10³m³/d	TANK m³	TANK m³	TANK °C
					Samples taken from tubing string when pulling out of hole													
Sample #1					Salinity by refractometer - 3% 18182 PPM, NaCl equipment, PH - 8													
Sample #2					Salinity by refractometer - 3.2% 19394 PPM, NaCl equipment, PH - 8													
Sample #3					Salinity by refractometer - 3% 18182 PPM, NaCl equipment, PH - 8													
Sample #4					Salinity by refractometer - 3.2% 19394 PPM, NaCl equipment, PH - 8													
Sample #5					Salinity by refractometer - 3% 18182 PPM, NaCl equipment, PH - 8													
Sample #6					Salinity by refractometer - 3.2% 19394 PPM, NaCl equipment, PH - 8													
Sample #7					Salinity by refractometer - .4% 2424 PPM, NaCl equipment, PH - 6													
Sample #8					Salinity by refractometer - .4% 2424 PPM, NaCl equipment, PH - 6													
Sample #9					Salinity by refractometer - .4% 2424 PPM, NaCl equipment, PH - 6													

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 25, 1987 PAGE 18 OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Bills
TEST OPERATOR(S): T. Hoff, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE _____ DIFF. RANGE: _____
OR: _____ CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: DST #3, Zone #4 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
					Rig up Otis test head and flow line and deadweight line													
0500																		
					Pressure test flow line													
0600																		
					Drop bar to perforate													
0710																		
					Guns fired													
0714	41																	
0719	7500																	
0720	8900		10500															
0721	10150																	
0723	12400																	
0724	13510																	
0725	14500		10500															
0727	15900																	
0728	16600																	
0730	17570		9500															
0733	18400																	
0734	18600																	
0735	18700																	
0736	18880																	

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE January 25, 1987 PAGE 19 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: DST #3, Zone #4 PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
0738	19000																	
0740	19100		10900															
0742	19220																	
0744	19300																	
0745	19350		10900															
0747	19400		10900															
0750	19550																	
					Otis Wireline run into get bar													
0755	19700																	
0800	19770		10500															
0805	19820																	
0810	19890		9500															
0815	20000																	
0820	20020		11000															
0825	20030																	
					Wireline out of hole with bar													
0830	19990		10800															
0835	20000																	
0840	20000																	

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE January 23, 1987 PAGE 20 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☑ L.P. METER SIZE DIFF. RANGE:

OPERATION: DST #3, Zone #4 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER.m³	METER.m³	METER.°C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm	p_{g2} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK.m³	TANK.m³	TANK.°C
0845	20040		12000															
0850	20050																	
0855	20050																	
0900	20070		11100															
					Otis Wireline running in with recorders													
0905																		
0915	21060																	
0930	21060		11000															
0945	21010																	
					Recorders on bottom 180 hr. clocks													
0955																		
					Lubricator leaking at pack off													
1000	19850		10800															
					Pump methanol down deadweight line													
1005																		
1010	20250		11000															
					Wireline out of hole, bleed off lubricator to pit													
1015	20250		10800															
1030	20270		11000															
1045	20270		10600															
1100	20280		11000															
1115	20290		11000															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 — FIELD NOTES — DATE Jan 25 1987 — PAL — OF

CUSTOMER: Northcor Energy Ltd. — TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Bills — H.P. METER SIZE 97.31 mm — DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A — GAS TO: FLARE ☒ — L.P. METER SIZE — DIFF. RANGE:

OPERATION: DST #3, Zone #4 — PIPELINE ☐ — OR: — CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.			
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☒	Oil/ Condensate Temp.
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{g1} kPa	°C	p_{g2} kPa	mm	p_{g1} kPa	p_{g2} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
1130	20320		11000															
1145	20320		11000															
1200	20340		11000															
1215	20340		11000															
1230	20300		11000															
1245	20230		10900															
					Open to flow, by-pass directly to flare pit, choke at 14/64													
1300	20300		11200															
					Switch flow through test unit on a 14/64 choke													
1308																		
					Meter in service with a 2.00" orifice plate													
1310	19180																	
					Open choke to 17/64													
1313																		
1315	18300	15	11000															
1320	17650	15	11000															
					Open choke to 22/64													
1322																		
					Open choke to 24/64													
1325	17520	15	11000															
					Rock choke													
1328																		
					H2S - .4%				2.00									
1330	17100	14	11000		3500		18	25		15.8%				131.70		0	0	
					Rock choke													
1331																		

REMARKS: Gas rates by Hewlett-Packard - Using CO2 - .1912, N2 - .0579, Gas Gravity - .756, Atmospheric Pressure - 100 kPa
1330 - Downhole methanol rate of 4 gallons/min.

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 FIELD NOTES DATE January 2[illegible] 1987 PAGE [illegible] OF [illegible]

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles
REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ PIPELINE ☐
OPERATION: DST #3, Zone #4 OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☒	Oil/Condensate Temp
					STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
	TUBING Pressure	Flow Temp.	CASING Pressure		Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
					Open choke to 27/64													
1334	15000	14	11000															
				27/64					2.00									
1345	13600	14	11000			4800	18	18		33.0%				158.20				
1347	13400	18	10500															
1355	13000	14																
					Cut choke to 24/64													
1400	12800	16				4870	19	25		36.9%				161.10		0	0	
1415	12650	17				4840	12	33		37.7%				125.29				
					Cut choke to 21/64													
1417																		
					Downhole methanol rate - 2 gallons/min.											2.33		
1430	11900	16				4350	7.75	42		41.4%				93.39		.37	0	
					Cut choke to 18/64													
1431																		
					Change orifice plate to 1.250"													
1440																		
									1.250									
1445	12580	16	9800			2830	27.75	45		38.0%				52.84				
					H2S - .5%, Downhole methanol rate - 1 gallon/min.											1.57		
1500	12910	15	10300			2850	22.5	40		36.4%		.249		48.18		.25	0	
1515	13250	16	10200			2850	20	35		34.7%				45.86				
																2.33		
1530	13450	17	10300			2850	16	33		34.0%		.431		41.17		.37	0	
1545	13770	15	10500			2850	14	34		32.2%								
					Salinity by refractometer - 8% 48484 PPM, PH - 5.5											1.64		
1600	13850	15	10700			2850	12	34		31.8%		.351		35.58		.26	0	
					Open choke to 31/64, meter out of service to unload well													
1603																		

REMARKS: 1500 - Salinity by refractometer - 5.2% 31515 PPM, PH - 6

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST No. 27 FIELD NOTES DA Ja y 2 981 AL OF

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles
REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0–50 kPa
GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:
WELL: Northcor et al Liard F-25A PIPELINE ☐ OR: CRITICAL FLOW PROVER
OPERATION: DST #3, Zone #4

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil ☐ Condensate ☒	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water		
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				31/64					1.250									
1606	10350																	
1607	9950																	
1608	9650																	
					Cut choke to 20/64, meter in service, raise back pressure													
1609	9390	21																
1615	10050	20	10700			3200	29	28		50.5%								
					Raise back pressure													
1616																		
					Raise back pressure													
1626																		
																12.65		
1630	9230	20	10100			4050	37	28		54.5%		1.271		75.89		2.01	0	
1645	9450	19	10100			3550	39	29										
					Salinity by refractometer – 12.2% 73939 PPM, PH – 5.5											10.57		
1700	8780	21	10000			3700	32	32		57.0%		1.208		66.75		1.68	0	
					Cut choke to 18/64													
1701																		
1715	9050	21	10000			3800	23	33										
																5.54		
1730	9600	21	9800			3800	22	34		53.0%		.756		55.86		.88	0	
1745	9780	21	10000			3800	27	34										
					H2S – .5%, Salinity by refractometer – 13.4% 81[illegible]2 PPM											10.13		
1800	9750	21	10000			3750	27	35		52.0%		1.260		61.34		1.61	0	
1815	9770	22	10000			3770	27	35										
																7.74		
1830	9600	21	10000			3900	24	35		53.0%		1.000		59.02		1.23	0	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

[redacted] TEST [redacted] No. [redacted]7 [redacted] [redacted] FIELD NOTES [redacted] DATE [redacted] Jan [redacted] 25, [redacted]987 [redacted] PAGE [redacted] OF 4[redacted]

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: DST #3, Zone #4, Single Rate Test PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Z DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				18/64					1.250									
1845	9820	22	10000			3700	24	35										
					Adjust proportional band on back pressure valve													
1848																		
					Methanol at 6 gallons/hr., Salinity 84848 PPM, PH - 5.5											9.19		
1900	9630	23	10000			4100	24	35		53.0%		1.157		60.58		1.46		
					Lower static													
1905																		
1915	9830	23	10000			2850	37	35								8.87		
1930	9950	23	10000			2850	36	34		51.0%		1.097		61.71		1.41		
1945	9870	24	10000			2860	35	35										
					Methanol at 3 gallons/hr., Salinity 89697 PPM, PH - 5.5											8.31		
2000	10000	24	10000			2850	28.5	35		51.0%		1.157		54.78		1.32		
2015	10090	25	10500			2870	29	35		50.0%						7.24		
2030	10120	25	10500			2850	30	36		50.0%		.984		56.10		1.15		
2045	10130	25	10500			2870	30	36		50.0%								
					Salinity 88484 PPM, PH - 5.5											7.93		
2100	10140	25	10500			2870	30.5	36		50.0%		1.065		56.77		1.26		
2115	10200	25	10500			2870	31.25	36		50.0%								
2130	10080	25	10500			2870	31.25	36		50.0%		.919		57.46		6.92		
2145	10070	25	10500			2870	31	37		50.0%						1.10		
					Salinity 91515 PPM, PH - 5											7.55		
2200	10070	25	10500			2870	31.25	36		50.0%		1.002		57.46		1.20		
2215	10070	26	10500			2870	31.5	36		50.0%								

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 25-26, 1987 PAL ___ OF ___

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Bills H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: DST #3, Zone #4 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR $m^3/10^3 m^3$	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches		Inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m^3	TANK m^3	TANK °C
				18/64					1.250							8.55		
2230	10070	26	10500			2870	31.5	36		50.0%		1.132		57.69		1.36		
2245	10070	26	10500			2870	31.5	37		50.0%								
					Salinity 92121 PPM, PH - 5											6.80		
2300	10070	26	10500			2880	31.75	36		50.0%		.860		58.02		1.04		
2315	10070	26	10500			2870	31.5	36										
																3.24		
2330	10070	26	10500			2880	31.75	36		50.0%		1.084		58.02		1.31		
2345	10080	26	10300			2870	32	36										
					Salinity 93333 PPM, PH - 5											5.91		
2400	10100	26	10300			2880	32	36		50.0%		.774		58.26		.94		
	January 26, 1987																	
0015	10110	27	10300			2870	32.25	36										
																6.54		
0030	10110	27	10300			2880	32.25	36		50.0%		.854		58.48		1.04		
0045	10110	27	10300			2880	32.5	36										
					Salinity 94545 PPM, PH - 5											7.23		
0100	10120	27	10800			2880	32.5	36		50.0%		.940		58.71		1.15		
0115	10120	27	10800			2870	32.75	37										
																7.11		
0130	10120	27	10800			2870	33	37		50.0%		.920		58.94		1.13		
0145	10130	27	10800			2880	33	37										
					Salinity 94545 PPM, PH - 5											7.49		
0200	10130	27	10800			2870	33	37		50.0%		.969		58.94		1.19		
0215	10140	27	10800			2870	33	37										
																8.24		
0230	10140	28	10800			2870	33	37		50.0%		1.067		58.94		1.31		

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 — **FIELD NOTES** — DATE January 26, 1987 — PAGE 28 OF 76

CUSTOMER: Northcor Energy Ltd. — TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich — H.P. METER SIZE 97.31 mm — DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A — GAS TO: FLARE ☒ — L.P. METER SIZE — DIFF. RANGE:

OPERATION: DST #3. Zone #4, Single Rate Test — PIPELINE ☐ — OR: — CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3 m^3$	inches	MMSCFD	MMSCFD	BBLS	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
				18/64					1.250									
0245	10150	28	10800			2870	33	37										
					Salinity 94545 PPM, PH - 5											6.54		
0300	10150	28	10500			2870	33	37		50.0%		.847		58.94		1.04		
0315	10150	28	10500			2870	33.25	36										
																7.36		
0330	10150	28	10500			2870	33.25	37		50.0%		.949		59.18		1.17		
0345	10150	28	10500			2870	33.5	37										
																6.35		
0400	10150	28	10500			2870	33.5	37		50.0%		.816		59.39		1.01		
0415	10120	28	10500			2870	33.5	37										
																6.54		
0430	10120	28	10500			2880	33.5	37		50.0%		.839		59.49		1.04		
0445	9750	28	10500			2880	32	37										
					Salinity 96970 PPM, PH - 5											7.61		
0500	10250	29	10500			2900	33	37		50.0%		.980		59.25		1.21		
0515	10240	29	10300			2880	34.5	37										
																5.91		
0530	10180	29	10300			2890	35	37		50.0%		.741		60.92		.94		
0545	10170	29	10400			2890	34.5	37										
					Salinity 96970 PPM, PH - 5, H2S .5%											8.49		
0600	10220	29	10400			2880	34	37		50.0%		1.081		59.94		1.35		
0615	10170	29	10300			2890	35.5	37										
																6.67		
0630	10220	29	10500			2880	35	37		50.0%		.837		60.82		1.06		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 FIELD NOTES DATE January 26, 1987 PAGE 7 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Single Point, Zone #4 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size						
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches		MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{gs} kPa	°C	p_{gs} kPa	mm	p_{gs} kPa	p_{gz} kPa	kPa	°C	mm		kPa		mm		$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				18/64					1.250										
0645	10240	29	10500			2880	35.5	37											
					Salinity 98182 PPM, PH - 5, discontinue pumping methanol downhole												7.04		
0700	10180	29	10500			2880	36	37		50.0%		.872			61.68		1.12		
					Gas flared last 18 hrs. - 50.16 10^3m^3														
					Water produced last 18 hrs. - 37.97 m^3														
					Condensate produced last 18 hrs. - 0 m^3														
					Average WGR for last 18 hrs. - 1.008 $m^3/10^3m^3$														
					Pumped total of 3.25 BBLS of methanol														

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

[redacted] FIELD NOTES DATE [redacted] Jan [redacted] 26 [redacted] 87 [redacted] PAG[redacted] OF [redacted]

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. [redacted]27 [redacted]

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
GAS TO: FLARE ☒ PIPELINE ☐
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Zone #4

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				18/64					1.250									
0715	10200	29	10500			2880	34.5	37										
																7.49		
0730	10260	29	10500			2870	34.75	37		49.0%		.944		60.49		1.19		
0745	10210	30	10500			2870	36	37										
					Salinity 96970 PPM, PH - 5.5											5.16		
0800	10200	30	10500			2900	35	37		50.0%		.645		61.03		.82		
0815	10200	30	10500			2900	34	37										
																8.30		
0830	10220	30	10500			2920	35.5	37		50.0%		1.027		61.68		1.32		
0845	10260	30	10500			2920	34.5	37										
					Salinity 100606 PPM, PH - 5.5											7.55		
0900	10260	30	10400			2930	35	37		49.0%		.939		61.35		1.20		
0915	10210	30	10200			2930	35.5	37										
																4.84		
0930	10230	30	10000			2920	35.25	37		50.0%		.601		61.46		.77		
0945	10270	30	10100			2920	35.25	37										
					Salinity 99394 PPM, PH - 5.5											5.91		
1000	10320	30	10250			2930	35	37		49.0%		.735		61.35		.94		
1015	10320	30	10500			2900	35	37										
																6.92		
1030	10330	30	10500			2910	35.5	37		49.0%		.858		61.57		1.10		
1045	10320	30	10500			2930	35.5	37										
					Salinity by refractometer -				16.2%	98182 PPM, PH - 5						7.55		
1100	10350	30	10500			2930	35.5	37		49.0%		.932		61.79		1.20		
1115	10350	30	10500			2930	36.25	37										

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST [redacted] No. [redacted]27 [redacted] FIELD NOTES DATE [redacted] Jan[redacted]y 2[redacted]987 [redacted] PAG[redacted] OF [redacted]

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Single Point, Zone #4 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Z DRAWDOWN	Diff.	WGR	Orifice Plate Size					
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	m^3inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				18/64					1.250									
1130	10370	30	10500			2970	36	37		49.0%				62.65				
1145	10360	30	10500			2950	35.5	37										
					Salinity by refractometer -				16.4%	99394 PPM, PH - 5						13.15		
1200	10390	30	10400			2970	36	37		49.0%		.801		62.65		2.09		
1215	10380	30	10400			2950	36.75	37										
1230	10360	30	10300			2970	36.5	37		49.0%				63.08				
1245	10420	30	10300			2960	36	37										
					H2S - .6%, Salinity by refractometer - 16.2% 98182 PPM, PH - 4.5											12.84		
1300	10410	30	10250			2970	36.25	37		49.0%		.779		62.86		2.04		
1315	10410	31	10200			2970	36.25	37										
1330	10440	31	10200			2980	36.75	37		49.0%				63.40				
1345	10440	31	10200			2970	36.75	37										
					Salinity by refractometer -				16.4%	99394 PPM, PH - 5						13.15		
1400	10440	30	10300			2970	36.5	37		49.0%		.795		63.08		2.09		
					Total gas flared since 0700 hrs. Jan. 26/87 - 18.09 10^3m^3													
					Total water produced since 0700 hrs. Jan. 26/87 - 14.76 m^3													
					Total condensate produced since 0700 hrs. Jan. 26/87 - 0 m^3													
					Cumulative gas flared last 25 hrs. - 68.25 10^3m^3													
					Cumulative water produced last 25 hrs. - 52.73 m^3													
					Cumulative condensate produced last 25 hrs. - 0 m^3													

REMARKS: Average WGR since 0700 hrs. Jan. 26/87 - .823 $m^3/10^3m^3$ Average WGR last 25 hrs. - .916 $m^3/10^3m^3$

1330 hrs. - samples taken - 5 H.P. gas - Chemex Bomb #5293, #6085, #1565 and Core Lab #V-1353, #V-1632

4 stock 1 litre water, all samples sent by hotshot to Core Labs.

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. [redacted]7 **FIELD NOTES** DATE [redacted]anu[redacted] 26, [redacted]87 PAG[redacted] OF [redacted]

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Single Point, Zone #4 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				18/64					1.250									
1415	10450	30	10300			2970	37	37										
1430	10450	30	10300			2990	36.5	37		49.0%				63.29				
1445	10470	31	10400			2970	37	37										
					Salinity by refractometer -				16.6%	100606 PPM, PH - 5						12.08		
1500	10470	31	10400			2970	37	37		48.0%		.726		63.51		1.92		
1515	10480	31	10500			2970	37.5	36										
1530	10490	31	10500			2980	37.5	37		48.0%				64.05				
1545	10500	31	10300			2990	37.75	37										
					Salinity by refractometer -				16.4%	99394 PPM, PH - 5						12.33		
1600	10500	31	10100			2970	38	37		48.0%		.731		64.36		1.96		
1615	10520	31	10300			2970	38	37										
1630	10520	31	10300			2970	38	37		48.0%				64.36				
1645	10550	31	10300			2990	38.25	37										
					H2S - .6%, Salinity by refractometer - 16.6% 100606 PPM, PH - 4.5											13.03		
1700	10550	31	10500			2990	38.5	37		48.0%		.764		65.01		2.07		
1715	10550	31	10700			2990	39	37										
1730	10570	31	10700			2990	39	37		48.0%				65.43				
1745	10570	31	10800			3000	39.25	37										
					Salinity by refractometer -				16.6%	100606 PPM, PH - 4.5						12.71		
1800	10570	31	10800			2980	39.25	37		48.0%		.740		65.53		2.02		
1815	10590	31	10800			2990	39.0	37										

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST [redacted] No. [redacted]7 [redacted] FIELD NOTES DA[redacted]anu[redacted] 26 [redacted]87 [redacted]AC [redacted]OF [redacted]

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles
REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF RANGE: 0-50 kPa
WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____
OPERATION: Single Point, Zone #4 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
					STATIC PRESSURE or prover		Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
	TUBING Pressure	Flow Temp.	CASING Pressure		Recorder	D.W.						$m^3/10^3m^3$						
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches		inches H2O		inches	MMSCFD	MMSCFD	BBLS	METER m³	METER °C
St. Units	p_{gs} kPa	°C	p_{gs} kPa	mm	p_{gs} kPa	p_{gs} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
				18/64					1.250									
1830	10570	31	10800			2990	39.5	37						65.85				
1845	10590	31	10800			2990	39.25	37										
					Salinity 99394 PPM, PH - 5											13.27		
1900	10600	31	10800			2980	39.25	37		48.0%		.773		65.53		2.11		
1915	10610	31	10800			2980	39.75	37										
1930	10620	31	10800			2980	40	37						66.17				
1945	10620	31	10800			2990	40	37										
					Salinity 100000 PPM, PH - 5											12.33		
2000	10630	31	10800			2990	40	37		48.0%		.710		66.27		1.96		
2015	10630	31	10800			2980	40.25	37										
2030	10670	32	10800			2990	40.25	37						66.48				
2045	10680	32	10800			2980	40.75	37										
					Salinity 99394 PPM, PH - 5,				H2S .4% by gastec rates figured					at .6%		10.94		
2100	10670	32	10800			2990	40.75	37		47.0%		.624		66.89		1.74		
2115	10670	32	10800			2980	41	37										
2130	10670	32	10800			2980	41	37						66.98				
2145	10680	32	10900			2990	41.25	37										
					Salinity 99394 PPM, PH - 5											12.39		
2200	10680	32	10900			2990	41.25	37		47.0%		.703		67.30		1.97		
2215	10680	32	10800			2990	41.25	37										
2230	10680	32	10800			2990	41.25	37						67.30				

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles
REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:
OPERATION: Single Point, Zone #4 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P Gas Rate	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp
					STATIC PRESSURE or prover		Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
	TUBING Pressure	Flow Temp.	CASING Pressure		Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	BBLS	METER m^3	
SI Units	p_{g1} kPa	°C	p_{g2} kPa	mm	p_{g3} kPa	p_{g2} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	E^3m^3/d	TANK m^3	TANK °C	
				18/64					1.250									
2245	10700	32	10800			2980	41.25	37										
					Salinity by refractometer -				16.4%	99394 PPM, PH		- 4.5				11.95		
2300	10700	32	10800			2980	41.25	37		47.0%		.679		67.19		1.90		
2315	10710	32	10800			2990	41.5	37										
2330	10720	32	10900			2990	41.5	37						67.51				
2345	10730	32	10900			2990	42	37										
					Salinity by refractometer -				16.4%	99394 PPM, PH		- 4.5				11.57		
2400	10730	32	10900			2980	42	37		47.0%		.651		67.80		1.84		
	January	27, 1987			Change orifice plate				1.500									
0001																		
					ESD valve shut-in													
0010																		
0015	12930																	
					Open well on 18/64 choke													
0016																		
0018	12650																	
					Meter back in service													
0020																		
0021	12400																	
0023	12200																	
0024	12000																	
0025	11900																	
0030	11670	32	10500			2970	24.5	35						75.35				

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd. Calgary, Alberta

FIELD NOTES

TEST No. 27 DA Jan 27 1987 AL OF

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Single Point, Zone #4 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp
					STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
	TUBING Pressure	Flow Temp.	CASING Pressure		Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches		inches	$m^3/10^3m^3$	3inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				18/64					1.500									
0045	11070	32	10500			2940	23	36										
					Salinity 100000 PPM, PH - 4.5, H2S - .5% by gastec											12.08		
0100	11390	32	10600			2940	20	36		44.0%		.682		67.58		1.92		
0115	10970	32	10700			2950	27	37										
0130	10600	32	10700			2940	26	37						76.93				
0145	10720	32	10950			2950	23.5	37										
					Salinity 100000 PPM, PH - 4.5											11.95		
0200	10710	32	10950			2940	21.5	37		47.0%		.652		69.93		1.90		
0215	10660	32	10950			2940	21.75	37										
0230	10680	32	10950			2950	21.5	37						70.06				
0245	10710	32	10950			2920	21.25	37										
					Salinity 99394 PPM, PH - 4.5											11.45		
0300	10710	32	11000			2940	21.5	37		47.0%		.625		69.93		1.82		
0315	10730	32	10900			2950	22	37										
0330	10710	32	10850			2950	21.5	37						70.06				
0345	10740	32	10800			2940	21.5	37										
					Salinity 99394 PPM, PH - 5											11.13		
0400	10740	32	10800			2940	21.75	37		47.0%		.604		70.35		1.77		
0415	10730	33	10800			2950	21.5	37										
0430	10750	33	10800			2950	21.75	37						70.47				
0445	10740	33	10800			2950	21.75	37										

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST No. 7 DATE Jan 27 87 DF

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0–50 kPa
L.P. METER SIZE DIFF. RANGE:
GAS TO: FLARE ☒ PIPELINE ☐
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Zone #4

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
					STATIC PRESSURE or prover		Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
	TUBING Pressure	Flow Temp.	CASING Pressure		Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{g3} kPa	°C	p_{g3} kPa	mm	p_{g3} kPa	p_{g3} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				18/64	Salinity 99394 PPM, PH-4.5				1.500							11.51		
0500	10760	33	10800			2950	21.5	37		47.0%		.627		70.06		1.83		
0515	10780	32	10600			2950	22	37										
0530	10760	32	10600			2940	22.25	37						71.15				
0545	10810	32	10600			2950	22	37										
					Salinity 99394 PPM, PH – 4.5											12.20		
0600	10780	32	10600			2950	22	37		47.0%		.654		71.16		1.94		
0615	10830	32	10700			2950	22	37										
0630	10780	32	10700			2950	22.25	37						71.28				
0645	10780	32	10800			2940	22.25	37										
					Salinity 99394 PPM, PH – 4.5											13.15		
0700	10790	32	10800			2950	22.5	37		47.0%		.700		71.69		2.09		

Total gas flared since 1400 hrs. Jan. 26/87 – 48.18 10^3m^3

Total water produced since 1400 hrs. Jan. 26/87 – 32.76 m^3

Total condensate produced since 1400 hrs. Jan. 26/87 – 0 m^3

Cumulative gas flared – 116.43 10^3m^3

Cumualative water produced – 85.49 m^3

Cumulative condensate produced – 0 m^3

Average WGR since 1400 hrs. Jan. 26/87 – .680 $m^3/10^3m^3$

Average WGR last 42 hrs. – .801 $m^3/10^3m^3$

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 27, 1987 PAGE 33 OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
GAS TO: FLARE ☒ PIPELINE ☐
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Zone #4

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				18/64					1.500									
0715	10800	32	10800			2950	22.25	37										
0730	10770	32	10800			2950	22.5	37		47.0%				71.68				
0745	10780	32	10800			2950	22.5	37										
					Salinity by refractometer - 16.6% 100606 PPM, PH - 4.5											11.83		
0800	10770	32	10800			2950	22.5	37		47.0%		.629		71.68		1.88		
0815	10770	31	10650			2950	22.25	37										
0830	10820	32	10650			2950	22.25	37		47.0%				71.28				
0845	10790	32	10600			2940	22.5	37										
					Salinity by refractometer - 16.8% 101818 PPM, PH - 4.5											11.14		
0900	10820	32	10600			2960	22.5	37		47.0%		.592		71.81		1.77		
0915	10790	32	10600			2950	23	37										
0930	10820	32	10600			2950	23	37		47.0%				72.48				
0945	10840	32	10700			2950	22.75	37										
					Salinity by refractometer - 16.8% 101818 PPM, PH - 4.5											11.14		
1000	10810	32	10700			2950	22.75	37		47.0%		.589		72.08		1.77		
1015	10850	32	10700			2970	23	37										
1030	10830	32	10750			2970	23	37		47.0%				72.73				
1045	10820	32	10800			2980	23	37										
					Salinity by refractometer - 17.0% 103030 PPM, PH - 4.5											12.53		
1100	10840	32	10800			2960	23.25	37		47.0%		.654		73.00		1.99		
1115	10850	32	10800			2960	23.25	37										

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 1

FIELD NOTES

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 DATE January 27, 1987 PAGE 30 OF 40

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Single Point, Zone #4 PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Z DRAWDOWN	Diff.	WGR	Orifice Plate Size					
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	BBLS	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				18/64					1.500									
1130	10880	32	10800			2960	23.25	37		46.0%				73.00				
1145	10830	32	10800			2950	23.25	37										
	Salinity by refractometer - 16.8% 101818 PPM, PH - 4.5															11.20		
1200	10890	33	10500			2960	23.25	37		46.0%		.585		73.00		1.78		
1215	10850	33	10500			2970	23.5	37										
1230	10850	33	10500			2970	23.5	37		47.0%				73.52				
1245	10870	33	10500			2960	23.5	37										
	H2S - .6%, Salinity by refractometer - 17.0% 103030 PPM, PH - 4.5															11.01		
1300	10890	33	10500			2960	23.5	37		46.0%		.572		73.39		1.75		
1315	10910	33	10500			2970	23.5	37										
1330	10910	33	10500			2990	23.5	37		46.0%				73.77				
1345	10890	33	10500			2980	23.5	37										
	Salintiy by refractometer - 16.8% 101818 PPM, PH - 4.5															11.64		
1400	10870	33	10500			2970	23.75	37		46.0%		.601		73.91		1.85		
	Total gas flared since 0700 hrs. Jan. 27/87 - 21.19 10^3m^3																	
	Total water produced since 0700 hrs. Jan. 27/87 - 12.79 m^3																	
	Total condensate produced since 0700 hrs. Jan. 27/87 - 0 m^3																	
	Cumulative gas flared - 137.62 10^3m^3																	
	Cumulative water produced - 98.28 m^3																	
	Cumulative condensate produced - 0 m^3																	

REMARKS: Average WGR since 0700 hrs. Jan. 27/87 - .603 $m^3/10^3m^3$

Average WGR last 49 hrs. - .702 $m^3/10^3m^3$

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE [redacted] Jan[redacted] 27, [redacted]987 PAG[redacted] OF [redacted]

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Single Point, Zone #4 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	BBLS	METER/m³	METER/°C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK/m³	TANK/m³	TANK/°C
				18/64					1.500									
1415	10920	33	10500			2950	23.75	37										
1430	10920	33	10600			2970	23.5	37		46.0%				73.51				
1445	10910	33	10600			2970	23.75	37										
					Salinity by refractometer - 16.8% 101818 PPM, PH - 4.6											12.15		
1500	10920	33	10700			2970	23.75	37		46.0%		.627		73.91		1.93		
					Shut-in well at Otis ESD valve													
1503																		
1504	12000																	
1505	12370																	
1506	12700																	
1507	13200																	
					Bleed off annulus pressure to close PCT													
1508	13400																	
1509	13700																	
1510	14000																	
					Blow down lines, separator and boot											4.97		
1515	15200															.79		
					Pump methanol down tubing													
1530	17570																	
1545	18120																	
1600	18330																	
1615	18420																	

REMARKS: 1450 - samples taken - 2 H.P. gas - Core Lab Bombs # V-1349 and #V-1358
- 2 stock water

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd. Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 27, 1987 PAGE 8 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Single Point, Zone #4 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{gs} kPa	°C	p_{gs} kPa	mm	p_{gs} kPa	p_{gs} kPa	kPa	°C	mm	p_{gs} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
1630	18470																	
1645	18500																	
1700	18500																	
1715	18530																	
1730	18570																	
1745	18610				Total gas flared since 1400 hrs. Jan. 27/87 - 3.07 10^3m^3													
1800	18640				Total water produced since 1400 hrs. Jan. 27/87 - 2.72 m^3													
1815	18660				Total condensate produced since 1400 hrs. Jan. 27/87 - 0 m^3													
1830	18660				Cumulative gas flared - 140.69 10^3m^3													
1845	18640				Cumulative water produced - 101.00 m^3													
1900	18670				Cumulative condensate produced - 0 m^3													
1915	18740				Average WGR since 1400 hrs. Jan. 27/87 - .627 $m^3/10^3m^3$													
1930	18770				Average WGR last 50 hrs. - .665 $m^3/10^3m^3$													
1945	18770																	
2000	18750																	
2015	18770																	
2030	18830																	

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 27-28, 1987 PAG 39 OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE _____ DIFF. RANGE: _____
OR: _____ CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point, Zone #4 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm	p_{g2} kPa	kPa	°C	mm	10³m³/d	10³m³/d	TANK m³	TANK m³	TANK °C
2045	18830																	
2100	18830																	
2115	18840																	
2130	18870																	
2145	18870																	
2200	18870																	
2230	18920																	
2300	18940		7500															
2316			7500		Bleed off casing pressure													
2317	18900																	
2330	18940																	
2331			0		Casing bled off													
2400	18970		400															
	January 28, 1987																	
0030	18950		400															
0100	18990		1300															
0130	18970		1200		Rig was bleeding down casing													
0200	18990		2000															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 28, 1987 PAGE 30 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Build-Up PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm	p_{g2} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
0230	18990		3000															
0300	18990		4000															
					Bleed off casing													
0330	19000		5000															
					Casing bled to 0 pressure, still unload a little fluid													
0345			0															
0400	19020		400															
0430	19020		1200															
0500	19020		2000															
0530	19000		2900															
0600	19000		3300															
0630	19010		4000															
0700	19010		4600															
					Bleed off casing, will not ignite at flare pit													
0703																		
					Casing bled off													
0712			0															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 28, 1987 PAGE 41 OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
GAS TO: FLARE ☒ PIPELINE ☐
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	10³m³/d	10³m³/d	TANK m³	TANK m³	TANK °C
0730	19020		500															
0800	18990		1500															
0830	19000		1900															
0900	19010		2400															
0930	19010		3500															
1000	19010		4400															
					Bleed off casing, will not burn at flare pit													
1030	19010		4000															
					Shut-in casing													
1044			0															
1100	19050		500															
1130	19010		1400															
1200	19030		2200															
1230	19020		3200															
1300	19010		4100															
					Open casing to flare pit, gas to surface, burns at pit													
1330	19010		4800															
					Close casing													
1350			0															
1400	19020		200															
1430	19020		1000															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 28, 1987 PAC 12 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Build-Up PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING.				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
1500	19020		2100															
1530	19020		3000															
1600	19040		3500															
1630	19000		4000															
1700	18980		4400															
1730	19010		4700															
1800	18970		5000															
1830	19020		5200															
1900	18970		5600															
1930	19020		6000															
2000	18970		6200															
2030	19020		6500															
2100	18920		6900															
2130	19020		7200															
2200	18990		7400															
2230	18990		7700															
2300	18990		8000															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 28-29, 1987 PAG. 43 OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE _____ DIFF. RANGE: _____
GAS TO: FLARE ☒
PIPELINE ☐
OR: _____
CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
2330	18990		8200															
2400	19010		8700															
	January 29, 1987																	
0030	18970		8900															
0100	19010		9100															
0130	18990		9500															
0200	19010		9800															
0230	18990		10000															
0300	19000		10100															
0330	19000		10500															
0400	19000		10800															
0430	19010		11000															
0500	19000		11400															
0530	19010		11600															
0600	19000		12000															
0601					Bleed off casing, flare to pit													
0612					Finish bleeding off, 10000 kPa remaining													
0630	19040		10050															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 29, 1987 PAC 14 OF 46

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, R. Knowles

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Build-Up PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Cu/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inchss	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm	p_{g2} kPa	kPa	°C	mm	10³m³/d	10³m³/d	TANK m³	TANK m³	TANK °C
0700	18980		10500															
0730	19040		10600															
0800	19000		10900															
0830	19020		11400															
0900	19030		11705															
0930	19030		12000															
0931					Bleed off casing from 12000 to 10000 kPa, flare to pit													
0939					Finish bleeding off shut-in casing													
1000	19060		10400															
1030	18990		10600															
1045	19030		10800															
1100	19060		11000															
1115	19050		11200		Bleed Otis test head off													
1130	19000		11500															
1145	19000		12000															
1146					Bleed off casing from 12000 to 10000 kPa, flare to pit													
1153					Finish bleeding off shut-in casing													

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 29, 1987 PAGE 45 OF 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, R. Knowles
H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE _____ DIFF. RANGE: _____
OR: _____ CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA: TUBING Pressure	Flow Temp.	CASING Pressure	Choke Size	H.P. SEP GAS METERING: STATIC PRESSURE or prover: Recorder	D.W.	Diff.	Temp.	Orifice Plate Size	L.P. SEP. GAS METERING: Static Pressure	Diff.	Temp.	Orifice Plate Size	H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER/m³	METER/m³	METER/°C
SI Metric	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	10³m³/d	10³m³/d	TANK/m³	TANK/m³	TANK/°C
					Calibrate surface recorder													
1155																		
1200	19050		10000															
1215	19070		10200															
1230	19040		10400															
1245	19010		10700															
1300	19020		11000															
1315	19090		11000															
1330	19030		11400															
1345	19030		11400															
1400	19000		11500															
1415	19050		11900															
1430	19080		12000															
					Bleed off casing from 12000 to 10500, flare to pit													
1431																		
					Finish bleeding off shut-in casing													
1438																		
1445	19080		10900															
1500	19050		11000															
1515	20000		11200															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 29, 1987 PAGE 16 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Build-Up PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER/m³	METER/m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	10³m³/d	10³m³/d	TANK/m³	TANK/m³	TANK °C
1530	19220		11200															
1545	19270		11000															
1600	19230		12200															
					Bleed down casing													
1614			10000															
1630	19020		10500															
1645	19000		10800															
1700	19050		11000															
1715	18940		11000															
1730	19090		11000															
1745	19300		11300															
1800	19240		11500															
1815	19150		11700															
1830	19050		11700															
1845	19000		12000															
1900	19140		12000															
1915	19150		12000															
1930	19120		12000															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE January 29, 1987 PAG. 7 OF 48

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Katutich H.P. METER SIZE 97.31 mm DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Build-Up PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER/m³	METER/m³	METER °C
St. Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm	p_{g2} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
1945	19150		12000															
					Bleed down casing													
1953			12250															
					Shut-in flare out													
1955			12250															
					Bleed down casing													
1956			12250															
					Shut-in gauge, frozen recorder on floor, 8000 kPa													
1958			12250															
					Bleed down casing													
2002			8000															
					Casing bled off													
2013			0															
2030	19020																	
2052	19020																	
					Open to flare to bleed down tubing													
2053																		
					Shut-in to check PCT valve													
2056	12600																	
2057	12900																	
2058	13200																	
2059	13550																	
2100	13850																	
2101	14300																	
2102	14600																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE January 29-30, 1987 PAGE 48 of 48

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich

TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 97.13 mm DIFF. RANGE: 0-50 kPa
L.P. METER SIZE _____ DIFF. RANGE: _____
OR: _____ CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m^3	TANK m^3	TANK °C
2103	14850																	
2104	15200																	
2105	15500																	
2108	16300																	
2110	16970																	
2112	17150																	
2114	17420				Open well to flow													
2119	12500																	
2128	9000				Pump up casing to break circulating valve													
2145	17170				Casing bled off, start pumping up casing for second time													
2148			19000		Pressure up circulating valve will not break													
2200	20300																	
2215	21070																	
2230	21200				Deadweight line frozen													
2300	N/A				Pumping water down tubing													
2347	N/A				Finish pumping													
0113	January 30, 1987		4500		Bleed down casing to slight flow													

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 1, 1987 PAGE 49 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Clean-Up Zone #4, Test #2 PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
					Halliburton pumping N2 for feed rate													
1730																		
					Halliburton finished acid job													
1937																		
					Otis rigging up to run recorders													
1940	22700																	
					Bleed casing down to 10000													
2030			13500															
					Pumping methanol down deadweight line													
2045			10250															
2100	22000		10250															
2115	22000		10500															
2130	22000		10500															
					Bleed down to 10000, Wireline out of hole													
2145	21930		11000															
2200	21870		10250															
2215	21850		10250															
					Pressure up to separator													
2224																		
					Open well to flow on 24/64 choke													
2230	21840																	
					ESD valve closed													
2232																		
2235	21400																	
					Open well to flow on 24/64 choke													
2238	21450																	
2240	20000		10500															

REMARKS: Gas rates calculated by Hewlett-Packard - CO2 - .1912, N2 - .0579, Gravity .756, H2S - .5%, Atmospheric - 100 kPa

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 | DATE February 1, 1987 | PAGE 50 OF 145

CUSTOMER: Northcor Energy Ltd. | TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich | H.P. METER SIZE 3.831" | DIFF. RANGE: 0–50 kPa

WELL: Northcor et al Liard F-25A | GAS TO: FLARE ☒ | L.P. METER SIZE | DIFF. RANGE:

OPERATION: Clean-Up, Zone #4, Test #2 | PIPELINE ☐ | OR: | CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA				H.P. SEP GAS METERING					L.P. SEP. GAS METERING					H.P.	L.P			
	TUBING Pressure	Flow Temp.	CASING Pressure	Choke Size	STATIC PRESSURE or prover: Recorder	STATIC PRESSURE or prover: D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size		Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3 m^3$	inches		MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm		$10^3 m^3/d$	$10^3 m^3/d$	TANK m^3	TANK m^3	TANK °C
				24/64	Bleed to 10000 kPa														
2245	18500	15	11000																
2250	15900	15	10000																
					Meter in service				2.000										
2255	14600	15	10000																
2300	12900	14	10000			4400	39	36							213.64				
					Fluid to surface, gas to surface														
2301																			
					Open choke to 28/64														
2304																			
2315	12650	18	10000			4350	26	29											
					PH – 3.5														
2330	12250	18	10750			4300	24	29		45%		.567			168.03		3.97		
					Change plate to				1.875										
2342																			
2345	12110	23	10500			4150	26.75	30											
2400	11750	25	10500			4150	25	32		46%					145.44				
Feb. 0015	2/87 11620	27	10500			4150	25	34											
				32/64	PH – 3.5, Open choke to 32/64														
0030	11570	29	10500			4150	21	34		47%		1.68			132.72		9.30		
0045	10870	33	10500			4200	29.5	36											
0100	10850	36	10500			4200	29	38		50%					155.68				
0115	10850	37	10250			4200	29.5	39											
					PH – 3.5														
0130	10760	39	10250			4200	29.5	41		51%		1.62			156.06		10.56		

REMARKS: 1200 hr. Gastec – .2% H2S

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 2, 1987 PAGE 51 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Clean-Up, Zone #4, Test #2 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P Gas Rate	L.P Gas Rate	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					1.875									
0145	10800	42	10900			4200	30	42										
0200	10800	43	10500			4200	30.5	43		51%				158.05				
0215	10770	45	10500			4200	31	45										
					Salinity 90909 PPM, PH - 5, Gastec - .1% H2S													
0230	10820	46	10250			4200	32	45		50%		1.67		161.25		11.23		
0245	10840	47	10500			4200	32.5	47										
0300	10850	48	10500			4250	32	47		50%				161.60				
0315	10850	49	10500			4250	32.5	48										
					Salinity 92121 PPM, PH - 5													
0330	10850	50	10500			4300	33.5	49		50%		1.51		165.70		10.40		
0345	10840	51	10500			4300	34	49										
0400	10850	52	10250			4350	35	50		50%				170.06				
0415	10850	54	10500			4350	35.5	52										
					Salinity 89696 PPM, PH - 5													
0430	10850	57	10500			4350	36	52		50%		1.31		171.82		9.41		
0445	10830	57	10500			4350	36	53										
0500	10770	57	10500			4350	36.5	53		51%				172.68				
0515	10790	57	10000			4350	36.5	53										
					Salinity 93333 PPM, PH - 5													
0530	10800	57	10500			4400	37.5	53		51%		1.17		176.07		8.57		
0545	10750	57	10500			4400	38	53										

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 2, 1987 PAGE 52 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
GAS TO: FLARE ☒ OR:
PIPELINE ☐ CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Clean-Up, Zone #4, Test #2

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P. Gas Rate	L.P Gas Rate	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					1.875									
0600	10775	57	10500			4400	38	53		51%				177.30				
0615	10890	57	10500			4400	38	53										
					Salinity 90909 PPM, PH - 5, Gastec - .2% H_2S													
0630	10840	57	10500			4400	41.5	53		50%		1.07		185.25		8.25		

Total gas rate last 8 hrs. - 55.65 10^3m^3

Total water produced last 8 hrs. - 71.69 m^3

Average W.G.R. - 1.32 $m^3/10^3m^3$

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 2, 1987 PAGE 53 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Clean-Up, Zone #4, Test #2 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA: TUBING Pressure	Flow Temp.	CASING Pressure	Choke Size	H.P. SEP GAS METERING: STATIC PRESSURE or prover: Recorder	D.W.	Diff.	Temp.	Orifice Plate Size	L.P. SEP. GAS METERING: % DRAWDOWN	Diff.	WGR	Orifice Plate Size	H.P. Gas Rate	L.P Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					1.875									
0645	10900	58	10500			4400	41.5	54										
					Change orifice plate				2.000									
0700	10925	58	10500			4400	41.5	55		50%				184.54				
									2.000									
0715	10950	60	10500			4450	31.5	55										
					Salinity 92121 PPM, PH - 5													
0730	11000	60	10500			4450	31.5	55		50%		1.07		185.85		8.26		
0745	11050	60	10500			4500	32	55										
0800	11100	60	10500			4550	33	55		49%				192.44				
0815	11200	61	10500			4500	34	56										
					Salinity 99394 PPM, PH - 5													
0830	11250	62	10500			4500	35	55		48%		.923		197.07		7.57		
0845	11300	63	10800			4600	35.5	56										
0900	11350	63	10700			4600	36	56		48%				201.77				
0915	11400	64	10700			4600	37.5	56										
					Salinity 95758 PPM, PH - 5													
0930	11425	64	10600			4600	39.5	56		48%		.541		211.27		4.76		
0945	11500	64	10600			4600	40	56										
1000	11500	64	10700			4600	39.5	56		47%				211.27				
1015	11500	64	10800			4600	39.75	56										
					Salinity 90909 PPM, PH - 5, Gastec .41% H2S													
1030	11480	64	11000			4600	39	56		47%		.698		210.09		6.11		
1045	11400	64	10500			4600	40.5	56										

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 2, 1987 PAGE 54 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
					Recorder	D.W.												
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	P_{ga} kPa	°C	P_{ga} kPa	mm	P_{ga} kPa	P_{ga} kPa	kPa	°C	mm		kPa		orifice	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.000									
1100	11500	64	11000			4600	41.75	56		47%				217.32				
1115	11350	65	10600			4650	41	56										
					Salinity 94545 PPM, PH - 4.5													
1130	11350	64	10500			4650	41.5	56		48%		.748		217.87		6.79		
1145	11200	64	10600			4650	43.5	56										
1200	11350	65	10700			4650	42.5	56		53%				220.50				
1215	11300	64	10600			4650	43	56										
					Salinity 90909 PPM, PH - 5													
1230	11250	65	10800			4700	43.5	56		48%		.782		224.32		7.31		
1245	11250	65	10400			4700	43.5	56										
1300	11200	65	10500			4700	43.5	56		49%				224.32				
1315	11150	64	10500			4700	43.5	56										
					Salinity 92121 PPM, PH - 5													
1330	11200	64	10400			4700	40.5	56		49%		.580		216.43		5.23		
1345	11200	64	10500			4700	40	56										

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 2, 1987 PAGE 55 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °F
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		orp	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.000									
1400	11200	64	10400			4700	40.5	56		49%				216.43				
1415	11170	64	10600			4700	41	56										
					Salinity 95758 PPM, PH - 5													
1430	11000	64	10000			4700	40.5	57		50%		.517		216.01		4.65		
1445	10850	64	10500			4700	40.5	57										
					Gastec - .4% H2S													
1500	10800	64	10200			4700	40.5	56		51%				216.43				
1515	10850	65	10300			4700	40.5	56										
					Salinity 95758 PPM, PH - 5													
1530	10800	64	10300			4700	40.5	56		51%		.476		216.43		4.29		
1545	10850	64	10300			4750	40.5	56										
1600	10850	64	10300			4750	40.5	56		50%				217.62				
1615	10850	64	10300			4750	40.5	56										
					Salinity 98182 PPM, PH - 5													
1630	10850	64	10300			4750	40.5	56		50%		.490		217.62		4.44		
1645	10850	64	10000			5000	41	56										
1700	10800	64	10000			5300	36.5	56		51%				218.66				
									2.250									
1715	10750	63	10000			3800	32	54										
					Salinity 96970 PPM, PH - 5													
1730	10600	63	10000			3800	33.25	54		51%				229.33		4.44		
1745	10600	63	10000			3800	32.5	54										
1800	10600	63	10000			3950	29	54		51%				218.49				

REMARKS:

1701 Change orifice plate to 2.250

1706 Lower static

1758 Raise static

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 2, 1987 PAGE 56 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
1815	10600	63	10000			3950	29	54										
					Salinity 90909 PPM, PH - 5													
1830	10700	63	10100			3950	28.75	54		51%		.479		217.54		4.34		
1845	10700	63	9900			3900	29	54										
1900	10800	63	10000			3950	28.5	55		51%				216.19				
1915	10800	64	10000			3900	28.5	55										
					Salinity 92121 PPM, PH - 5													
1930	10700	63	10000			4000	28.5	55		51%		.438		217.58		3.97		
1945	10700	64	10000			4100	28.5	55										
2000	10700	64	9600			4100	28.5	55		51%				220.36				
2015	10700	64	10000			4200	28	55										
					Salinity 90909 PPM, PH - 5													
2030	10700	64	10000			4200	28	55		51%		.397		221.13		3.66		
2045	10600	64	10000			4300	27.5	55										
2100	10600	64	10000			4300	27.5	56		52%				221.40				
2115	10550	63	10600			4000	30.5	56										
					Salinity 90909 PPM, PH - 5													
2130	10600	64	10600			4000	30	55		52%		.399		223.25		3.71		
2145	10600	64	10000			4000	30.5	54										
2200	10450	63	9600			4000	30	54		53%				223.67				
2215	10370	63	9600			4000	30.5	54										

REMARKS

2010 Manual back pressure in service

2101 Back pressure valve in service

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 2-3, 1987 PAGE 57 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp		Z DRAWDOWN	Diff.	WGR	Orifice Plate Size					
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches		Inches	$m^3/10^3 m^3$	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	P_{ga} kPa	°C	P_{ga} kPa	mm	P_{ga} kPa	P_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
				32/64	Salinity 92121 PPM, PH - 5				2.250	Gastec - .2% H2S								
2230	10500	63	9600			4000	29.5	54		52%		.368		221.79		3.40		
2245	10450	63	9600			4000	29.5	54										
2300	10450	63	9600			4000	29.5	53		52%				221.79				
2315	10480	63	9600			4000	29.5	53										
					Salinity 94545 PPM, PH - 5													
2330	10500	63	9600			4000	29	53		52%		.358		220.31		3.29		
2345	10450	63	9800			4000	29.5	53										
2400	10450	63	9800			4000	29.5	53		52%				221.79				
Feb. 3/87 0015	10450	63	9800			4000	29.5	53										
					Salinity 90909 PPM, PH - 5													
0030	10400	63	9800			4000	29.5	53		52%		.345		221.79		3.19		
0045	10400	63	9800			4000	29.5	53										
0100	10400	63	9800			4000	29.5	53		52%				221.79				
0115	10400	63	9800			4000	29.5	53										
					Salinity 89696 PPM, PH - 5													
0130	10400	63	9800			4000	29.5	53		52%		.373		221.79		3.45		
0145	10400	63	9800			4000	29.5	53										
0200	10375	63	9800			4000	29.5	53		52%				221.79				
0215	10380	63	10000			4000	29.5	53										
					Salinity 87878 PPM, PH - 5, Gastec - .2% H2S													
0230	10400	63	10000			4000	29.5	53		52%		.338		221.79		3.13		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 3, 1987 PAGE 58 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
M&P Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	ρ_{ga} kPa	°C	ρ_{ga} kPa	mm	ρ_{ga} kPa	ρ_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
0245	10380	63	10000			4000	29.5	53										
0300	10350	63	10000			4000	29.5	53		53%				221.79				
0315	10350	63	10000			4000	29.5	53										
					Salinity 90303 PPM, PH - 5													
0330	10350	63	10000			4000	29.5	53		53%		.317		221.79		2.93		
0345	10350	63	10000			4000	29.5	53										
0400	10300	63	10000			4000	29	53		53%				220.31				
0415	10275	63	10000			4000	29	53										
					Salinity 89696 PPM, PH - 5													
0430	10250	63	10000			4000	29	53		53%		.307		220.31		2.82		
0445	10250	63	10000			4000	28.5	53										
0500	10300	63	10000			4000	29	53		53%				220.31				
0515	10300	63	10000			4100	29	53										
					Salinity 89696 PPM, PH - 5													
0530	10280	63	10000			4100	28.5	53		53%		.311		221.19		2.87		
0545	10250	63	10000			4100	28.5	53										
0600	10300	63	10000			4100	28.5	53		53%				221.19				
0615	10300	63	10000			4100	28.5	53										
					Salinity 90303 PPM, PH - 5, Gasted - .25% H2S													
0630	10300	63	10000			4100	28.5	53		53%		.290		221.19		2.67		
	Total gas rate last 24 hrs. - 216.79 10^3m^3									Cumulative gas rate - 272.44 10^3m^3								

REMARKS: Total water produced last 24 hrs. - 107.28 m^3 Cumlative water produced - 178.97 m^3

Average W.G.R. - .481 $m^3/10^3m^3$

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. [redacted]7 DATE February 3, 1987 PAGE 59 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP. GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3 m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orifice	$10^3 m^3/d$	$10^3 m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
0645	10300	63	10000			4100	28.5	53										
0700	10250	63	10000			4150	28.5	53		53%				222.57				
0715	10250	63	10000			4150	28.5	53										
					Salinity 89697 PPM, PH - 5													
0730	10200	63	10000			4150	28	53		53%		.301		220.54		2.77		
0745	10200	63	10100			4150	28.5	53										
0800	10200	63	9900			4150	28.5	53		53%				222.57				
0815	10200	62	9900			4150	28.5	53										
					Salinity 89697 PPM, PH - 5													
0830	10200	62	10000			4150	28.25	53		53%		.300		221.59		2.87		
0845	10200	62	10000			4150	28.25	53										
0900	10200	62	10000			4150	28	53		53%				220.54				
0915	10200	63	10000			4150	28	53										
					Salinity 89697 PPM, PH - 5													
0930	10200	63	10000			4150	28.5	53		53%		.281		222.57		2.61		
0945	10200	63	10000			4150	28.5	53										
1000	10200	63	9900			4150	28.5	53		53%								
1015	10200	63	9800			4150	28.5	53						222.57				
					Salinity 90909 PPM, PH - 5, Gastec .4% H2S													
1030	10200	63	9800			4150	28.75	53		53%		.269		223.60		2.51		
1045	10200	63	9800			4150	28.75	53										

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 3, 1987 PAGE 66 OF 143

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches		Inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
				32/64					2.250									
1045	10200	63	10000			4150	28.75	53										
1100	10200	62	10000			4150	28.5	53		53%				222.57				
1115	10200	62	9800			4150	28.5	53										
					Salinity 89697 PPM, PH – 5.5													
1130	10200	62	9700			4150	28.5	53		53%		.276		222.57		2.56		
1145	10150	62	9600			4150	28.5	53										
1200	10150	62	9700			4150	28.5	53		54%				222.57				
1215	10150	62	10100			4150	28	53										
					Salinity 88485 PPM, PH – 5.5													
1230	10150	62	10000			4150	28.5	53		54%		.248		222.57		2.30		
1245	10150	62	10000			4150	28.5	53										
1300	10150	62	10000			4150	28.5	53		54%				222.57				
1315	10150	62	10000			4150	28.5	53										
					Salinity 86061 PPM, PH – 5.5													
1330	10150	62	10000			4150	28.5	53		54%		.271		222.57		2.51		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 3, 1987 PAGE 61 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Single Rate, Zone #4, Test #2 PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P. Gas Rate	L.P Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
1345	10150	62	10000			4150	28.5	53										
1400	10150	62	10000			4150	28.25	53		54%				221.59				
1415	10150	62	10000			4150	28.25	53										
					Salinity 86061 PPM, PH - 5.5, Gastec - .4% H2S													
1430	10150	62	10000			4150	28.5	53		54%		.268		222.57		2.49		
1445	10150	62	10000			4150	28.25	53										
1500	10100	62	10000			4150	28.25	53		54%				222.57				
					Salinity 89697 PPM, PH - 5.5													
1530	10100	62	10000			4150	28.5	53		54%		.248		222.57		2.30		
1545	10100	62	10000			4150	28.5	53										
1600	10100	62	10000			4150	28.5	53		54%				222.57				
1615	10100	62	10000			4150	28.5	53										
					Salinity 94545 PPM, PH - 5.5													
1630	10100	62	10000			4150	28.5	53		54%		.248		222.57		2.30		
1645	10100	62	10000			4150	28.5	53										
1700	10100	62	10100			4150	28.5	53		54%				222.57				
1715	10050	62	10200			4150	28.5	53										
					Salinity 89697 PPM, PH - 5.5													
1730	10050	62	10200			4150	28.5	53		54%		.247		222.57		2.29		
1745	10050	62	10200			4150	28.5	53										
1800	10050	62	10000			4150	28.5	53		54%				222.57				

REMARKS:

1630 Changed refractometer, reading slightly higher than other refractometer.

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 3, 1987 PAGE 62 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
1815	10050	62	10000			4150	28.5	53										
					Salinity 90909 PPM, PH - 5.5													
1830	10050	62	10000			4150	28.5	53		54%		.231		222.57		2.14		
1845	10050	62	10000			4150	28.5	53										
1900	10050	62	10000			4150	28.5	53		54%				222.57				
1915	10050	62	10000			4150	28.5	53										
					Salinity 93333 PPM, PH - 5.5													
1930	10050	62	10000			4150	28.5	53		54%		.232		222.57		2.15		
1945	10050	62	10000			4150	28.5	53										
2000	10050	62	10000			4150	28.5	53		54%				222.57				
2015	10050	62	10000			4150	28.5	53										
					Salinity 92121 PPM, PH - 5.5													
2030	10050	62	10000			4150	28.5	53		54%		.197		222.57		1.83		
2045	10050	62	10000			4150	28.5	53										
2100	10020	62	10000			4150	28.5	53		54%				222.57				
2115	10020	62	10000			4150	28.5	53										
					PH - 5.5													
2130	10020	62	10000			4150	28.5	53		54%		.253		222.57		2.35		
2145	10020	62	10000			4150	28.5	53										
2200	10020	62	10000			4150	28.5	53		54%				222.57				
2215	10020	62	10000			4150	28.5	53										

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 3-4, 1987 PAGE 63 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Koff, D. Marr
H.P. METER SIZE 3.831" DIFF RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover: Recorder	STATIC PRESSURE or prover: D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		orifice	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64	Salinity 89696 PPM, PH-5.5				2.250	Gastec -	.25%	H2S						
2230	10020	62	10000			4150	28.5	53		54%		.180		222.57		1.67		
2245	10020	62	10000			4150	28.5	53										
2300	10020	62	10000			4150	28.5	53		54%				222.57				
2315	10020	62	10000			4150	28.5	53										
					Salinity 89696 PPM, PH - 5.5													
2330	10000	62	10000			4150	28.5	53		54%		.236		222.57		2.19		
2345	10000	62	10000			4150	28.5	53										
2400	10000	62	10000			4150	28.5	53		54%				222.57				
Feb. 4/87 0015	10000	62	10000			4150	28.5	53										
					Salinity 89696 PPM, PH - 5.5													
0030	9990	62	10000			4150	28.5	53		54%		.231		222.57		2.14		
0045	9990	62	10000			4150	28.5	53										
0100	9990	62	10000			4150	28.5	53		54%				222.57				
0115	9990	62	10000			4150	28.5	53										
					Salinity 90909 PPM, PH - 5													
0130	9980	62	10000			4150	28.5	53		54%		.219		222.57		2.04		
0145	9980	62	10000			4150	28.5	53										
0200	9970	62	10000			4150	28.5	53		54%				222.57				
0215	9970	62	10000			4150	28.5	53										
					Salinity 90909 PPM, PH - 5													
0230	9970	62	10000			4150	28.5	53		54%		.202		222.57		1.88		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 4, 1987 PAGE 54 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Single Point .PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
0245	9970	62	10000			4150	28.5	53										
0300	9970	62	10000			4150	28.5	53		54%				222.57				
0315	9970	62	10000			4150	28.5	53										
					Salinity 91515 PPM, PH - 5.5													
0330	9970	62	10000			4150	28.5	53		54%		.214		222.57		1.98		
0345	9970	62	10000			4150	28.5	53										
0400	9970	62	10000			4150	28.5	53		54%				222.57				
0415	9970	62	10000			4150	28.5	53										
					Salinity 89696 PPM, PH - 5.5													
0430	9960	62	10000			4150	28.5	53		54%		.209		222.57		1.94		
0445	9960	62	10000			4150	28.5	53										
0500	9960	62	10000			4150	28.5	53		54%				222.57				
0515	9960	62	10000			4150	28.5	53										
					Salinity 89696 PPM, PH - 5													
0530	9960	62	10000			4150	28.5	53		54%		.214		222.57		1.99		
0545	9950	62	10000			4200	28.5	53										
0600	9950	62	10000			4200	28.5	53		54%				223.95				
0615	9950	62	10000			4200	28.5	53										
					Salinity 90909 PPM, PH - 5, Gastec - .2% H_2S													
0630	9950	62	10000			4200	28.5	53		54%		.179		223.95		1.67		
	Total gas rate last 24 hrs. - 222.52 10^3m^3									Cumulative gas rate - 494.96 10^3m^3								

REMARKS: Total water produced last 24 hrs. - 53.48 m^3 Cumulative water produced - 232.45 m^3

Average W.G.R. - .240 $m^3/10^3m^3$

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 4, 1987 PAGE 65 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Single Point PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Z DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water		
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{gs} kPa	°C	p_{gs} kPa	mm	p_{gs} kPa	p_{gs} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
0700	9940	62	10000			4200	28.5	52		54%				223.95				
0715	9940	62	10000			4200	28.5	52										
					Salinity 90909 PPM, PH - 5													
0730	9940	62	10000			4200	28.5	52		54%		.185		223.95		1.73		
0745	9940	62	10000			4200	28.25	52										
0800	9940	62	10000			4200	28.25	52		54%				223.39				
0815	9940	62	10000			4200	28.25	52										
					Salinity 87273 PPM, PH - 5.5													
0830	9940	62	10000			4200	28.25	52		54%		.179		223.39		1.67		
0845	9940	62	10300			4200	28.25	52										
0900	9940	62	10400			4200	28.25	52		54%				223.39				
0915	9920	62	10400			4200	28.25	52										
					Salinity 92121 PPM, PH - 5.5													
0930	9920	62	10400			4200	28.25	52		54%		.190		223.39		1.77		
0945	9920	62	10300			4200	28	52										
1000	9900	62	10300			4200	28	52		55%				222.40				
1015	9900	62	10300			4200	28	52										
					Salinity 92121 PPM, PH - 5.5													
1030	9900	62	10300			4200	28	52		55%		.215		222.40		1.99		
1045	9900	62	10300			4200	28	52										
1100	9900	62	10300			4200	28	52		55%				222.40				

REMARKS:

0800 – Take 3 H.P. Gas samples – Bomb #V1358, V1349 (purged), and #V1348 on vacuum

4 Stock Water – samples sent to Calgary by hot-shot

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 4, 1987 PAGE 66 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF RANGE:

OPERATION: Single Point PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
					STATIC PRESSURE or prover		Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size		Gas Rate	Gas Rate			
	TUBING Pressure	Flow Temp.	CASING Pressure		Recorder	D.W.													
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches		Inches	$m^3/10^3m^3$	Inches		MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm		$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250										
1115	9900	62	10300			4200	28.25	52											
					Salinity 87273 PPM, PH - 5.5														
1130	9900	62	10300			4200	28.25	52				.162			223.39		1.51		
1145	9900	62	10300			4200	28.5	52											
1200	9900	62	10100			4200	28.5	52							223.95				
1215	9900	62	10100			4200	28.25	52											
					Salinity 92121 PPM, PH - 5.5														
1230	9900	62	10100			4200	28.25	52				.304			223.39		2.83		
1245	9900	62	10100			4200	28.25	52											
1300	9900	62	10000			4200	28.25	52							223.39				
1315	9900	62	9900			4200	28.25	52											
					Salinity 85366 PPM, PH - 5.5														
1330	9900	62	9800			4200	28.25	52				.207			223.39		1.93		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 4, 1987 PAGE 67 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
GAS TO: FLARE ☒ PIPELINE ☐
OPERATION: Single Point

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C		kPa		orve	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64								2.250					
1345	9900	62	10000			4200	28.25	52									
1400	9900	62	10000			4200	28.25	52					223.39				
1415	9900	62	10000			4200	28.25	52									
					Salinity 86061 PPM, PH - 5.5												
1430	9890	62	9900			4200	28.25	52			.185		223.39		1.72		
1445	9890	62	9900			4200	28.25	52									
1500	9890	62	9900			4200	28.25	52					223.95				
1515	9890	62	9900			4200	28.5	52									
					Salinity 87273 PPM, PH - 5.5												
1530	9890	62	9900			4200	28.5	52			.180		223.95		1.68		
1545	9880	62	9900			4200	28.5	52									
1600	9880	62	9900			4200	28.5	52					223.95				
1615	9880	62	9700			4200	28.75	52									
					Salinity 84848 PPM, PH - 5.5												
1630	9880	62	9700			4200	28.75	52			.173		225.36		1.62		
1645	9870	62	10100			4200	28.75	52									
1700	9870	62	10100			4200	28.75	52					225.36				
1715	9870	62	10100			4200	28.75	52									
					Salinity 83636 PPM, PH - 5.5												
1730	9870	62	10100			4200	28.75	52			.150		225.36		1.41		
1745	9870	62	10100			4200	28.75	52									

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 4, 1987 PAGE 66 OF 143

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
1800	9870	62	10000			4200	28.75	52		55%				225.36				
1815	9870	62	10000			4200	28.75	52										
					Salinity 83636 PPM, PH - 5.5, Gastec - .45% H2S													
1830	9870	62	10000			4200	28.75	52		55%		.167		225.36		1.57		
1845	9870	62	10000			4200	28.75	52										
1900	9870	62	10000			4200	28.75	52		55%				225.36				
1915	9870	62	10000			4200	28.75	52										
					Salinity 82424 PPM, PH - 5.5													
1930	9870	62	10000			4200	28.75	52		55%		.183		225.36		1.72		
1945	9870	62	10000			4200	28.75	52										
2000	9870	62	10000			4200	28.75	52		55%				225.36				
2015	9870	62	10000			4200	28.5	52										
					Salinity 81818 PPM, PH - 5.5													
2030	9870	62	10000			4200	28.5	52		55%		.168		223.95		1.57		
2045	9860	62	10000			4200	28.5	52										
2100	9860	62	10000			4200	28.5	52		55%				223.95				
2115	9860	62	10000			4200	28.5	52										
					Salinity 81818 PPM, PH - 5.5													
2130	9860	62	10000			4200	28.5	52		55%		.180		223.95		1.67		
2145	9850	62	10000			4200	28.5	52										
2200	9850	62	10000			4200	28.5	52		55%				223.95				

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

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Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 5, 1987 PAGE 70 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orifice	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64	Salinity 82424 PPM, PH-5.5				2.250	Gastec – .4% H2S								
0230	9830	62	10000			4200	28.5	52		55%		.174		223.95		1.62		
0245	9830	62	10000			4250	28	52										
0300	9830	62	10000			4250	28	52		55%				223.76				
0315	9830	62	10000			4300	27.5	52										
					Salinity 84848 PPM, PH – 5.5													
0330	9820	62	10000			4300	27.5	52		55%		.157		223.09		1.46		
0345	9820	62	10000			4250	28	52										
0400	9820	62	10000			4250	28	52		55%				223.76				
0415	9820	62	10000			4250	28	52										
					Salinity 84848 PPM, PH – 5.5													
0430	9820	62	10000			4250	28	52		55%		.162		223.76		1.51		
0445	9820	61	10000			4250	28	52										
0500	9820	61	10000			4250	28	52		55%				223.76				
0515	9820	61	10000			4250	28	52										
					Salinity 84848 PPM, PH – 5.5													
0530	9820	61	10000			4250	28	52		55%		.180		223.76		1.68		
0545	9820	61	10000			4250	28	52										
0600	9820	61	10000			4250	28	52		55%				223.76				
0615	9820	61	10000			4250	28	52										
					Salinity 84848 PPM, PH – 5.5, Gastec – .4% H2S													
0630	9820	61	10000			4250	28	52		55%		.163		223.76		1.52		

REMARKS: Total gas rate last 24 hrs. – 223.91 10^3m^3 Cumulative gas rate – 718.87 10^3m^3

Total water produced last 24 hrs. – 40.29 m^3 Cumulative water produced – 272.74 m^3

Average W.G.R. – .180 $m^3/10^3m^3$

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 7 **FIELD NOTES** DATE February 5, 1987 PAGE 71 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA				H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.			
	TUBING Pressure	Flow Temp.	CASING Pressure	Choke Size	STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
0645	9820	62	10000			4250	28	52										
0700	9820	62	10000			4250	28	52		55%				223.76				
0715	9820	62	10000			4250	28	52										
					Salinity 83636 PPM, PH - 5.5													
0730	9820	62	10000			4250	28	52		55%		.157		223.76		1.46		
0745	9810	62	10000			4250	28	52										
0800	9810	62	10000			4250	28	52		55%				223.76				
0815	9810	62	10000			4250	28	52										
					Salinity 83636 PPM, PH - 5.5													
0830	9810	62	10000			4250	28	52		55%		.146		223.76		1.36		
					Pump methanol													
0845	9850	62	10000			4250	28	52										
					Shut down methanol													
0900	9850	62	10000			4250	28	52		55%				223.76				
0915	9860	62	10000			4300	28	52										
					Salinity 84242 PPM, PH - 5.5													
0930	9870	62	10000			4300	28	52		55%		.144		225.02		1.35		
0945	9870	62	10000			4300	27.75	52										
1000	9870	62	10000			4300	27.75	52		55%				224.10				
1015	9860	62	10000			4300	27.75	52										
					Salinity 83636 PPM, PH - 5.5, Gastec - .4% H2S													
1030	9860	62	10000			4300	27.75	52		55%		.163		224.00		1.52		
1045	9860	62	10000			4300	27.75	52										

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 5, 1987 PAGE 72 OF 145

CUSTOMER: Northcor Energy Ltd.
REF. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Zone #4, Test #2
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
1100	9860	62	10000			4300	28	52		55%				225.02				
1115	9860	62	10000			4300	28	52										
					Salinity 81212 PPM, PH - 5.5													
1130	9860	62	10000			4300	28	52		55%		.173		225.02		1.62		
1145	9860	62	10000			4300	28	52										
1200	9860	62	10000			4230	28.25	52		55%				224.21				
1215	9860	62	10000			4180	28.5	52										
					Salinity 81212 PPM, PH - 5.5													
1230	9860	62	10000			4140	29	52		55%		.151		224.67		1.41		
1245	9860	62	10000			4160	28.75	52										
1300	9860	62	10000			4170	28.75	52		55%				224.53				
1315	9860	62	10000			4170	28.75	52										
					Change out propane tanks for supply													
1320																		
					Salinity 82424 PPM, PH - 5.5													
1330	9860	62	10000			4300	28	52		55%		.156		225.02		1.46		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 5, 1987 PAGE 73 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P. Gas Rate	L.P Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.		% DRAWDOWN	Diff.	WGR		Orifice Plate Size					
					Recorder	D.W													
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3 m^3$		inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa			mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250										
1345	9860	62-	9900			4300	28	52											
1400	9860	62	9900			4300	28	52		55%					225.02				
1415	9860	62	9900			4300	28	52											
					Salinity 78788 PPM, PH – 5.5														
1430	9860	62	9900			4300	28	52		55%		.155			225.02		1.45		
1445	9850	62	9800			4300	28	52											
1500	9850	62	9800			4300	28	52		55%					225.02				
1515	9850	62	9600			4300	28	52											
					Salinity 87273 PPM, PH – 5.5														
1530	9850	62	9500			4300	28	52		55%		.132			225.02		1.24		
1545	9850	61	9500			4310	28	52											
1600	9850	61	9500			4310	28	52		55%					225.38				
1615	9850	61	9500			4310	28	52											
					Pump methanol,(pump up casing), Salinity – 82434 PPM, PH – 6.5														
1630	9850	61	10000			4310	28	52		55%		.135			225.38		1.27		
1645	9850	61	10000			4310	28.25	52											
1700	9850	61	10000			4310	28.25	52		55%					226.39				
1715	9850	61	10000			4310	28.25	52											
					Salinity 83636 PPM, PH – 5.5														
1730	9850	61	10000			4310	28.25	52		55%		.162			226.39		1.53		
1745	9850	61	10000			4320	28.25	52											

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 5, 1987 PAGE 74 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA				H.P. SEP GAS METERING					L.P. SEP. GAS METERING					H.P.	L.P.			
	TUBING Pressure	Flow Temp.	CASING Pressure	Choke Size	STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size		Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches		MSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orvo		$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250										
1800	9850	61	10000			4320	28.25	52		55%					226.66				
1815	9850	61	10000			4320	28.25	52											
					Salinity 83030 PPM, PH – 5.5, Gastec – .4% H2S														
1830	9850	61	10000			4320	28.25	52		55%		.139			226.66		1.31		
1845	9850	61	10000			4320	28.25	52											
1900	9850	61	10000			4320	28.25	52		55%					226.66				
1915	9850	61	10000			4320	28.25	52											
					Salinity 81212 PPM, PH – 5.5														
1930	9850	61	10000			4320	28.25	52		55%		.138			226.66		1.30		
1945	9850	61	9800			4330	28	52											
2000	9850	61	9800			4330	28	52		55%					225.92				
2015	9850	61	9800			4330	28	52											
					Salinity 83636 PPM, PH – 5.5														
2030	9850	61	9800			4300	28.5	52		55%		.152			227.12		1.44		
2045	9850	61	9800			4300	28.5	52											
					Pump up casing														
2100	9850	61	9800			4300	28.5	52		55%					227.12				
2115	9850	61	10000			4300	28.5	52											
					Salinity 83636 PPM, PH – 5.5														
2130	9850	61	10000			4300	28.5	52		55%		.152			227.12		1.44		
2145	9850	61	10000			4300	28.5	52											
2200	9850	61	10000			4300	28.5	52		55%					227.12				

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 5-6, 1987 PAGE 75 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover: Recorder	STATIC PRESSURE or prover: D.W.	Diff.	Temp	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water		
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{gs} kPa	°C	p_{gs} kPa	mm	p_{gs} kPa	p_{gs} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64					2.250									
2215	9850	61	10000			4300	28.5	52										
					Salinity 82424 PPM, PH - 5.5, Gastec - .4% H2S													
2230	9850	61	10000			4300	28.5	52		55%		.159		227.12		1.50		
2245	9850	61	10000			4300	28.5	52										
2300	9850	61	10000			4300	28	52		55%				225.08				
2315	9850	61	10000			4300	28	52										
					Salinity 82424 PPM, PH - 5.5													
2330	9850	61	10000			4300	28	52		55%		.133		225.06		1.26		
2345	9850	61	10000			4250	28.5	52										
2400	9850	61	9800			4250	28.5	52		55%				225.75				
Feb. 6/87 0015	9850	61	9800			4250	28.5	52										
					Salinity 83636 PPM, PH - 5.5													
0030	9850	61	9800			4250	28.5	52		55%		.152		225.75		1.43		
0045	9850	61	9800			4250	28.5	52										
0100	9850	61	9800			4250	28.5	52		55%				225.75				
0115	9850	61	9800			4250	28.5	52										
					Salinity 81818 PPM, PH - 5.5													
0130	9850	61	9800			4250	28.5	52		55%		.149		225.75		1.40		
0145	9850	61	9800			4250	28.5	52										
0200	9850	61	9800			4250	28.5	52		55%				225.75				
0215	9850	61	9800			4250	28.5	52										

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 6, 1987 PAGE 79 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Zone #4, Test #2
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Z DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64	Salinity 82424 PPM, PH - 5.5				2.250	Gastec - .4% H2S								
0230	9850	62	9800			4250	28.5	52		55%		.149		225.75		1.41		
0245	9850	62	9800			4250	28.5	52										
0300	9850	62	9800			4250	28.5	52		55%				225.75				
0315	9850	62	9800			4250	28.5	52										
					Salinity 84848 PPM, PH - 5.5													
0330	9850	62	9800			4250	28.5	52		55%		.141		225.75		1.33		
0345	9850	62	9800			4250	28.5	52										
0400	9850	62	9800			4250	28.5	52		55%				225.75				
0415	9850	62	9800			4250	28.5	52										
					Salinity 84848 PPM, PH - 5.5													
0430	9850	62	10000			4250	28.5	52		55%		.145		225.75		1.36		
0445	9850	62	10000			4250	28.5	52										
0500	9850	62	10000			4250	28.5	52		55%				225.75				
0515	9850	62	10000			4250	28.5	52										
					Salinity 83636 PPM, PH - 5.5													
0530	9850	62	10000			4250	28.5	52		55%		.136		225.75		1.28		
0545	9850	62	10000			4250	28.5	52										
0600	9850	62	10000			4250	28.5	52		55%				225.75				
0615	9850	62	10000			4250	28.5	52										
					Salinity 83636 PPM, PH - 5.5, Gastec - .4% H2S													
0630	9850	62	10000			4250	28.5	52		55%		.122		225.75		1.15		

REMARKS: Total gas rate last 24 hrs. - 225.48 10^3m^3 Cumulative gas rate - 944.35 10^3m^3
Total water produced last 24 hrs. - 33.28 m^3 Cumulative water produced - 306.02 m^3
Average W.G.R. - .148 $m^3/10^3m^3$

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 6, 1987 PAGE 77 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐ OR CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
					Recorder	D.W.						$m^3/10^3m^3$						
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches		inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orvo	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				32/64				.	2.250									
0700	9850	62	10000			4250	28.5	52										
					Salinity 84848 PPM, PH - 5.5													
0730	9850	62	10000			4250	28.5	52		55%		.150		225.75		1.41		
0800	9850	62	10000			4250	28.5	52										
0815	9850	62	10000			4250	28.5	52										
					Salinity 82424 PPM, PH - 5.5													
0830	9850	62	10000			4250	28.5	52		55%		.155		225.75		1.46		
					Shut-in master valve, bleed off casing to close bottom hoke PCT valve													
0830																		
0831	11850		0															
0832	11860																	
0835	11850		0															
0840	11840																	
0845	11820		0															
0855	11790		0															
0900	11770		0															
0930	11670		0															
1000	11590		0															
1030	11490		0															
1100	11420		0															

REMARKS: Total gas flared last 2.0 hrs. - 18.81 10^3m^3 Cumulative gas flared - 963.16 10^3m^3

Total water produced last 2.0 hrs. - 2.87 m^3 Cumulative water produced - 308.89 m^3

Average W.G.R. last 2.0 hrs. - 1.51 $m^3/10^3m^3$

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 6, 1987 PAGE 78 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point, Zone #4, Test #2 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
1130	11350		0															
1200	11290		0															
1230	11250		0															
1300	11220		0															
1330	11190		0															
1400	11160		0															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 6-7, 1987 PAGE 79 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF RANGE:
GAS TO: FLARE [X] PIPELINE [ ] OR:
CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
1500	11080		0															
1600	11020		0															
1700	10950		0															
1800	10920		0															
1900	10900		0															
2000	10830		0															
2100	10800		0															
2200	10770		0															
2300	10730		0															
2400	10700		0															
Feb. 7/87																		
0100	10670		0															
0200	10650		0															
0300	10620		0															
0400	10600		0															
0500	10580		0															
0600	10560		0															
0700	10540		0															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 7, 1987 PAGE 80 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE
GAS TO: FLARE [X]
PIPELINE [ ]
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP GAS METERING				H.P.	L.P.		Oil [ ] Condensate [ ]	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE @ prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate	Water		
					Recorder	D.W.												
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm	p_{g2} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0800	10520		0															
0900	10510		0															
1000	10500		0															
1100	10490		0															
1200	10470		0															
1300	10460		0															
1400	10450		0															
1500	10440		0															
1600	10430		0															
1700	10420		0															
1800	10410		0															
1900	10400		0															
2000	10390		0															
2100	10380		0															
2200	10370		0															
2300	10360		0															
2400	10350		0															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form N.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 8, 1987 PAGE 81 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
GAS TO: FLARE ☒ PIPELINE ☐ OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0100	10330		0															
0200	10320		0															
0300	10310		0															
0400	10300		0															
0500	10290		0															
0600	10280		0															
0700	10270		0															

REMARKS

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 8, 1987 PAGE 82 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
GAS TO: FLARE [x] PIPELINE [ ]
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0800	10265		0															
0900	10260		0															
1000	10260		0															
1100	10250		0															
1200	10250		0															
1300	10240		0															
1400	10230		0															
1500	10230		0															
1600	10220		0															
1700	10220		0															
1800	10220		0															
1900	10210		0															
2000	10210		0															
2100	10200		0															
2200	10200		0															
2300	10200		0															
2400	10190		0															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 9, 1987 PAGE 83 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [x] L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Build-Up PIPELINE [ ] OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
					STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
	TUBING Pressure	Flow Temp.	CASING Pressure		Recorder	D.W												
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	dec	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0100	10190		0															
0200	10180		0															
0300	10180		0															
0400	10170		0															
0500	10160		0															
0600	10160		0															
0700	10150		0															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form N...

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 9, 1987 PAGE 84 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [x] L.P. METER SIZE DIFF. RANGE:

OPERATION: Build-Up PIPELINE [ ] OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W												
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0800	10150		0															
0900	10150		0															
1000	10150		0															
1100	10140		0															
1200	10140		0															
1300	10130		0															
1400	10130		0															
1500	10130		0															
1600	10120		0															
1700	10120		0															
1800	10120		0															
1900	10120		0															
2000	10110		0															
2100	10110		0															
2200	10110		0															
2300	10100		0															
2400	10100		0															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 10, 1987 PAGE 85 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [x] L.P. METER SIZE DIFF. RANGE:

OPERATION: Build-Up PIPELINE [ ] OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
0100	10100		0															
0200	10090		0															
0300	10090		0															
0400	10090		0															
0500	10090		0															
0600	10080		0															
0700	10080		0															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form N.

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 10, 1987 PAGE 80 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE x PIPELINE ☐ L.P. METER SIZE ____ DIFF RANGE: ____

OPERATION: Build-Up OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil / Condensate	Oil / Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
0800	10070		0															
0900	10070		0															
1000	10070		0															
1100	10070		0															
1200	10070		0															
1300	10060		0															
1400	10060		0															
1500	10060		0															
1600	10050		0															
1700	10050		0															
1800	10050																	
1800					Otis rig up to pull recorders													
1830					Halliburton pump up casing to open PCT valve													
1835					Valve open tubing press. up													
1840	20450		10500															
1845	20700		10500															
1850	20900		10500															

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 10, 1987 PAGE 87 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE _____ DIFF. RANGE: _____
OR: _____ CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
GAS TO: FLARE [x]
PIPELINE [ ]
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
1855	2100		10500															
1900					Shut-in put more weight on Wireline													
1925					Open well run in with Wireline													
1930	21300		10500															
1935	21450		10500															
2000	21750		10500															
2115	21830				Recorders out run in for gradient													
2130	21840		10500															
2145	21840		10500															
2200	21850		10500															
2215	21850		10500															
2230	21850		10500															
2245	21850		10500															
2300	21850		10200															
2315	21860		10200															
2330	21860		10200															
2345	21870		10200															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27
CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
GAS TO: FLARE ☒
PIPELINE ☐

TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
2400	21870		10200															
Feb. 11/87 0015	21870		10200															
0030	21870		10200															
0045	21870		10200															
0100	21870		10200															
0115	21870		10200															
0138					Reverse out of hole													
0201					Fluid to surface													

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form N...

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 12, 1987 PAGE 89 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [x] L.P. METER SIZE DIFF RANGE:

OPERATION: Build-Up PIPELINE [ ] OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P			
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
					Pressure up casing to open PCT valve													
1630																		
					Open well to flow to tank to unload fluid													
1700																		
					Choke plugging up, deadweight line frozen													
1710																		
					By gauge on flowline													
1730	4000																	
1800	6000																	
					Shut-in well													
1830	11500															21.37		
					Schlumberger running in hole for temperature survey														
1900	15380		10500															
1930	15600		9200															
2000	16480		10600															
2030	17020		10600															
2100	17370		10000															
2130	17700		10000															
2200	18000		10200															
2230	18400		10700															
2300	18720		10500															
2330	19050		10500															
2400	19450		11500															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 13, 1987 PAGE 90 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Clean-Up PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches		Inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	P_{ga} kPa	°C	P_{ga} kPa	mm	P_{ga} kPa	P_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
0030	19650		11000															
				32/64	Open well to a 32/64 adj. choke													
0100	19800		11000															
					Fluid to surface													
0104																		
0105	15700																	
					Meter in service				2.250									
0109																		
0110	14600																	
0115	14100																	
0130	13450	29	8650			3700	22	24						195.40				
					Change plate to				2.125									
0144																		
0145	12700	31	10000			3600	25	27										
					Salinity 18181 PPM, PH - 5.5													
0200	12400	33	10500			3800	21	30		43%		.814		167.98		5.70		
0215	12270	34	10500			3700	21	32										
					Change plate to				2.000									
0216																		
0230	12330	35	10500			3800	26.5	33						164.09				
				36.64	Open choke													
0240																		
0245	11900	39	10500			4200	36	34										
					Salinity 23636 PPM, PH - 5.5													
0300	12000	42	10500			4200	36.5	38		45%		.853		200.86		7.14		

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 13, 1987 PAGE 91 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Clean-Up PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder *	D.W.												
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orifice	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				36/64					2.000									
0330	12100	44	10500			4200	41.5	40		45%				213.33				
					Salinity 23636 PPM, PH - 5.5													
0345	12080	45	10500			4250	42	41		45%		.616		215.50		5.53		
					Shut-in well, Schlumberger to pull out of hole													
0345																		
0400	16900		10000															
0415	17800		10000															
0430	18250		10000															
0445	18750		10000															
0500	19000		10500															
0515	19350		10500															
0530	19570		10500															
0545	19890		10500															
0600	20000		10500															
				36/64	Open well on a 36/64 adj. choke													
0630	20350		10500															
0635	15500																	
									2.250									
0640	14370																	
0645	14150																	
0700	12900	35	10500			4200	46	24						302.27				

REMARKS: Total gas rate last 3.5 hrs. - 30.40 10^3m^3

Total water produced last 3.5 hrs. - 18.37 m^3 Cumulative water produced since 1700 hrs. Feb. 12/87

Average W.G.R. last 3.5 hrs. - .761 $m^3/10^3m^3$ 39.74 m^3

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 13, 1987 PAGE 92 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
GAS TO: FLARE ☒
OPERATION: Clean-Up, Zone #4, Test #3
PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water		
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				36/64					2.250									
0715	12000	39	11500			4100	48.5	29										
0730	11550	40	11500			4100	45	32		47%		.320		290.07		3.87		
0745	11200	40	11500			4100	41	35										
					Salinity 30909 PPM, PH - 5.5													
0800	11150	42	11500			4100	37	37		49%				260.2				
0815	11100	43	11500			4100	36.5	38										
					Shut-in well.													
0830	11000	44	11500			4200	34.5	42		50%		.530		251.82		5.56		
0900	17170		11500		Halliburton rigging up to do acid job													
1300					Otis rigging up to run recorders													
1433					Triple recorders landed at 3223 m KB													
1452					Otis out of hole													
1506	21800																	
1510					Open to flow 24/64													
1515	20000	19																
1520	18990																	
1523					Meter in service													
1525	18450																	
1530	18330	22	10000	24/64		4360	36	35						266.15				

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 13, 1987 PAGE 93 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Clean-Up, Zone #4, Test #3
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					Z DRAWDOWN	L.P. SEP. GAS METERING			H.P.	L.P	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size		Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				24/64					2.250									
1545	18250	23	10000			4350	34	35						258.32				
1545					Liquid to surface													
				30/64	Open choke, gas to surface													
1550																		
					Change plate				2.500									
1555																		
					Meter out													
1600	18150	23	10000													.49		
				36/64	Open choke													
1601																		
1605	17930																	
				40/64	Open choke													
1610																		
1615	17530	29	10800			4300	31	34										
1630	16850	31	10000			4300	31	30						317.33				
				48/64	Open choke													
1631																		
					Deadweight frozen													
1645	11800																	
					Lower static													
1653																		
					Deadweight frozen, PH - 2													
1700	6500		10000			3600	34	35		?		.636		299.79		7.94		
				44/64	Cut choke													
1701																		
					Lower static													
1706																		
				38/64	Thaw out deadweight line, cut choke													
1715																		

REMARKS

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 13, 1987 PAGE 94 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Clean-Up, Zone #4, Test #3 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WCR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches		Inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				38/64					2.500									
1730	10900	40	10000			3800	34	36		50%				307.66				
				44/64	Open choke													
1740																		
1745	10200	41	10000			4000	28	38										
				48/64	Open choke													
1751																		
					PH - 2.5, Gastec - .4% H_2S													
1800	9950	43	10200			4000	27.5	39		54%		.491		282.36		5.78		
1815	9800	44	10500			4000	28.5	40										
1830	9750	45	10500			4000	28.5	42		55%				285.73				
1845	9580	46	10000			4000	28	43										
					PH - 2.5													
1900	9580	47	10500			4000	28	43		56%		.451		282.64		5.31		
1915	9520	48	10600			4000	28	44										
1930	9450	50	10000			4000	27.5	45		57%				279.00				
1945	9420	50	10000			4000	27.5	46										
					Salinity 103030 PPM, PH - 5													
2000	9400	51	10000			4000	27.75	46		57%		.467		279.71		5.44		
2015	9350	52	10000			3950	28	47										
2030	9330	53	10000			3900	28	48		57%				276.26				
2045	9330	53	10500			3900	28	48										
					Salinity 94545 PPM, PH - 5													
2100	9300	54	10300			3900	28	48		57%		.428		276.26		4.93		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 13-14, 1987 PAGE 95 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: ____ PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orifice	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500									
2115	9150	54	10700			3900	28	49										
2130	9100	55	10800			3900	28	49		58%				275.73				
2145	9050	55	10800			3900	28	49										
					Salinity 90303 PPM, PH - 5, Gastec - .4% H2S													
2200	9000	55	10800			3900	28	49		58%		.506		275.73		5.81		
2215	8950	55	10800			3900	28	49										
2230	8950	55	10800			3900	28	49		58%				275.73				
2245	8950	55	10800			3900	28	50										
					Salinity 89090 PPM, PH - 5													
2300	8900	55	10000			3900	28	50		59%		.383		275.20		4.39		
2315	8800	56	10000			3900	28	50										
2330	8700	57	10000			3900	28	50		60%				275.20				
2345	8800	57	10000			3900	27.5	50										
					Salinity 87272 PPM, PH - 5													
2400	8700	57	10000			3900	27	50		60%		.246		270.23		2.77		
Feb. 14/87 0015	8650	57	10000			3900	27	50										
0030	8630	58	10000			3900	27	50		60%				270.23				
0045	8700	58	10000			3900	26.5	51										
					Salinity 84848 PPM, PH - 5													
0100	8720	58	10500			3900	26.5	51		60%		.324		267.2		3.61		
0101					Change plate to				2.250									

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 14, 1987 PAGE 56 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Clean-Up, Zone #4, Test #3 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size		Gas Rate	Gas Rate			
					Recorder	D.W.													
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches		MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	P_{ga} kPa	°C	P_{ga} kPa	mm	P_{ga} kPa	P_{ga} kPa	kPa	°C	mm		kPa				$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.250										
0115	8650	59	10500			3950	43	51											
0130	8600	59	10500			3950	42	51		61%					264.55				
0145	8550	59	10000			3950	42	51											
					Salinity 86060 PPM, PH - 5, Gastec - .4% H2S														
0200	8500	59	10000			3950	42	51		61%		.313			264.55		3.45		
0215	8490	59	10000			3950	41.5	52											
0230	8470	59	10000			3950	41.5	52		61%					262.47				
0245	8450	59	10200			3900	41	52											
					Salinity 84848 PPM, PH - 5														
0300	8400	59	10200			3900	41	52		61%		.307			259.18		3.23		
0315	8380	59	10200			3900	40.5	52											
0330	8370	59	10200			3900	40.5	52		62%					257.59				
0345	8350	59	10200			3900	40	52											
					Salinity 84848 PPM, PH - 5														
0400	8350	59	10200			3900	40	52		62%		.299			255.99		3.19		
0415	8330	59	10200			3900	40	52											
0430	8330	59	10200			3900	40	52		62%					255.99				
0445	8320	59	10200			3900	40	52											
					Salinity 86060 PPM, PH - 5														
0500	8300	59	10200			3900	40	52		62%		.275			255.99		2.93		
0515	8250	60	10200			3900	39.75	53											

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 14, 1987 PAGE 97 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Clean-Up, Zone #4, Test #3 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.			
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
					Recorder	D.W.						$m^3/10^3 m^3$						
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches		inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	ρ_{ga} kPa	°C	ρ_{ga} kPa	mm	ρ_{ga} kPa	ρ_{ga} kPa	kPa	°C	mm		kPa		orifice	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
				48/64					2.250									
0530	8250	60	10200			3900	39.75	53		62%				254.71				
0545	8240	60	10200			3900	39.5	53										
					Salinity 83636 PPM, PH - 5, Gastec - .4% H_2S													
0600	8220	60	10200			3900	39.5	53		62%		.271		253.90		2.87		
0615	8220	60	10200			3900	39.5	53										
0630	8200	60	10200			3900	39.5	53		62%				253.90				
0645	8190	60	10200			3900	39	53										
					Salinity 83636 PPM, PH - 5													
0700	8170	60	10200			3900	39	53		63%		.268		252.28		2.82		

Total gas rate last 17.5 hrs. - 197.98 $10^3 m^3$

Cumulative gas rate - 228.38 $10^3 m^3$

Total water produced last 17.5 hrs. - 74.39 m^3

Cumulative water produced - 114.13 m^3

Average W.G.R. last 17.5 hrs. - .383 $m^3/10^3 m^3$

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 14, 1987 PAGE 98 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
GAS TO: FLARE ☒
PIPELINE ☐
OPERATION: Single Point, Zone #4, Test #3

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water		
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.250									
0715	8120	60	10200			3900	39	53										
0730	8120	60	10200			3900	39	53		63%				252.28				
0745	8110	60	10200			3900	38.75	53										
					Salinity 83636 PPM, PH - 5													
0800	8110	60	10200			3900	38.75	53		63%		.235		251.47		2.46		
0815	8100	60	10200			3900	38.75	53										
0830	8070	60	10200			3900	38.5	53		63%				250.66				
0845	8050	60	10200			3900	38.5	53										
					Salinity 82424 PPM, PH - 5													
0900	8050	60	10200			3900	38.5	53		63%		.242		250.66		2.53		
0915	8050	60	10200			3900	38.5	53										
0930	8040	60	10200			3900	38.5	53		63%				250.66				
0945	8020	60	10200			3900	38.5	53										
					Salinity 86061 PPM, PH - 5, Gastec - .4% H_2S													
1000	8020	60	10200			3900	38.5	53		63%		.236		250.66		2.47		
1015	8000	60	10200			3900	38.25	53										
1030	7970	60	10200			3900	38.25	53		63%				249.84				
1045	7970	60	10400			3900	38.25	53										
					Salinity 83636 PPM, PH - 5													
1100	7970	60	10300			3900	38.25	53		63%		.244		249.84		2.54		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 14, 1987 PAGE 99 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Zone #4, Test #3
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
I.M.P. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
S.I. Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.250									
1115	7970	60	10200			3900	37.25	53										
1130	7970	60	10200			3900	37.25	53		63%				249.84				
1145	7970	60	10200			3900	37.25	53										
					Salinity 84848 PPM, PH – 5													
1200	7950	60	10200			3900	37	53		63%		.245		245.71		2.51		
1215	7940	60	10200			3900	37	53										
1230	7930	60	10200			3900	37	53		64%				245.71				
1245	7930	60	10200			3900	37	53										
					Salinity 83636 PPM, PH – 5													
1300	7930	60	10200			3900	37	53		64%		.230		245.71		2.35		
1315	7900	60	10000			3900	37	53										
1330	7910	60	10100			3900	36.75	53		64%				244.88				
1345	7910	60	10100			3900	36.75	53										
					Salinity 84242 PPM, PH – 5, Gastec – .4% H2S													
1400	7910	60	10100			3900	36.75	53		64%		.216		244.88		2.20		
1415	7890	60	10100			3900	36.5	53										
1430	7890	60	10100			3900	36.5	53		64%				244.04				
1445	7870	61	10200			3900	36.5	53										
					Salinity 84848 PPM, PH – 5													
1500	7870	61	10200			3900	36.5	53		64%		.242		244.04		2.46		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 14, 1987 PAGE 100 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REF. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water		
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orve	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.250									
1515	7860	61	10200			3900	36.5	53										
1530	7860	61	10000			3900	36.5	53		64%				244.04				
1545	7860	61	10000			3900	36.5	53										
					Salinity 82424 PPM, PH - 5													
1600	7840	61	10000			3900	36.5	53		64%		.225		244.04		2.29		
1615	7840	61	10000			3900	36.5	53										
1630	7830	61	10200			3900	36.5	53		64%				244.04				
1645	7830	61	10200			3900	36.5	53										
					Salinity 83636 PPM, PH - 5													
1700	7830	61	10200			3900	36.5	53		64%		.204		244.04		2.07		
1715	7830	61	10500			3900	36.5	53										
1730	7830	61	10000			3900	36.5	53		64%				244.04				
1745	7820	61	10000			3900	36.5	53										
					Salinity 82424 PPM, PH - 5, Gastec - .4% H2S													
1800	7820	61	10000			3900	36.5	53		64%		.231		244.04		2.35		
1815	7810	61	10000			3900	36.25	53										
1830	7800	61	10000			3900	36.25	53		64%				243.20				
1845	7800	61	10200			3900	36.25	53										
					Salinity 80000 PPM, PH - 5													
1900	7800	61	10200			3900	36.25	53		64%		.171		243.20		1.73		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 14, 1987 PAGE 101 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orifice	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.250									
1915	7790	61	10200			3900	36.25	53										
1930	7790	61	10200			3900	36.25	53		64%				243.20				
1945	7790	61	10200			3900	36	53										
					Salinity 87272 PPM, PH - 5													
2000	7780	61	10200			3900	35	53		64%		.186		242.36		1.88		
2015	7770	61	10200			3900	36	54										
2030	7770	61	10200			3900	36	54		64%				242.36				
2045	7770	61	10200			3900	36	54										
					Salinity 82424 PPM, PH - 5													
2100	7760	61	10200			3900	36	54		64%		.198		242.36		2.00		
2115	7760	61	10200			3900	36	54										
2130	7760	61	10200			3900	36	54		64%				242.36				
2145	7750	61	10200			3900	36	54										
					Salinity 80000 PPM, PH - 5, Gastec - .4% H2S													
2200	7750	61	10200			3900	36	54		64%		.280		242.36		2.83		
2215	7750	61	10200			3900	36	54										
2230	7750	61	10200			3900	36	54		64%				242.36				
2245	7740	61	10500			3900	36	54										
					Lower back presssure for critical flow													
2250																		
					Salinity 80000 PPM, PH - 5													
2300	7630	61	10500			3400	42	54		65%		.165		243.72		1.68		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 14-15, 1987 PAGE 102 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
GAS TO: FLARE ☒ PIPELINE ☐
OPERATION: Single Point, Zone #4, Test #3

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size						
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches		MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm		$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.250										
2315	7620	61	10500			3400	42	54											
2330	7620	61	10500			3400	42	54		65%					243.72				
2345	7600	61	10500			3400	41.5	54											
					Salinity 80000 PPM, PH - 5														
2400	7600	61	10500			3400	41.5	54		65%		.207			242.28		2.09		
Feb. 15/87 0015	7600	61	10500			3400	41.5	54											
0030	7600	61	10500			3400	41.5	54		65%					242.28				
0045	7600	62	10500			3400	41.5	54											
					Salinity 82424 PPM, PH - 5														
0100	7600	62	10500			3400	41.5	54		65%		.150			242.28		1.51		
0115	7590	62	10500			3400	41.5	54											
0130	7590	62	10500			3400	41.5	54		65%					242.28				
0145	7580	62	10500			3400	41.5	54											
					Salinity 80000 PPM, PH - 5, Gastec - .4% H_2S														
0200	7580	62	10500			3400	41.5	54		65%		.217			242.28		2.19		
0215	7580	62	10500			3400	41.5	54											
0230	7580	62	10500			3400	41.5	54		65%					242.28				
0245	7580	62	10500			3400	41.5	54											
					Salinity 80000 PPM, PH - 5														
0300	7580	62	10500			3400	41.5	54		65%		.202			242.28		2.04		
0315	7570	62	10500			3400	41.5	54											

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 15, 1987 PAGE 103 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO FLARE ☒ L.P. METER SIZE DIFF RANGE:

OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA				H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P			
	TUSING Pressure	Flow Temp.	CASING Pressure	Choke Size	STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.250									
0330	7650	62	10500			3400	41.5	54		65%				242.28				
0345	7650	62	10500			3400	41.5	54										
					Salinity 82424 PPM, PH - 5													
0400	7560	62	10200			3400	41.5	54		65%		.207		242.28		2.09		
0415	7550	62	10200			3400	41.5	54										
0430	7550	62	10200			3400	41.5	54		65%				242.28				
0445	7550	62	10200			3400	41.5	54										
					Salinity 78787 PPM, PH - 5													
0500	7550	62	10200			3400	41.5	54		65%		.124		242.28		1.25		
0515	7550	62	10200			3400	41.5	54										
0530	7550	62	10200			3400	41.5	54		65%				242.28				
0545	7550	62	10200			3400	41.5	54										
					Salinity 80000 PPM, PH - 5													
0600	7550	62	10200			3400	41.5	54		65%		.217		242.28		2.19		
0615	7540	62	10200			3400	41.5	54										
0630	7530	62	10200			3400	41.5	54		65%				242.28				
0645	7530	62	10200			3400	41.5	54										
					Salinity 80000 PPM, PH - 5													
0700	7530	62	10200			3400	41.5	54		65%		.147		242.28		1.47		
	Total gas rate last 24 hrs. - 244.59 10^3m^3									Cumulative gas rate - 472.97 10^3m^3								
	Total water production last 24 hrs. - 51.18 m^3									Cumulative water produced - 165.31 m^3								

REMARKS: Average W.G.R. - .209 $m^3/10^3m^2$

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 15, 1987 PAGE 104 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size					
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.250									
0715	7530	62	10200			3400	41.5	54										
0730	7520	62	10200			3400	41.5	54		65%				242.28				
0745	7520	62	10200			3400	41.5	54										
					Salinity 81212 PPM, PH - 5													
0800	7520	62	10200			3400	41.5	54		65%		.194		242.28		1.96		
0815	7510	62	10200			3450	41.5	54										
0830	7510	63	10200			3450	41.5	54		66%				244.06				
					Adjust static pressure													
0834																		
0845	7490	62	10200			3360	42.75	54										
					Salinity 80000 PPM, PH - 5													
0900	7490	62	10200			3360	42.75	54		66%		.133		244.40		1.35		
0915	7490	62	10200			3370	42.75	54										
0930	7490	62	10200			3370	42.75	54		66%				244.79				
0945	7490	62	10200			3370	42.75	54										
					Salinity 80000 PPM, PH - 5, Gastec - .4% H2S													
1000	7490	62	10200			3380	42.75	54		66%		.192		245.16		1.96		
1015	7480	62	10200			3370	42.75	54										
1030	7480	62	10200			3370	42.75	54		66%				244.79				
1045	7480	63	10200			3370	42.75	54										
					Salinity 78788 PPM, PH - 5													
1100	7480	63	10200			3370	42.75	54		66%		.146		244.79		1.49		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 15, 1987 PAGE 105 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		Z DRAWDOWN	Diff.	WGR	Orifice Plate Size						
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches		MMSCFD	MMSCFD	METER m^3	METER m^3	°C/°F
SI Units	kPa	°C	kPa	mm	kPa	kPa	kPa	°C	mm		kPa		mm		$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.250										
1115	7480	63	10200			3370	42.75	54											
1130	7480	63	10200			3370	42.75	54		66%					244.79				
1145	7480	63	10200			3370	42.75	54											
					Salinity 78788 PPM, PH - 5														
1200	7480	63	10200			3370	42.75	54		66%		.201			244.79		2.05		
1215	7480	63	10200			3370	48.75	54											
1230	7480	63	10200			3370	42.75	54		66%					244.79				
1245	7470	63	10200			3370	42.75	54											
					Salinity 77576 PPM, PH - 5														
1300	7470	63	10200			3370	4275	54		66%		.116			244.79		1.18		
1315	7470	63	10200			3370	42.75	54											
1330	7470	63	10200			3370	42.75	54		66%					244.79				
1345	7470	63	10200			3370	42.75	54											
					Salinity 77576 PPM, PH - 5, Gastac - .4% H2S														
1400	7470	63	10200			3370	42.75	54		66%		.200			244.79		2.04		
1415	7460	63	10200			3380	42.75	54											
1430	7460	63	10200			3380	42.75	54		66%					244.79				
1445	7460	62	10700			3380	42.75	54											
					Shut-in to pull recorders. Salinity 77576 PPM, PH - 5														
1500	7450	62	12000			3380	42.75	54		66%		.198			244.79		2.02		
					Wireline running in hole.														

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 15, 1987 PAGE 106 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich

TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING.				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
1505	11420																	
1510	12090																	
1515	12120																	
1535	14020																	
1540	14200																	
1545	14350																	
					Wireline at surface with recorders													
1548	14460																	
1600	14900																	
1615	15340		10000															
1630	15700		10000															
1645	16240		10000															
					Recorders at surface to be run in													
1700	16510		10000															
1715	16700		10000															
1730	16920		10000															
1745	17090		10000															
					Recorders on bottom at 3223 m KB													
1752																		
1800	17250		10000															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 15, 1987 PAGE 107 OF 145

CUSTOMER Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐ OR _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3 m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orce	$10^3 m^3/d$	$10^3 m^3/d$	TANK m^3	TANK m^3	TANK °C
					Wireline out of hole													
1809	17340		10000															
1815	17400		10000															
1820					Pressure up flowline													
1826					Pressure up vessel													
1830	17500				Open well slowly to 48/64													
1835	11800	48	10000															
1840	10830	50	10200															
1845	10270	51	10200															
1855					Meter in service													
									2.500									
1900	9420	52	10200			4600	46	43		57%		.014		389.77		.11		
1912					Lower back pressure													
1915	8850	53	10500			4140	48	45										
1930	8590	54	10500			4100	47	46		61%				368.91				
1945	8370	55	10200			4120	44	46										
					Salinity 84848 PPM, PH - 5													
2000	8100	55	10500			3520	48	46		63%		.058		344.75		.83		
2015	7850	55	10500			3420	47	46										
					Salinity 80000 PPM, PH - 5													
2030	7800	55	10500			3400	42.5	47		64%		.063		318.04		.42		

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 15-16, 1987 PAGE 108 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{g2} kPa	°C	p_{g2} kPa	orif.	p_{s2} kPa	p_{g2} kPa	kPa	°C	orif.		kPa		orif.	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500									
2045	7720	56	10500			3400	42.5	47										
2100	7700	57	10200			3370	42.5	48		65%				316.02				
2115	7640	58	10200			3340	41.5	49										
					Salinity 42272 PPM, PH - 5													
2130	7530	58	10200			3340	40.5	49		65%		.065		306.50		.83		
2145	7500	59	10200			3340	39.5	50										
2200	7520	59	10200			3340	37.5	50		66%				294.34				
2215	7500	59	10200			3340	37.5	50										
					Salinity 67878 PPM, PH - 5, Gastec - .4% H_2S													
2230	7490	60	10200			3340	37	51		66%		.104		291.83		1.27		
2245	7460	60	10200			3340	36.5	52										
2300	7440	60	10200			3340	36	52		66%				287.32				
2315	7420	61	10200			3340	35.5	52										
					Salinity 80000 PPM, PH - 5													
2330	7400	61	10200			3340	35	52		66%		.115		283.26		1.36		
2345	7350	61	10200			3340	34.75	53										
2400	7300	61	10200			3340	34.5	53		67%				280.74				
Feb. 16/87																		
0015	7280	61	10200			3340	34	53										
					Salinity 78787 PPM, PH - 5													
0030	7240	61	10200			3340	33.5	53		67%		.116		276.56		1.34		
0045	7200	61	10200			3340	33	53										

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

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Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 16, 1987 PAGE 109 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Zone #4, Test #3
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P.	L.P	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size		Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3 m^3$	Inches		MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{g4} kPa	°C	p_{g3} kPa	mm	p_{g2} kPa	p_{g2} kPa	kPa	°C	mm		kPa		orifice		$10^3 m^3/d$	$10^3 m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500										
0100	7170	61	10200			3340	32	53		67%					270.35				
0115	7170	61	10200			3310	31.5	53											
					Salinity 82424 PPM, PH - 5														
0130	7160	61	10200			3310	31	53		67%		.123			264.87		1.36		
0145	7140	61	10200			3310	31	54											
0200	7130	61	10200			3300	30.75	54		67%					262.92				
0215	7120	61	10200			3300	30.5	54											
					Salinity 80000 PPM, PH - 5, Gastec - .4% H2S														
0230	7110	61	10200			3300	30	54		67%		.146			259.68		1.58		
0245	7090	61	10200			3300	30	54											
0300	7080	61	10200			3300	30	54		68%					259.68				
0315	7070	62	10200			3300	30	54											
					Salinity 80000 PPM, PH - 5														
0330	7060	62	10200			3300	30	54		68%		.167			259.68		1.83		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 16, 1987 PAGE 110 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Zone #4, Test #3
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500									
0345	7050	62	10200			3300	29.5	54										
0400	7040	62	10200			3300	29	54		68%				255.31				
0415	7030	62	10200			3300	29	54										
					Salinity 78787 PPM, PH - 5													
0430	7020	62	10200			3300	29	54		68%		.172		255.31		1.83		
0445	7030	62	10200			3300	29	54										
0500	7030	62	10200			3300	29	54		68%				255.31				
0515	7020	62	10200			3300	28.5	54										
					Salinity 82424 PPM, PH - 5													
0530	7010	62	10200			300	28.5	54		68%		.193		253.09		2.04		
0545	7010	63	10200			3300	28.5	55										
					Gastec - .4% H2S													
0600	7000	63	10200			3300	28.5	55		68%				252.64				
0615	7000	63	10200			3300	28.5	55										
					Salinity 82424 PPM, PH - 5													
0630	7000	63	10200			3300	28	55		68%		.169		250.41		1.76		
0645	7000	63	10200			3300	28	55										
0700	7000	63	10200			3300	28	55		68%				250.41				
0715	6990	63	10200			3300	28	55										
					Salinity 80000 PPM, Ph - 5													
0730	6990	63	10200			3300	28	55		68%		.156		250.41		1.56		
	Total gas rate last 24 hrs. - 234.77 10^3m^3									Cumulative gas rate - 707.74 10^3m^3								

REMARKS: Total water produced last 24 hrs. - 32.17 m^3 Cumulative water produced - 197.48 m^3

Average W.G.R. - .138 $m^3/10^3m^3$

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 16, 1987 PAGE 111 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich

TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Zone #4, Test #3

GAS TO: FLARE ☒
PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D W	Diff.	Temp.		Z DRAWDOWN	Diff.	WGR	Orifice Plate Size						
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches		MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm		$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500										
0745	6970	64	10000			3330	28	55											
0800	6970	64	10000			3330	28	55		68%					251.55				
0815	6970	65	10000			3330	28	55											
					Salinity	80000 PPM, PH - 5													
0830	6960	65	10000			3330	28	55		68%		.173			251.55		1.81		
0845	6960	65	10000			3330	28	55											
0900	6960	65	10000			3330	28	55		68%					251.55				
0915	6960	65	10000			3330	27.75	55											
					Salinity	81212 PPM, PH - 5													
0930	6950	65	10000			3330	27.75	55		68%		.166			250.37		1.73		
0945	6950	65	10000			3340	27.75	55											
					Gastec -	.4% H2S													
1000	6950	65	10000			3340	27.75	55		68%					250.81				
1015	6950	65	10000			3340	27.75	55											
					Salinity	81212 PPM, PH - 5													
1030	6930	65	10000			3360	27.75	55		68%		.156			251.57		1.69		
1045	6930	65	10000			3360	27.75	55											
1100	6930	65	10000			3360	27.75	55		68%					251.57				
1115	6930	65	10000			3370	27.5	55											
					Salinity	80000 PPM, PH - 5													
1130	6920	65	10000			3370	27.5	55		68%		.165			250.81		1.72		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 16, 1987 PAGE 112 OF 145

CUSTOMER: Northcor Energy Ltd.
TEST OPERATOR(S): T. Hoff, D. Marr
REP. BY: R. Kalutich
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
WELL: Northcor et al Liard F-25A
GAS TO: FLARE ☒
L.P. METER SIZE DIFF. RANGE:
OPERATION: Single Point, Zone #4, Test #3
PIPELINE ☐
OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR		Orifice Plate Size					
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$		inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa			mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500										
1145	6920	65	10000			3370	27.5	55											
1200	6920	65	10000			3370	27.25	55		68%					249.63				
1215	6920	65	10000			3370	27.25	55											
					Salinity	80000 PPM, PH - 5													
1230	6920	65	10000			3380	27.25	55		68%		.156			250.04		1.63		
1245	6920	65	10000			3380	27.25	55											
1300	6920	65	10000			3380	27	55		68%					248.94				
1315	6920	65	10000			3380	27	55											
					Salinity	78788 PPM, PH - 5													
1330	6920	65	10000			3380	27	55		68%		.156			248.94		1.62		
1345	6910	65	10000			3380	27	55											
					Gastec - .4% H2S														
1400	6910	65	10000			3390	27	55		68%					249.26				
1415	6900	65	10000			3400	26.75	55											
					Salinity	78788 PPM, PH - 5													
1430	6900	65	10000			3420	26.75	55		68%		.165			249.71		1.71		
1445	6900	65	10000			3440	26.5	55											
1500	6900	65	10000			3450	26.25	55		68%					247.96				
1515	6900	65	10000			3460	26.25	56											
					Salinity	80000 PPM, PH - 5													
1530	6900	65	10000			3460	26.25	56		68%		.147			247.88		1.52		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 16, 1987 PAGE 113 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water		
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3 m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500									
1545	6900	65	10000			3460	26.25	56										
					Lower static pressure													
1548																		
1600	6800	65	10000			3170	28.75	56		69%				248.20				
1615	6810	65	10000			3180	29	56										
					Salinity 78788 PPM, PH - 5													
1630	6810	65	10000			3190	28.75	56		69%		.149		248.99		1.55		
1645	6810	65	10000			3200	28.75	56										
1700	6800	65	10200			3200	28.75	56		69%				249.38				
1715	6790	65	10100			3200	28.75	56										
					Salinity 78788 PPM, PH - 5													
1730	6790	65	10100			3200	28.75	56		69%		.156		249.38		1.62		
1745	6790	65	10000			3200	28.75	56										
1800	6780	65	10000			3200	28.75	56		69%				249.38				
1815	6780	65	10000			3200	28.75	56										
					Salinity 78788 PPM, PH - 5													
1830	6780	65	10000			3200	28.75	56		69%		.151		249.38		1.57		
1845	6770	65	10000			3200	28.75	56										
1900	6770	65	10000			3200	28.75	56		69%				249.38				
1915	6770	65	10000			3210	28.75	56										
					Salinity 77576 PPM, PH - 5													
1930	6770	65	10000			3210	28.75	56		69%		.146		249.38		1.52		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 16, 1987 PAGE 114 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P Gas Rate	L.P Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size						
					Recorder	D.W.													
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches		MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		over		$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500										
1945	6760	65	10000			3200	29	57											
2000	6760	65	10000			3200	29	57		69%									
2015	6750	65	10000			3200	29	57											
					Salinity	81212 PPM, PH - 5													
2030	6750	65	10000			3200	29	57		69%		.142			250.02		1.48		
2045	6750	65	10000			3200	29	57											
2100	6750	65	10000			3200	29	57		69%					250.02				
2115	6740	65	10000			3180	29	57											
					Salinity	80000 PPM, PH - 5													
2130	6740	65	10000			3180	29	57		69%		.140			249.23		1.45		
2145	6740	65	10000			3200	29	57											
2200	6740	65	10000			3200	28.75	57		69%					248.93				
2215	6740	66	10000			3200	28.75	57											
					Salinity	78787 PPM, PH - 5													
2230	6740	66	10000			3200	28.75	57		69%		.126			248.75		1.31		
2245	6730	66	10000			3200	28.75	57											
2300	6730	66	10000			3200	28.75	57		69%					248.75				
2315	6730	66	10000			3200	28.75	57											
					Salinity	78787 PPM, PH - 5													
2330	6730	65	10000			3200	28.75	57		69%		.137			248.75		1.42		
2345	6730	65	10000			3200	28.5	57											

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No 27

FIELD NOTES

DATE February 16-17, 1987 PAGE 115 OF 145

CUSTOMER: Northcor Energy Ltd.
REP BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Test #3, Zone #4
GAS TO: FLARE ☒
PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P			
	TUBING Pressure	Flow Temp	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		mm	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500									
2400	6730	65	10000			3200	28.5	57		69%				247.90				
Feb. 17/87																		
0015	6730	65	10000			3200	28.5	57										
					Salinity	82424 PPM, PH - 5												
0030	6730	65	10000			3200	28.5	57		69%		.138		247.90		1.43		
0045	6730	65	10000			3200	28.5	57										
0100	6730	65	10000			3200	28.5	57		69%				247.90				
0115	6720	65	10000			3200	28.5	57										
					Salinity	80000 PPM, PH - 5												
0130	6720	65	10000			3200	28.5	57		69%		.126		247.90		1.30		
0145	6720	65	10000			3200	28.5	57										
					Gastec - .4% H2S													
0200	6720	65	10000			3200	28.5	57		69%				247.90				
0215	6720	65	10000			3200	28.5	57										
					Salinity	80000 PPM, PH - 5												
0230	6720	65	10000			3200	28.5	57		69%		.129		247.90		1.33		
0300	6720	65	10000			3200	28.5	57		69%				247.90				
0315	6710	65	10000			3200	28.5	57										
					Salinity	80000 PPM, PH - 5												
0330	6710	65	10000			3200	28.5	57		69%		.132		247.90		1.36		
0345	6710	65	10000			3200	28.25	57										
0400	6710	65	10000			3200	28.25	57		69%				246.76				
0415	6710	65	10000			3200	28.25	57										

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No 27

FIELD NOTES

DATE February 17, 1987 PAGE 116 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water		
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orvo	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64	Salinity	78787 PPM, PH - 5			2.500									
0430	6710	65	10200			3220	28.25	57		69%		.158		246.76		1.62		
0445	6710	65	10200			3220	28.25	57										
0500	6710	65	10200			3220	28.25	57		69%				246.76				
0515	6710	65	10200			3220	28.25	57										
					Salinity	82424 PPM, PH - 5												
0530	6710	65	10200			3220	28.25	57		69%		.148		246.76		1.52		
0545	6700	65	10200			3220	28.25	57										
					Gastec - .4% H2S													
0600	6700	65	10200			3220	28.25	57		69%				246.76				
0615	6700	65	10200			3220	28.25	57										
					Salinity	77575 PPM, PH - 5												
0630	6700	65	10200			3220	28.25	57		69%		.138		246.76		1.42		
0645	6700	65	10500			3220	28.25	57										
0700	6700	65	10500			3220	28.25	57		69%				246.76				
0715	6700	65	10500			3220	28.25	57										
					Salinity	77575 PPM, PH - 5												
0730	6700	65	10500			3220	28.25	57		69%		.121		246.76		1.24		
	Total gas rate last 24 hrs. - 238.52 10^3m^3									Cumulative gas rate - 946.26 10^3m^3								
	Total water produced last 24 hrs. - 36.52 m^3									Cumulative water produced - 234.0 m^3								
	Average W.G.R. - .147 $m^3/10^3m^3$																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 17, 1987 PAGE 117 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Single Point, Zone #4, Test #3
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Conden-sate ☐	Oil/ Conden sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	MGR	Orifice Plate Size					
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches		Inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orb	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500									
0745	6700	65	10300			3220	28.5	56										
0800	6700	65	10200			3220	28.5	56		69%				249.07				
0815	6700	65	10200			3220	28.5	56										
					Salinity 78788 PPM, PH - 5													
0830	6700	65	10200			3220	28.5	56		69%		.125		249.07		1.30		
0845	6700	65	10200			3220	28.5	56										
0900	6700	65	10200			3220	28.5	56		69%				249.07				
0915	6700	65	10200			3220	28.5	56										
					Salinity 77576 PPM, PH - 5													
0930	6700	65	10200			3220	28.5	56		69%		.125		249.07		1.30		
0945	6700	65	10200			3220	28.5	56										
					Gastec - .4% H2S													
1000	6690	65	10200			3220	28.5	56		69%				249.07				
1015	6690	65	10200			3220	28.5	56										
					Salinity 83636 PPM, PH - 5													
1030	6690	65	10200			3220	28.5	56		69%		.119		249.07		1.23		
1045	6690	65	10200			3220	28.5	56										
1100	6690	65	10200			3220	28.5	56		69%				249.07				
1115	6690	65	10200			3220	28.5	56										
					Salinity 83030 PPM, PH - 5													
1130	6690	65	10200			3220	28.5	56		69%		.118		249.07		1.22		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 17, 1987 PAGE 118 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING				Orifice Plate Size	L.P. SEP. GAS METERING					H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.		% DRAWDOWN	Diff.	WGR	Orifice Plate Size						
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches		Inches	$m^3/10^3m^3$	Inches		MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orifice		$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500										
1145	6690	65	10200			3220	28.5	56											
1200	6690	65	10200			3220	28.5	56		69%					249.07				
1215	6690	65	10200			3220	28.75	56											
					Salinity	77576 PPM, PH - 5													
1230	6690	65	10200			3220	28.25	56		69%		.117			247.97		1.21		
1245	6690	65	10200			3220	28.25	56											
1300	6680	65	10100			3220	28.25	56		69%					247.97				
1315	6680	65	10000			3220	28.25	56											
					Salinity	77576 PPM, PH - 5													
1330	6680	65	10000			3220	28.25	56		69%		.111			247.97		1.15		
1345	6680	65	10000			3220	28.25	56											
					Gastec - .4% H2S														
1400	6680	65	10000			3220	28.25	56		69%					247.97				
					Salinity	77576 PPM, PH - 5													
1430	6680	65	10000			3220	28.25	56				.123			247.97		1.27		
1445	6680	65	10000			3220	28.25	56		69%									
1500	6680	65	10000			3220	28.25	56											
1515	6690	65	10000			3220	28.25	56		69%									
					Salinity	77576 PPM, PH - 5													
1530	6690	65	10000			3220	28.25	56				.132			247.97		1.36		

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 17, 1987 PAGE 119 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich

TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE ____ DIFF. RANGE: ____
OR: ____ CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒
OPERATION: Single Point, Zone #4, Test #3 PIPELINE ☐

DATE AND TIME	WELLHEAD DATA				H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.			
	TUBING Pressure	Flow Temp.	CASING Pressure	Choke Size	STATIC PRESSURE or prover: Recorder	STATIC PRESSURE or prover: D.W.	Diff.	Temp.	Orifice Plate Size	% DRAWDOWN	Diff.	WGR	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp.
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches		inches	$m^3/10^3m^3$	inches	MMSCFD	MMSCFD	METER m^3	METER m^3	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm		kPa		orve	$10^3m^3/d$	$10^3m^3/d$	TANK m^3	TANK m^3	TANK °C
				48/64					2.500									
1545	6690	65	10000			3220	28.25	56										
1600	6690	65	10000			3220	28.25	56		69%				247.97				
1615	6690	65	10000			3220	28.25	56										
					Salinity	77676 PPM, PH - 5												
1630	6690	65	10000			3220	28.25	56		69%		.118		247.97		1.22		
1645	6690	65	10000			3220	28.25	56										
1700	6690	65	10000			3220	28.25	56		69%				247.97				
1715	6690	65	9900			3220	28.25	56										
					Salinity	77576 PPM, PH - 5												
1730	6700	65	10500			3220	28.25	56		69%		.123		247.97		1.27		
1745	6700	65	10900			3220	28.25	56										
					Pumping methanol down tubing													
1800	6740	65	10900			3260	28	56		69%				248.42				
1815	6740	65				3260	28	56										
					Shut-in well for build-up. Salinity 77576 PPM, PH - 5													
1830	6740	65				3260	28	56		69%		.117		248.42		1.21		
1835	11080																	
1840	11690																	
1845	12150																	
1900	13030																	
	Total gas flared last 11 hrs. - 113.89 10^3m^3									Cumulative gas flared - 1060.15 10^3m^3								
	Total water produced last 11 hrs. - 13.74 m^3									Cumulative water produced - 247.74 m^3								

REMARKS: Average W.G.R. last 11 hrs. - .121 $m^3/10^3m^3$
1745 hrs. - 4 H.P. Gas samples taken Core Lab - Bomb #V2995, #V2642, #V16 and #V199
4 Stock Tank Water samples taken.

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 3

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 17, 1987 PAGE 120 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Build-Up, Zone #4, Test #3 PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size					
					Recorder	D.W												
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
					Shut-in well													
1830	6740		10000															
1835	11080		10000															
1840	11690		10000															
1845	12150		10000															
1900	13030		10000															
1915	13850		10000															
1930	14420		10000															
1945	14920		10000															
2000	15470		10000															
2015	15790		10000															
2030	16040		10000															
2045	16250		10000															
2100	16370		10000															
2115	16490		10000															
2130	16720		10000															
2145	16890		10000															
2200	17000		10000															

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 17-18, 1987 PAGE 121 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
GAS TO: FLARE [X]
PIPELINE [ ]
OPERATION: Build-Up, Zone #4, Test #3

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil [ ] Condensate [ ]	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D W	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate	Water		
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
2215	17170		10000															
2230	17350		10000															
2245	17550		10000															
2300	17660		10000															
2315	17740		10000															
2330	17840		10000															
2345	17930		10000															
2400	18060		10000															
Feb. 18/87 0015	18250		10000															
0030	18340		10000															
0045	18440		10000															
0100	18550		10000		Otis out of hole													
0115	18620		10000															
0130	18740		10000															
0145	18840		10000															
0200	18940		10000															
0215	19050		10000															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 18, 1987 PAGE 122 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
GAS TO: FLARE ☒ PIPELINE ☐
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
0230	19140		10000															
0245	19230		10000															
0300	19300		10000															
0315	13390		10000															
0330	19470		10000															
0345	19550		10000															
0400	19640		10000															
0415	19720		10000															
0430	19800		10000															
0445	19870		10000															
0500	19940		10000															
0515	20020		10000															
0530	20100		10000															
0545	20180		10000															
0600	20250		10000															
0615	20310		10000															
0630	20370		10000															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 16, 1987 PAGE 123 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
GAS TO: FLARE [x] PIPELINE [ ] OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
					STATIC PRESSURE or prover		Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
	TUBING Pressure	Flow Temp.	CASING Pressure		Recorder	D.W.												
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0645	20440		10000															
0700	20500		10000															
0715	20560		10000															
0730	20610		10000															

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 18, 1987 PAGE 124 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [x] L.P. METER SIZE DIFF. RANGE:

OPERATION: Build-Up PIPELINE [ ] OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate	Water	Condensate [ ]	
					Recorder	D.W.												
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0745	20670																	
0800	20720																	
0815	20770																	
0830	20800																	
0845	20830																	
0900	20870																	
0915	20900																	
0930	20920																	
0945	20950																	
1000	20990																	
1015	21120																	
1030	21160																	
1045	21210																	
1100	21260																	
1115	21310																	
1130	21350																	
1145	21370																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 18, 1987 PAGE 125 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [X] L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Build-Up PIPELINE [ ] OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
1200	21390																	
1215	21420																	
1230	21450																	
1245	21480																	
1300	21510																	
1315	21540																	
1330	21560																	
1345	21580																	
1400	21610																	
1415	21650																	
1430	21720																	
1445	21740																	
1500	21750																	
1515	21760																	
1530	21780																	
1545	21800																	
1600	21830																	

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 18, 1987

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0–50 kPa

GAS TO: FLARE ☒ L.P. METER SIZE DIFF. RANGE:

PIPELINE ☐ OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A

OPERATION: Build-Up, Zone #4, Test #3

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W	Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	orvo	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
1615	21850																	
1630	21860																	
1645	21870																	
1700	21880																	
1715	21890																	
1730	21910																	
1745	21920																	
1800	21930																	
1815	21940																	
1830	21950																	
1845	21960																	
1900	21970																	
1915	21980																	
1930	21980																	
1945	21990																	
2000	22000																	
2015	22000																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form NL

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 18-19, 1987 PAGE 127 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): T. Hoff, D. Marr
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up , Zone #4, Test #3
GAS TO: FLARE ☒ PIPELINE ☐

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
2030	22010																	
2045	22010																	
2100	22020																	
2115	22030																	
2130	22030																	
2145	22030																	
2200	22040																	
2215	22040																	
2230	22050																	
2245	22050																	
2300	22060																	
2315	22060																	
2330	22070																	
2345	22070																	
2400	22080																	
Feb. 19/87 0015	22080																	
0030	22080																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 19, 1987 PAGE 128 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [X] L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Build-Up, Zone #4, Test #3 PIPELINE [ ] OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D W												
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0045	22080																	
0100	22080																	
0115	22080																	
0130	22080																	
0145	22080																	
0200	22080																	
0215	22080																	
0230	22080																	
0245	22080																	
0300	22080																	
0315	22080																	
0330	22080																	
0345	22080																	
0400	22080																	
0415	22080																	
0430	22080																	
0445	22080																	

REMARKS ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 19, 1987 PAGE 129 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): T. Hoff, D. Marr

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [x] L.P. METER SIZE DIFF. RANGE:

OPERATION: Build-Up PIPELINE [ ] OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
0500	22080																	
0515	22080																	
0530	22080																	
0545	22080																	
0600	22080																	
0615	22080																	
0630	22080																	
0645	22080																	
0700	22080																	
0715	22070																	
0730	22070																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 19, 1987 PAGE 130 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
GAS TO: FLARE ☒ PIPELINE ☐

TEST OPERATOR(S): D. Marr, D. Reimer
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE _____ DIFF. RANGE: _____
OR: _____ CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA				H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.			
	TUBING Pressure	Flow Temp.	CASING Pressure	Choke Size	STATIC PRESSURE or prover: Recorder	STATIC PRESSURE or prover: D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	P_{ga} kPa	°C	P_{ga} kPa	mm	P_{ga} kPa	P_{ga} kPa	kPa	°C	mm	P_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0745	22070																	
0800	22070																	
0815	22070																	
0830	22070																	
0845	22060																	
0900	22060																	
0915	22050																	
0930	22040																	
0945	22040																	
1000	22040																	
1015	22040																	
1030	22040																	
1045	22040																	
1100	22040																	
1115	22040																	
1130	22040																	
1145	22040																	

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 19, 1987 PAGE 131 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [X] L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Build-Up PIPELINE [ ] OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING.				H.P.	L.P			
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
1200	22040																	
1215	22040																	
1230	22040																	
1245	22040																	
1300	22040																	
1315	22040																	
1330	22040																	
1345	22040																	
1400	22040																	
1415	22040																	
1430	22040																	
1445	22040																	
1500	22040																	
1515	22040																	
1530	22040				Blow down deadweight line - pump methanol													
1545	22030																	
1600	22020																	

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27
DATE February 19, 1987
CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): D. Marr, D. Reimer
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
OR: CRITICAL FLOW PROVER
GAS TO: FLARE ☒ PIPELINE ☐
WELL: Northcor et al Liard F-25A
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
1615	22020																	
1630	22020																	
1645	22020																	
1700	22020																	
1715	22020																	
1730	22020																	
1745	22020																	
1800	22020																	
1815	22020				Otis run into pull recorders													
1830	22020																	
1845	22020																	
1900	22020				Recorders out													
1915	22010																	
1930	22010																	
1945	22010				Run in hole with recorders													
2000	22000																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 19, 1987 PAGE 133 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO FLARE [X] L.P. METER SIZE DIFF RANGE.

OPERATION: Build-Up PIPELINE [ ] OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
2015	22000																	
2030	22000																	
2045	22000				Recorders on bottom													
2100	22000																	
2115	22000																	
2130	22000																	
2145	22000																	
2200	22000																	
2215	22000																	
2230	22000																	
2245	22000																	
2300	22000																	
2315	21990																	
2330	21990																	
2345	21990																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No.

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 19-20, 1987 PAGE 134 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [x] L.P. METER SIZE DIFF. RANGE:

OPERATION: Build-Up PIPELINE [ ] OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D W	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
SI Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
2400	21990																	
Feb. 20/87																		
0015	21990																	
0030	21990																	
0045	21990																	
0100	21990																	
0115	21990																	
0130	21990																	
0145	21990																	
0200	21990																	
0215	21990																	
0230	21990																	
0245	21990																	
0300	21990																	
0315	21990																	
0330	21980																	
0345	21980																	
0400	21980																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 20, 1987 PAGE 135 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO. FLARE ☒ L.P. METER SIZE DIFF. RANGE:

OPERATION: Build-Up PIPELINE ☐ OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.			
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0415	21980																	
0430	21980																	
0445	21980																	
0500	21980																	
0515	21980																	
0530	21970																	
0545	21970																	
0600	21970																	
0615	21970																	
0630	21970																	
0645	21970																	
0700	21970																	
0715	21970																	
0730	21970																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No 27

FIELD NOTES

DATE February 20, 1987 PAGE 136 OF 145

CUSTOMER Northcor Energy Ltd. TEST OPERATOR(S) D. Marr, D. Reimer

REP BY R. Kalutich H.P. METER SIZE 3.831" DIFF RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [x] L.P. METER SIZE _____ DIFF RANGE: _____

OPERATION: Build-Up PIPELINE [ ] OR _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil [ ] Condensate [ ]	Oil/ Condensate Temp
					STATIC PRESSURE or prover		Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate	Water		
	TUBING Pressure	Flow Temp	CASING Pressure		Recorder	D W												
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
0745	21970																	
0800	21970																	
0815	21970																	
0830	21970																	
0845	21970																	
0900	21970																	
0915	21970																	
0930	21970																	
0945	21970																	
1000	21970																	
1015	21970																	
1030	21970																	
1045	21970																	
1100	21970																	
1115	21970																	
1130	21970																	
1145	21970																	

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 20, 1987 PAGE 137 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [x] L.P. METER SIZE DIFF. RANGE:

OPERATION: Build-Up PIPELINE [ ] OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D W	Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
1200	21960																	
1215	21960																	
1230	21960																	
1245	21960																	
1300	21960																	
1315	21960																	
1330	21960																	
1345	21960																	
1400	21960																	
1415	21960																	
1430	21960																	
1445	21960																	
1500	21960																	
1515	21960																	
1530	21960																	
1545	21960																	
1600	21960																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27 **FIELD NOTES** DATE February 20, 1987 PAGE 136 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [X] L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Build-Up PIPELINE [ ] OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover		Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
					Recorder	D.W.												
IMP. Units	PSIG	°F	PSIG	inches	PSIG	PSIG	Inches	°F	inches	PSIG	Inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
1615	21960																	
1630	21960																	
1645	21960																	
1700	21960																	
1715	21960																	
1730	21950																	
1745	21950																	
1800	21950																	
1815	21950																	
1830	21950																	
1845	21950																	
1900	21950																	
1915	21950																	
1930	21950																	
1945	21950																	
2000	21950																	
2015	21950																	

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

DATE February 20-21, 1987 PAGE 135 OF 145

TEST UNIT No. 27
CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
WELL: Northcor et al Liard F-25A
OPERATION: Build-Up
GAS TO: FLARE ☒ PIPELINE ☐

TEST OPERATOR(S): D. Marr, D. Reimer
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE ____ DIFF. RANGE: ____
OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA				H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.			
	TUBING Pressure	Flow Temp.	CASING Pressure	Choke Size	STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D W	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
2030	21950																	
2045	21950																	
2100	21950																	
2115	21950																	
2130	21950																	
2200	21940																	
2215	21940																	
2230	21940																	
2245	21940																	
2300	21940																	
2315	21940																	
2330	21940																	
2345	21940																	
2400	21940																	
Feb. 21/87 0015	21940																	
0030	21940																	
0045	21940																	

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 21, 1987 PAGE 140 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE [x] L.P. METER SIZE DIFF. RANGE:

OPERATION: Build-Up PIPELINE [ ] OR: CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
MP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0100	21940																	
0115	21940																	
0130	21940																	
0145	21940																	
0200	21940																	
0215	21940																	
0230	21940																	
0245	21940																	
0300	21940																	
0315	21930																	
0330	21930																	
0345	21930																	
0400	21930																	
0415	21930																	
0430	21930																	
0445	21930																	
0500	21930																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 21, 1987 PAGE 141 OF 145

CUSTOMER: Northcor Energy Ltd.
REP. BY: R. Kalutich
TEST OPERATOR(S): D. Marr, D. Reimer
H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa
L.P. METER SIZE DIFF. RANGE:
GAS TO: FLARE [X] PIPELINE [ ] OR: CRITICAL FLOW PROVER

WELL: Northcor et al Liard F-25A
OPERATION: Build-Up

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil [ ] Condensate [ ]	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0515	21930																	
0530	21930																	
0545	21930																	
0600	21930																	
0615	21930																	
0630	21930																	
0645	21930																	
0700	21930																	
0715	21920																	
0730	21920																	

REMARKS:

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 21, 1987 PAGE 142 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Build-Up PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.		Oil ☐ Conden-sate ☐	Oil/ Conden sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate	Water		
IMP Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
0745	21920																	
0800	21920																	
0815	21920																	
0830	21920																	
0845	21920																	
0900	21920																	
0915	21920																	
0930	21920																	
0945	21920																	
1000	21920																	
1015	21900																	
1030	21900																	
1045	21900																	
1100	21900																	
1115	21900																	
1130	21900																	
1145	21900																	

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 21, 1987 PAGE 143 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE x PIPELINE ☐ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Build-Up OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp	Orifice Plate Size	Gas Rate	Gas Rate			
IMP Units	PSIG	°F	PSIG	inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
1200	21900																	
1215	21900																	
1230	21900																	
1245	21900																	
1300	21900																	
1315	21900																	
1330	21900																	
1345	21900																	
1400	21900																	
1415	21900																	
1430	21900																	
1445	21900																	
1500	21900																	
1515	21900																	
1530	21900																	
1545	21900																	
1600	21900																	

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

TEST UNIT No. 27

FIELD NOTES

DATE February 21, 1987 PAGE 144 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP BY: R. Kalutich H.P. METER SIZE 5.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE ____ DIFF. RANGE: ____

OPERATION: Build-Up PIPELINE ☐ OR: ____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P. Gas Rate	L.P. Gas Rate	Water	Oil ☐ Condensate ☐	Oil/ Condensate Temp
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size					
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	Inches	°F	Inches	PSIG	Inches	°F	Inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	p_{ga} kPa	°C	p_{ga} kPa	mm	p_{ga} kPa	p_{ga} kPa	kPa	°C	mm	p_{ga} kPa	kPa	°C	mm	$10^3 m^3/d$	$10^3 m^3/d$	TANK m³	TANK m³	TANK °C
1615	21900																	
1630	21900																	
1645	21900																	
1700	21900																	
1715	21900																	
1730	21900																	
1745	21900																	
1800	21900																	
1815	21900																	
					Rig in hole with Otis Wireline to retrieve recorders.													
1830	21900																	
1845	21900																	
1900	21900																	
1915	21900																	
					Out of hole with Wireline, prepare to do static gradient													
1930	21900																	
1945	21900																	
2000	21900																	

REMARKS: ____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No 1

NORWARD Norward Energy Services Ltd.
Calgary, Alberta

FIELD NOTES

TEST UNIT No. 27 DATE February 21, 1987 PAGE 145 OF 145

CUSTOMER: Northcor Energy Ltd. TEST OPERATOR(S): D. Marr, D. Reimer

REP. BY: R. Kalutich H.P. METER SIZE 3.831" DIFF. RANGE: 0-50 kPa

WELL: Northcor et al Liard F-25A GAS TO: FLARE ☒ L.P. METER SIZE _____ DIFF. RANGE: _____

OPERATION: Build-Up PIPELINE ☐ OR: _____ CRITICAL FLOW PROVER

DATE AND TIME	WELLHEAD DATA			Choke Size	H.P. SEP GAS METERING					L.P. SEP. GAS METERING				H.P.	L.P.	Water	Oil ☐ Conden-sate ☐	Oil/ Conden-sate Temp.
	TUBING Pressure	Flow Temp.	CASING Pressure		STATIC PRESSURE or prover Recorder	STATIC PRESSURE or prover D.W.	Diff.	Temp.	Orifice Plate Size	Static Pressure	Diff.	Temp.	Orifice Plate Size	Gas Rate	Gas Rate			
IMP. Units	PSIG	°F	PSIG	Inches	PSIG	PSIG	inches	°F	inches	PSIG	inches	°F	inches	MMSCFD	MMSCFD	METER m³	METER m³	METER °C
SI Units	P_{ga} kPa	°C	P_{ga} kPa	mm	P_{ga} kPa	P_{ga} kPa	kPa	°C	mm	P_{ga} kPa	kPa	°C	mm	$10^3m^3/d$	$10^3m^3/d$	TANK m³	TANK m³	TANK °C
2015	21900																	
2030	21890																	
2045	21890																	
2100	21890																	
2115	21890																	
2130	21890																	
2145	21890																	
2200	21890																	
2215	21890																	
2230	21890																	
2245	21890																	
2300	21890																	
2310					Otis out of hole													
2327					Reverse circulate													

REMARKS: _____

GAS FLOW RATES ARE FIELD APPROXIMATIONS ONLY

Form No. 1

Bews Wireline Services Ltd.

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1. BASIC DATA

PAGE ____ of ____

COMPANY Northcor Energy Ltd.
ADDRESS 880, 555 - 4th Avenue S.W.
FIELD and POOL Liard - Nahanni
TYPE OF TEST Single Point & Buildup
ELEVATION ____ m(CF) 723.0 m(KB)
PRODUCING INTERVAL 3250.4 - 3258.4 m(KB)
MID-POINT OF PRODUCING (MPP) INTERVAL 3254.4 M (KB)
DATUM DEPTH OF WELL (FROM CF) ____ M
TBG PRESSURE See Remarks kPa G
CSG PRESSURE See Remarks kPa G
TEMPERATURE AT RUN DEPTH 161.7 °C
PRESSURE AT RUN DEPTH ____ kPa G
GRADIENT AT RUN DEPTH ____ kPa/m

WELL NAME Northcor et al Liard
WELL IDENTIFIER F-25A
STATUS: OIL X GAS ____ OTHER SPECIFY ____
DATE OF TEST ____ 87 (Yr) 01 (Mo) 25 - 29 (Day)
TBG 88.9 mm @ ____ mKB
PRODUCING THRU X TBG ____ CSG
POOL DATUM ____ m (subsea)
RUN DEPTH (FROM KB) 3234.8 M
ON BTM 09:52 87 (Yr) 01 (Mo) 25 (Day)
OFF BTM 15:37 87 (Yr) 01 (Mo) 29 (Day)
SHUT IN DATE 15:00 87 (Yr) 01 (Mo) 27 (Day)
PRESSURE MPP ____ kPa G
DATUM DEPTH PRESSURE ____ kPa G

2. RECORDER COMPARISON	TOP	MIDDLE	BOTTOM (TEMPERATURE)
RUN DEPTH	3231.2	3233.0	3234.8 (KB)
PRESSURE AT RUN DEPTH			kPa G
FINAL BUILDUP PRESSURE	*18731.5 kPa G	28427.4 kPa G	162.5° °C
GRADIENT AT RUN DEPTH			kPa/m
CLOCK RANGE	180 hr D Sx	180 hr D Sx	180 hr D Sx
ELEMENT SERIAL/RANGE	#15236R/34819	• 40684R/34474	• 15295R/70-233 °C
INNER HOUSING	#7088	• 11951	• 28743
CALIBRATION EQUATION	691.9 D+(-54.1)	687.5 D+(-22.3)	2.79 D+(93.32)
DATE OF LAST CALIBRATION	87 01 24 yr mo day	87 01 24 Yr Mo Day	Yr Mo Day

REMARKS:

	Tubing Pressure :	Casing Pressure :
January 25/87	19850 kPa	10800 kPa
January 29/87	19220 kPa	11200 kPa

*Note: Top clock stopped at approx. 17:31 January 26, 1987 after 31.55 hours of total recorded time.

DOWNHOLE EQUIPMENT:

SURVEY COMPANY Otis TEST BY M. Simons COMPUTED BY R. Hosmar

INSTRUCTIONS: The original of this report shall be filed with the Energy Resources Conservation Board 640 5th Avenue S.W. Calgary Alberta within thirty days of completion of the survey

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F-25A

PAGE OF

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY

DATE: JANUARY 25 - 29, 1987

WELL NAME: NORTHCOR ET AL LIARD

LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
GAUGES ON BOTTOM AT 09:52 JANUARY 25, 1987 AT 3231.2 m KB					
0.00	0.00	41.2928	28516.4	4.1	28520.5
0.50	0.50	41.3055	28525.2	4.1	28529.3
1.00	1.00	41.3334	28544.5	4.1	28548.6
1.50	1.50	41.3563	28560.3	4.1	28564.4
2.00	2.00	41.3690	28569.1	4.1	28573.2
2.50	2.50	41.3715	28570.9	4.1	28575.0
3.13	3.13	41.3715	28570.9	4.1	28575.0
OPENED WELL UP AT 13:00 JANUARY 25, 1987					
	0.50	28.6207	19748.6	-18.9	19729.7
	1.00	27.0078	18632.6	-18.9	18613.7
	1.50	30.5105	21056.1	-8.7	21047.4
	2.00	33.3172	22998.1	-8.7	22989.4
	2.92	36.1188	24936.5	4.1	24940.6
	3.00	27.7368	19137.0	-18.9	19118.1
	3.07	25.3009	17451.6	-26.6	17425.0
	4.00	26.3423	18172.2	-18.9	18153.3
	5.00	27.0789	18681.8	-18.9	18662.9

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	6.00	27.0510	18662.5	-18.9	18643.6
	7.00	27.6174	19054.4	-18.9	19035.5
	8.00	27.6022	19043.9	-18.9	19025.0
	9.00	27.4777	18957.7	-18.9	18938.8
	10.00	27.4269	18922.6	-18.9	18903.7
	11.00	27.3812	18891.0	-18.9	18872.1
	12.00	27.3304	18855.8	-18.9	18836.9
	14.00	27.2974	18833.0	-18.9	18814.1
	16.00	27.2110	18773.2	-18.9	18754.3
	18.00	27.0459	18659.0	-18.9	18640.1
	20.00	27.1043	18699.4	-18.9	18680.5
	22.00	27.1348	18720.5	-18.9	18701.6
	24.00	27.1348	18720.5	-18.9	18701.6
	26.00	27.1501	18731.0	-18.9	18712.1
	28.00	27.1729	18746.8	-18.9	18727.9
	28.52	27.1780	18750.4	-18.9	18731.5

CLOCK STOPPED AT APPROX. 17:31 JANUARY 26, 1987-MALFUNCTIONED

SHUT WELL IN FOR BUILDUP AT 15:00 JANUARY 27, 1987

GAUGES PULLED AT 15:37 JANUARY 29, 1987

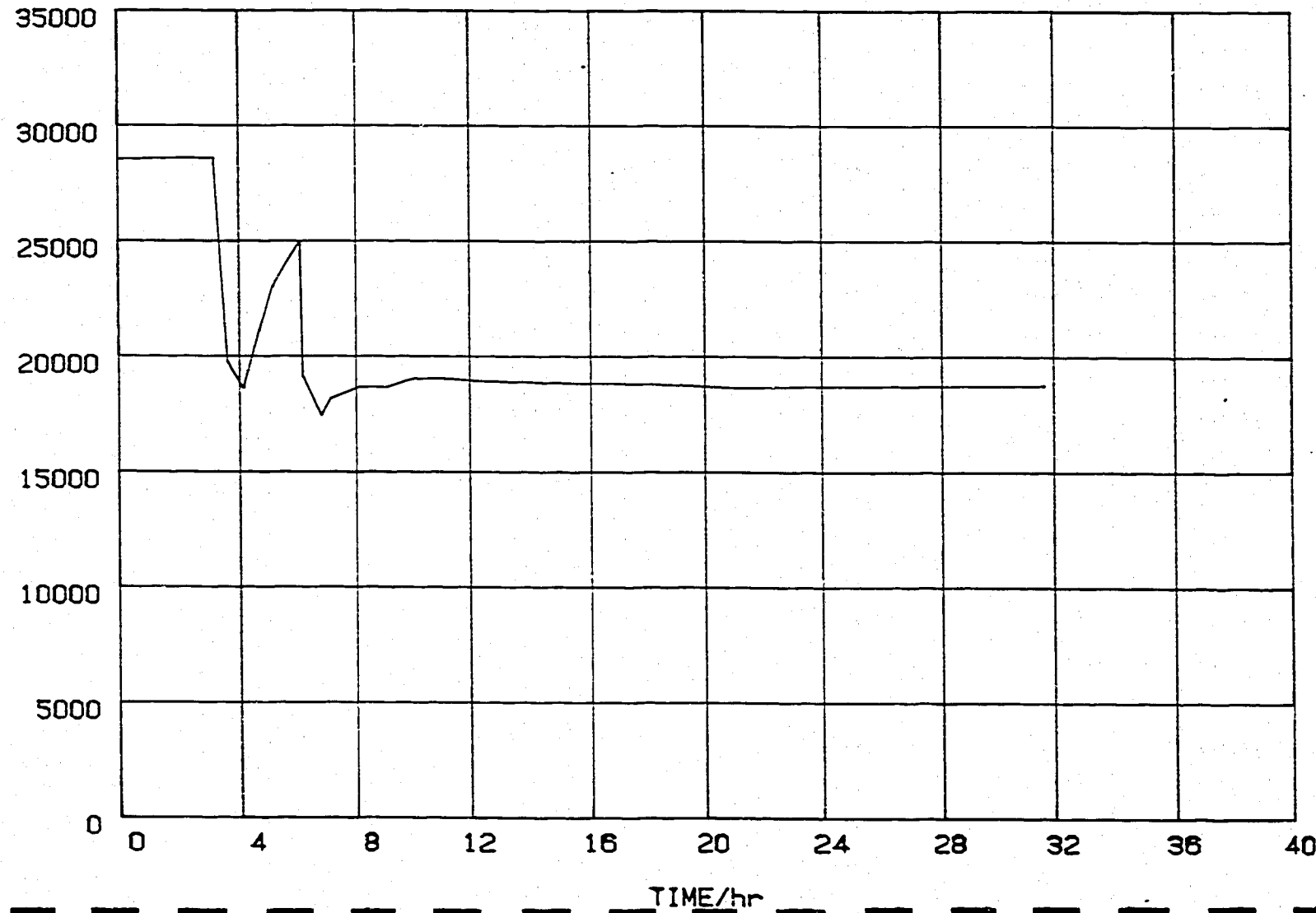
NOTE: TOP RECORDER NUMBER 15236R

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION:

DATE: JANUARY 25 - 29, 1987
COMPANY: NORTHCOR ENERGY



PAGE OF

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY

DATE: JAN. 25 - 29, 1987

WELL NAME: NORTHCOR ET AL LIARD

LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
GAUGES ON BOTTOM AT 09:52 JANUARY 25, 1987 AT 3233.0 m KB					
0.00	0.00	41.5341	28532.4	3.3	28535.7
0.50	0.50	41.5519	28544.6	3.3	28547.9
1.00	1.00	41.5620	28551.6	3.3	28554.9
1.50	1.50	41.5798	28563.8	3.3	28567.1
2.00	2.00	41.5849	28567.3	3.3	28570.6
2.50	2.50	41.5976	28576.0	3.3	28579.3
3.13	3.13	41.5976	28576.0	3.3	28579.3
OPENED WELL UP AT 13:00 JANUARY 25, 1987					
	0.50	35.3568	24285.5	3.3	24288.8
	1.00	27.1704	18657.3	1.9	18659.2
	1.50	31.2166	21439.1	3.0	21442.1
	2.00	33.7033	23148.7	3.0	23151.7
	2.92	36.2941	24929.9	3.3	24933.2
	3.00	27.6123	18961.2	1.9	18963.1
	3.67	25.4457	17471.6	-4.1	17467.5
	4.00	26.6192	18278.4	1.9	18280.3
	5.00	27.2517	18713.2	1.9	18715.1

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	6.00	27.1780	18662.6	1.9	18664.5
	7.00	27.8384	19116.6	1.9	19118.5
	8.00	27.7393	19048.5	1.9	19050.4
	9.00	27.6403	18980.4	1.9	18982.3
	10.00	27.5869	18943.7	1.9	18945.6
	11.00	27.5488	18917.5	1.9	18919.4
	12.00	27.5107	18891.3	1.9	18893.2
	14.00	27.4676	18861.6	1.9	18863.5
	16.00	27.3507	18781.3	1.9	18783.2
	18.00	27.2771	18730.7	1.9	18732.6
	20.00	27.2847	18735.9	1.9	18737.8
	22.00	27.3329	18769.1	1.9	18771.0
	24.00	27.3279	18765.6	1.9	18767.5
	26.00	27.3406	18774.3	1.9	18776.2
	28.00	27.3736	18797.0	1.9	18798.9
	32.00	27.4015	18816.2	1.9	18818.1
	34.92	27.4041	18818.0	1.9	18819.9
	35.17	31.7322	21793.6	3.0	21796.6
	35.58	28.0975	19294.7	1.9	19296.6
	36.00	27.3888	18807.5	1.9	18809.4
	36.25	26.9240	18488.0	1.9	18489.9
	40.00	27.2491	18711.5	1.9	18713.4
	44.00	27.1704	18657.3	1.9	18659.2
	48.00	27.1755	18660.8	1.9	18662.7
	50.00	27.1526	18645.1	1.9	18647.0
SHUT WELL IN FOR BUILDUP AT 15:00 JANUARY 27, 1987					
0.50	0.50	31.9278	21928.1	3.0	21931.1
0.67	0.67	36.7030	25211.0	3.3	25214.3
1.00	1.00	39.3675	27042.8	3.3	27046.1

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
1.50	1.50	39.9237	27425.3	3.3	27428.6
1.58	1.58	40.1523	27582.4	3.3	27585.7
2.00	2.00	40.2082	27620.8	3.3	27624.1
2.50	2.50	40.3504	27718.6	3.3	27721.9
3.00	3.00	40.4876	27812.9	3.3	27816.2
3.50	3.50	40.6400	27917.7	3.3	27921.0
4.00	4.00	40.7619	28001.5	3.3	28004.8
5.00	5.00	40.9448	28127.2	3.3	28130.6
6.00	6.00	41.0718	28214.6	3.3	28217.9
7.00	7.00	41.1658	28279.2	3.3	28282.5
8.00	8.00	41.2293	28322.8	3.3	28326.1
9.00	9.00	41.2725	28352.5	3.3	28355.8
10.00	10.00	41.3004	28371.7	3.3	28375.0
11.00	11.00	41.3182	28383.9	3.3	28387.2
12.00	12.00	41.3283	28390.9	3.3	28394.2
14.00	14.00	41.3410	28399.7	3.3	28403.0
16.00	16.00	41.3512	28406.7	3.3	28410.0
18.00	18.00	41.3563	28410.1	3.3	28413.4
20.00	20.00	41.3487	28404.9	3.3	28408.2
22.00	22.00	41.3537	28408.4	3.3	28411.7
24.00	24.00	41.3563	28410.1	3.3	28413.4
26.00	26.00	41.3588	28411.9	3.3	28415.2
28.00	28.00	41.3791	28425.9	3.3	28429.2
30.00	30.00	41.3842	28429.4	3.3	28432.7
32.00	32.00	41.3817	28427.6	3.3	28430.9
34.00	34.00	41.3817	28427.6	3.3	28430.9
36.00	36.00	41.3817	28427.6	3.3	28430.9
38.00	38.00	41.3817	28427.6	3.3	28430.9
40.00	40.00	41.3741	28422.4	3.3	28425.7
42.00	42.00	41.3842	28429.4	3.3	28432.7

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
44.00	44.00	41.3817	28427.6	3.3	28430.9
46.00	46.00	41.3664	28417.1	3.3	28420.4
48.62	48.62	41.3766	28424.1	3.3	28427.4

GAUGES PULLED AT 15:37 JANUARY 29, 1987

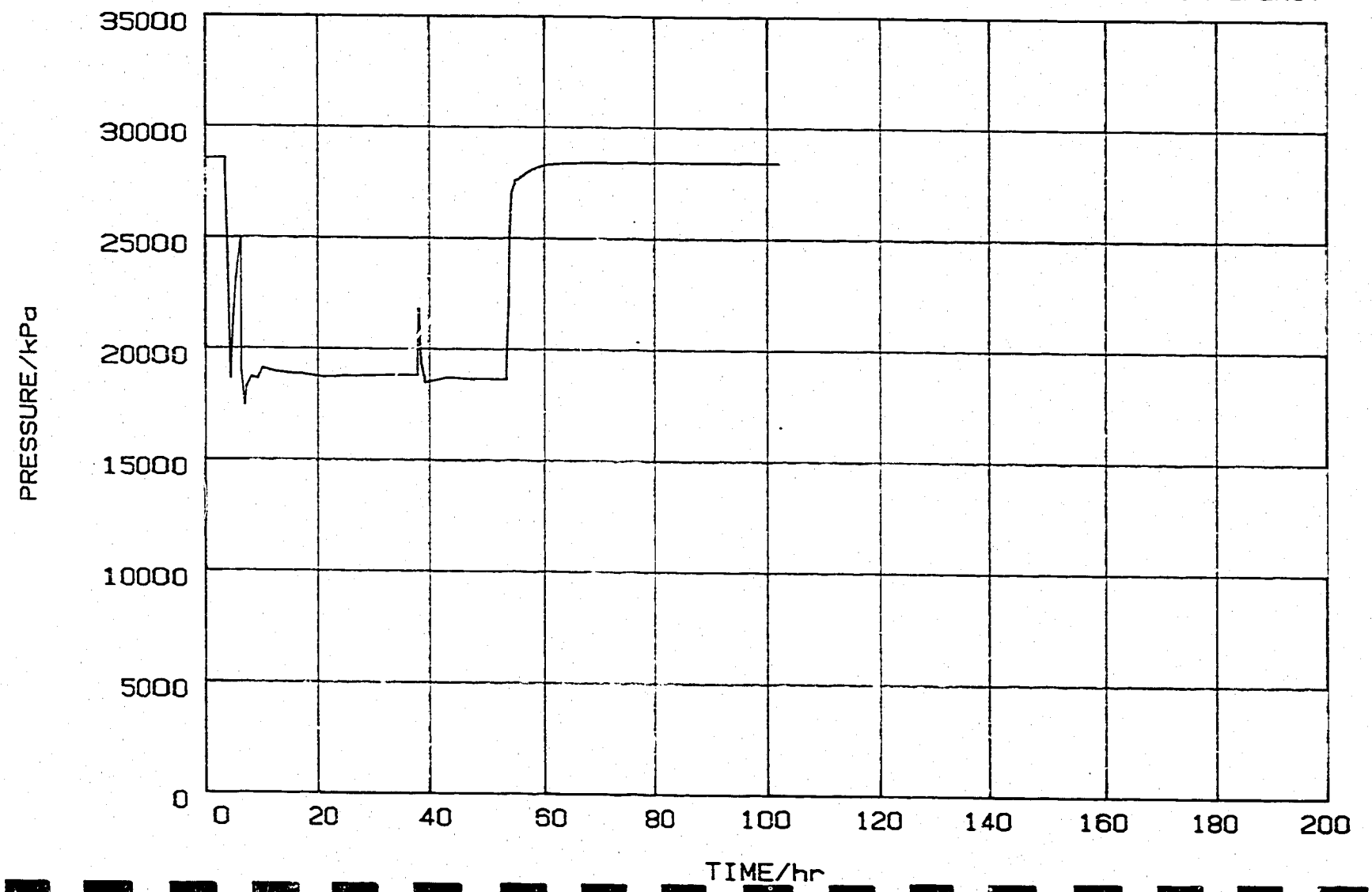
NOTE: MIDDLE RECORDER NUMBER 40684R

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: JAN. 25 - 29, 1987
COMPANY: NORTHCOR ENERGY



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Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY DATE: JANUARY 25 - 29, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

TEMPERATURE

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	TEMPERATURE (C°)
GAUGES ON BOTTOM AT 09:52 JANUARY 25, 1987 at 3234.8 m KB			
	0.00	19.1465	154.4
	0.50	21.0591	159.3
	1.00	21.1760	159.6
	1.50	21.2446	159.7
	2.00	21.2700	159.8
	2.50	21.3030	159.9
	3.13	21.3614	160.1
OPENED WELL UP AT 13:00 JANUARY 25, 1987			
	0.50	20.5511	158.0
	1.00	20.2717	157.3
	1.17	19.9669	156.5
	1.50	20.3784	157.5
	2.00	20.9220	159.0
	2.50	21.1861	159.6
	3.00	21.2954	159.9
	3.50	20.7442	158.5
	4.00	20.6934	158.4

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	TEMPERATURE (C°)
	5.00	20.7975	158.6
	6.00	20.8051	158.6
	7.00	20.8534	158.8
	8.00	20.8788	158.8
	9.00	20.8839	158.8
	10.00	20.8839	158.8
	11.00	20.8890	158.8
	12.00	20.8890	158.8
	14.00	20.9017	158.9
	16.00	20.9042	158.9
	18.00	20.9067	158.9
	20.00	20.9093	158.9
	22.00	20.9220	159.0
	24.00	20.9220	159.0
	26.00	20.9220	159.0
	28.00	20.9245	159.0
	32.00	20.9296	159.0
	35.17	20.9296	159.0
	35.50	21.1988	159.7
	36.00	21.0591	159.3
	40.00	20.9931	159.1
	44.00	20.9829	159.1
	48.00	20.9829	159.1
	50.00	20.9829	159.1
EHUT WELL IN FOR BUILDUP AT 15:00 JANUARY 27, 1987			
0.50	0.50	21.4376	160.3
1.00	1.00	21.7170	161.0
1.50	1.50	21.7119	161.0
2.00	2.00	21.6967	160.9

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	TEMPERATURE (C°)
2.50	2.50	21.6916	160.9
3.00	3.00	21.6916	160.9
3.50	3.50	21.6967	160.9
4.00	4.00	21.7094	161.0
5.00	5.00	21.7195	161.0
6.00	6.00	21.7475	161.0
7.00	7.00	21.7729	161.1
8.00	8.00	21.7983	161.2
9.00	9.00	21.8186	161.2
10.00	10.00	21.8415	161.3
12.00	12.00	21.8719	161.4
14.00	14.00	21.9177	161.5
16.00	16.00	21.9659	161.6
18.00	18.00	21.9761	161.6
19.67	19.67	22.0167	161.7
20.17	20.17	22.3190	162.5

CLOCK STOPPED AT APPROX. 11:10 JANUARY 28, 1987

GAUGES PULLED AT 15:37 JANUARY 29, 1987

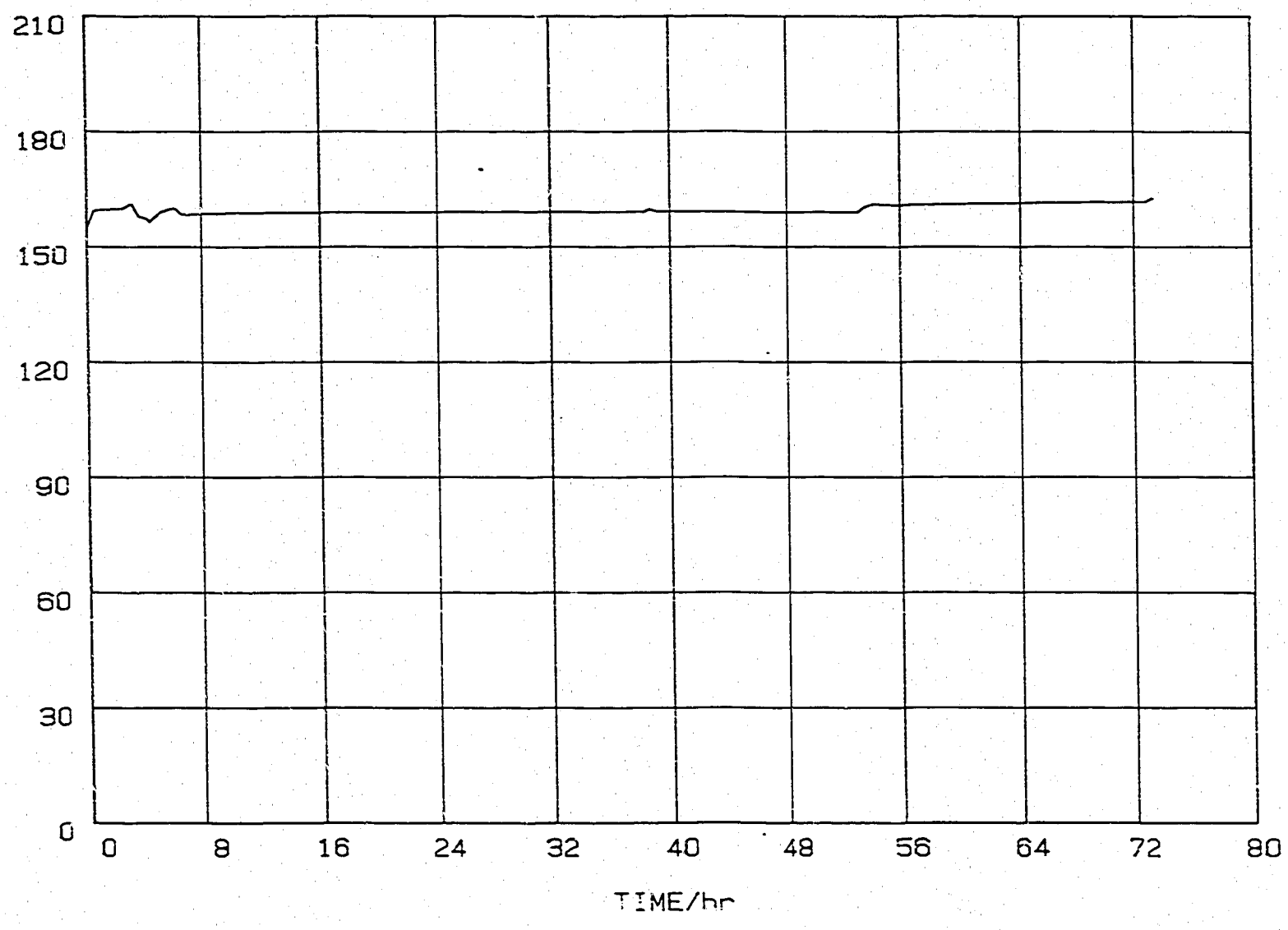
NOTE: BOTTOM RECORDER NUMBER 16295R

BEWS WIRELINE SERVICES LTD

TEMPERATURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: JANUARY 25 - 29, 1987
COMPANY: NORTHCOR ENERGY



Bews Wireline Services Ltd.

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1. BASIC DATA

PAGE ____ of ____

COMPANY Northcor Energy Ltd.
ADDRESS 880, 555 - 4th Avenue S.W.
FIELD and POOL Liard - Nahanni
TYPE OF TEST Static Gradient
ELEVATION N/A m(CF) 723.0 m(KB)
PRODUCING INTERVAL 3250.4 - 3258.4 m KB
MID-POINT OF PRODUCING (MPP) INTERVAL 3254.4 M KB
DATUM DEPTH OF WELL (FROM CF) ____ M
TBG PRESSURE See Remarks kPa G
CSG PRESSURE See Remarks kPa G
TEMPERATURE AT RUN DEPTH 156.9 °C
PRESSURE AT RUN DEPTH ____ kPa G
GRADIENT AT RUN DEPTH ____ kPa m

WELL NAME Northcor et al Liard
WELL IDENTIFIER F-25A
STATUS OIL X GAS ____ OTHER SPECIFY ____
DATE OF TEST ____ 87 (Yr) 01 (Mo) 29 (Day)
TBG 88.9 mm @ ____ mKB
PRODUCING THRU X TBG ____ CSG
POOL DATUM ____ m (subsea)
RUN DEPTH (FROM KB) 3234.8 M
ON BTM 18:45 87 01 29
OFF BTM 18:50 87 01 29
SHUT IN DATE 15:00 87 01 27
PRESSURE MPP ____ kPa G
DATUM DEPTH PRESSURE ____ kPa G

2. RECORDER COMPARISON	TOP	MIDDLE	BOTTOM (TEMPERATURE)
RUN DEPTH	3231.2	3233.0	3234.8 KB
PRESSURE AT RUN DEPTH	28276.2 kPa G	28386.7 kPa G	
FINAL Temperature			156.9 °C
GRADIENT AT RUN DEPTH	12.142 kPa G	10.248 kPa G	
CLOCK RANGE	3 hr d Sx	3 hr D Sx	3 hr D Sx
ELEMENT SERIAL/RANGE	# 15236R/34819	• 40684R/34474	• 16295R/70-233 °C
INNER HOUSING	# 7088	• 11951	• 28743
CALIBRATION EQUATION	691.9 D+(-54.1)	687.5 D+(-22.3)	2.79 D+(93.32)
DATE OF LAST CALIBRATION	87 01 24 yr mo day	87 01 24 Yr Mo Dav	Yr Mo Dav

REMARKS:

		Tubing Pressure:	Casing Pressure:
17:13	January 29/87	18940 kPa	11000 kPa
19:20	January 29/87	19150 kPa	12000 kPa

DOWNHOLE EQUIPMENT

SURVEY COMPANY Otis TEST BY M. Simmons COMPUTED BY R. Hosmar

INSTRUCTIONS: The original of this report shall be filed with the Energy Resources Conservation Board 640 5th Avenue S.W. Calgary Alberta within thirty days of completion of the survey

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F-25A

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Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY

DATE: JANUARY 29 , 1987

WELL NAME: NORTHCOR ET AL LIARD

LOCATION: F-25A

RUN DEPTH (m)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-PC (kPa)	CORRECTED PRESSURE (kPa)	PRESSURE GRADIENT (kPa/m)
0.00	27.0789	18681.8	-18.9	18662.9	
0.00	27.2771	18818.9	-18.9	18800.0	
298.20	28.5750	19716.9	-18.9	19698.0	
298.20	28.6512	19769.7	-18.9	19750.8	3.169
598.20	29.7612	20537.7	-18.9	20518.8	
598.20	29.8272	20583.3	-18.9	20564.4	2.712
898.20	30.8077	21261.7	-8.7	21253.0	
898.20	30.8356	21281.1	-8.7	21272.4	2.360
1198.20	31.7271	21897.9	-8.7	21889.2	
1198.20	31.7729	21929.6	-8.7	21920.9	2.162
1498.20	32.5679	22479.6	-8.7	22470.9	
1498.20	32.5679	22479.6	-8.7	22470.9	1.833
1798.20	33.2715	22966.5	-8.7	22957.8	
1798.20	33.2715	22966.5	-8.7	22957.8	1.623
2098.20	33.9522	23437.4	-8.7	23428.7	
2098.20	33.9522	23437.4	-8.7	23428.7	1.476
2398.20	34.5923	23880.3	-8.7	23871.6	

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Bews Wireline Services Ltd.

1450,633 – 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY

DATE: JANUARY 29, 1987

WELL NAME: NORTHCOR ET AL LIARD

LOCATION: F-25A

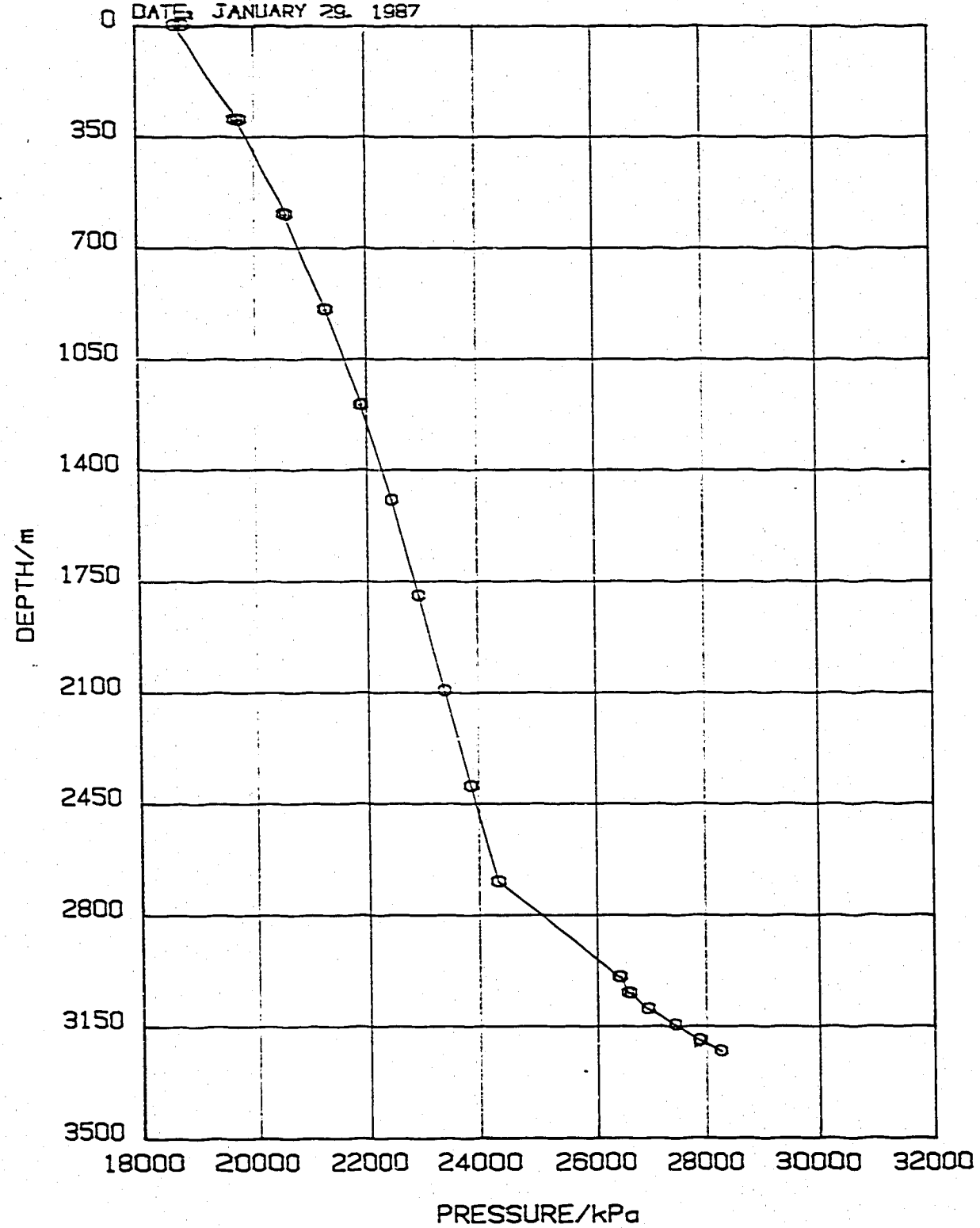
RUN DEPTH (m)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-PC (kPa)	CORRECTED PRESSURE (kPa)	PRESSURE GRADIENT (kPa/m)
2398.20	34.5923	23880.3	-8.7	23871.6	1.476
2698.20	35.2298	24321.4	4.1	24325.5	
2698.20	35.2298	24321.4	4.1	24325.5	1.513
2998.20	38.2448	26407.5	4.1	26411.6	
2998.20	38.2067	26381.1	4.1	26385.2	6.866
3048.20	38.5089	26590.2	4.1	26594.3	
3048.20	38.4327	26537.5	4.1	26541.6	3.128
3098.20	38.9890	26922.4	4.1	26926.5	
3098.20	38.9712	26910.1	4.1	26914.2	7.452
3148.20	39.6926	27409.2	4.1	27413.3	
3148.20	39.6748	27396.9	4.1	27401.0	9.736
3198.20	40.3860	27889.0	4.1	27893.1	
3198.20	40.3606	27871.4	4.1	27875.5	9.490
3231.20	40.9169	28256.3	4.1	28260.4	
3231.20	40.9397	28272.1	4.1	28276.2	12.142
SURF	27.7114	19119.4	-18.9	19100.5	
FLEX	0.0000	0.0	0.0	0.0	
SURF	27.3558	18873.4	-18.9	18854.5	
SURF	27.4498	18938.4	-18.9	18919.5	

NOTE: TOP RECORDER NUMBER 15236R

BEWS WIRELINE SERVICES LTD

STATIC GRADIENT PLOT

COMPANY: NORTHCOR ENERGY
WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A
DATE: JANUARY 29, 1987



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Bews Wireline Services Ltd.

1450,633 – 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY

DATE: JANUARY 29, 1987

WELL NAME: NORTHCOR ET AL LIARD

LOCATION: F-25A

RUN DEPTH (m)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-PC (kPa)	CORRECTED PRESSURE (kPa)	PRESSURE GRADIENT (kPa/m)
0.00	27.3787	18800.5	1.9	18802.4	
0.00	27.6276	18971.7	1.9	18973.6	
300.00	28.8392	19804.6	1.9	19806.5	
300.00	28.9560	19885.0	1.9	19886.9	3.044
600.00	30.0228	20618.4	1.9	20620.3	
600.00	30.1015	20672.5	1.9	20674.4	2.625
900.00	31.0896	21351.8	3.0	21354.8	
900.00	31.1302	21379.7	3.0	21382.7	2.361
1200.00	32.0269	21996.2	3.0	21999.2	
1200.00	32.0573	22017.1	3.0	22020.1	2.125
1500.00	32.8676	22574.2	3.0	22577.2	
1500.00	32.8549	22565.4	3.0	22568.4	1.828
1800.00	33.6042	23080.6	3.0	23083.6	
1800.00	33.5864	23068.4	3.0	23071.4	1.677
2100.00	34.2925	23553.8	3.0	23556.8	
2100.00	34.2798	23545.1	3.0	23548.1	1.589
2400.00	34.9529	24007.8	3.3	24011.1	

PAGE CF

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY

DATE: JANUARY 29, 1987

WELL NAME: NORTHCOR ET ALLIARD

LOCATION: F-25A

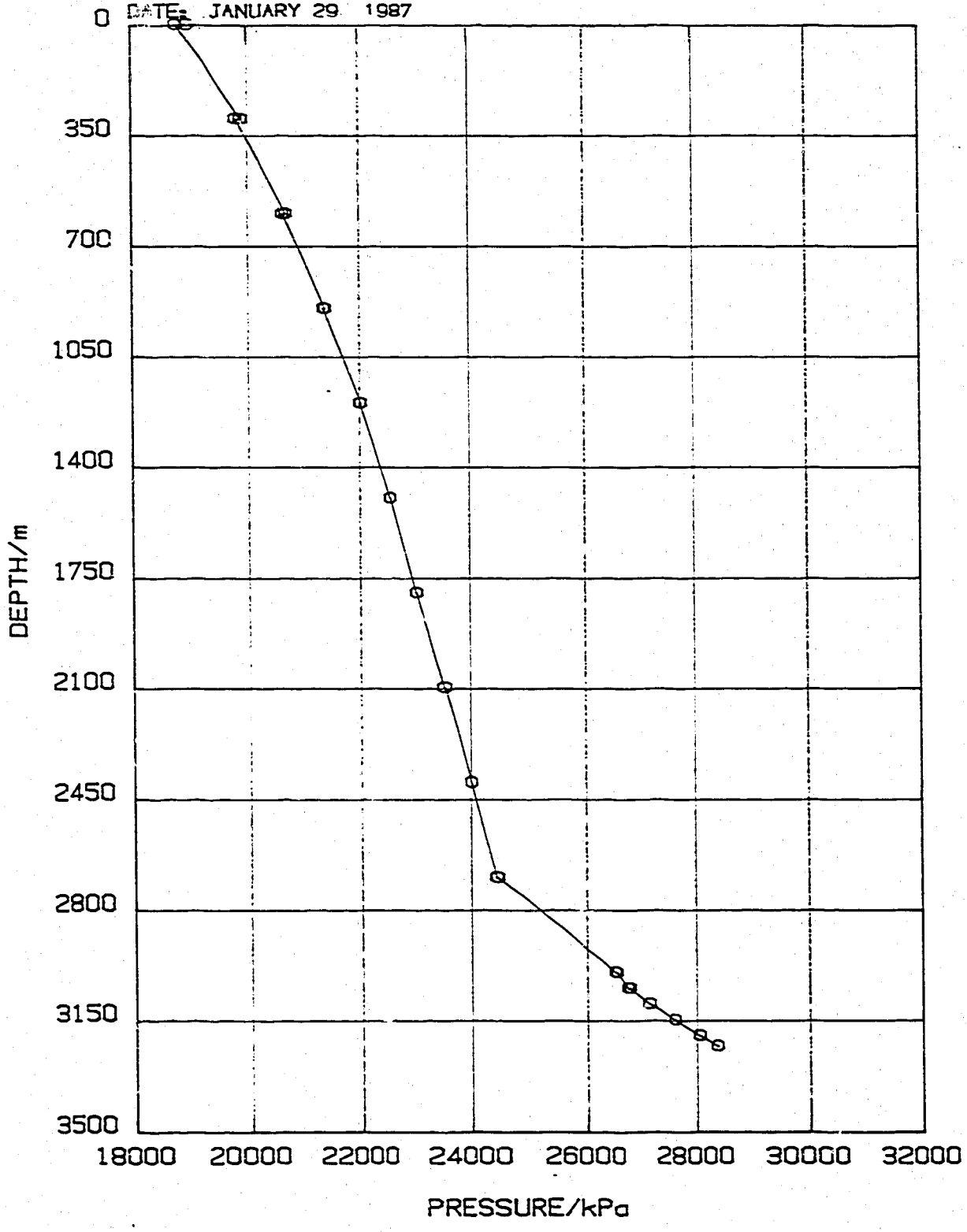
RUN DEPTH (m)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-PC (kPa)	CORRECTED PRESSURE (kPa)	PRESSURE GRADIENT (kPa/m)
2400.00	34.9529	24007.8	3.3	24011.1	1.543
2700.00	35.6083	24458.4	3.3	24461.7	
2700.00	35.5879	24444.4	3.3	24447.7	1.455
3000.00	38.6080	26520.7	3.3	26524.0	
3000.00	38.5648	26491.0	3.3	26494.3	6.822
3050.00	38.9661	26766.9	3.3	26770.2	
3050.00	38.9077	26726.7	3.3	26730.0	4.714
3100.00	39.4741	27116.1	3.3	27119.4	
3100.00	39.4741	27116.1	3.3	27119.4	7.788
3150.00	40.1752	27598.2	3.3	27601.5	
3150.00	40.1625	27589.4	3.3	27592.7	9.466
3200.00	40.8432	28057.4	3.3	28060.7	
3200.00	40.8254	28045.2	3.3	28048.5	9.116
3233.00	41.3309	28392.7	3.3	28396.0	
3233.00	41.3174	28383.4	3.3	28386.7	10.248
SURF	28.0365	19252.8	1.9	19254.7	
FLEX	0.0000	0.0	0.0	0.0	
SURF	27.6504	18987.4	1.9	18989.3	
SURF	27.7597	19062.5	1.9	19064.4	

NOTE: MIDDLE RECORDER NUMBER 40684R

BEWS WIRELINE SERVICES LTD

STATIC GRADIENT PLOT

COMPANY: NORTHCOR ENERGY
WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A
DATE: JANUARY 29 1987



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Bows Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 29, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

TEMPERATURE

RUN DEPTH (m)	DEFLECTION (mm)	CALCULATED TEMPERATURE (°C)	DEVIATION CORRECTION	CORRECTED TEMPERATURE (°C)	TEMPERATURE GRADIENT (°C/m)
0.00	0.0000	0.0	0.0	0.0	
301.80	0.0000	0.0	0.0	0.0	0.000
601.80	0.0000	0.0	0.0	0.0	0.000
901.80	70.8000	70.8	0.0	70.8	0.236
901.80	70.8000	70.8	0.0	70.8	
1201.80	81.6000	81.6	0.0	81.6	0.036
1201.80	82.9000	82.9	0.0	82.9	
1501.80	94.3000	94.3	0.0	94.3	0.038
1501.80	95.5000	95.5	0.0	95.5	
1801.80	101.4000	101.4	0.0	101.4	0.020
1801.80	103.0000	103.0	0.0	103.0	
2101.80	108.3000	108.3	0.0	108.3	0.018
2101.80	109.7000	109.7	0.0	109.7	
2401.80	116.2000	116.2	0.0	116.2	0.022
2401.80	118.4000	118.4	0.0	118.4	
2701.80	129.2000	129.2	0.0	129.2	0.036
2701.80	131.0000	131.0	0.0	131.0	
3001.80	143.2000	143.2	0.0	143.2	0.041

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Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: JANUARY 29, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

TEMPERATURE

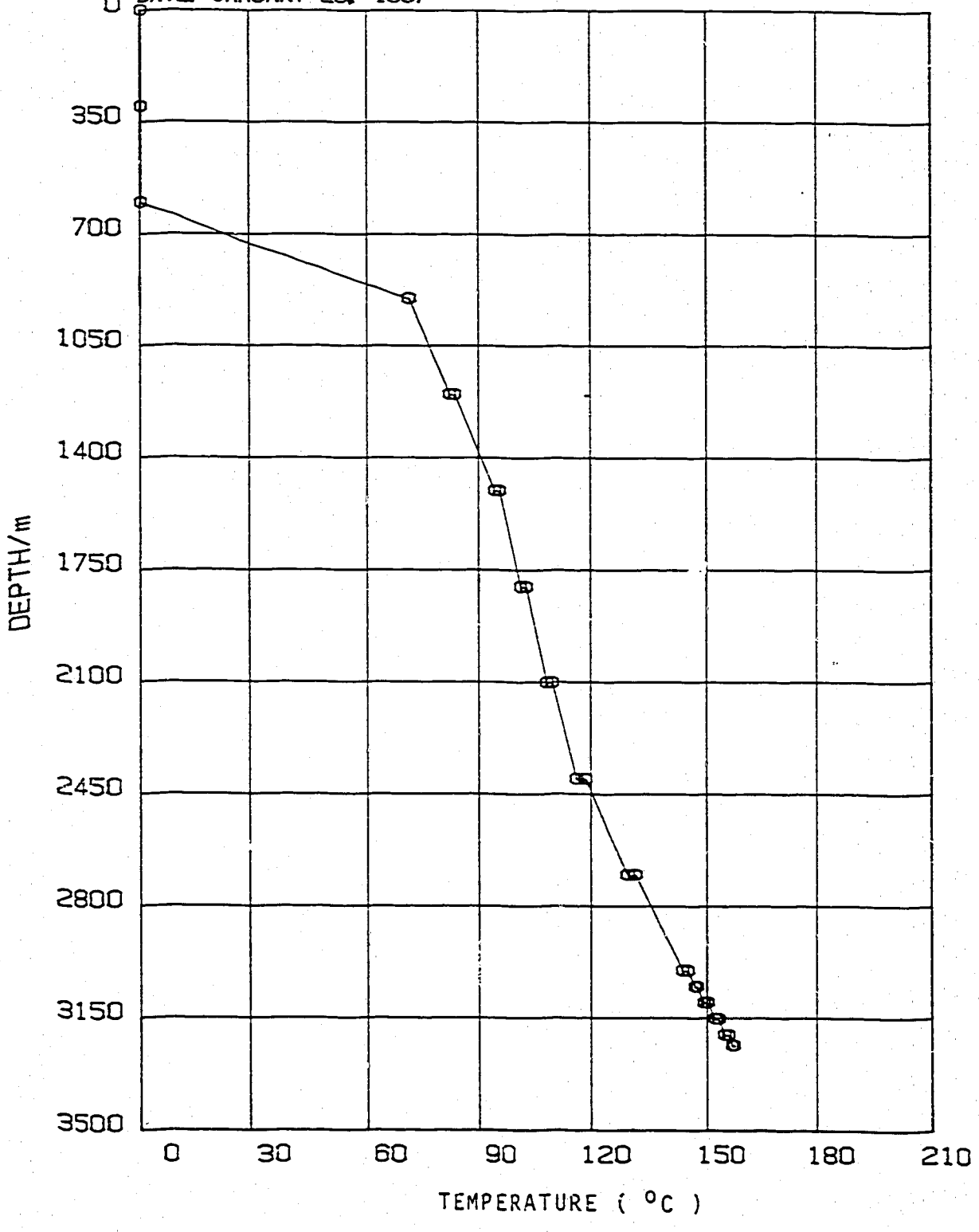
RUN DEPTH (m)	DEFLECTION (mm)	CALCULATED TEMPERATURE (°C)	DEVIATION CORRECTION	CORRECTED TEMPERATURE (°C)	TEMPERATURE GRADIENT (° C/m)
3001.80	144.6000	144.6	0.0	144.6	
3051.80	146.6000	146.6	0.0	146.6	0.040
3051.80	147.1000	147.1	0.0	147.1	
3101.80	149.0000	149.0	0.0	149.0	0.038
3101.80	149.9000	149.9	0.0	149.9	
3151.80	151.9000	151.9	0.0	151.9	0.040
3151.80	152.7000	152.7	0.0	152.7	
3201.80	154.4000	154.4	0.0	154.4	0.034
3201.80	155.4000	155.4	0.0	155.4	
3234.80	156.4000	156.4	0.0	156.4	0.030
3234.80	156.9000	156.9	0.0	156.9	

NOTE: BOTTOM RECORDER NUMBER 16295N

BEWS WIRELINE SERVICES LTD

TEMPERATURE PLOT

COMPANY: NORTHCOR ENERGY LTD.
WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A
DATE: JANUARY 29, 1987



Bews Wireline Services Ltd.

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1 BASIC DATA PAGE ____ of ____

COMPANY Northcor Energy Ltd.
ADDRESS 880, 555 - 4th Avenue S.W.
FIELD and POOL Liard - Nahanni
TYPE OF TEST Single Point & Buildup
ELEVATION N/A m(CF) 723.0 m(KB)
PRODUCING INTERVAL 3250.4 - 3258.4 m KB
MID-POINT OF PRODUCING (MPP) INTERVAL 3254.4 M KB
DATUM DEPTH OF WELL (FROM CF) ____ M
TBG PRESSURE See Remarks kPa G
CSG PRESSURE 10500 Throughout kPa G
TEMPERATURE AT RUN DEPTH 168.1 °C
PRESSURE AT RUN DEPTH ____ kPa G
GRADIENT AT RUN DEPTH ____ kPa m

WELL NAME Northcor et al Liard
WELL IDENTIFIER F-25A
STATUS OIL X GAS ____ OTHER SPECIFY ____
DATE OF TEST ____ 87 (Yr) 02 (Mo) 01 - 10 (Day)
TBG 88.9 mm @ ____ mKB
PRODUCING THRU X TBG ____ CSG
POOL DATUM ____ m (subsea)
RUN DEPTH (FROM KB) 3231.9 M
ON BTM 21:24 87 02 01
OFF BTM 20:00 87 02 10
SHUT IN DATE 08:30 87 02 06 (Yr Mo Day)
PRESSURE MPP ____ kPa G
DATUM DEPTH PRESSURE ____ kPa G

2. RECORDER COMPARISON	TOP	MIDDLE	BOTTOM (TEMPERATURE)
RUN DEPTH	3228.3	3230.1	3231.9 (KB)
PRESSURE AT RUN DEPTH			kPa G
FINAL BUILDUP PRESSURE	29272.7 kPa G	28924.7 kPa G	168.1 °C
GRADIENT AT RUN DEPTH			kPa/m
CLOCK RANGE	360 hrs D x	360 hrs D x	360 hrs D x °C
ELEMENT SERIAL/RANGE	15236N/34819	* 40684N/34819	* 16295N/70-233
INNER HOUSING	7088	* 12984	* 14585
CALIBRATION EQUATION	691.9 D+(-54.1)	687.5 D+(-22.3)	2.79 D+(93.32)
DATE OF LAST CALIBRATION	87 01 24	87 01 24	
		(Yr Mo Day)	(Yr Mo Day)

REMARKS: Tubing Pressure:
February 01/87 22000 kPa
February 10/87 21750 kPa

*Note: Top & Middle recorders stopped early
See computer printout sheets for details

DOWNHOLE EQUIPMENT:

SURVEY COMPANY Otis TEST BY M. Simmons COMPUTED BY R. Hosmar

INSTRUCTIONS: The original of this report shall be filed with the Energy Resources Conservation Board 640 5th Avenue S.W. Calgary Alberta within thirty days of completion of the survey

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F-25A

PAGE OF

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 01-10, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 21:24 AT 3228.3 M KB FEBRUARY 01, 1987					
	0.00	42.6500	29455.4	4.1	29459.5
	1.10	43.0300	29718.4	4.1	29722.5
WELL OPENED TO FLOW AT 22:30 ON FEBRUARY 01, 1987					
	0.25	41.9500	28971.1	4.1	28975.2
	0.50	41.7700	28846.6	4.1	28850.7
	0.75	41.1200	28396.8	4.1	28400.9
	1.00	40.0700	27670.3	4.1	27674.4
	1.25	38.7400	26750.1	4.1	26754.2
	1.50	37.2600	25726.1	4.1	25730.2
	1.75	36.0300	24875.1	4.1	24879.2
	2.00	35.5400	24536.0	4.1	24540.1
	2.25	35.4400	24466.8	4.1	24470.9
	2.50	35.3300	24390.7	4.1	24394.8
	2.75	35.1100	24238.5	4.1	24242.6
	3.00	34.6200	23899.5	-8.7	23890.8
	3.25	34.0900	23532.8	-8.7	23524.1
	3.50	33.5300	23145.3	-8.7	23136.6

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	4.00	33.2600	22958.5	-8.7	22949.8
	4.50	32.8000	22640.2	-8.7	22631.5
	5.00	32.4500	22398.1	-8.7	22389.4
	5.50	32.0800	22142.1	-8.7	22133.4
	6.00	31.8400	21976.0	-8.7	21967.3
	6.50	31.5300	21761.5	-8.7	21752.8
	7.00	31.2900	21595.5	-8.7	21586.8
	7.50	31.0900	21457.1	-8.7	21448.4
	8.00	30.8200	21270.3	-8.7	21261.6
	8.50	30.4400	21007.3	-8.7	20998.6
	9.00	30.2500	20875.9	-18.9	20857.0
	9.50	30.0200	20716.7	-18.9	20697.8
	10.50	29.4500	20322.4	-18.9	20303.5
	11.50	29.0300	20031.8	-18.9	20012.9
	12.50	28.5600	19706.6	-18.9	19687.7
	13.50	28.2200	19471.3	-18.9	19452.4
	14.50	27.9800	19305.3	-18.9	19286.4
	15.50	27.6500	19076.9	-18.9	19058.0
	16.50	27.2900	18827.9	-18.9	18809.0
	17.50	27.0800	18682.6	-18.9	18663.7
	18.50	26.7900	18481.9	-18.9	18463.0
	19.50	26.5800	18336.6	-18.9	18317.7
	20.50	26.4300	18232.8	-18.9	18213.9
	21.50	26.2700	18122.1	-18.9	18103.2
	22.50	26.1000	18004.5	-18.9	17985.6
	23.50	25.9700	17914.5	-26.6	17887.9
	24.50	25.9100	17873.0	-26.6	17846.4
	25.50	25.8500	17831.5	-26.6	17804.9
	26.50	25.7300	17748.5	-26.6	17721.9
	27.50	25.6500	17693.1	-26.6	17666.5

PAGE OF

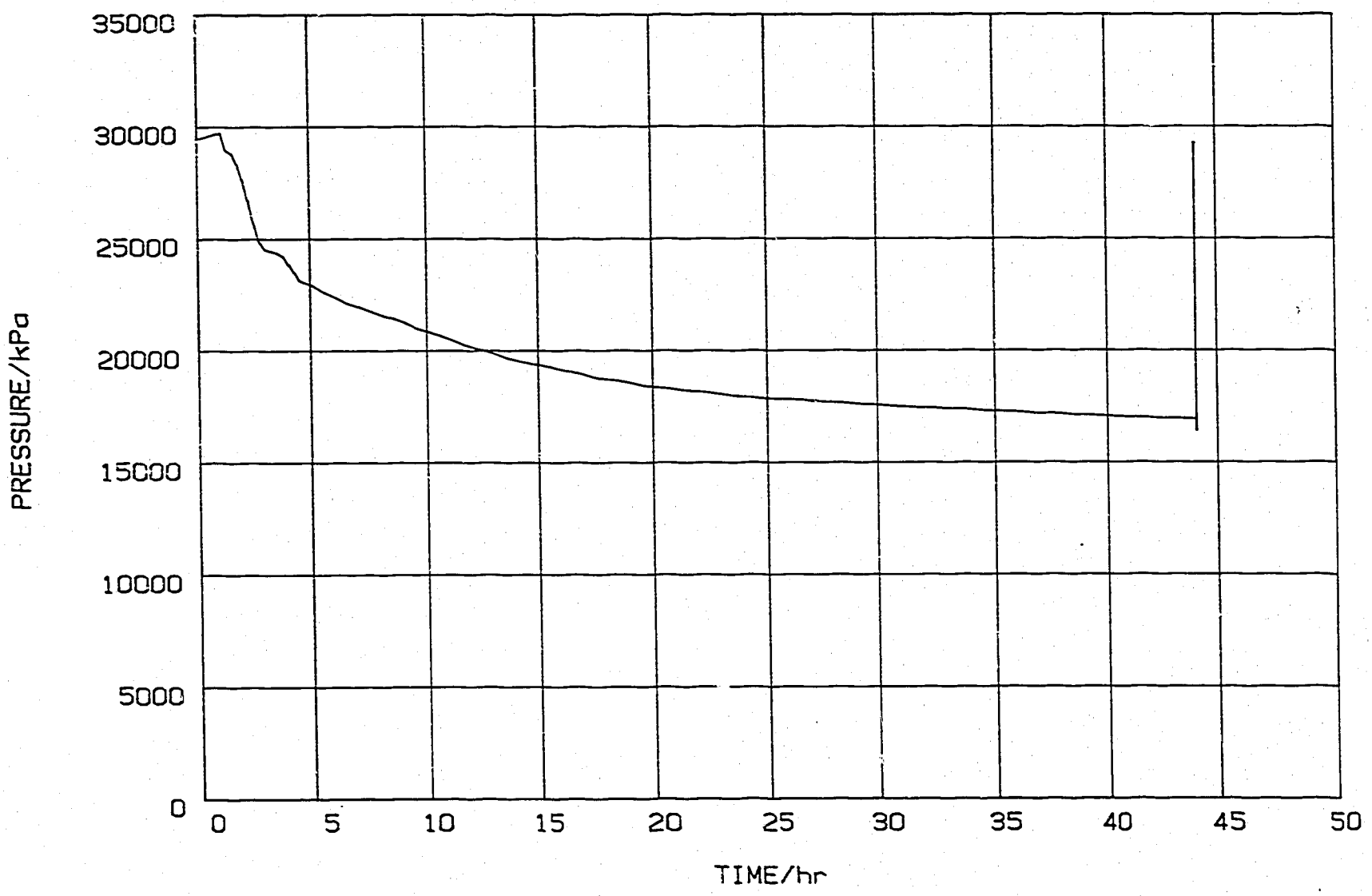
CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	28.50	25.5700	17637.8	-26.6	17611.2
	29.50	25.4700	17568.6	-26.6	17542.0
	30.50	25.3700	17499.4	-26.6	17472.8
	31.50	25.3100	17457.9	-26.6	17431.3
	32.50	25.2500	17416.4	-26.6	17389.8
	33.50	25.1500	17347.2	-26.6	17320.6
	34.50	25.0900	17305.7	-26.6	17279.1
	35.50	25.0000	17243.4	-26.6	17216.8
	36.50	24.9400	17201.9	-26.6	17175.3
	37.50	24.8800	17160.4	-26.6	17133.8
	38.50	24.8200	17118.9	-26.6	17092.3
	39.50	24.7600	17077.3	-26.6	17050.7
	40.50	24.7000	17035.8	-26.6	17009.2
	41.50	24.6500	17001.2	-26.6	16974.6
	42.50	24.6200	16980.5	-26.6	16953.9
	43.00	24.5900	16959.7	-26.6	16933.1
CLOCK STOPPED AT APPROX. 17:30 ON FEBRUARY 03, 1987					
LOW POINT ON CHART AFTER CLOCK STOPPED					
	0.00	23.8600	16454.6	-26.6	16428.0
WELL SHUT IN AT 08:30 FEBRUARY 06, 1987					
HIGH POINT ON CHART AFTER CLOCK STOPPED					
0.00	0.00	42.3800	29268.6	4.1	29272.7
PULLED RECORDERS AT 20:00 FEBRUARY 10, 1987					
NOTE: TOP RECORDER NUMBER 15236N					

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: FEBRUARY 01-10, 1987
COMPANY: NORTHCOR ENERGY LTD.



PAGE OF

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 01 - 10, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 21:24 ON FEBRUARY 01, 1987 AT 3230.1 M KB					
NO PRESSURES AVAILABLE FROM 21:24 - 22:30 FEBRUARY 01, 1987 DUE TO STATIC ON CHART					
WELL OPENED TO FLOW AT 22:30 FEBRUARY 01, 1987					
	0.25	41.3500	28405.8	3.3	28409.1
	0.50	38.8500	26687.1	3.3	26690.4
	0.75	37.1500	25518.3	3.3	25521.6
	1.00	36.0000	24727.7	3.3	24731.0
	1.25	35.7600	24562.7	3.3	24566.0
	1.50	35.3300	24267.1	3.3	24270.4
	1.75	35.1900	24170.8	3.3	24174.1
	2.00	34.9700	24019.6	3.3	24022.9
	2.25	34.2800	23545.2	3.0	23548.2
	2.50	34.1300	23442.1	3.0	23445.1
	2.75	33.7800	23201.5	3.0	23204.5
	3.00	33.4300	22960.8	3.0	22963.8
	3.25	33.0800	22720.2	3.0	22723.2
	3.50	32.8900	22589.6	3.0	22592.6

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	4.00	32.5900	22383.3	3.0	22386.3
	4.50	32.2300	22135.8	3.0	22138.8
	5.00	31.9000	21909.0	3.0	21912.0
	5.50	31.6600	21744.0	3.0	21747.0
	6.00	31.3200	21510.2	3.0	21513.2
	6.50	31.0900	21352.1	3.0	21355.1
	7.00	30.8500	21187.1	3.0	21190.1
	7.50	30.6700	21063.3	3.0	21066.3
	8.00	30.3700	20857.1	1.9	20859.0
	8.50	30.0900	20664.6	1.9	20666.5
	9.00	29.8400	20492.7	1.9	20494.6
	9.50	29.7100	20403.3	1.9	20405.2
	10.50	29.2000	20052.7	1.9	20054.6
	11.50	28.7400	19736.5	1.9	19738.4
	12.50	28.3900	19495.8	1.9	19497.7
	13.50	27.9300	19179.6	1.9	19181.5
	14.50	27.6000	18952.7	1.9	18954.6
	15.50	27.3200	18760.2	1.9	18762.1
	16.50	27.0600	18581.5	1.9	18583.4
	17.50	26.7900	18395.8	1.9	18397.7
	18.50	26.5100	18203.3	1.9	18205.2
	19.50	26.3300	18079.6	1.9	18081.5
	20.50	26.1100	17928.3	-4.1	17924.2
	21.50	25.9300	17804.6	-4.1	17800.5
	22.50	25.8100	17722.1	-4.1	17718.0
	23.50	25.6800	17632.7	-4.1	17628.6
	24.50	25.6300	17598.3	-4.1	17594.2
	25.50	25.5800	17564.0	-4.1	17559.9
	26.50	25.4500	17474.6	-4.1	17470.5
	27.50	25.3700	17419.6	-4.1	17415.5

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	28.50	25.3000	17371.5	-4.1	17367.4
	29.50	25.1900	17295.8	-4.1	17291.7
	30.50	25.1100	17240.8	-4.1	17236.7
	31.50	25.0600	17206.5	-4.1	17202.4
	32.50	24.9700	17144.6	-4.1	17140.5
	33.50	24.9100	17103.3	-4.1	17099.2
	34.50	24.8300	17048.3	-4.1	17044.2
	35.50	24.7700	17007.1	-4.1	17003.0
	36.50	24.7200	16972.7	-4.1	16968.6
	37.50	24.6700	16938.3	-4.1	16934.2
	38.50	24.5800	16876.5	-4.1	16872.4
	39.50	24.5400	16849.0	-4.1	16844.9
	40.50	24.4900	16814.6	-4.1	16810.5
	41.50	24.4400	16780.2	-4.1	16776.1
	42.50	24.4000	16752.7	-4.1	16748.6
	43.50	24.3700	16732.1	-4.1	16728.0
	44.50	24.3300	16704.6	-4.1	16700.5
	45.50	24.3000	16684.0	-4.1	16679.9
	46.50	24.2700	16663.3	-4.1	16659.2
	47.50	24.2300	16635.8	-4.1	16631.7
	48.50	24.2000	16615.2	-4.1	16611.1
	49.50	24.1700	16594.6	-4.1	16590.5
	50.50	24.1400	16574.0	-4.1	16569.9
	51.50	24.1100	16553.3	-4.1	16549.2
	52.50	24.0900	16539.6	-4.1	16535.5
	53.00	24.0600	16519.0	-4.1	16514.9

CLOCK STOPPED AT APPROX. 03:30 FEBRUARY 04, 1987

LOW POINT ON CHART AFTER CLOCK STOPPED

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	0.00	23.6100	16209.6	-4.1	16205.5

ELL SHUT IN AT 08:30 FEBRUARY 06, 1987

HIGH POINT ON CHART AFTER CLOCK STOPPED

0.00	0.00	42.1000	28921.4	3.3	28924.7

RECORDERS PULLED AT 20:00 FEBRUARY 10, 1987

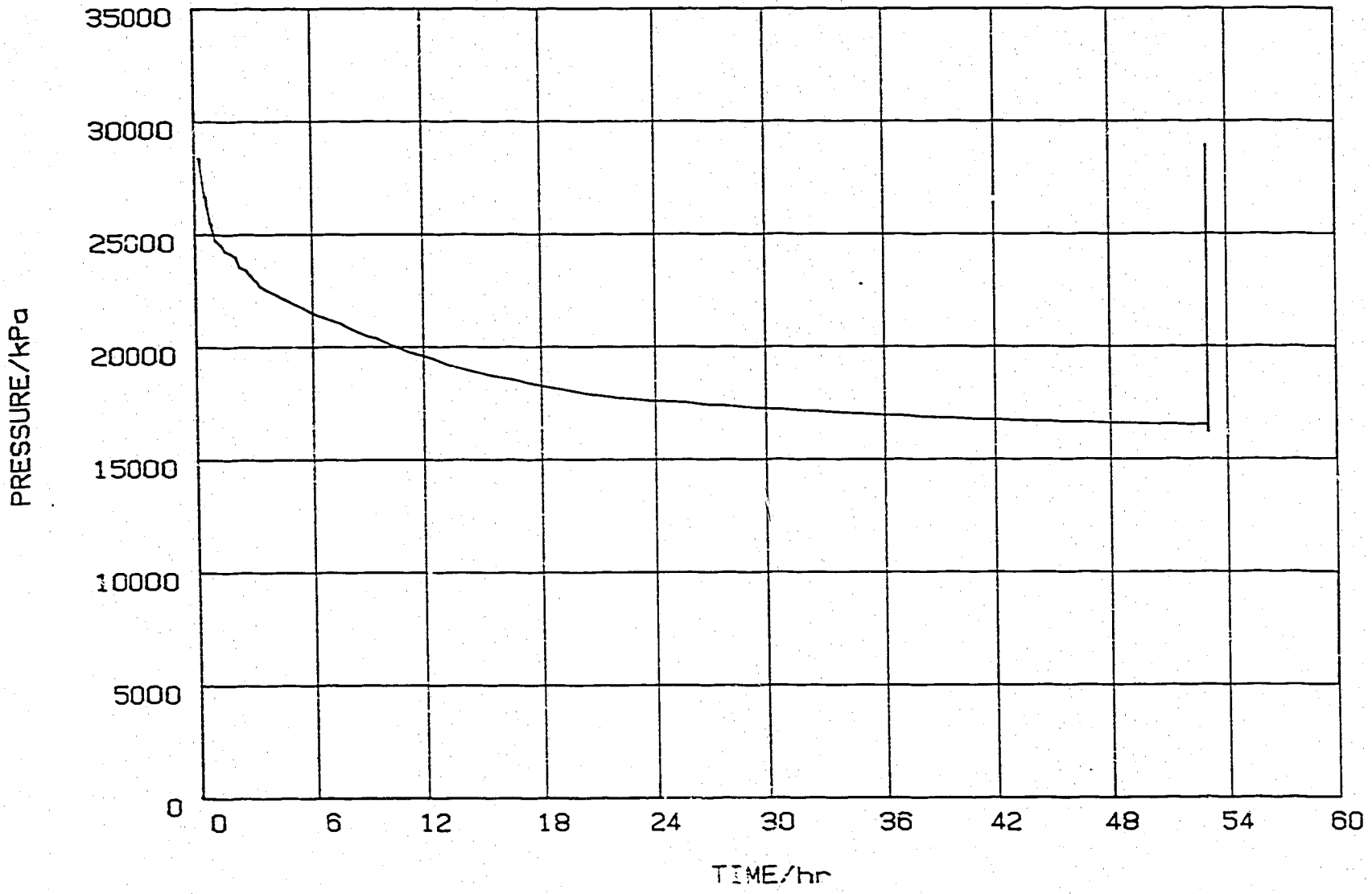
OTE: MIDDLE RECORDER NUMBER 40684N

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: FEBRUARY 01 - 10, 1987
COMPANY: NORTHCOR ENERGY LTD.



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Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 01 - 10, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

TEMPERATURE

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED TEMPERATURE (°C)	DEVIATION CORRECTION	CORRECTED TEMPERATURE (°C)
RECORDERS ON BOTTOM AT 21:24 FEBRUARY 01, 1987 AT 3231.9 M KB					
	0.00	16.9500	148.6	0.0	148.6
	1.10	19.4800	155.3	0.0	155.3
WELL OPENED TO FLOW AT 22:30 FEBRUARY 01, 1987					
	0.25	21.5500	160.5	0.0	160.5
	0.50	21.9500	161.6	0.0	161.6
	0.75	22.0900	161.9	0.0	161.9
	1.00	22.2100	162.2	0.0	162.2
	1.25	22.2400	162.3	0.0	162.3
	1.50	22.2700	162.4	0.0	162.4
	2.00	22.3300	162.5	0.0	162.5
	2.50	22.4000	162.7	0.0	162.7
	3.00	22.4500	162.9	0.0	162.9
	3.50	22.4900	162.9	0.0	162.9
	4.50	22.5700	163.2	0.0	163.2
	5.50	22.6400	163.3	0.0	163.3
	6.50	22.7000	163.5	0.0	163.5
	7.50	22.7700	163.6	0.0	163.6

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED TEMPERATURE (°C)	DEVIATION CORRECTION	CORRECTED TEMPERATURE (°C)
	9.50	22.8600	163.9	0.0	163.9
	11.50	22.9100	164.0	0.0	164.0
	13.50	22.9700	164.1	0.0	164.1
	15.50	23.0000	164.3	0.0	164.3
	17.50	23.0400	164.3	0.0	164.3
	19.50	23.0800	164.4	0.0	164.4
	21.50	23.1000	164.4	0.0	164.4
	23.50	23.1200	164.5	0.0	164.5
	25.50	23.1400	164.6	0.0	164.6
	27.50	23.1700	164.6	0.0	164.6
	29.50	23.1900	164.7	0.0	164.7
	31.50	23.2000	164.7	0.0	164.7
	33.50	23.2100	164.8	0.0	164.8
	35.50	23.2200	164.8	0.0	164.8
	37.50	23.2300	164.8	0.0	164.8
	39.50	23.2400	164.8	0.0	164.8
	41.50	23.2400	164.8	0.0	164.8
	43.50	23.2500	164.8	0.0	164.8
	45.50	23.2500	164.8	0.0	164.8
	47.50	23.2500	164.8	0.0	164.8
	49.50	23.2500	164.8	0.0	164.8
	53.50	23.2700	164.9	0.0	164.9
	57.50	23.2900	164.9	0.0	164.9
	61.50	23.3100	165.0	0.0	165.0
	65.50	23.3200	165.0	0.0	165.0
	69.50	23.3300	165.1	0.0	165.1
	73.50	23.3400	165.1	0.0	165.1
	77.50	23.3500	165.1	0.0	165.1
	81.50	23.3600	165.1	0.0	165.1
	85.50	23.3600	165.1	0.0	165.1

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED TEMPERATURE (°C)	DEVIATION CORRECTION	CORRECTED TEMPERATURE (°C)
	89.50	23.3700	165.1	0.0	165.1
	93.50	23.3700	165.1	0.0	165.1
	97.50	23.3800	165.1	0.0	165.1
	101.50	23.3900	165.2	0.0	165.2
	105.50	23.3900	165.2	0.0	165.2
	106.00	23.3900	165.2	0.0	165.2
WELL SHUT IN AT 08:30 FEBRUARY 06, 1987					
0.25	0.25	23.6800	165.9	0.0	165.9
0.50	0.50	23.8200	166.2	0.0	166.2
0.75	0.75	23.8400	166.3	0.0	166.3
1.00	1.00	23.8500	166.3	0.0	166.3
1.25	1.25	23.8700	166.4	0.0	166.4
1.50	1.50	23.8700	166.4	0.0	166.4
2.00	2.00	23.8600	166.3	0.0	166.3
2.50	2.50	23.8500	166.3	0.0	166.3
3.00	3.00	23.8400	166.3	0.0	166.3
3.50	3.50	23.8300	166.2	0.0	166.2
4.50	4.50	23.8100	166.2	0.0	166.2
5.50	5.50	23.8100	166.2	0.0	166.2
6.50	6.50	23.8100	166.2	0.0	166.2
7.50	7.50	23.8100	166.2	0.0	166.2
9.50	9.50	23.8200	166.2	0.0	166.2
11.50	11.50	23.8300	166.2	0.0	166.2
13.50	13.50	23.8300	166.2	0.0	166.2
15.50	15.50	23.8400	166.3	0.0	166.3
19.50	19.50	23.8500	166.3	0.0	166.3
23.50	23.50	23.8600	166.3	0.0	166.3
27.50	27.50	23.8700	166.4	0.0	166.4
31.50	31.50	23.9100	166.4	0.0	166.4

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED TEMPERATURE (°C)	DEVIATION CORRECTION	CORRECTED TEMPERATURE (°C)
35.50	35.50	23.9300	166.5	0.0	166.5
39.50	39.50	23.9800	166.6	0.0	166.6
43.50	43.50	24.0300	166.7	0.0	166.7
47.50	47.50	24.0700	166.9	0.0	166.9
51.50	51.50	24.1100	166.9	0.0	166.9
55.50	55.50	24.1400	167.0	0.0	167.0
59.50	59.50	24.2000	167.2	0.0	167.2
63.50	63.50	24.2300	167.2	0.0	167.2
67.50	67.50	24.2900	167.3	0.0	167.3
71.50	71.50	24.3100	167.4	0.0	167.4
75.50	75.50	24.3300	167.5	0.0	167.5
79.50	79.50	24.3600	167.5	0.0	167.5
83.50	83.50	24.4200	167.7	0.0	167.7
87.50	87.50	24.4300	167.7	0.0	167.7
91.50	91.50	24.4900	167.8	0.0	167.8
95.50	95.50	24.5400	168.0	0.0	168.0
99.50	99.50	24.5700	168.0	0.0	168.0
103.50	103.50	24.6000	168.1	0.0	168.1
107.50	107.50	24.6200	168.1	0.0	168.1

RECORDERS PULLED AT 20:00 FEBRUARY 10, 1987

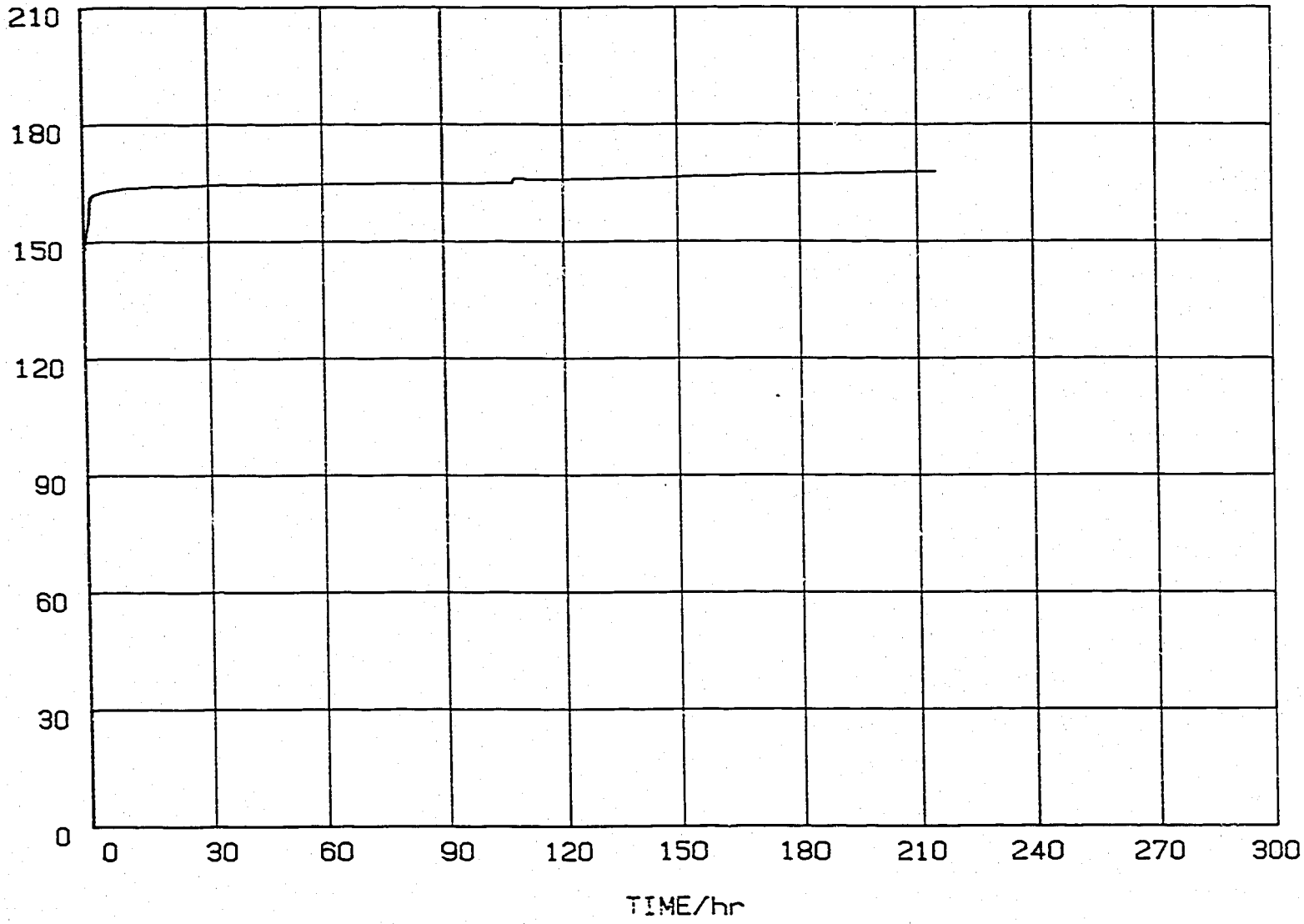
NOTE: BOTTOM RECORDER NUMBER 16295N

BEWS WIRELINE SERVICES LTD

TEMPERATURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: FEBRUARY 01 - 10, 1987
COMPANY: NORTHCOR ENERGY LTD.



Bews Wireline Services Ltd.

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1 BASIC DATA

PAGE ____ of ____

COMPANY Northcor Energy Ltd.
ADDRESS 880, 555 - 4th Avenue S.W.
FIELD and POOL Liard - Nahanni
TYPE OF TEST Static Gradient
ELEVATION N/A m(CF) 723.0 m(KB)
PRODUCING INTERVAL 3250.4 - 3258.4 m KB
MID-POINT OF PRODUCING (MPP) INTERVAL 3254.4 M KB
DATUM DEPTH OF WELL (FROM CF) ____ M
TBG PRESSURE See Remarks kPa G
CSG PRESSURE See Remarks kPa G
TEMPERATURE AT RUN DEPTH 165.7 °C
PRESSURE AT RUN DEPTH ____ kPa G
GRADIENT AT RUN DEPTH ____ kPa m

WELL NAME Northcor et al Liard
WELL IDENTIFIER F-25A
STATUS OIL X GAS ____ OTHER SPECIFY ____
DATE OF TEST ____ 87 (Yr) 02 (Mo) 10 (Day)
TBG 88.9 mm @ ____ mKB
PRODUCING THRU X TBG ____ CSG
POOL DATUM ____ m (subsea)
RUN DEPTH (FROM KB) 3231.9 M
ON BTM 23:04 87 02 10
OFF BTM 23:34 87 02 10
SHUT IN DATE 08:30 87 02 06
PRESSURE MPP ____ kPa G
DATUM DEPTH PRESSURE ____ kPa G

2. RECORDER COMPARISON	TOP	MIDDLE	BOTTOM (TEMPERATURE)
RUN DEPTH	3228.3	3230.1	3231.9 (KB)
PRESSURE AT RUN DEPTH	28380.2	28446.9	kPa G
FINAL	Temperature		165.7 °C
GRADIENT AT RUN DEPTH	2.386	2.909	kPa/m
CLOCK RANGE	3	3 hr D S	3 hr D S
ELEMENT SERIAL/RANGE	15236N/34819	x 40684N/34819	x 16295N/70-233 °C
INNER HOUSING	7088	12984	14585
CALIBRATION EQUATION	691.9 D+(-54.1)	687.5 D+(-22.3)	2.79 D+(93.32)
DATE OF LAST CALIBRATION	87 01 24	87 01 24 (Yr Mo Day)	(Yr Mo Day)

REMARKS:

	Tubing Pressure:	Casing Pressure:
February 10/87 @ 23:04	21830 kPa	21860 kPa
February 10/87 @ 23:34	10500 kPa	10200 kPa

DOWNHOLE EQUIPMENT:

SURVEY COMPANY Otis TEST BY M. Simmons COMPUTED BY R. Hosmar

INSTRUCTIONS: The original of this report shall be filed with the Energy Resources Conservation Board 640 - 5th Avenue S.W. Calgary, Alberta within thirty days of completion of the survey

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F-25A

PAGE OF

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 10, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

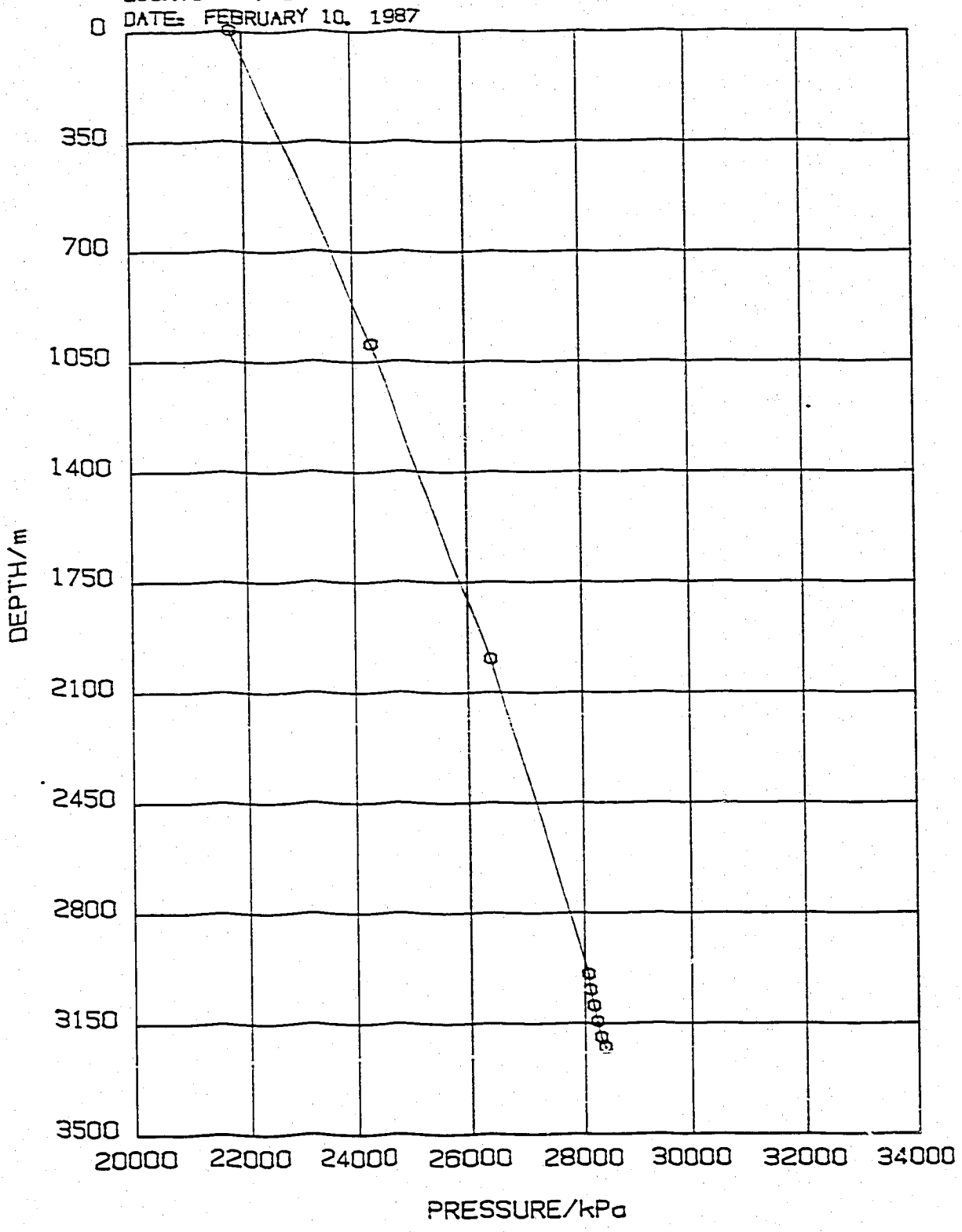
RUN DEPTH (m)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-PC (kPa)	CORRECTED PRESSURE (kPa)	PRESSURE GRADIENT (kPa/m)
0.00	31.6000	21809.9	-8.7	21801.2	
996.40	35.2600	24342.3	4.1	24346.4	2.554
1996.40	38.2300	26397.2	4.1	26401.3	2.055
2996.40	40.6550	28075.1	4.1	28079.2	1.678
3046.40	40.7000	28106.2	4.1	28110.3	0.624
3096.40	40.7900	28168.5	4.1	28172.6	1.246
3146.40	40.8800	28230.8	4.1	28234.9	1.244
3196.40	40.9800	28300.0	4.1	28304.1	1.384
3228.30	41.0900	28376.1	4.1	28380.2	2.386

NOTE: TOP RECORDER NUMBER 15236N

BEWS WIRELINE SERVICES LTD

STATIC GRADIENT PLOT

COMPANY: NORTHCOR ENERGY LTD.
WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A
DATE: FEBRUARY 10, 1987



PAGE OF

Bows Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 10, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

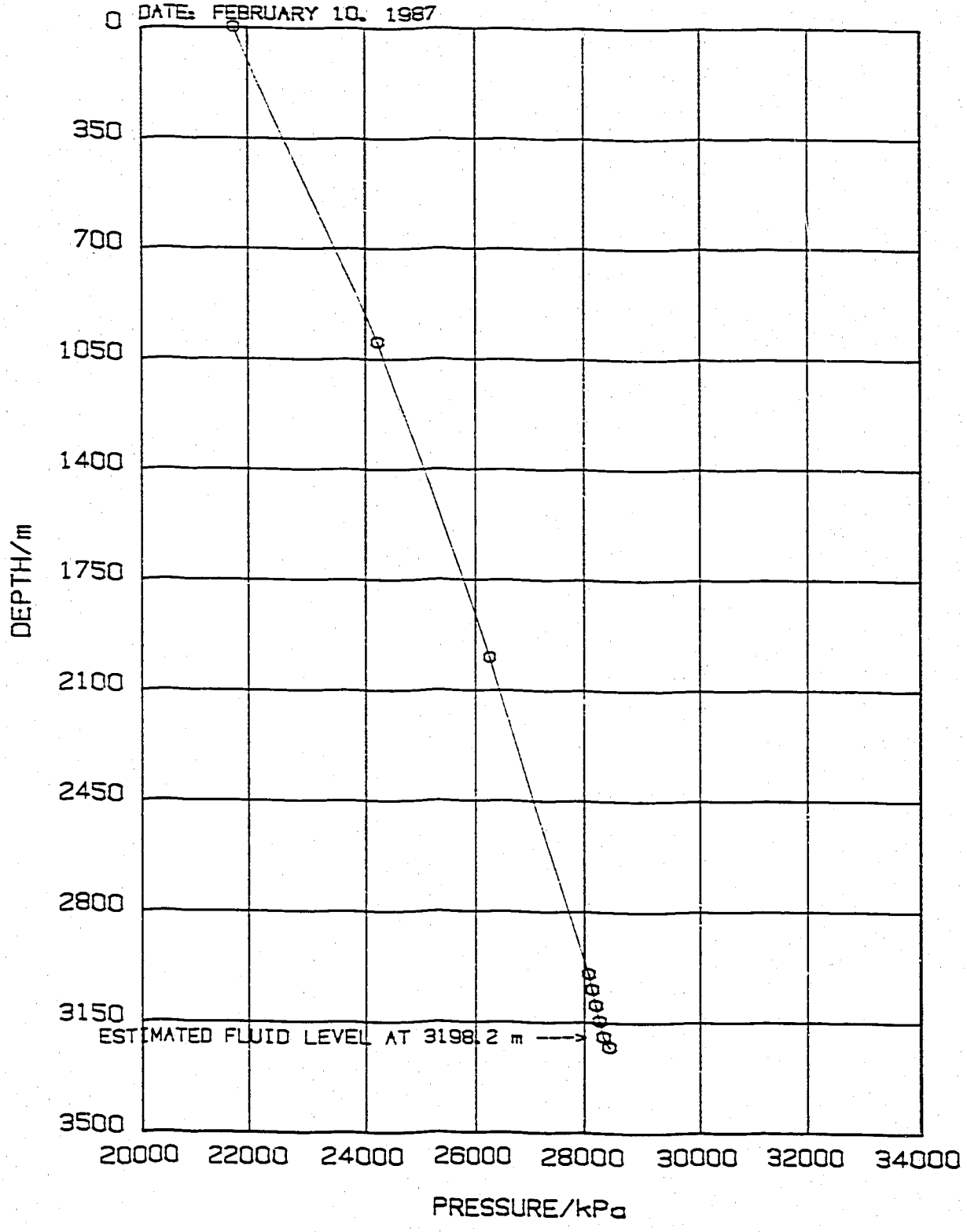
RUN DEPTH (m)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-PC (kPa)	CORRECTED PRESSURE (kPa)	PRESSURE GRADIENT (kPa/m)
0.00	31.6800	21757.7	3.0	21760.7	
998.20	35.3000	24246.5	3.3	24249.8	2.493
1998.20	38.2850	26298.6	3.3	26301.9	2.052
2998.20	40.9000	28096.5	3.3	28099.8	1.798
3048.20	40.9900	28158.3	3.3	28161.6	1.238
3098.20	41.0800	28220.2	3.3	28223.5	1.238
3148.20	41.1750	28285.5	3.3	28288.8	1.306
3198.20	41.2700	28350.8	3.3	28354.1	1.306
3230.10	41.4050	28443.6	3.3	28446.9	2.909

NOTE: MIDDLE RECORDER NUMBER 40684N

BEWS WIRELINE SERVICES LTD

STATIC GRADIENT PLOT

COMPANY: NORTHCOR ENERGY LTD.
WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A
DATE: FEBRUARY 10, 1987



PAGE OF

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1-(403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 10, 1987

WELL NAME: NORTHCUR ET AL LIARD LOCATION: F-25A

TEMPERATURE

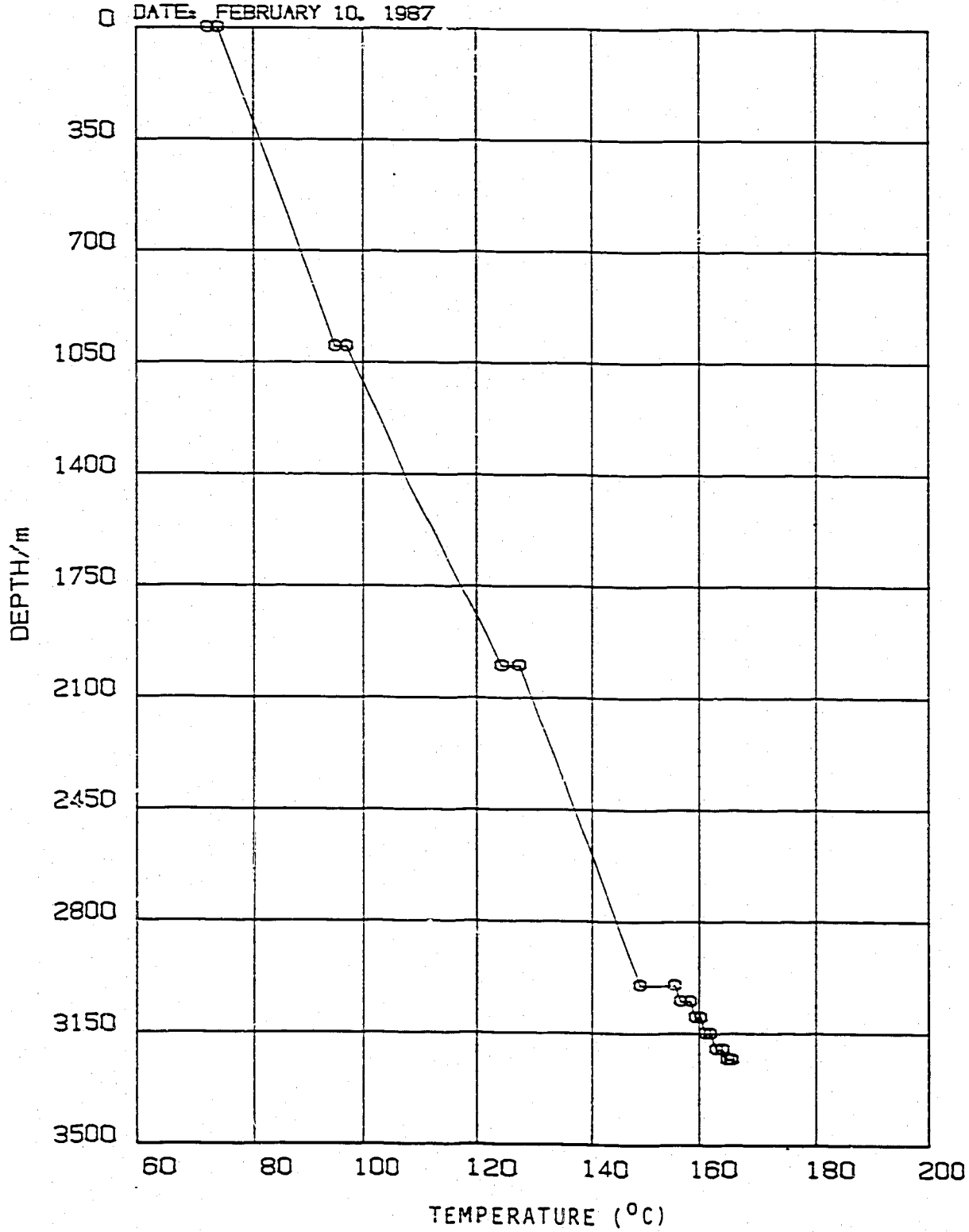
RUN DEPTH (m)	DEFLECTION (mm)	CALCULATED TEMPERATURE (°C)	DEVIATION CORRECTION	CORRECTED TEMPERATURE (°C)	TEMPERATURE GRADIENT (°C/m)
0.00	72.0000	72.0	0.0	72.0	
0.00	73.7000	73.7	0.0	73.7	
1000.00	94.7000	94.7	0.0	94.7	0.021
1000.00	96.9000	96.9	0.0	96.9	
2000.00	124.3000	124.3	0.0	124.3	0.027
2000.00	127.1000	127.1	0.0	127.1	
3000.00	148.8000	148.8	0.0	148.8	0.022
3000.00	155.4000	155.4	0.0	155.4	
3050.00	156.5000	156.5	0.0	156.5	0.022
3050.00	158.3000	158.3	0.0	158.3	
3100.00	159.2000	159.2	0.0	159.2	0.018
3100.00	160.3000	160.3	0.0	160.3	
3150.00	161.1000	161.1	0.0	161.1	0.016
3150.00	162.1000	162.1	0.0	162.1	
3200.00	163.2000	163.2	0.0	163.2	0.022
3200.00	164.2000	164.2	0.0	164.2	
3231.90	165.1000	165.1	0.0	165.1	0.028
3231.90	165.7000	165.7	0.0	165.7	

NOTE: BOTTOM RECORDER NUMBER 16295N

BEWS WIRELINE SERVICES LTD

TEMPERATURE PLOT

COMPANY: NORTHCOR ENERGY LTD.
WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A
DATE: FEBRUARY 10, 1987



Bews Wireline Services Ltd.

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1. BASIC DATA

PAGE ____ of ____

COMPANY Northcor Energy Ltd.
ADDRESS 880, 555 - 4th Avenue S.W.
FIELD and POOL Liard - Nahanni
TYPE OF TEST Flow
ELEVATION N/A m(CF) 723.0 m(KB)
PRODUCING INTERVAL 3250.4 - 3258.4 m KB
MID-POINT OF PRODUCING (MPP) INTERVAL 3254.4 M KB
DATUM DEPTH OF WELL (FROM CF) ____ M
TBG PRESSURE See Remarks kPa G
CSG PRESSURE 10,000 Throughout kPa G
TEMPERATURE AT RUN DEPTH 151.7 °C
PRESSURE AT RUN DEPTH ____ kPa G
GRADIENT AT RUN DEPTH ____ kPa m

WELL NAME Northcor et al Liard
WELL IDENTIFIER F-25A
STATUS: OIL X GAS ____ OTHER SPECIFY ____
DATE OF TEST ____ 87 (Yr) 02 (Mo) 13 - 15 (Day)
TBG 88.9 mm @ ____ mKB
PRODUCING THRU X TBG ____ CSG
POOL DATUM ____ m (subsea)
RUN DEPTH (FROM KB) 3221.6 M
ON BTM 14:33 87 02 13
OFF BTM 15:26 87 02 15
SHUT IN DATE 15:00 87 02 15 (Yr Mo Day)
PRESSURE MPP ____ kPa G
DATUM DEPTH PRESSURE ____ kPa G

2. RECORDER COMPARISON

	TOP	MIDDLE	BOTTOM
RUN DEPTH	3218.0	3219.8	3221.6 KB
PRESSURE AT RUN DEPTH			kPa G
FINAL BUILDUP PRESSURE	17545.5	17540.3	17505.4 kPa G
GRADIENT AT RUN DEPTH			kPa/m
CLOCK RANGE	360	360 hr D/S X	360 hr D/S X
ELEMENT SERIAL/RANGE	48898N/34474	x 25544N/33095	x 15230N/35163
INNER HOUSING	60451	x 55315	x 15667
CALIBRATION EQUATION	687.9 D+(57.9)	657.2 D+(-1.8)	692.8 D+(9.2)
DATE OF LAST CALIBRATION	87 02 11	87 02 11	87 02 11
		(Yr Mo Day)	(Yr Mo Day)

REMARKS: Tubing Pressure:
February 13/87 21800 kPa
February 15/87 14020 kPa

DOWNHOLE EQUIPMENT ____

SURVEY COMPANY Otis TEST BY M. Simmons COMPUTED BY R. Hosmar

INSTRUCTIONS The original of this report shall be filed with the Energy Resources Conservation Board 640 5th Avenue S.W. Calgary Alberta within thirty days of completion of the survey

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F-25A

PAGE OF

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY DATE: FEB 13-15/87

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
GAUGES ON BOTTOM @ 14:33 FEBRUARY 13, 1987 @ 3218.0 MKB					
0.00	0.00	41.5798	28660.6	1.0	28661.6
0.45	0.45	41.5798	28660.6	1.0	28661.6
OPENED WELL @ 15:00 FEBRUARY 13, 1987					
	0.02	38.5064	26546.5	1.0	26547.5
	0.08	38.4810	26529.0	1.0	26530.0
	0.50	34.7574	23967.5	9.7	23977.2
	1.00	30.1600	20804.9	14.3	20819.2
	1.50	28.3464	19557.4	14.3	19571.7
	1.83	28.3667	19571.4	14.3	19585.7
	2.00	28.1178	19400.1	14.3	19414.4
	2.50	27.0358	18655.8	14.3	18670.1
	3.00	26.4160	18229.5	14.3	18243.8
	3.50	25.9334	17897.5	14.9	17912.4
	4.00	25.5524	17635.4	14.9	17650.3
	4.50	25.1892	17385.5	14.9	17400.4
	5.00	24.8666	17163.6	14.9	17178.5
	5.50	24.5720	16961.0	14.9	16975.9

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	6.00	24.3256	16791.5	14.9	16806.4
	7.00	23.8633	16473.5	14.9	16488.4
	8.00	23.4950	16220.1	14.9	16235.0
	9.00	23.1902	16010.4	14.9	16025.3
	10.00	22.9235	15827.0	14.9	15841.9
	11.00	22.7051	15676.7	14.9	15691.6
	12.00	22.4790	15521.2	14.9	15536.1
	14.00	22.0980	15259.1	14.9	15274.0
	16.00	21.7856	15044.2	14.9	15059.1
	18.00	21.5163	14859.0	19.1	14878.1
	20.00	21.3309	14731.4	19.1	14750.5
	22.00	21.1658	14617.9	19.1	14637.0
	24.00	21.0287	14523.5	19.1	14542.6
	26.00	20.9067	14439.6	19.1	14458.7
	28.00	20.8128	14375.0	19.1	14394.1
	30.00	20.7264	14315.6	19.1	14334.7
	32.00	20.5486	14193.3	19.1	14212.4
	34.00	20.4495	14125.1	19.1	14144.2
	36.00	20.3886	14083.2	19.1	14102.3
	37.55	20.3352	14046.5	19.1	14065.6

CLOCK STOPPED AT APPROX. 04:58 FEBRUARY 15, 1987

FINAL FLOW PRESSURE

	48.0	20.1930	13948.7	19.1	13967.8

SHUT WELL IN FOR BUILDUP @ 15:00 FEBRUARY 15, 1987

0.43	0.43	25.4000	17530.6	14.9	17545.5

GAUGES PULLED @ 1526 FEBRUAURY 15, 1987

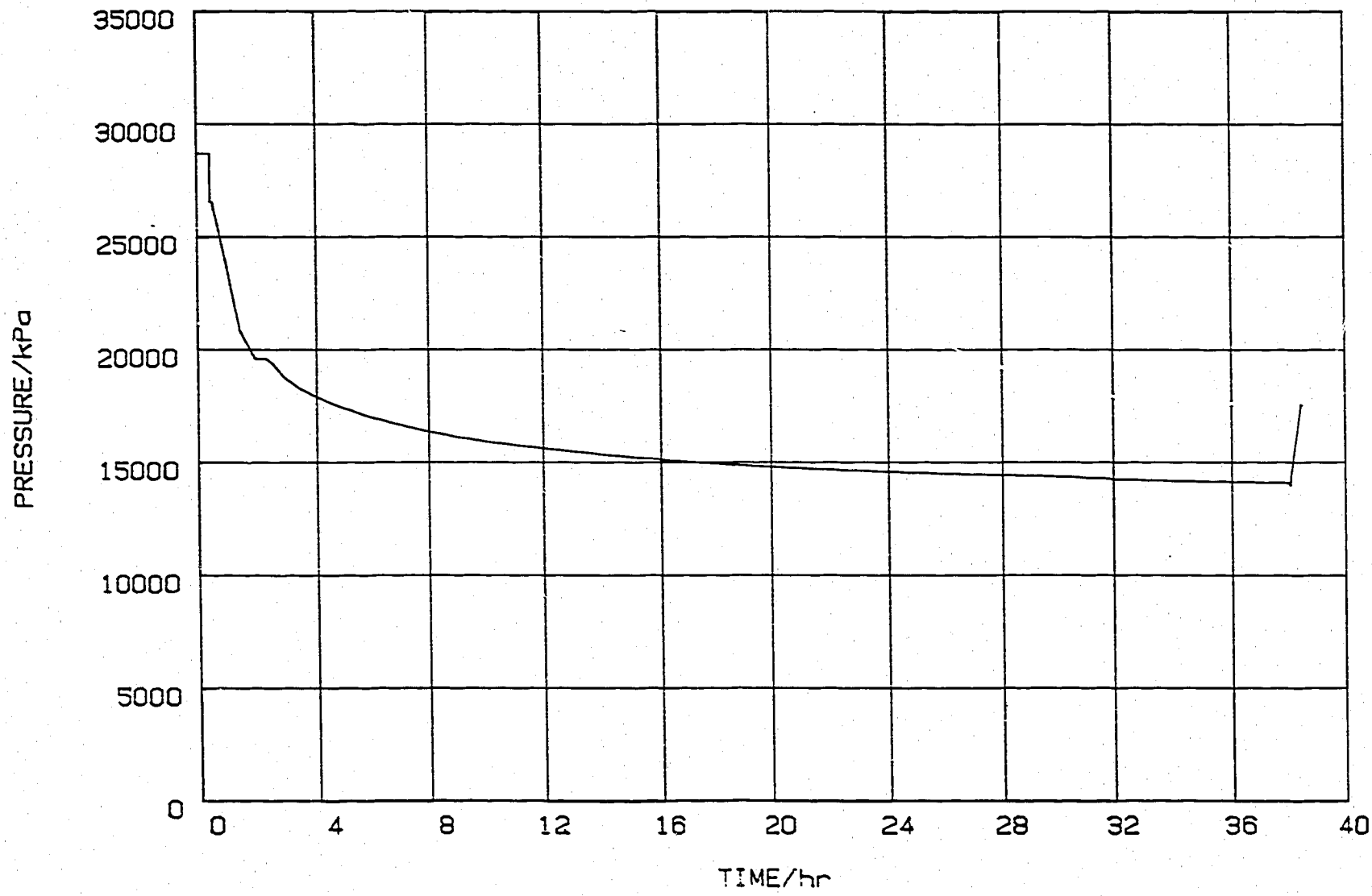
NOTE: TOP RECORDER NUMBER 48898N

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: FEB 13-15/87
COMPANY: NORTHCOR ENERGY



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Bews Wireline Services Ltd.

1450,633 – 6 Avenue S.W. Calgary,Alberta * 1– (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY DATE: FEB 13-15/87

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
GAUGES ON BOTTOM @ 14:33 FEBRUARY 13, 1987 @ 3219.8 MKB					
	0.00	43.5356	28609.8	-5.3	28604.5
	0.45	43.5356	28609.8	-5.3	28604.5
ENED WELL @ 15:00 FEBRUARY 13, 1987					
	0.02	40.0507	26319.5	-5.3	26314.2
	0.08	40.0126	26294.5	-5.3	26289.2
	0.50	37.5920	24703.7	-5.3	24698.4
	1.00	34.2138	22483.5	-13.1	22470.4
	1.50	30.4292	19996.3	-17.4	19978.9
	1.83	29.6875	19508.8	-17.4	19491.4
	2.00	29.6926	19512.2	-17.4	19494.8
	2.50	29.4361	19343.6	-17.4	19326.2
	3.00	28.3896	18655.8	-17.4	18638.4
	3.50	27.7876	18260.2	-17.4	18242.8
	4.00	27.3558	17976.4	-18.8	17957.6
	4.50	26.9799	17729.4	-18.8	17710.6
	5.00	26.6446	17509.0	-18.8	17490.2
	5.50	26.3398	17308.7	-18.8	17289.9

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	6.00	26.0528	17120.1	-18.8	17101.3
	7.00	25.5778	16807.9	-18.8	16789.1
	8.00	25.1460	16524.2	-18.8	16505.4
	9.00	24.8031	16298.8	-18.8	16280.0
	10.00	24.5364	16123.5	-18.8	16104.7
	11.00	24.2824	15956.6	-18.8	15937.8
	12.00	24.0640	15813.0	-18.8	15794.2
	14.00	23.6677	15552.6	-18.8	15533.8
	16.00	23.3172	15322.3	-18.8	15303.5
	18.00	23.0251	15130.3	-18.8	15111.5
	20.00	22.7889	14975.1	-17.3	14957.8
	22.00	22.6238	14866.5	-17.3	14849.2
	24.00	22.4714	14766.4	-17.3	14749.1
	26.00	22.3444	14682.9	-17.3	14665.6
	28.00	22.2199	14601.1	-17.3	14583.8
	30.00	22.1234	14537.7	-17.3	14520.4
	32.00	22.0396	14482.6	-17.3	14465.3
	34.00	21.8567	14362.4	-17.3	14345.1
	36.00	21.7703	14305.7	-17.3	14288.4
	38.00	21.7094	14265.6	-17.3	14248.3
	40.00	21.6408	14220.5	-17.3	14203.2
	42.00	21.5773	14178.8	-17.3	14161.5
	44.00	21.5138	14137.1	-17.3	14119.8
	46.00	21.4630	14103.7	-17.3	14086.4
	48.00	21.4071	14067.0	-17.3	14049.7
SHUT WELL IN FOR BUILDUP @ 15:00 FEBRUARY 15, 1987					
0.43	0.43	26.7208	17559.1	-18.8	17540.3
GAUGES PULLED @ 15:26 FEBRUARY 15, 1987					

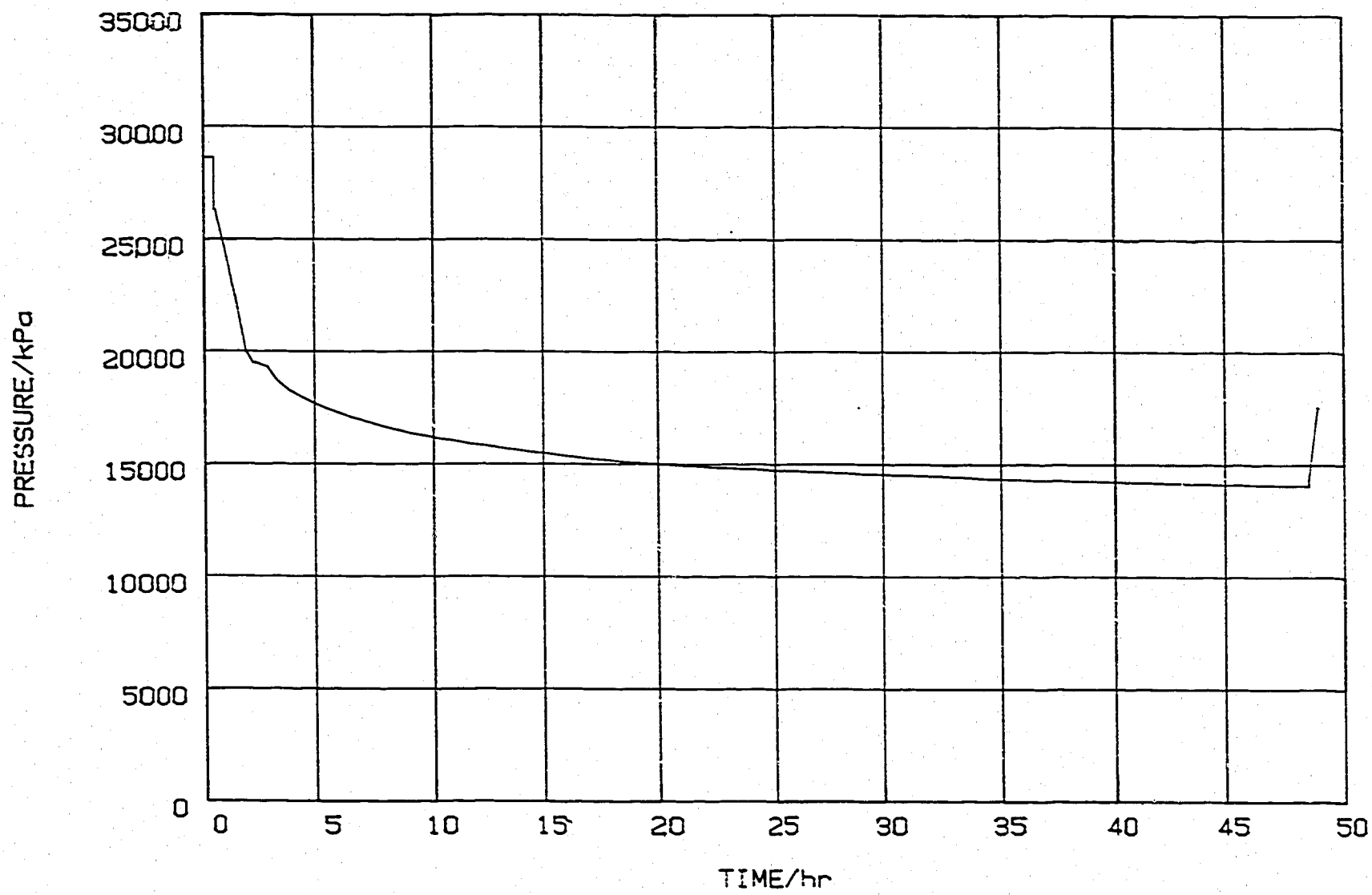
NOTE: MIDDLE RECORDER NUMBER 25644N

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: FEB 13-15/87
COMPANY: NORTHCOR ENERGY



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Bews Wireline Services Ltd.

1450,633 – 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY DATE: FEB. 13 - 15, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
GAUGES ON BOTTOM @ 14:33 FEBRUARY 13, 1987 @ 3221.6 MKB					
	0.00	41.3309	28643.2	-2.8	28640.4
	0.45	41.3309	28643.2	-2.8	28640.4
OPENED WELL @ 15:00 FEBRUARY 13, 1987					
	0.02	38.1254	26422.5	-2.8	26419.7
	0.08	38.0822	26392.6	-2.8	26389.8
	0.50	35.5648	24648.5	-2.8	24645.7
	1.00	32.1615	22290.7	-12.7	22278.0
	1.50	28.7706	19941.5	-18.8	19922.7
	1.83	28.1432	19506.8	-18.8	19488.0
	2.00	28.1508	19512.1	-18.8	19493.3
	2.50	27.7368	19225.3	-18.8	19206.5
	3.00	26.7792	18561.8	-18.8	18543.0
	3.50	26.2128	18169.4	-18.8	18150.6
	4.00	25.7810	17870.3	-12.9	17857.4
	4.50	25.4432	17636.2	-12.9	17623.3
	5.00	25.1155	17409.2	-12.9	17396.3
	5.50	24.8107	17198.1	-12.9	17185.2

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	6.00	24.5491	17016.8	-12.9	17003.9
	7.00	24.0792	16691.3	-12.9	16678.4
	8.00	23.6982	16427.3	-12.9	16414.4
	9.00	23.3731	16202.1	-12.9	16189.2
	10.00	23.0886	16005.0	-12.9	15992.1
	11.00	22.8600	15846.6	-12.9	15833.7
	12.00	22.6568	15705.8	-12.9	15692.9
	14.00	22.2910	15452.4	-12.9	15439.5
	16.00	21.9634	15225.4	-12.9	15212.5
	18.00	21.7195	15056.5	-12.9	15043.6
	20.00	21.5062	14908.7	-11.1	14897.6
	22.00	21.3436	14796.1	-11.1	14785.0
	24.00	21.2090	14702.8	-11.1	14691.7
	26.00	21.0871	14618.3	-11.1	14607.2
	28.00	20.9804	14544.4	-11.1	14533.3
	30.00	20.8940	14484.6	-11.1	14473.5
	32.00	20.7848	14408.9	-11.1	14397.8
	34.00	20.6477	14313.9	-11.1	14302.8
	36.00	20.5715	14261.1	-11.1	14250.0
	38.00	20.5029	14213.6	-11.1	14202.5
	40.00	20.4470	14174.9	-11.1	14163.8
	42.00	20.3810	14129.1	-11.1	14118.0
	44.00	20.3200	14086.9	-11.1	14075.8
	46.00	20.2692	14051.7	-11.1	14040.6
	48.00	20.2336	14027.1	-11.1	14016.0

SHUT WELL IN FOR BUILDUP @ 15:00 FEBRUARY 15, 1987

0.43	0.43	25.2730	17518.3	-12.9	17505.4

GAUGES PULLED @ 15:26 FEBRUARY 15, 1987

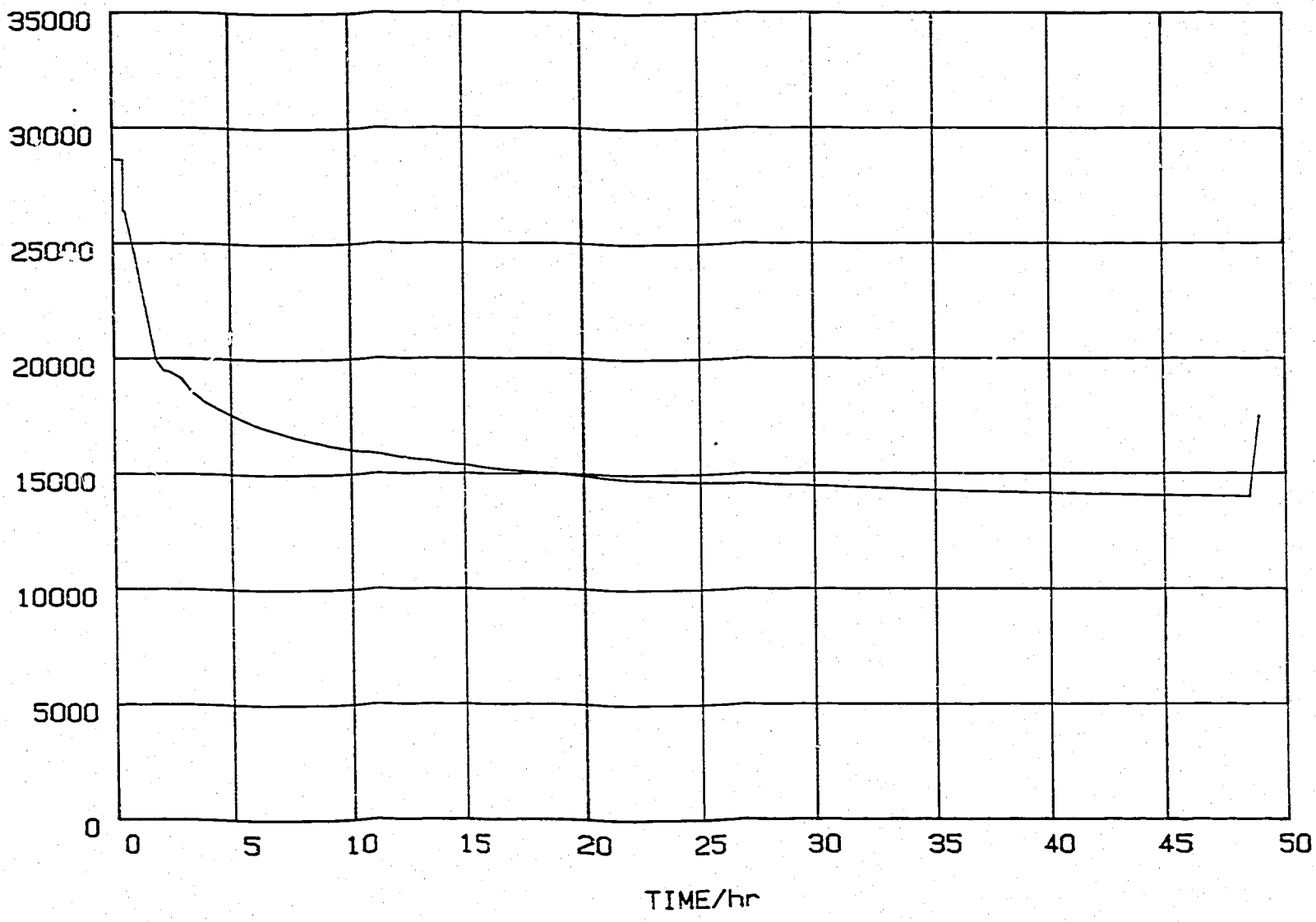
NOTE: BOTTOM RECORDER NUMBER 15230N

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: FEB. 13 - 15. 1987
COMPANY: NORTHCOR ENERGY



Bews Wireline Services Ltd.

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1 BASIC DATA

PAGE ____ of ____

COMPANY	Northcor Energy Ltd.	WELL NAME	Northcor et al Liard
ADDRESS	880, 555 - 4th Avenue S.W.	WELL IDENTIFIER	F-25A
FIELD and POOL	Liard - Nahanni	STATUS OIL X GAS ____ OTHER SPECIFY ____	
TYPE OF TEST	Single Point & Buildup	DATE OF TEST	87 (Yr) 02 (Mo) 15 - 21 (Day)
ELEVATION	N/A m(CF) 723.0 m(KB)	TBG	88.9 mm @ ____ mKB
PRODUCING INTERVAL	3250.4 - 3258.4 m KB	PRODUCING THRU	X TBG ____ CSG
MID-POINT OF PRODUCING (MPP) INTERVAL	3254.4 M KB	POOL DATUM	____ m (subsea)
DATUM DEPTH OF WELL (FROM CF)	____ M	RUN DEPTH (FROM KB)	3223.0 M
TBG PRESSURE	22000 Feb. 18/87 kPa G	ON BTM	17:52 87 02 15
CSG PRESSURE	N/A kPa G	OFF BTM	19:05 87 02 21
TEMPERATURE AT RUN DEPTH	See Remarks °C	SHUT IN DATE	18:30 87 02 17
PRESSURE AT RUN DEPTH	____ kPa G	PRESSURE MPP	____ kPa G
GRADIENT AT RUN DEPTH	____ kPa m	DATUM DEPTH PRESSURE	____ kPa G

2 RECORDER COMPARISON

	TOP	MIDDLE	BTM
RUN DEPTH	3219.4	3221.2	3223.0 KB
PRESSURE AT RUN DEPTH			kPa G
FINAL BUILDUP PRESSURE	28407.3	*See Remarks	28258.8 kPa G
GRADIENT AT RUN DEPTH			kPa/m
CLOCK RANGE	360	360 hr D S	360 hr D S
ELEMENT SERIAL/RANGE	48898N/34475 X	*25644N/33096 X	15230N/35165 X
INNER HOUSING	60451	* 55315	* 15667
CALIBRATION EQUATION	687.9 D+(57.9)	657.2 D+(-1.8)	692.8 D+(9.2)
DATE OF LAST CALIBRATION	87 02 11	87 02 11	87 02 11
		(Yr Mo Day)	(Yr Mo Day)

REMARKS: *Note: Middle recorder # 25644N malfunctioned at approx. 18:40 February 17, 1987. Replaced 25644N with recorder # 19639N at 20:39 February 19, 1987. Recorder # 19639N also malfunctioned. No pressures available during this time. See computer printout sheets.

Temperature:
February 18/87 154.4°C
February 19/87 157.2°C

SURVEY COMPANY Otis TEST BY S. Dulyk COMPUTED BY R. Hosmar

INSTRUCTIONS: The original of this report shall be filed with the Energy Resources Conservation Board 640 5th Avenue S.W. Calgary Alberta within thirty days of completion of the survey

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F-25A

PAGE OF

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 15 - 21, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 17:52 FEBRUARY 15, 1987 AT 3219.4 M KB					
1.37	0.00	31.0100	21389.7	9.7	21399.4
2.00	0.63	31.0100	21389.7	9.7	21399.4
WELL OPENED TO FLOW AT 18:30 FEBRUARY 15, 1987					
	0.08	27.7700	19160.9	14.3	19175.2
	0.17	25.4400	17558.1	14.9	17573.0
	0.25	23.8300	16450.6	14.9	16465.5
	0.50	23.3800	16141.0	14.9	16155.9
	0.75	23.1300	15969.0	14.9	15983.9
	1.00	22.0500	15226.1	14.9	15241.0
	1.25	21.4200	14792.7	19.1	14811.8
	1.50	21.2000	14641.4	19.1	14660.5
	2.00	20.9900	14496.9	19.1	14516.0
	2.50	20.7400	14324.9	19.1	14344.0
	3.00	20.5600	14201.1	19.1	14220.2
	3.50	20.5800	14214.9	19.1	14234.0
	4.00	20.5600	14201.1	19.1	14220.2
	4.50	20.3600	14063.5	19.1	14082.6

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	5.00	20.2500	13987.9	19.1	14007.0
	5.50	20.0300	13836.5	19.1	13855.6
	6.50	19.8800	13733.4	19.1	13752.5
	7.50	19.8000	13678.3	19.1	13697.4
	8.50	19.7600	13650.8	19.1	13669.9
	9.50	19.6900	13602.7	19.1	13621.8
	10.50	19.6700	13588.9	19.1	13608.0
	11.50	19.6400	13568.3	19.1	13587.4
	12.50	19.6100	13547.6	19.1	13566.7
	13.50	19.6000	13540.7	19.1	13559.8
	14.50	19.5700	13520.1	19.1	13539.2
	15.50	19.5400	13499.5	19.1	13518.6
	16.50	19.5200	13485.7	19.1	13504.8
	17.50	19.5000	13472.0	19.1	13491.1
	19.50	19.4700	13451.3	19.1	13470.4
	21.50	19.4400	13430.7	19.1	13449.8
	23.50	19.3700	13382.5	19.1	13401.6
	25.50	19.3300	13355.0	19.1	13374.1
	27.50	19.2900	13327.5	19.1	13346.6
	29.50	19.2700	13313.7	19.1	13332.8
	31.50	19.2400	13293.1	19.1	13312.2
	33.50	19.2100	13272.5	19.1	13291.6
	35.50	19.2000	13265.6	19.1	13284.7
	37.50	19.1800	13251.8	19.1	13270.9
	39.50	19.1600	13238.1	19.1	13257.2
	41.50	19.1400	13224.3	19.1	13243.4
	43.50	19.1300	13217.4	19.1	13236.5
	45.50	19.1200	13210.6	19.1	13229.7
	47.50	19.1200	13210.6	19.1	13229.7
	48.00	19.1200	13210.6	19.1	13229.7

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
SHUT WELL IN FOR BUILDUP AT 18:30 FEBRUARY 17, 1987					
0.25	0.25	22.6800	15659.5	14.9	15674.4
CHART CARRIER SKIPPED AHEAD AT APPROX. 18:45 FEBRUARY 17, 1987					
MAXIMUM DEFLECTION RECORDED					
4.08	4.08	31.6400	21823.1	9.7	21832.8
RECORDERS PULLED AT 22:35 FEBRUARY 17, 1987					
RECORDERS RE-RUN AT 00:44 FEBRUARY 18, 1987 AT 3219.4 M KB					
6.76	6.76	34.0000	23446.5	9.7	23456.2
6.86	6.86	34.3870	23712.7	9.7	23722.4
6.98	6.98	34.4720	23771.2	9.7	23780.9
7.00	7.00	34.6280	23878.5	9.7	23888.2
7.51	7.51	34.7120	23936.3	9.7	23946.0
7.55	7.55	34.8910	24059.4	1.0	24060.4
7.65	7.65	34.9720	24115.1	1.0	24116.1
7.68	7.68	35.1210	24217.6	1.0	24218.6
8.00	8.00	35.1580	24243.1	1.0	24244.1
8.31	8.31	35.1890	24264.4	1.0	24265.4
8.34	8.34	35.4470	24441.9	1.0	24442.9
9.00	9.00	35.8780	24738.4	1.0	24739.4
9.52	9.52	36.1590	24931.7	1.0	24932.7
9.84	9.84	36.1750	24942.7	1.0	24943.7
9.88	9.88	36.3900	25090.6	1.0	25091.6
10.00	10.00	36.4380	25123.6	1.0	25124.6
10.33	10.33	36.4630	25140.8	1.0	25141.8
10.37	10.37	36.6560	25273.6	1.0	25274.6

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
10.86	10.86	36.7470	25336.2	1.0	25337.2
10.87	10.87	36.9010	25442.1	1.0	25443.1
11.00	11.00	36.9500	25475.8	1.0	25476.8
11.34	11.34	36.9840	25499.2	1.0	25500.2
11.35	11.35	37.1710	25627.8	1.0	25628.8
11.84	11.84	37.2600	25689.1	1.0	25690.1
11.85	11.85	37.4010	25786.1	1.0	25787.1
12.00	12.00	37.4520	25821.1	1.0	25822.1
12.30	12.30	37.5000	25854.2	1.0	25855.2
12.31	12.31	37.6410	25951.1	1.0	25952.1
12.81	12.81	37.7520	26027.5	1.0	26028.5
12.84	12.84	37.8840	26118.3	1.0	26119.3
13.33	13.33	37.9680	26176.1	1.0	26177.1
13.35	13.35	38.0890	26259.3	1.0	26260.3
13.86	13.86	38.1710	26315.7	1.0	26316.7
13.87	13.87	38.3180	26416.9	1.0	26417.9
14.00	14.00	38.3540	26441.6	1.0	26442.6
14.39	14.39	38.3800	26459.5	1.0	26460.5
14.46	14.46	38.4320	26495.3	1.0	26496.3
14.58	14.58	38.4620	26515.9	1.0	26516.9
14.60	14.60	38.5820	26598.5	1.0	26599.5
15.09	15.09	38.6590	26651.4	1.0	26652.4
15.11	15.11	38.7640	26723.7	1.0	26724.7
15.57	15.57	38.8310	26769.7	1.0	26770.7
15.60	15.60	38.9180	26829.6	1.0	26830.6
16.00	16.00	38.9800	26872.2	1.0	26873.2
16.05	16.05	38.9880	26877.7	1.0	26878.7
16.08	16.08	39.0730	26936.2	1.0	26937.2
16.54	16.54	39.1450	26985.7	1.0	26986.7
16.58	16.58	39.2480	27056.6	1.0	27057.6

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
17.07	17.07	39.3110	27099.9	1.0	27100.9
17.08	17.08	39.3970	27159.1	1.0	27160.1
17.60	17.60	39.4720	27210.7	1.0	27211.7
17.67	17.67	39.5410	27258.2	1.0	27259.2
18.00	18.00	39.5920	27293.2	1.0	27294.2
18.05	18.05	39.5920	27293.2	1.0	27294.2
18.06	18.06	39.6520	27334.5	1.0	27335.5
18.58	18.58	39.7190	27380.6	1.0	27381.6
18.62	18.62	39.7780	27421.2	1.0	27422.2
19.12	19.12	39.8430	27465.9	1.0	27466.9
19.13	19.13	39.8920	27499.6	1.0	27500.6
19.55	19.55	39.9390	27531.9	1.0	27532.9
19.62	19.62	39.9800	27560.1	1.0	27561.1
20.00	20.00	40.0300	27594.5	1.0	27595.5
20.10	20.10	40.0320	27595.9	1.0	27596.9
20.11	20.11	40.0700	27622.1	1.0	27623.1
20.56	20.56	40.1150	27653.0	1.0	27654.0
20.63	20.63	40.1490	27676.4	1.0	27677.4
21.07	21.07	40.2020	27712.9	1.0	27713.9
21.56	21.56	40.2700	27759.6	1.0	27760.6
22.00	22.00	40.3460	27811.9	1.0	27812.9
24.00	24.00	40.5780	27971.5	1.0	27972.5
26.00	26.00	40.7290	28075.4	1.0	28076.4
28.00	28.00	40.8100	28131.1	1.0	28132.1
30.00	30.00	40.8730	28174.4	1.0	28175.4
32.00	32.00	40.9080	28198.5	1.0	28199.5
34.00	34.00	40.9310	28214.3	1.0	28215.3
36.00	36.00	40.9400	28220.5	1.0	28221.5
38.00	38.00	40.9420	28221.9	1.0	28222.9
40.00	40.00	40.9450	28224.0	1.0	28225.0

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
42.00	42.00	40.9470	28225.3	1.0	28226.3
44.00	44.00	40.9490	28226.7	1.0	28227.7
46.00	46.00	40.9590	28233.6	1.0	28234.6

LOCK STOPPED AT APPROX. 16:30 FEBRUARY 19, 1987

ECORDERS PULLED AT 18:53 FEBRUARY 19, 1987

RECORDERS RE-RUN AT 20:39 FEBRUARY 19, 1987 AT 3219.4 M KB

50.15	50.15	41.1200	28344.4	1.0	28345.4
50.50	50.50	41.1300	28351.2	1.0	28352.2
51.00	51.00	41.1400	28358.1	1.0	28359.1
51.50	51.50	41.1500	28365.0	1.0	28366.0
52.50	52.50	41.1600	28371.9	1.0	28372.9
53.50	53.50	41.1700	28378.7	1.0	28379.7
55.50	55.50	41.1800	28385.6	1.0	28386.6
57.50	57.50	41.1800	28385.6	1.0	28386.6
59.50	59.50	41.1800	28385.6	1.0	28386.6
61.50	61.50	41.1900	28392.5	1.0	28393.5
63.50	63.50	41.1900	28392.5	1.0	28393.5
65.50	65.50	41.1900	28392.5	1.0	28393.5
67.50	67.50	41.2000	28399.4	1.0	28400.4
69.50	69.50	41.2000	28399.4	1.0	28400.4
71.50	71.50	41.2000	28399.4	1.0	28400.4
73.50	73.50	41.2100	28406.3	1.0	28407.3
75.50	75.50	41.2100	28406.3	1.0	28407.3
77.50	77.50	41.2100	28406.3	1.0	28407.3
79.50	79.50	41.2100	28406.3	1.0	28407.3
81.50	81.50	41.2100	28406.3	1.0	28407.3
83.50	83.50	41.2100	28406.3	1.0	28407.3

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CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
85.50	85.50	41.2100	28406.3	1.0	28407.3
87.50	87.50	41.2100	28406.3	1.0	28407.3
89.50	89.50	41.2100	28406.3	1.0	28407.3
91.50	91.50	41.2100	28406.3	1.0	28407.3
93.50	93.50	41.2100	28406.3	1.0	28407.3
95.50	95.50	41.2100	28406.3	1.0	28407.3
96.58	96.58	41.2100	28406.3	1.0	28407.3

RECORDERS PULLED AT 19:05 FEBRUARY 21, 1987

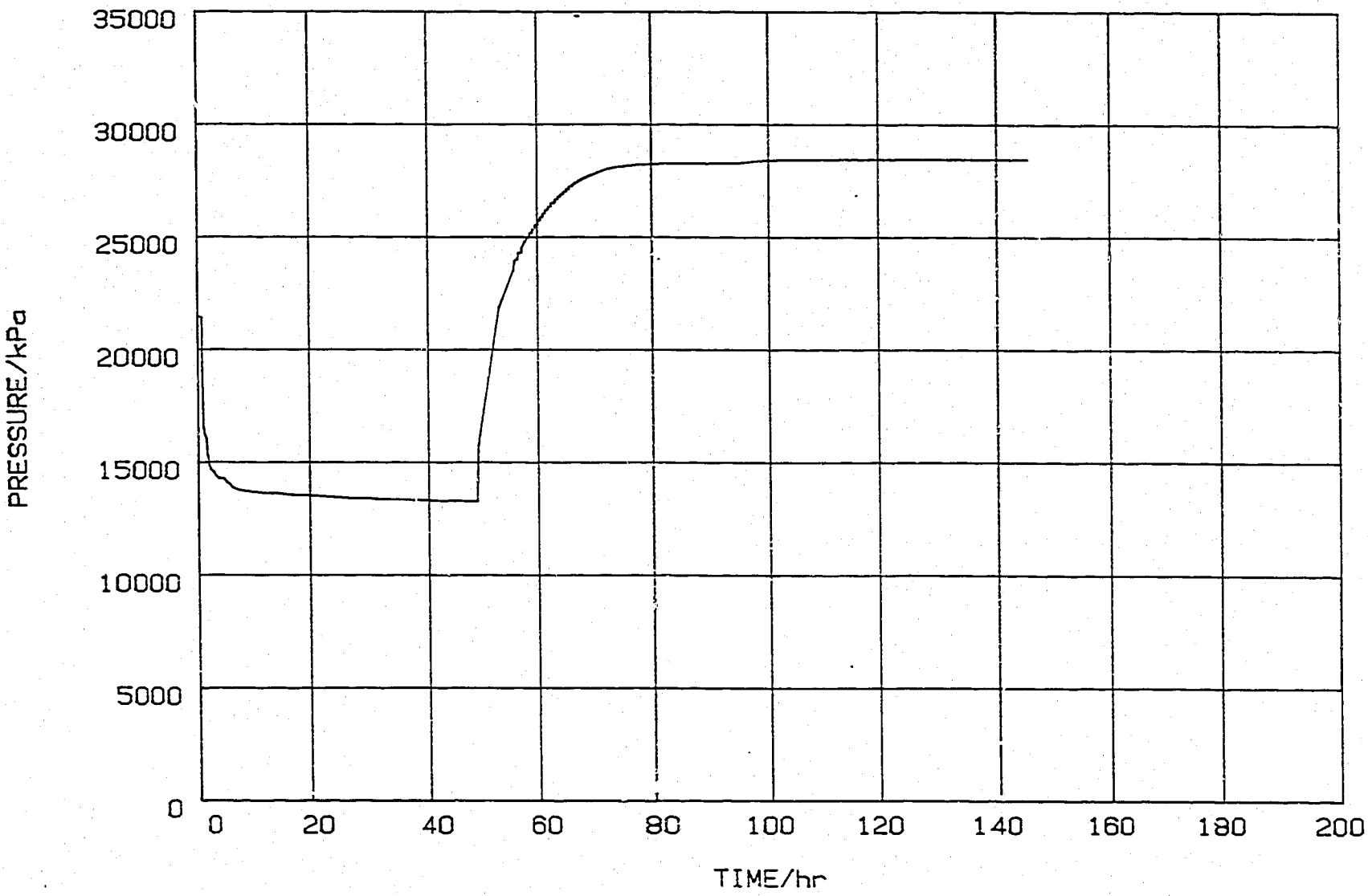
NOTE: TOP RECORDER NUMBER 48898N

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: FEBRUARY 15 - 21, 1987
COMPANY: NORTHCOR ENERGY LTD.



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Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 15 - 21, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 17:52 FEBRUARY 15, 1987 AT 3221.2 M KB					
1.37	0.00	33.8100	22218.1	-13.1	22205.0
2.00	0.63	33.8100	22218.1	-13.1	22205.0
WELL OPENED TO FLOW AT 18:30 FEBRUARY 15, 1987					
	0.00	31.0000	20371.4	-17.4	20354.0
	0.17	29.8900	19641.9	-17.4	19624.5
	0.25	28.5800	18781.0	-17.4	18763.6
	0.50	26.3900	17341.7	-18.8	17322.9
	0.75	24.5600	16139.0	-18.8	16120.2
	1.00	23.7300	15593.6	-18.8	15574.8
	1.25	23.4700	15422.7	-18.8	15403.9
	1.50	22.8500	15015.2	-18.8	14996.4
	2.00	22.5200	14798.3	-17.3	14781.0
	2.50	22.2000	14588.0	-17.3	14570.7
	3.00	22.0300	14476.3	-17.3	14459.0
	3.50	21.9900	14450.0	-17.3	14432.7
	4.00	21.9000	14390.9	-17.3	14373.6
	4.50	21.7800	14312.0	-17.3	14294.7

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	5.00	21.6400	14220.0	-17.3	14202.7
	5.50	21.4500	14095.1	-17.3	14077.8
	6.50	21.2500	13963.7	-17.3	13946.4
	7.50	21.1800	13917.7	-17.3	13900.4
	8.50	21.1200	13878.3	-17.3	13861.0
	9.50	21.0800	13852.0	-17.3	13834.7
	10.50	21.0400	13825.7	-17.3	13808.4
	11.50	21.0200	13812.5	-17.3	13795.2
	12.50	20.9700	13779.7	-17.3	13762.4
	13.50	20.9400	13760.0	-17.3	13742.7
	14.50	20.9100	13740.3	-17.3	13723.0
	15.50	20.8800	13720.5	-17.3	13703.2
	16.50	20.8700	13714.0	-17.3	13696.7
	17.50	20.8500	13700.8	-17.3	13683.5
	19.50	20.8100	13674.5	-17.3	13657.2
	21.50	20.7700	13648.2	-17.3	13630.9
	23.50	20.7100	13608.8	-17.3	13591.5
	25.50	20.6700	13582.5	-17.3	13565.2
	27.50	20.6200	13549.7	-17.3	13532.4
	29.50	20.5900	13529.9	-17.3	13512.6
	31.50	20.5700	13516.8	-17.3	13499.5
	33.50	20.5500	13503.7	-17.3	13486.4
	35.50	20.5300	13490.5	-17.3	13473.2
	37.50	20.5100	13477.4	-17.3	13460.1
	39.50	20.4900	13464.2	-17.3	13446.9
	41.50	20.4700	13451.1	-17.3	13433.8
	43.50	20.4600	13444.5	-17.3	13427.2
	45.50	20.4500	13437.9	-17.3	13420.6
	47.50	20.4400	13431.4	-17.3	13414.1
	48.00	20.4400	13431.4	-17.3	13414.1

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CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
WELL SHUT IN FOR BUILDUP AT 18:30 FEBRUARY 17, 1987					
0.17	0.17	24.1700	15882.7	-18.8	15863.9
CLOCK MALFUNCTIONED AT THIS POINT-NO FURTHER PRESSURES AVAIL.					
ECORDERS PULLED AT 22:35 FEBRUARY 17, 1987					
RECORDERS RE-RUN AT 00:44 FEBRUARY 18, 1987 AT 3221.2 M KB					
ECORDERS MALFUNCTIONED-NO PRESSURES AVAILABLE					
ECORDERS PULLED AT 18:53 FEBRUARY 19, 1987					
RECORDERS RE-RUN AT 20:39 FEBRUARY 19, 1987 AT 3221.2 M KB					
51.52	51.52	40.9500	26910.5	-5.3	26905.2
RECORDERS MALFUNCTIONED AT THIS POINT-NO FURTHER PRESSURES AVAIL					
ECORDERS PULLED AT 19:05 FEBRUARY 21, 1987					

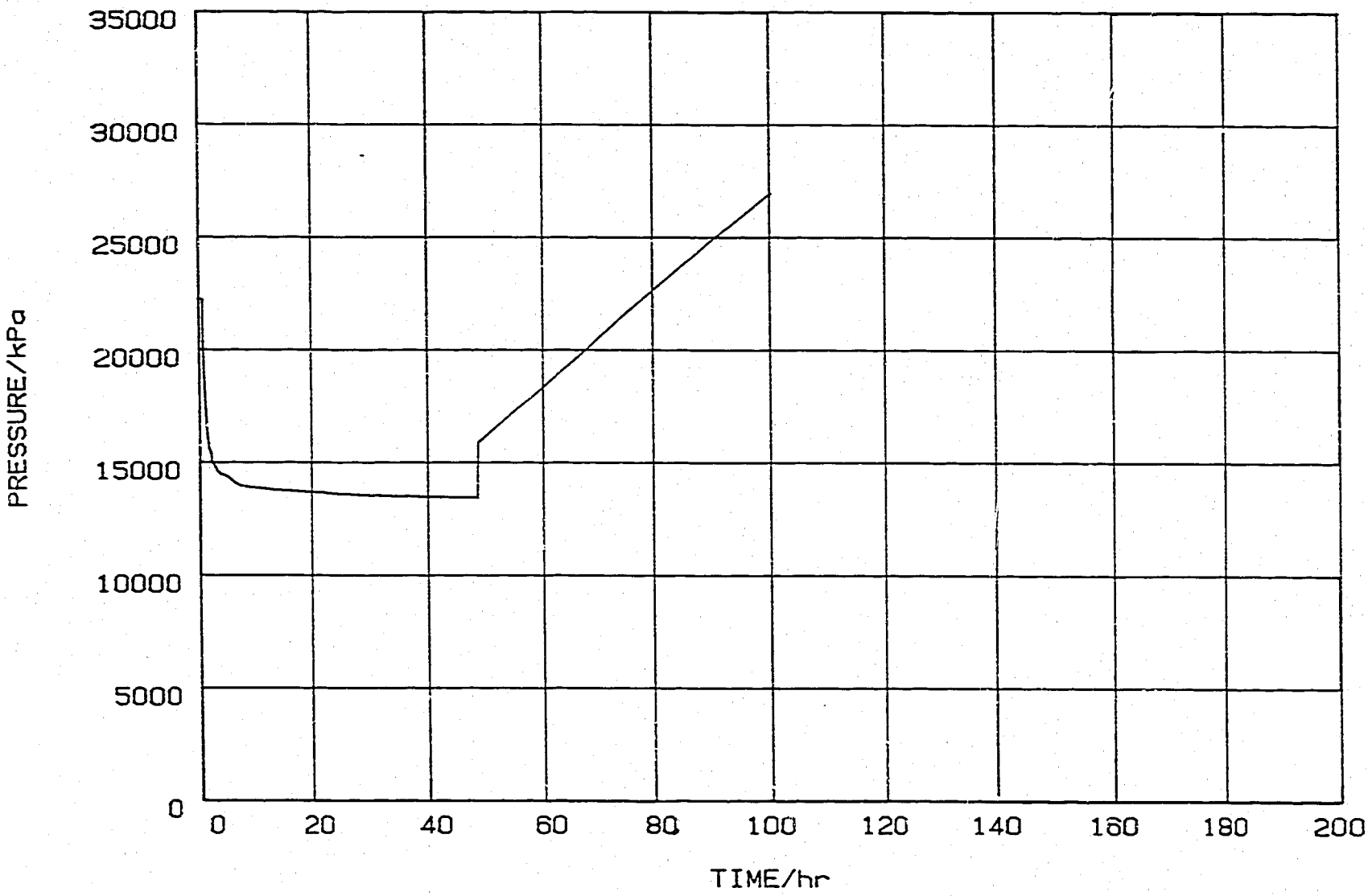
NOTE: MIDDLE RECORDER NUMBER 25644N

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: FEBRUARY 15 - 21, 1987
COMPANY: NORTHCOR ENERGY LTD.



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Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 15 - 21, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
RECORDERS ON BOTTOM AT 17:52 FEBRUARY 15, 1987 AT 3223.0 M KB					
1.37	0.00	32.0400	22206.5	-12.7	22193.8
2.00	0.63	32.0400	22206.5	-12.7	22193.8
LL OPENED TO FLOW AT 18:30 FEBRUARY 15, 1987					
	0.08	29.2600	20280.5	-18.8	20261.7
	0.17	27.2500	18888.0	-18.8	18869.2
	0.25	26.7700	18555.5	-18.8	18536.7
	0.50	24.4800	16968.9	-12.9	16956.0
	0.75	23.3300	16172.2	-12.9	16159.3
	1.00	22.5900	15659.6	-12.9	15646.7
	1.25	22.1100	15327.0	-12.9	15314.1
	1.50	21.6300	14994.5	-11.1	14983.4
	2.00	21.3300	14786.6	-11.1	14775.5
	2.50	21.0500	14592.6	-11.1	14581.5
	3.00	20.8500	14454.1	-11.1	14443.0
	3.50	20.8200	14433.3	-11.1	14422.2
	4.00	20.7000	14350.2	-11.1	14339.1
	4.50	20.6100	14287.8	-11.1	14276.7

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CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
	5.00	20.4800	14197.7	-11.1	14186.6
	5.50	20.3300	14093.8	-11.1	14082.7
	6.50	20.1200	13948.3	-11.1	13937.2
	7.50	20.0600	13906.8	-11.1	13895.7
	8.50	20.0000	13865.2	-11.1	13854.1
	9.50	19.9600	13837.5	-11.1	13826.4
	10.50	19.9200	13809.8	-11.1	13798.7
	11.50	19.8700	13775.1	-11.1	13764.0
	12.50	19.8500	13761.3	-11.1	13750.2
	13.50	19.8300	13747.4	-11.1	13736.3
	14.50	19.8000	13726.6	-11.1	13715.5
	15.50	19.7800	13712.8	-11.1	13701.7
	16.50	19.7600	13698.9	-11.1	13687.8
	17.50	19.7400	13685.1	-11.1	13674.0
	19.50	19.7100	13664.3	-11.1	13653.2
	21.50	19.6800	13643.5	-11.1	13632.4
	23.50	19.6000	13588.1	-11.1	13577.0
	25.50	19.5700	13567.3	-11.1	13556.2
	27.50	19.5500	13553.4	-11.1	13542.3
	29.50	19.5200	13532.7	-11.1	13521.6
	31.50	19.4900	13511.9	-11.1	13500.8
	35.50	19.4700	13498.0	-11.1	13486.9
	37.50	19.4600	13491.1	-11.1	13480.0
	39.50	19.4500	13484.2	-11.1	13473.1
	41.50	19.4300	13470.3	-11.1	13459.2
	43.50	19.4100	13456.4	-11.1	13445.3
	45.50	19.4000	13449.5	-11.1	13438.4
	47.50	19.3900	13442.6	-11.1	13431.5
	48.00	19.3900	13442.6	-11.1	13431.5

SHUT WELL IN FOR BUILDUP AT 18:30 FEBRUARY 17, 1987

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
0.17	0.17	22.9200	15888.2	-12.9	15875.3

CLOCK MALFUNCTIONED AT THIS POINT-NO FURTHER PRESSURES AVAIL.

RECORDERS PULLED AT 22:35 FEBRUARY 17, 1987

RECORDERS RE-RUN AT 00:44 FEBRUARY 18, 1987 AT 3223.0 M KB

6.23	6.23	33.3400	23107.2	-12.7	23094.5
7.00	7.00	33.8290	23445.9	-12.7	23433.2
8.00	8.00	34.5810	23966.9	-12.7	23954.2
9.00	9.00	35.2920	24459.5	-2.8	24456.7
10.00	10.00	35.9520	24916.7	-2.8	24913.9
11.00	11.00	36.5520	25332.4	-2.8	25329.6
12.00	12.00	37.0990	25711.4	-2.8	25708.6
14.00	14.00	38.0200	26349.5	-2.8	26346.7
16.00	16.00	38.7900	26882.9	-2.8	26880.1
18.00	18.00	39.3890	27297.9	-2.8	27295.1
20.00	20.00	39.8300	27603.4	-2.8	27600.6
22.00	22.00	40.1610	27832.7	-2.8	27829.9
24.00	24.00	40.3830	27986.5	-2.8	27983.7
26.00	26.00	40.5420	28096.7	-2.8	28093.9
28.00	28.00	40.6500	28171.5	-2.8	28168.7
30.00	30.00	40.7230	28222.1	-2.8	28219.3
32.00	32.00	40.7600	28247.7	-2.8	28244.9
34.00	34.00	40.8000	28275.4	-2.8	28272.6
36.00	36.00	40.8190	28288.6	-2.8	28285.8
38.00	38.00	40.8320	28297.6	-2.8	28294.8
40.00	40.00	40.8490	28309.4	-2.8	28306.6
42.00	42.00	40.8510	28310.8	-2.8	28308.0
44.00	44.00	40.8580	28315.6	-2.8	28312.8

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
46.00	46.00	40.8620	28318.4	-2.8	28315.6

CLOCK STOPPED AT APPROX. 16:30 FEBRUARY 19, 1987

RECORDERS PULLED AT 18:53 FEBRUARY 19, 1987

RECORDES RE-RUN AT 20:39 FEBRUARY 19, 1987 T 3223.0 M KB

50.15	50.15	40.7900	28268.5	-2.8	28265.7
50.50	50.50	40.8000	28275.4	-2.8	28272.6
51.00	51.00	40.8100	28282.4	-2.8	28279.6
51.50	51.50	40.8100	28282.4	-2.8	28279.6
52.50	52.50	40.8200	28289.3	-2.8	28286.5
53.50	53.50	40.8300	28296.2	-2.8	28293.4
55.50	55.50	40.8100	28282.4	-2.8	28279.6
57.50	57.50	40.8000	28275.4	-2.8	28272.6
59.50	59.50	40.7900	28268.5	-2.8	28265.7
61.50	61.50	40.7900	28268.5	-2.8	28265.7
63.50	63.50	40.7900	28268.5	-2.8	28265.7
65.50	65.50	40.7900	28268.5	-2.8	28265.7
67.50	67.50	40.7900	28268.5	-2.8	28265.7
69.50	69.50	40.7900	28268.5	-2.8	28265.7
71.50	71.50	40.7900	28268.5	-2.8	28265.7
73.50	73.50	40.7900	28268.5	-2.8	28265.7
75.50	75.50	40.7900	28268.5	-2.8	28265.7
77.50	77.50	40.7900	28268.5	-2.8	28265.7
79.50	79.50	40.7900	28268.5	-2.8	28265.7
81.50	81.50	40.7800	28261.6	-2.8	28258.8
83.50	83.50	40.7800	28261.6	-2.8	28258.8
85.50	85.50	40.7800	28261.6	-2.8	28258.8
87.50	87.50	40.7800	28261.6	-2.8	28258.8

PAGE OF

CUM SHUT-IN TIME (hr)	CLOCK TIME (hr)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-Pc (kPa)	CORRECTED PRESSURE (kPa)
89.50	89.50	40.7800	28261.6	-2.8	28258.8
91.50	91.50	40.7800	28261.6	-2.8	28258.8
93.50	93.50	40.7800	28261.6	-2.8	28258.8
95.50	95.50	40.7800	28261.6	-2.8	28258.8
96.58	96.58	40.7800	28261.6	-2.8	28258.8

RECORDERS PULLED AT 19:05 FEBRUARY 21, 1987

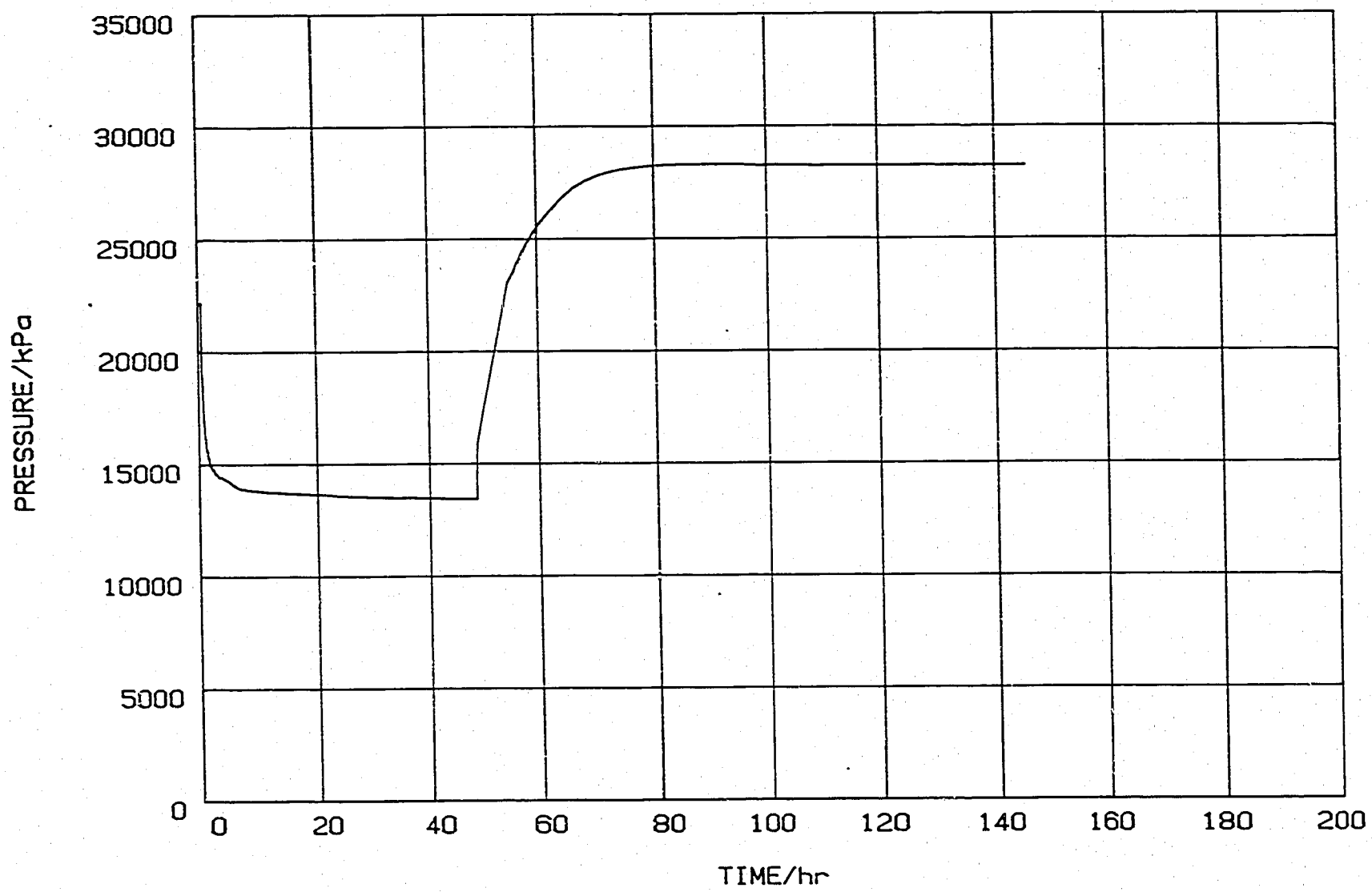
NOTE: BOTTOM RECORDER NUMBER 15230N

BEWS WIRELINE SERVICES LTD

PRESSURE BUILDUP PLOT

WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A

DATE: FEBRUARY 15 - 21, 1987
COMPANY: NORTHCOR ENERGY LTD.



Bews Wireline Services Ltd.

1450, 633 - 6 Avenue S.W., Calgary, Alberta • 1 - (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

1. BASIC DATA

PAGE ____ of ____

COMPANY Northcor Energy Ltd.
ADDRESS 880, 555 - 4th Avenue S.W.
FIELD and POOL Liard - Nahanni
TYPE OF TEST Static Gradient
ELEVATION N/A m(CF) 723.0 m(KB)
PRODUCING INTERVAL 3250.4 - 3258.4 m KB
MID-POINT OF PRODUCING (MPP) INTERVAL 3254.4 M KB
DATUM DEPTH OF WELL (FROM CF) ____ M
TBG PRESSURE N/A kPa G
CSG PRESSURE N/A kPa G
TEMPERATURE AT RUN DEPTH 157.2 °C
PRESSURE AT RUN DEPTH 28601.7 kPa G
GRADIENT AT RUN DEPTH 9.360 kPa/m

WELL NAME Northcor et al Liard
WELL IDENTIFIER F-25A
STATUS: OIL X GAS ____ OTHER SPECIFY ____
DATE OF TEST ____ 87 (Yr) 02 (Mo) 21 (Day)
TBG 88.9 mm @ ____ mKB
PRODUCING THRU X TBG ____ CSG
POOL DATUM ____ m (subsea)
RUN DEPTH (FROM KB) 3260.0 M
ON BTM 22:16 87 02 21
OFF BTM 22:31 87 02 21
SHUT IN DATE 18:30 87 02 17
PRESSURE MPP 28549.3 kPa G
DATUM DEPTH PRESSURE ____ kPa G

2. RECORDER COMPARISON

	TOP	MIDDLE	BTM
RUN DEPTH	3256.4	3258.2	3260.0 KB
PRESSURE AT RUN DEPTH	28816.6	28813.3	28601.7 kPa G
FINAL BUILDUP PRESSURE			kPa G
GRADIENT AT RUN DEPTH	9.970	8.400	9.360 kPa/m
CLOCK RANGE	3	3 hr D S	3 hr D S
ELEMENT SERIAL/RANGE	48898N/34475 X	19639N/35165 X	15230N/35165 X
INNER HOUSING	60451	45803	15667
CALIBRATION EQUATION	687.9 D+(57.9)	657.2 D+(-1.8)	692.8 D+(9.2)
DATE OF LAST CALIBRATION	87 02 11	87 02 11	87 02 11
		Yr Mo Day	Yr Mo Day

REMARKS: ____

DOWNHOLE EQUIPMENT: ____

SURVEY COMPANY Otis TEST BY S. Dulyk COMPUTED BY R. Hosmar

INSTRUCTIONS: The original of this report shall be filed with the Energy Resources Conservation Board 640 - 5th Avenue S.W. Calgary, Alberta within thirty days of completion of the survey.

BWS FORM 2

COMPANY NORTHCOR ENERGY LTD. WELL NAME NORTHCOR ET AL LIARD F-25A

PAGE OF

Bews Wireline Services Ltd.

1450,633 – 6 Avenue S.W. Calgary, Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 21, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

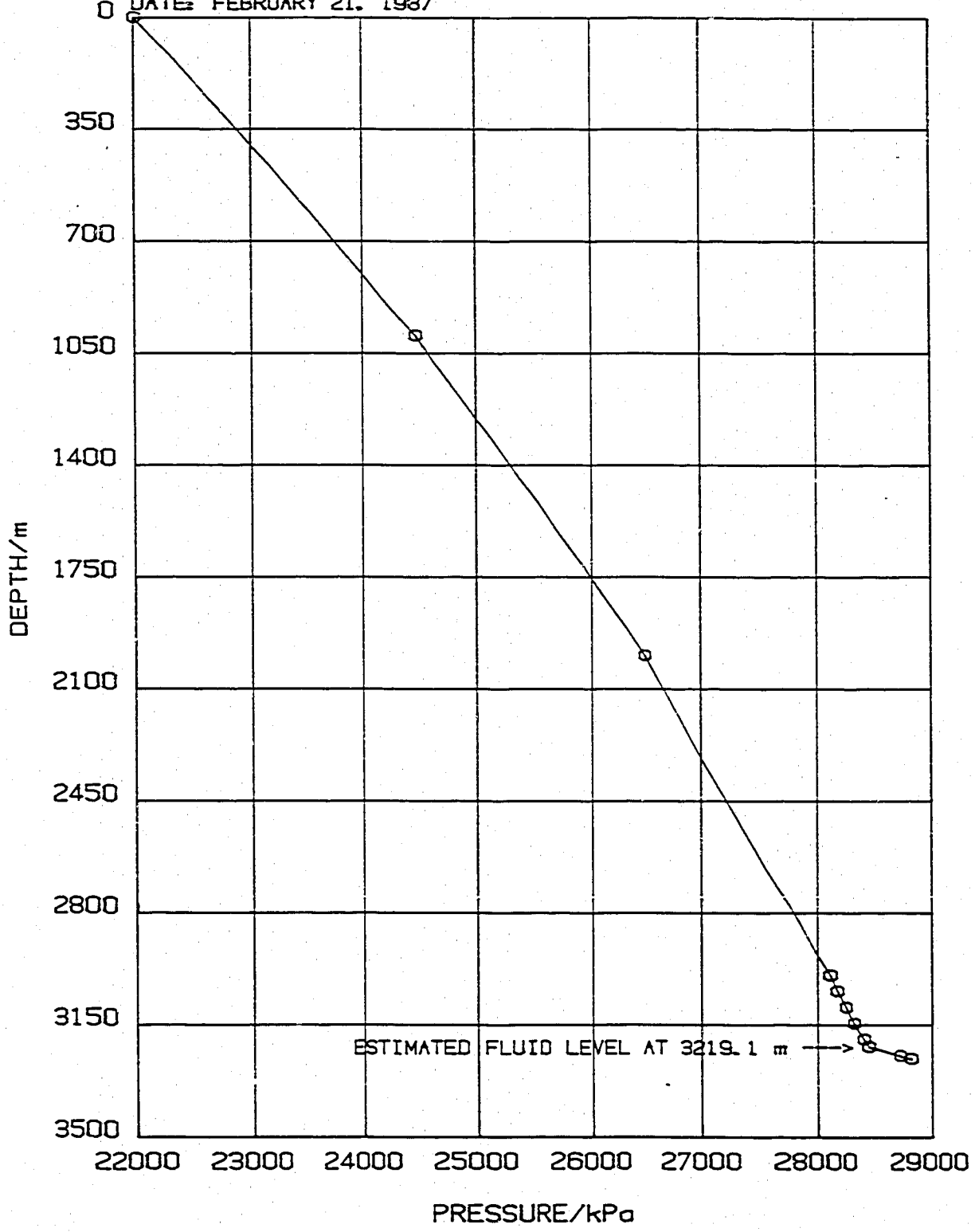
RUN DEPTH BELOW C.F. (m)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-PC (kPa)	CORRECTED PRESSURE (kPa)	PRESSURE GRADIENT (kPa/m)
0.00	31.8850	21991.6	9.7	22001.3	
996.40	35.5000	24478.4	1.0	24479.4	2.487
1996.40	38.4100	26480.1	1.0	26481.1	2.002
2996.40	40.7650	28100.1	1.0	28101.1	1.620
3046.40	40.8500	28158.6	1.0	28159.6	1.170
3096.40	40.9650	28237.7	1.0	28238.7	1.582
3146.40	41.0750	28313.4	1.0	28314.4	1.512
3196.40	41.2050	28402.8	1.0	28403.8	1.790
3246.40	41.6600	28715.8	1.0	28716.8	6.260
3256.40	41.8050	28815.6	1.0	28816.6	9.970
SURF	32.1250	22156.7	9.7	22166.4	
FLEX	0.0000	0.0	0.0	0.0	
SURF	31.9400	22029.4	9.7	22039.1	

NOTE: TOP RECORDER NUMBER 48898N

BEWS WIRELINE SERVICES LTD

STATIC GRADIENT PLOT

COMPANY: NORTHCOR ENERGY LTD.
WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A
DATE: FEBRUARY 21, 1987



PAGE OF

Bews Wireline Services Ltd.

1450,633 - 6 Avenue S.W. Calgary,Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 21, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

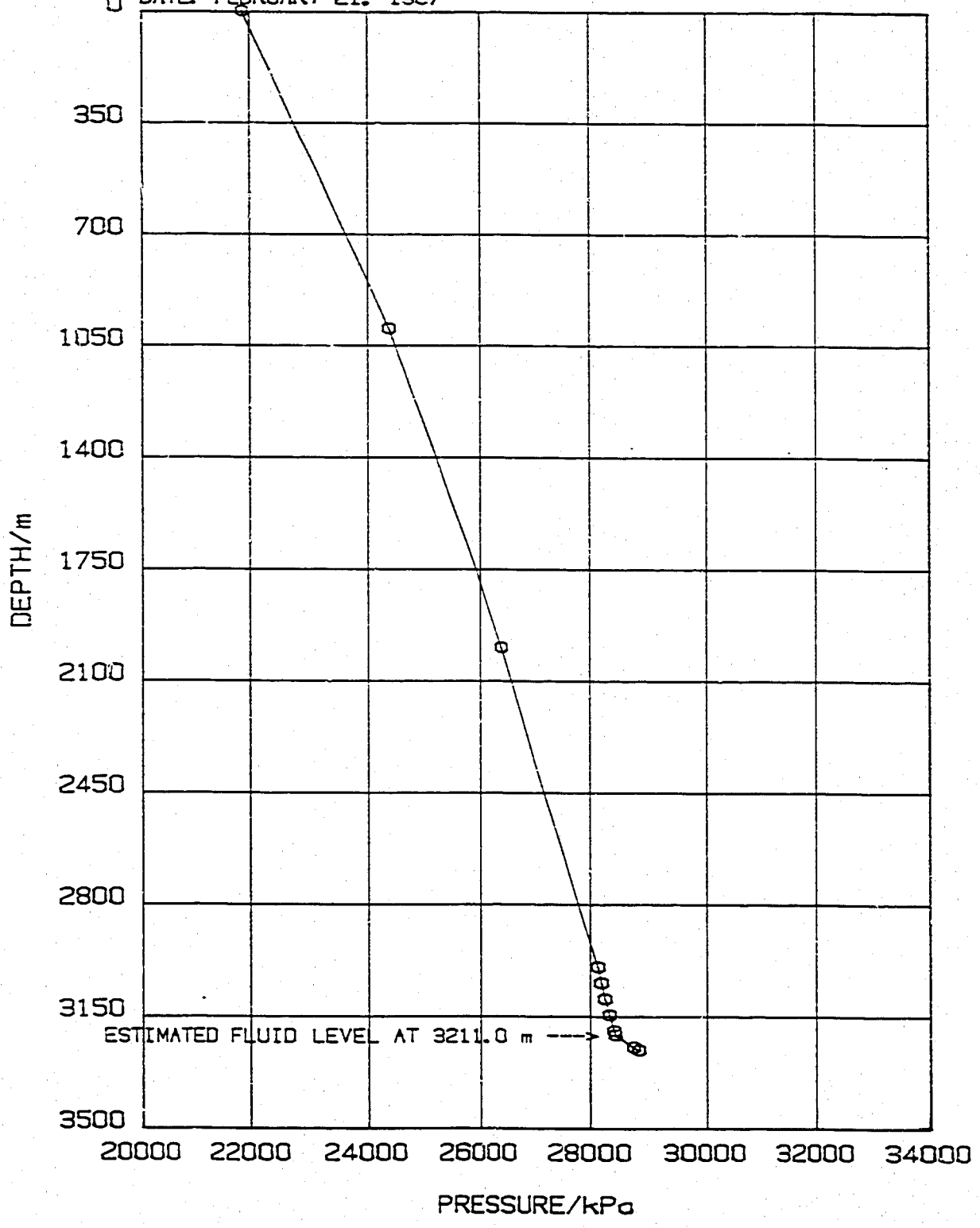
RUN DEPTH BELOW C.F. (m)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-PC (kPa)	CORRECTED PRESSURE (kPa)	PRESSURE GRADIENT (kPa/m)
0.00	31.2420	21878.2	-6.3	21871.9	
998.20	34.8200	24382.4	-3.0	24379.4	2.512
1998.20	37.7350	26422.6	-3.0	26419.6	2.040
2998.20	40.1800	28133.9	-3.0	28130.9	1.711
3048.20	40.2600	28189.9	-3.0	28186.9	1.120
3098.20	40.3450	28249.4	-3.0	28246.4	1.190
3148.20	40.4500	28322.9	-3.0	28319.9	1.470
3198.20	40.5600	28399.8	-3.0	28396.8	1.540
3248.20	41.0350	28732.3	-3.0	28729.3	6.648
3298.20	41.1550	28816.3	-3.0	28813.3	8.400
SURF	31.3900	21981.8	-6.3	21975.5	
FLEX	0.0000	0.0	0.0	0.0	
SURF	31.2200	21862.8	-6.3	21856.5	

NOTE: MIDDLE RECORDER NUMBER 19639N

BEWS WIRELINE SERVICES LTD

STATIC GRADIENT PLOT

COMPANY: NORTHCOR ENERGY LTD.
WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A
DATE: FEBRUARY 21, 1987



PAGE OF

Bews Wireline Services Ltd.

1450,633 – 6 Avenue S.W. Calgary, Alberta * 1- (403) 237-8686

SUBSURFACE PRESSURE MEASUREMENTS

COMPANY: NORTHCOR ENERGY LTD. DATE: FEBRUARY 21, 1987

WELL NAME: NORTHCOR ET AL LIARD LOCATION: F-25A

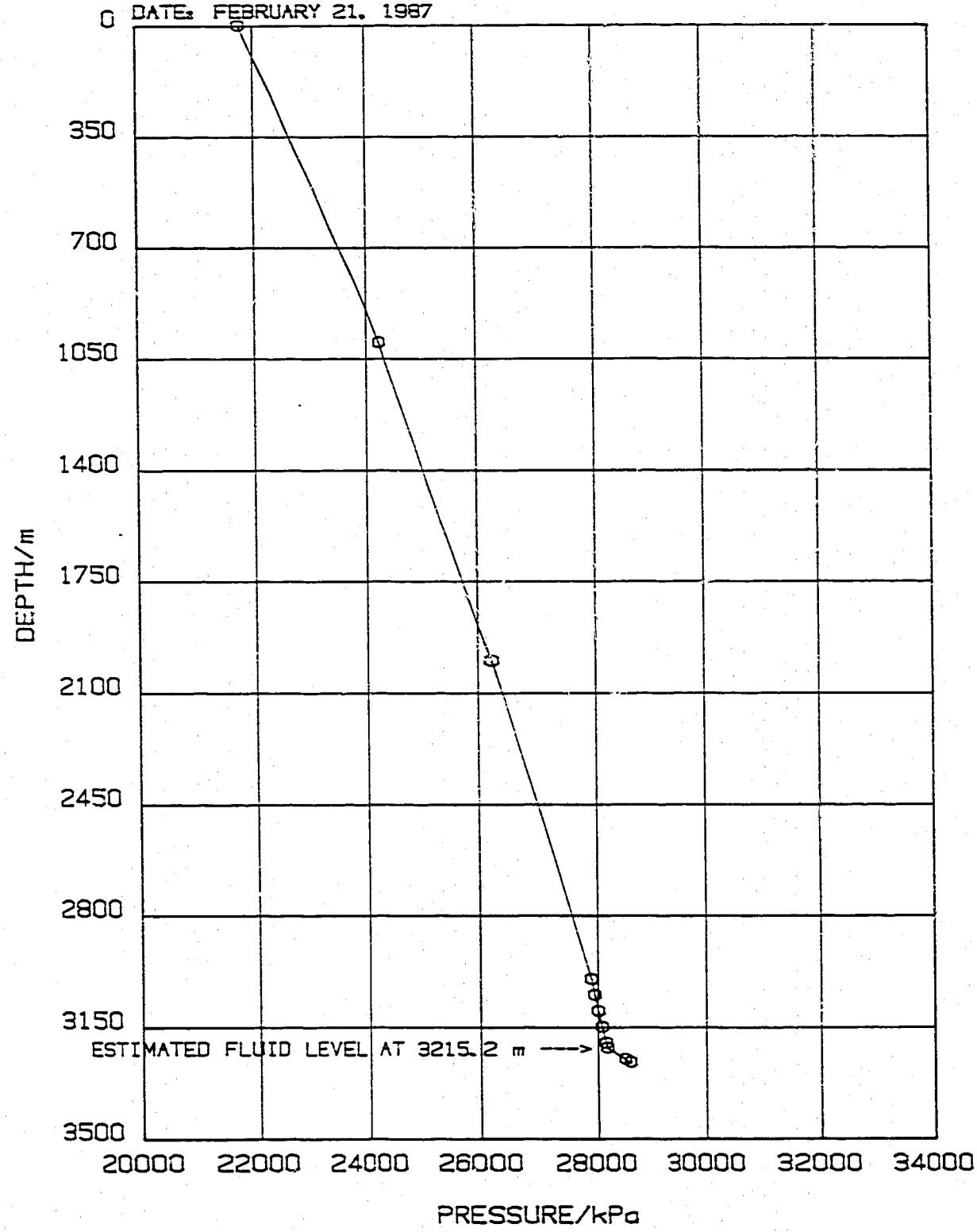
RUN DEPTH BELOW C.F. (m)	DEFLECTION (mm)	CALCULATED PRESSURE (kPa)	DEVIATION CORRECTION P-PC (kPa)	CORRECTED PRESSURE (kPa)	PRESSURE GRADIENT (kPa/m)
0.00	31.4300	21783.9	-12.7	21771.2	
1000.00	35.0400	24284.9	-2.8	24282.1	2.511
2000.00	37.8700	26245.5	-2.8	26242.7	1.961
3000.00	40.2700	27908.3	-2.8	27905.5	1.663
3050.00	40.3500	27963.7	-2.8	27960.9	1.108
3100.00	40.4400	28026.0	-2.8	28023.2	1.248
3150.00	40.5400	28095.3	-2.8	28092.5	1.386
3200.00	40.6400	28164.6	-2.8	28161.8	1.384
3250.00	41.1400	28511.0	-2.8	28508.2	6.928
3260.00	41.2750	28604.5	-2.8	28601.7	9.360
SURF	31.4650	21808.2	-12.7	21795.5	
FLEX	0.0000	0.0	0.0	0.0	
SURF	31.3700	21742.5	-12.7	21729.6	

NOTE: BOTTOM RECORDER NUMBER 15230N

BEWS WIRELINE SERVICES LTD

STATIC GRADIENT PLOT

COMPANY: NORTHCOR ENERGY LTD.
WELL NAME: NORTHCOR ET AL LIARD
LOCATION: F-25A
DATE: FEBRUARY 21, 1987



Litton Core Lab

GAS ANALYSIS

9153 — CONTAINER IDENTITY

70380-86-1880 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

2 of 3 — PAGE

60° 24' 22.25" NL
13° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) | GR ELEV.(m)

Nahani — FIELD OR AREA

POOL OR ZONE

Howco Testers — SAMPLER

DST #2 — TEST TYPE & NO.

DST: 224 m Salt Water — TEST RECOVERY

Bubble Hose — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

3227-3263 — TEST INTERVALS (metres)

PUMPING | FLOWING | GAS LIFT | SWAB

WATER m³/d | OIL m³/d | GAS m³/d

SEPARATOR | RESERVOIR | @ °C CONTAINER WHEN SAMPLED | 3930 @22°C CONTAINER WHEN RECEIVED | SEPARATOR

— PRESSURES, kPa (gauge) — | — TEMPERATURES, °C —

86 11 23 — DATE SAMPLED (Y/M/D)

86 11 26 — DATE RECEIVED (Y/M/D)

86 11 27 — DATE ANALYZED (Y/M/D)

EW — ANALYST

REMARKS

COMPONENT	MOLE FRACTION AIR FREE AS RECEIVED	MOLE FRACTION AIR FREE ACID GAS FREE	mL/m³ AIR FREE AS RECEIVED
[redacted]2	0.0001		
He	0.0015		
N_2	0.0579		
[redacted]$_2$	0.1912		
H_2S	-0.0097		
[redacted]	0.7591		
[redacted]	Trace		
[redacted]$_3$	0.0000		0.0
[redacted]$_4$	0.0000		0.0
C_4	0.0000		0.0
[redacted]$_5$	0.0000		0.0
[redacted]	0.0000		0.0
[redacted]	0.0000		0.0
[redacted]+	0.0000		0.0
TOTAL	1.0000		0.0
		C_{5+}	0.0

CALCULATED GROSS HEATING VALUE MJ/m³ @15°C & 101.325 kPa (abs.)

28.43 — MOISTURE FREE

35.03 — MOISTURE & ACID GAS FREE

CALCULATED VAPOUR PRESSURE kPa (abs.) @37.8°C

0.0 — PENTANES PLUS

CALCULATED TOTAL SAMPLE PROPERTIES (AIR=1) @ 15° C & 101.325 kPa
MOISTURE FREE AS SAMPLED

0.926 kg/m³ — DENSITY

0.756 — RELATIVE DENSITY

21.9 — RELATIVE MOLECULAR MASS

CALCULATED PSEUDOCRITICAL PROPERTIES

AS SAMPLED		ACID GAS FREE	
5016.0 kPa (abs)	206.5 K	kPa (abs)	K
pPc	pTc	pPc	pTc

REMARKS

Note: The Gross Heating Value has been calculated in accordance to AGA Report #5.

Litton
Core Lab

WATER ANALYSIS

Plastic — CONTAINER IDENTITY
70380-86-1880 — LABORATORY NUMBER
Northcor Energy Ltd. — OPERATOR
3 of 3 — PAGE
60° 24' 22.25" NL, 123° 35' 07.58" WL — LOCATION
Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME
KB ELEV.(m) — GR ELEV.(m)
FIELD OR AREA — POOL OR ZONE
Howco Testers — SAMPLER
DST #2 — TEST TYPE & NO.
DST: 224 m Salt Water — TEST RECOVERY
Top of Tool — POINT OF SAMPLE
AMT. & TYPE CUSHION
@ °C — MUD RESISTIVITY
3227-3263 — TEST INTERVALS (metres)
PUMPING
FLOWING
GAS LIFT
SWAB
WATER m^3/d
OIL m^3/d
GAS m^3/d
SEPARATOR
RESERVOIR
@ °C — CONTAINER WHEN SAMPLED
@ °C — CONTAINER WHEN RECEIVED
SEPARATOR
PRESSURES, kPa (gauge)
TEMPERATURES, °C
86 11 23 — DATE SAMPLED (Y/M/D)
86 11 26 — DATE RECEIVED (Y/M/D)
86 11 27 — DATE ANALYZED (Y/M/D)
GK — ANALYST
REMARKS

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	44500	.2787	1935.6
K	6350	.0398	162.4
Ca	11269	.0706	562.3
Mg	673	.0042	55.3
Ba			
Sr			
Fe	Not Detected		

ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	96108	.6020	2710.9
Br			
I			
HCO_3	664	.0042	10.9
SO_4	96	.0006	2.0
CO_3	0	.0000	0.0
OH	0	.0000	0.0
H_2S	Present		

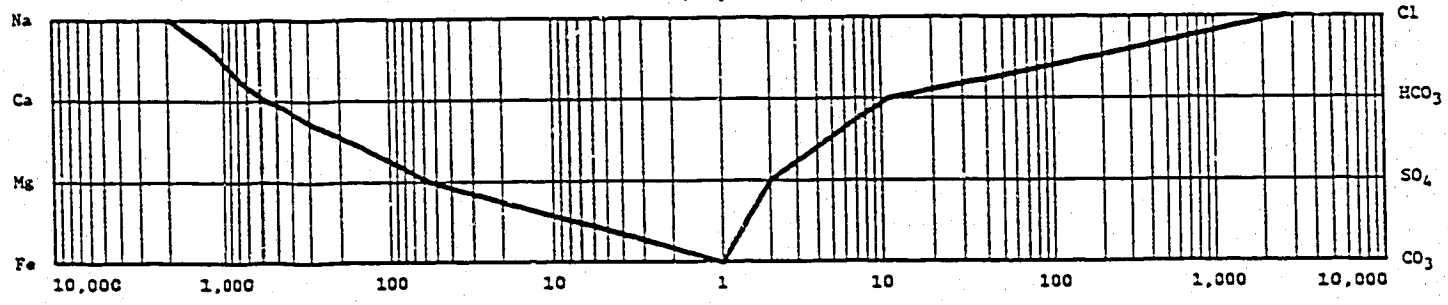
TOTAL SOLIDS (mg/L)

BY EVAPORATION @ 110°C
BY EVAPORATION @ 180°C
AT IGNITION
159660 — CALCULATED

1.1140 @15.6°C — SPECIFIC GRAVITY
1.3560 @21 °C — REFRACTIVE INDEX

5.3 — pH
0.055 @25°C — RESISTIVITY (OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 159236

Core Lab

GAS ANALYSIS

V1353 — CONTAINER IDENTITY

70380-87-127 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

1 of 12 — PAGE

60° 24' 22.25" NL
123° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) — GR ELEV.(m)

FIELD OR AREA

Zone =4 — POOL OR ZONE

Norward Energy — SAMPLER

TEST TYPE & NO. — TEST RECOVERY

Separator Gas — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

PUMPING — FLOWING — GAS LIFT — SWAB

TEST INTERVALS (metres)

WATER m^3/d — OIL m^3/d — GAS m^3/d

2980			@ °C	2950 @22°C	37	
SEPARATOR	RESERVOIR		CONTAINER WHEN SAMPLED	CONTAINER WHEN RECEIVED	SEPARATOR	
PRESSURES, kPa (gauge)					TEMPERATURES, °C	

87 01 26	87 01 27	87 01 27	RH	
DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS

COMPONENT	MOLE FRACTION AIR FREE AS RECEIVED	MOLE FRACTION AIR FREE ACID GAS FREE	mL/m^3 AIR FREE AS RECEIVED
H_2	Trace		
He	0.0014		
N_2	0.0413		
CO_2	0.2007		
H_2S	0.0041		
C_1	0.7524		
C_2	0.0001		
C_3	0.0000		0.0
iC_4	0.0000		0.0
C_4	0.0000		0.0
iC_5	0.0000		0.0
C_5	0.0000		0.0
C_6	0.0000		0.0
C_{7+}	0.0000		0.0
TOTAL	1.0000		0.0
		C_{5+}	0.0

CALCULATED GROSS HEATING VALUE MJ/m^3 @15°C & 101.325 kPa (abs.)

28.53	35.75
MOISTURE FREE	MOISTURE & ACID GAS FREE

CALCULATED VAPOUR PRESSURE kPa (abs.) @37.8°C

0.0
PENTANES PLUS

CALCULATED TOTAL SAMPLE PROPERTIES (AIR=1) @ 15° C & 101.325 kPa
MOISTURE FREE AS SAMPLED

0.940 kg/m^3	0.767	22.2
DENSITY	RELATIVE DENSITY	RELATIVE MOLECULAR MASS

CALCULATED PSEUDOCRITICAL PROPERTIES

AS SAMPLED		ACID GAS FREE	
5124.4 kPa (abs)	211.2 K	kPa (abs)	K
pPc	pTc	pPc	pTc

REMARKS

Hydrogen sulphide value determined in the lab by Tutwiler.

Note: The Gross Heating Value has been calculated in accordance to AGA Report #5.

Core Lab

V1353 (CONTAINER IDENTITY)		70380-87-127 (LABORATORY NUMBER)
	Northcor Energy Ltd. (OPERATOR)	2 of 12 (PAGE)
60° 24' 22.25" NL 123° 35' 07.58" WL (LOCATION)	Northcor et al Laird F-25A (WELL OR SAMPLE LOCATION NAME)	KB ELEV.(m) GR ELEV.(m)
(FIELD OR AREA)	Zone #4 (POOL OR ZONE)	Norward Energy (SAMPLER)
(TEST TYPE & NO.)	(TEST RECOVERY)	
Separator Gas (POINT OF SAMPLE)	(AMT. & TYPE CUSHION)	@ °C (MUD RESISTIVITY)
(TEST INTERVALS (metres))	PUMPING / FLOWING / GAS LIFT / SWAB	
	WATER m^3/d	OIL m^3/d GAS m^3/d

PRESSURES, kPa (gauge)			TEMPERATURES, °C		
2980 (SEPARATOR)	(RESERVOIR)	@ °C (CONTAINER WHEN SAMPLED)	2950 @22°C (CONTAINER WHEN RECEIVED)	37 (SEPARATOR)	

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 01 26	87 01 27	87 01 27	RH	

TRACE SULPHUR ANALYSIS (FPD)

Component	Concentration, ppm V/V
Hydrogen Sulphide	0.41 mole %
Carbonyl Sulphide	3.4
Methyl Mercaptan	5.3
Ethyl Mercaptan	2.1
Carbon Disulphide	*ND
Propyl Mercaptans	1.8
Butyl Mercaptans	1.6
Dimethyl Disulphide	**ND

Hydrogen sulphide value determined in the lab by Tutwiler.

*ND - None Detected. Minimum detectable concentration - 0.1 ppm
**ND - None Detected. Minimum detectable concentration - 0.5 ppm

Core Lab

CONTAINER IDENTITY

70380-87-127
LABORATORY NUMBER

Northcor Energy Ltd.
OPERATOR

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PAGE

60° 24' 22.25" NL
123° 35' 07.58" WL
LOCATION

Northcor et al Laird F-25A
WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) GR ELEV.(m)

FIELD OR AREA

POOL OR ZONE

Norward Energy
SAMPLER

TEST TYPE & NO.

TEST RECOVERY

Separator Gas
POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C
MUD RESISTIVITY

TEST INTERVALS (metres)

PUMPING FLOWING GAS LIFT SWAB

WATER m^3/d OIL m^3/d GAS m^3/d

SEPARATOR RESERVOIR @ °C CONTAINER WHEN SAMPLED @ °C CONTAINER WHEN RECEIVED SEPARATOR

—PRESSURES, kPa (gauge)— —TEMPERATURES, °C—

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 01 26	87 01 27	87 01 27	RH	

Hydrogen Sulphide Values of Duplicate Samples
As Determined in the Lab

Cylinder Number	H_2S (mole fraction)
CL V-1632 (316SS)	0.0039
CX 6085 (Alum)	0.0027
CX 5293 (304SS)	0.0000
CX-1565 (304SS)	0.0000

Core Lab

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

70380-87-127 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

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60° 24' 22.25" NL
123° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) GR ELEV.(m)

FIELD OR AREA

Zone #4 — POOL OR ZONE

Norward Energy — SAMPLER

TEST TYPE & NO.

TEST RECOVERY

Separator — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

PUMPING | FLOWING | GAS LIFT | SWAB

TEST INTERVALS (metres)

WATER m³/d | OIL m³/d | GAS m³/d

SEPARATOR | RESERVOIR | @ °C CONTAINER WHEN SAMPLED | @ °C CONTAINER WHEN RECEIVED | SEPARATOR

PRESSURES, kPa (gauge) — TEMPERATURES, °C

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 01 26	87 01 27	87 01 29	GK	

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	46000	.2777	2000.9
K	6450	.0389	165.0
Ca	11694	.0706	583.5
Mg	939	.0057	77.3
Ba			
Sr			
Fe		Trace	

ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	99920	.6032	2818.4
Br			
I			
HCO_3	618	.0037	10.1
SO_4	27	.0002	0.6
CO_3	0	.0000	0.0
OH	0	.0000	0.0
H_2S		Trace	

TOTAL SOLIDS (mg/L)

BY EVAPORATION @ 110°C

BY EVAPORATION @ 180°C

AT IGNITION

165649 — CALCULATED

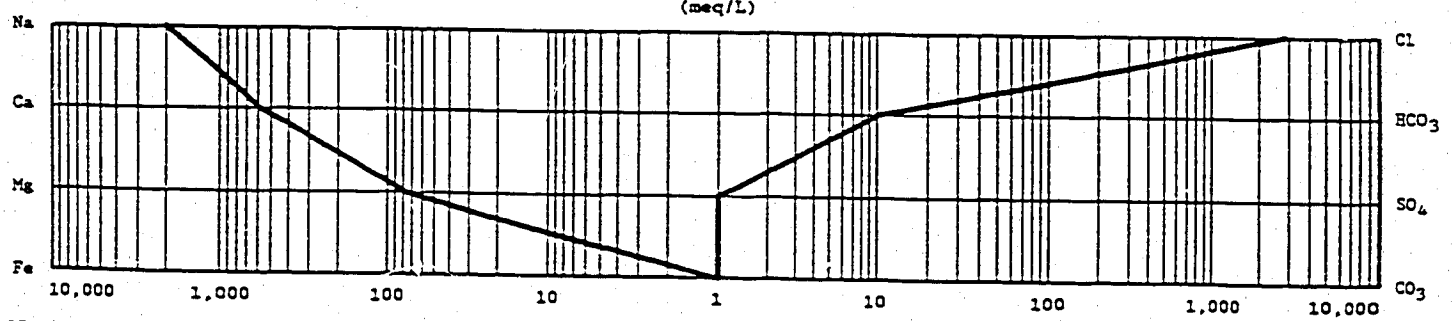
1.1065 @15.6°C — SPECIFIC GRAVITY

1.3590 @21 °C — REFRACTIVE INDEX

6.7 — pH

0.050 @25°C — RESISTIVITY(OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 165539

Core Lab

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

70380-87-127 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

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60° 24' 22.25" NL
123° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) GR ELEV.(m)

FIELD OR AREA

POOL OR ZONE

Norward Energy — SAMPLER

TEST TYPE & NO.

TEST RECOVERY

Boiler Feed — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

PUMPING FLOWING GAS LIFT SWAB

TEST INTERVALS (metres)

WATER m^3/d OIL m^3/d GAS m^3/d

SEPARATOR RESERVOIR @ °C CONTAINER WHEN SAMPLED @ °C CONTAINER WHEN RECEIVED SEPARATOR

PRESSURES, kPa (gauge) — TEMPERATURES, °C

87 01 20 — DATE SAMPLED (Y/M/D)

87 01 27 — DATE RECEIVED (Y/M/D)

87 01 29 — DATE ANALYZED (Y/M/D)

GK — ANALYST

REMARKS

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	75	.1061	3.3
K	6	.0085	0.2
Ca	82	.1159	4.1
Mg	30	.0428	2.5
Ba			
Sr			
Fe	Not Detected		

ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	20	.0283	0.6
Sr			
I			
HCO_3	270	.3818	4.4
SO_4	213	.3010	4.4
CO_3	11	.0156	0.4
OH	0	.0000	0.0
H_2S	Not Detected		

TOTAL SOLIDS (mg/L)

BY EVAPORATION @ 110°C

BY EVAPORATION @ 180°C

AT IGNITION

707 — CALCULATED

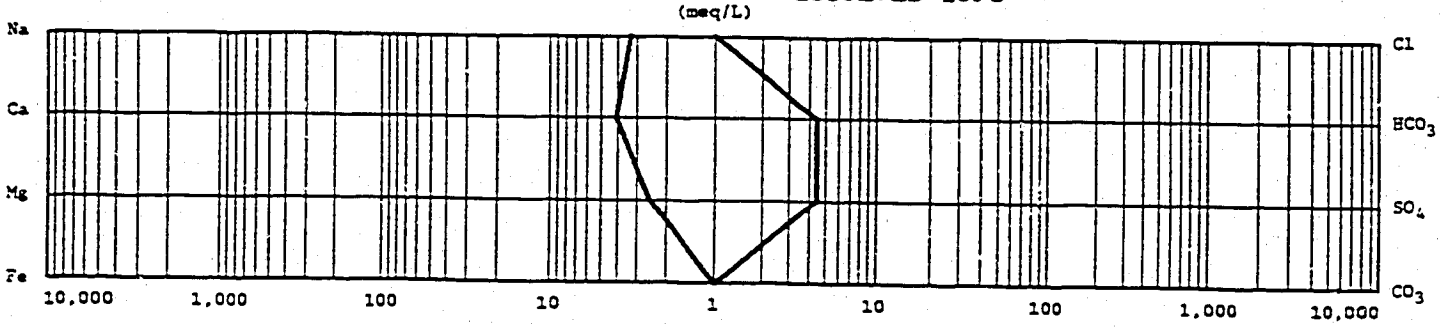
1.0008 @15.6°C — SPECIFIC GRAVITY

1.3310 @21 °C — REFRACTIVE INDEX

8.7 — pH

12.800 @25°C — RESISTIVITY (OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 432

Core Lab

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

70380-87-127 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

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60° 24' 22.25" NL
123° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) GR ELEV.(m)

FIELD OR AREA

POOL OR ZONE

Norward Energy — SAMPLER

TEST TYPE & NO.

TEST RECOVERY

Inhibited Water Blue Tank — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

PUMPING FLOWING GAS LIFT SWAB

TEST INTERVALS (metres)

WATER m^3/d OIL m^3/d GAS m^3/d

SEPARATOR RESERVOIR @ °C CONTAINER WHEN SAMPLED @ °C CONTAINER WHEN RECEIVED SEPARATOR

PRESSURES, kPa (gauge) — *TEMPERATURES, °C*

87 01 20 — DATE SAMPLED (Y/M/D)

87 01 27 — DATE RECEIVED (Y/M/D)

87 01 29 — DATE ANALYZED (Y/M/D)

GK — ANALYST

REMARKS

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	780	.3825	33.9
K	50	.0245	1.3
Ca	29	.0141	1.4
Mg	11	.0055	0.9
Ba			
Sr			
Fe	Not Detected		

ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	20	.0096	0.6
Br			
I			
HCO_3	0	.0000	0.0
SO_4	468	.2297	9.8
CO_3	527	.2585	17.6
OH	154	.0755	9.1
H_2S	Not Detected		

TOTAL SOLIDS (mg/L)

BY EVAPORATION @ 110°C

BY EVAPORATION @ 180°C

AT IGNITION

2039 — CALCULATED

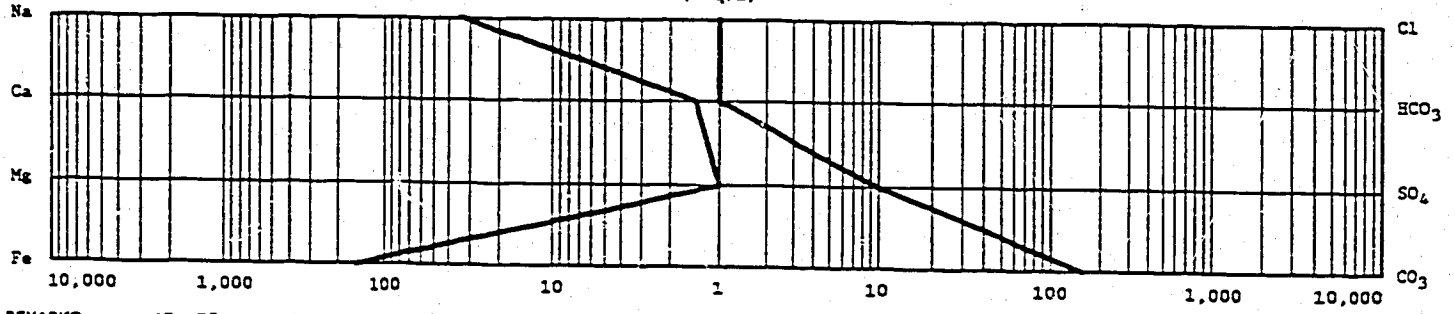
1.0035 @15.6°C — SPECIFIC GRAVITY

1.3310 @21 °C — REFRACTIVE INDEX

12.0 — pH

2.350 @25°C — RESISTIVITY (OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 2568

Core Lab

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

70380-87-127 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

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60° 24' 22.25" NL
123° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) GR ELEV.(m)

FIELD OR AREA

POOL OR ZONE

Norward Energy — SAMPLER

DST #1 — TEST TYPE & NO.

TEST RECOVERY

Tubing String (Sample #1) — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

3451-3456 — TEST INTERVALS (metres)

PUMPING FLOWING GAS LIFT SWAB

WATER m^3/d OIL m^3/d GAS m^3/d

SEPARATOR RESERVOIR — @ °C CONTAINER WHEN SAMPLED — @ °C CONTAINER WHEN RECEIVED — SEPARATOR

PRESSURES, kPa (gauge) — *TEMPERATURES, °C*

87 01 20	87 01 27	87 01 29	GK	
DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	770	.3283	33.5
K	192	.0819	4.9
Ca	2	.0009	0.1
Mg	0	.0000	0.0
Ba			
Sr			
Fe	Not Detected		

ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	136	.0581	3.8
Br			
I			
HCO_3	630	.2685	10.3
SO_4	409	.1744	8.5
CO_3	206	.0880	6.9
OH	0	.0000	0.0
H_2S	Not Detected		

TOTAL SOLIDS (mg/L)

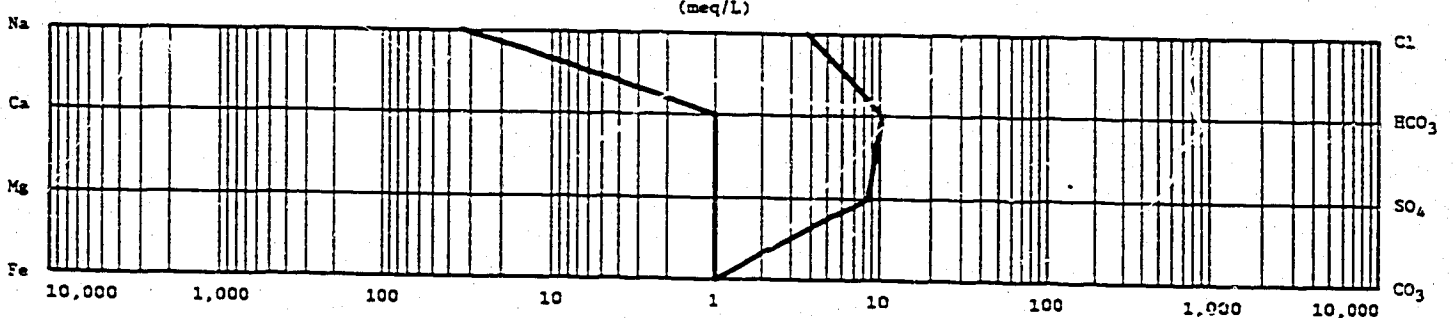
BY EVAPORATION @ 110°C — BY EVAPORATION @ 180°C

AT IGNITION — 2346 CALCULATED

1.0032 @15.6°C SPECIFIC GRAVITY — 1.3320 @21 °C REFRACTIVE INDEX

9.5 pH — 2.950 @25°C RESISTIVITY(OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 1735

Core Lab

WATER ANALYSIS

Plastic (CONTAINER IDENTITY)		70380-87-127 (LABORATORY NUMBER)
60° 24' 22.25" NL	Northcor Energy Ltd. (OPERATOR)	8 of 12 (PAGE)
123° 35' 07.58" WL (LOCATION)	Northcor et al Laird F-25A (WELL OR SAMPLE LOCATION NAME)	KB ELEV.(m) GR ELEV.(m)
(FIELD OR AREA)	(POOL OR ZONE)	Norward Energy (SAMPLER)
DST #1 (TEST TYPE & NO.)	(TEST RECOVERY)	
Tubing String (Sample #5) (POINT OF SAMPLE)	(AMT. & TYPE CUSHION)	@ °C (MUD RESISTIVITY)
3451-3456 (TEST INTERVALS (metres))	PUMPING / FLOWING / GAS LIFT / SWAB	
	WATER m^3/d / OIL m^3/d / GAS m^3/d	
SEPARATOR / RESERVOIR	@ °C CONTAINER WHEN SAMPLED / @ °C CONTAINER WHEN RECEIVED	SEPARATOR
— PRESSURES, kPa (gauge) —		— TEMPERATURES, °C —
87 01 20 (DATE SAMPLED (Y/M/D))	87 01 27 (DATE RECEIVED (Y/M/D))	87 01 29 (DATE ANALYZED (Y/M/D)) / ANALYST / REMARKS

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	775	.3120	33.7
K	194	.0781	5.0
Ca	2	.0008	0.1
Mg	0	.0000	0.0
Ba			
Sr			
Fe	Not Detected		

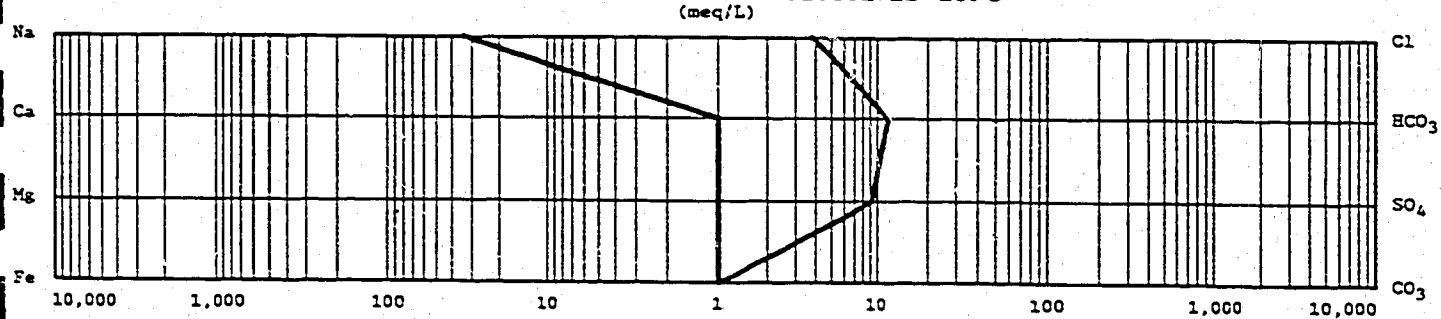
ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	136	.0547	3.8
Br			
I			
HCO_3	711	.2862	11.7
SO_4	442	.1779	9.2
CO_3	224	.0902	7.5
OH	0	.0000	0.0
H_2S	Not Detected		

TOTAL SOLIDS (mg/L)

BY EVAPORATION @ 110°C	BY EVAPORATION @ 180°C
AT IGNITION	2484 CALCULATED
1.0028 @15.6°C SPECIFIC GRAVITY	1.3315 @21 °C REFRACTIVE INDEX
9.5 pH	3.000 @25°C RESISTIVITY(OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 1802

Core Lab

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

70380-87-127 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

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60° 24' 22.2" NL
123° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) | GR ELEV.(m)

Nahanni — FIELD OR AREA

Norward Energy — SAMPLER

DST #1 — TEST TYPE & NO.

TEST RECOVERY

Tubing String (Sample #8) — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

3451-3456 — TEST INTERVALS (metres)

PUMPING | FLOWING | GAS LIFT | SWAB

WATER m^3/d | OIL m^3/d | GAS m^3/d

SEPARATOR | RESERVOIR | @ °C CONTAINER WHEN SAMPLED | @ °C CONTAINER WHEN RECEIVED | SEPARATOR

PRESSURES, kPa (gauge) | *TEMPERATURES, °C*

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 01 20	87 01 27	87 01 29	GK	

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	825	.3189	35.9
K	185	.0715	4.7
Ca	3	.0011	0.1
Mg	0	.0002	0.0
Ba			
Sr			
Fe	Not Detected		

ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	187	.0724	5.3
Br			
I			
HCO_3	679	.2626	11.1
SO_4	452	.1748	9.4
CO_3	255	.0985	8.5
OH	0	.0000	0.0
H_2S	Not Detected		

TOTAL SOLIDS (mg/L)

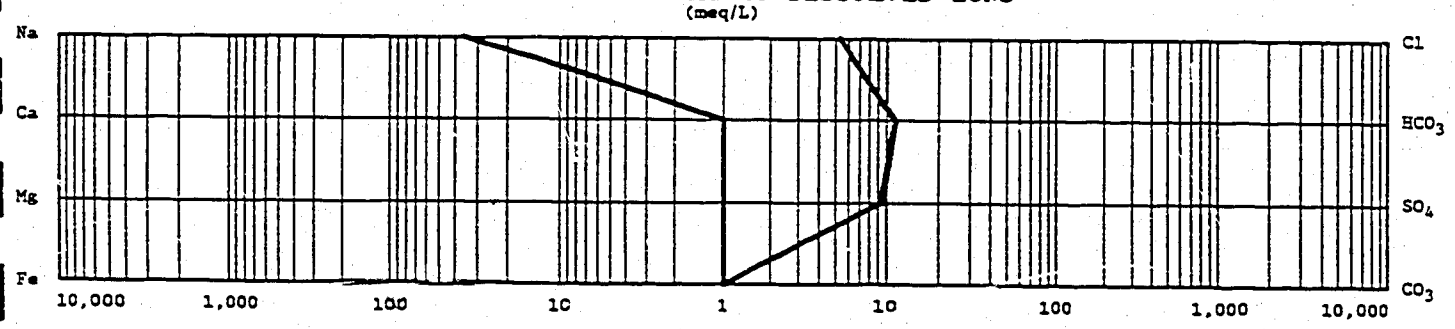
BY EVAPORATION @ 110°C | BY EVAPORATION @ 180°C

AT IGNITION | 2587 CALCULATED

1.0028 @15.6°C — SPECIFIC GRAVITY | 1.3315 @21 °C — REFRACTIVE INDEX

9.6 — pH | 3.000 @25°C — RESISTIVITY (OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 1932

Core Lab

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

70380-87-127 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

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60° 24' 22.25" NL
123° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) GR ELEV.(m)

FIELD OR AREA

Zone #3 — POOL OR ZONE

Norward Energy — SAMPLER

DST #2B — TEST TYPE & NO.

TEST RECOVERY

Collars (Sample #1) — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

PUMPING FLOWING GAS LIFT SWAB

TEST INTERVALS (metres)

WATER m^3/d OIL m^3/d GAS m^3/d

SEPARATOR RESERVOIR — @ °C CONTAINER WHEN SAMPLED — @ °C CONTAINER WHEN RECEIVED — SEPARATOR

PRESSURES, kPa (gauge) — *TEMPERATURES, °C*

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 01 24	87 01 27	87 01 29	GK	

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	180	.0984	7.8
K	108	.0590	2.8
Ca	4	.0021	0.2
Mg	1	.0004	0.1
Ba			
Sr			
Fe	Not Detected		

ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	109	.0597	3.1
Br			
I			
HCO_3	798	.4362	13.1
SO_4	39	.0211	0.8
CO_3	591	.3231	19.7
OH	0	.0000	0.0
H_2S	Not Detected		

TOTAL SOLIDS (mg/L)

BY EVAPORATION @ 110°C

BY EVAPORATION @ 180°C

AT IGNITION

1830 — CALCULATED

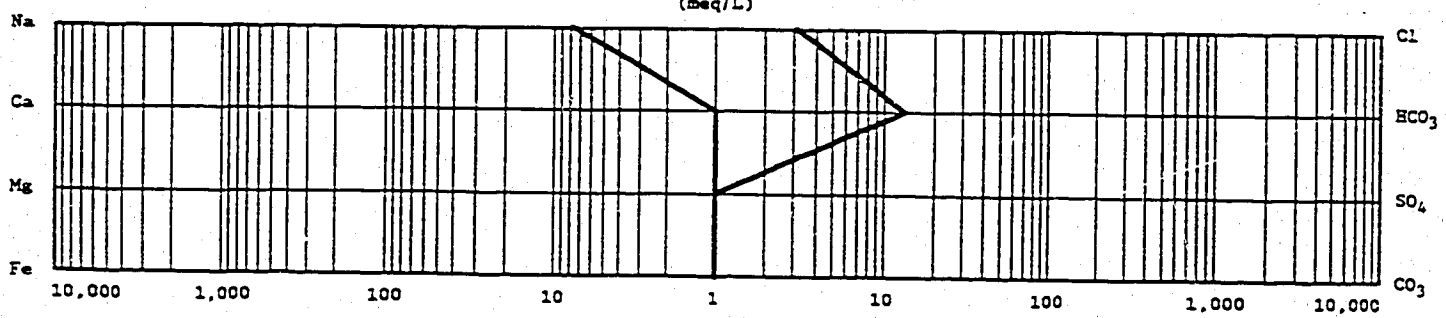
1.0022 @15.6°C — SPECIFIC GRAVITY

1.3360 @21 °C — REFRACTIVE INDEX

9.6 — pH

1.950 @25°C — RESISTIVITY(OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 1382
Brownish water. Cations and anions do not balance due to the presence of ions which are not analyzed.

Core Lab

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

70380-87-127 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

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60° 24' 22.25" NL
123° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) GR ELEV.(m)

FIELD OR AREA

Zone #3 — POOL OR ZONE

Norward Energy — SAMPLER

DST #2B — TEST TYPE & NO.

TEST RECOVERY

Collars (Sample #5) — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

PUMPING | FLOWING | GAS LIFT | SWAB

TEST INTERVALS (metres)

WATER m^3/d | OIL m^3/d | GAS m^3/d

SEPARATOR | RESERVOIR | @ °C CONTAINER WHEN SAMPLED | @ °C CONTAINER WHEN RECEIVED | SEPARATOR

PRESSURES, kPa (gauge) — *TEMPERATURES, °C*

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 01 24	87 01 27	87 01 29	GK	

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	220	.1155	9.6
K	113	.0593	2.9
Ca	4	.0023	0.2
Mg	2	.0008	0.1
Ba			
Sr			
Fe	Not Detected		

ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	94	.0491	2.6
Br			
I			
HCO_3	862	.4524	14.1
SO_4	49	.0258	1.0
CO_3	561	.2947	18.7
OH	0	.0000	0.0
H_2S	Not Detected		

TOTAL SOLIDS (mg/L)

BY EVAPORATION @ 110°C

BY EVAPORATION @ 180°C

AT IGNITION

1904 — CALCULATED

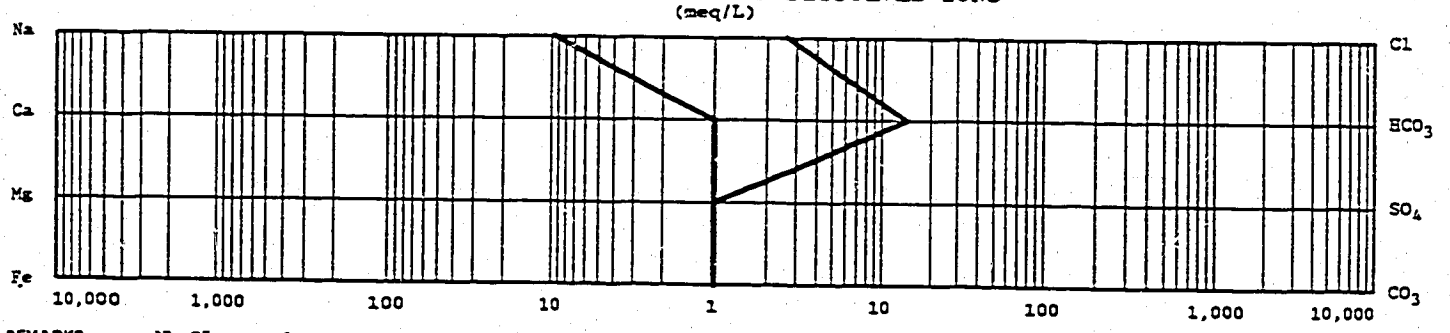
1.0022 @15.6°C — SPECIFIC GRAVITY

1.3365 @21 °C — REFRACTIVE INDEX

9.7 — pH

1.950 @25°C — RESISTIVITY(OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 1398
Brownish water. Cations and anions do not balance due to the presence of ions which are not analyzed.

Core Lab

WATER ANALYSIS

Plastic (CONTAINER IDENTITY)		70380-87-127 (LABORATORY NUMBER)
	Northcor Energy Ltd. (OPERATOR)	12 of 12 (PAGE)
60° 24' 22.25" NL 123° 35' 07.58" WL (LOCATION)	Northcor et al Laird F-25A (WELL OR SAMPLE LOCATION NAME)	KB ELEV.(m) GR ELEV.(m)
(FIELD OR AREA)	Zone #3 (POOL OR ZONE)	Norward Energy (SAMPLER)
DST #2B (TEST TYPE & NO.)	(TEST RECOVERY)	
Collars (Sample #8) (POINT OF SAMPLE)	(AMT. & TYPE CUSHION)	@ °C (MUD RESISTIVITY)
(TEST INTERVALS (metres))	PUMPING / FLOWING / GAS LIFT / SWAB	
	WATER m³/d / OIL m³/d / GAS m³/d	
SEPARATOR / RESERVOIR	@ °C CONTAINER WHEN SAMPLED / @ °C CONTAINER WHEN RECEIVED	SEPARATOR
PRESSURES, kPa (gauge)		TEMPERATURES, °C
87 01 24 (DATE SAMPLED Y/M/D)	87 01 27 (DATE RECEIVED Y/M/D)	87 01 29 (DATE ANALYZED Y/M/D) / GK (ANALYST) / (REMARKS)

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	630	.3169	27.4
K	150	.0754	3.8
Ca	6	.0029	0.3
Mg	1	.0005	0.1
Ba			
Sr			
Fe	Not Detected		

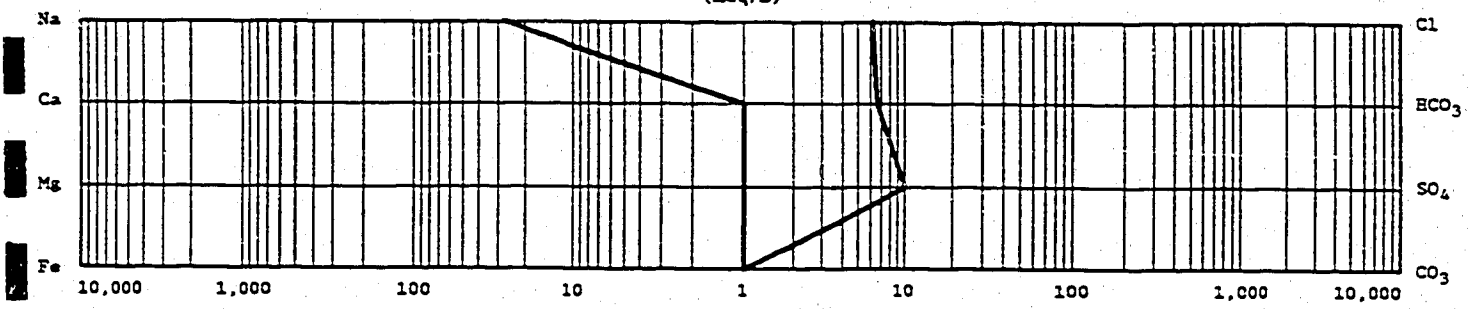
ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	219	.1103	6.2
Br			
I			
HCO_3	406	.2040	6.6
SO_4	479	.2411	10.0
CO_3	97	.0489	3.2
OH	0	.0000	0.0
H_2S	Not Detected		

TOTAL SOLIDS (mg/L)

BY EVAPORATION @ 110°C	BY EVAPORATION @ 180°C
	1988 CALCULATED
AT IGNITION	
1.0010 @15.6°C SPECIFIC GRAVITY	1.3310 @21 °C REFRACTIVE INDEX
9.6 pH	3.700 @25°C RESISTIVITY(OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 1479

Core Lab

GAS ANALYSIS

V1349 (316SS) — CONTAINER IDENTITY

70380-87-203 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

1 of 4 — PAGE

60° 24' 22.25" NL
123° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) GR ELEV.(m)

Northwest Territories — FIELD OR AREA

POOL OR ZONE

Norward Energy — SAMPLER

TEST TYPE & NO.

TEST RECOVERY

Meter Run — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

PUMPING | FLOWING | GAS LIFT | SWAB

TEST INTERVALS (metres)

WATER m^3/d | OIL m^3/d | GAS m^3/d

SEPARATOR	RESERVOIR	CONTAINER WHEN SAMPLED	CONTAINER WHEN RECEIVED	SEPARATOR
	4200 @ °C	4137 @22°C		52

PRESSURES, kPa (gauge) — TEMPERATURES, °C

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 02 04	87 02 05	87 02 08	EW	

COMPONENT	MOLE FRACTION AIR FREE AS RECEIVED	MOLE FRACTION AIR FREE ACID GAS FREE	mL/m^3 AIR FREE AS RECEIVED
H_2	Trace		
He	0.0014		
N_2	0.0418		
CO_2	0.2027		
H_2S	0.0046		
C_1	0.7494		
C_2	0.0001		
C_3	0.0000		0.0
iC_4	0.0000		0.0
C_4	0.0000		0.0
iC_5	0.0000		0.0
C_5	0.0000		0.0
C_6	0.0000		0.0
C_{7+}	0.0000		0.0
TOTAL	1.0000		0.0
		C_{5+}	0.0

CALCULATED GROSS HEATING VALUE MJ/m^3 @15°C & 101.325 kPa (abs.)

28.43 MOISTURE FREE | 35.72 MOISTURE & ACID GAS FREE

CALCULATED VAPOUR PRESSURE kPa (abs.) @37.8°C

0.0 PENTANES PLUS

CALCULATED TOTAL SAMPLE PROPERTIES (AIR=1) @ 15° C & 101.325 kPa
MOISTURE FREE AS SAMPLED

0.943 kg/m³ DENSITY | 0.769 RELATIVE DENSITY | 22.3 RELATIVE MOLECULAR MASS

CALCULATED PSEUDOCRITICAL PROPERTIES

AS SAMPLED		ACID GAS FREE	
5131.6 kPa (abs) pPc	211.5 K pTc	kPa (abs) pPc	K pTc

REMARKS

Hydrogen sulphide value determined in the lab by tutwiler.

Note: The Gross Heating Value has been calculated in accordance to AGA Report #5.

WATER ANALYSIS

CONTAINER IDENTITY:

LABORATORY NUMBER: F87-1781

LICENCE NUMBER:

OPERATOR NAME: NORTHCOR ENERGY LTD.

LOCATION:

WELL NAME: NORTHCOR ET AL FORT LIARD F-25-A

ELEVATIONS (metres) K.B. / GRD.:

FIELD OR AREA: FORT LIARD

POOL OR ZONE: NAHANNI

NAME OF SAMPLER:

COMPANY: NORWARD ENERGY

TEST TYPE / NO.:

TEST RECOVERY:

MULTIPLE RECOVERY: Y / N: X

SAMPLING POINT: SEPARATOR

AMT. & TYPE OF CUSHION:

MUD RESISTIVITY @ 25°C:

TEST INTERVAL (metres):

PERFORATIONS (metres):

TYPE OF PRODUCTION: PUMPING / FLOWING / GAS LIFT / SWAB

PRODUCTION RATES: WATER m³/d / OIL m³/d / GAS 10³m³/d

	SEPARATOR	TREATER	RESERVOIR	SOURCE	SAMPLED	RECEIVED
GAUGE PRESSURE kPa						
TEMPERATURE °C						

DATE SAMPLED (Y-M-D): 87/01/26

DATE RECEIVED (Y-M-D): 87/01/26

DATE REPORTED (Y-M-D): 87/02/02

ANALYST: M.F.

OTHER INFORMATION:

ION	Mg/l	Mass Fraction	Meq/l
Na	43 680	0.2636	1900.08
K	6 055	0.0365	155.01
Ca	11 500	0.0694	573.85
Mg	1 079	0.0065	88.69
Ba			
Sr			
Fe	MUCH		

ION	Mg/l	Mass Fraction	Meq/l
Cl	102 700	0.6197	2896.14
Br			
I			
HCO_3	669	0.0040	10.97
SO_4	54	0.0003	1.12
CO_3	0	0.0000	0.00
OH	0	0.0000	0.00
H_2S	MUCH		

TOTAL SOLIDS Mg/l

EVAPORATED @ 110°C	EVAPORATED @ 180°C
197 900	
AT IGNITION	CALCULATED
163 500	165 737

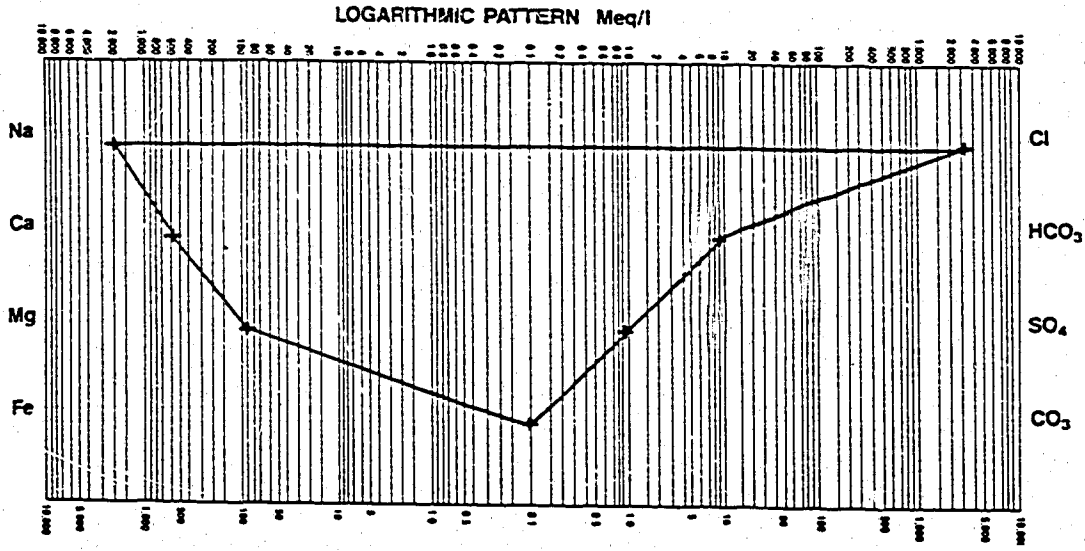
ORGANICS: PRESENT

RELATIVE DENSITY	REFRACTIVE INDEX
1.116 @ 25°C	1.3625 @ 25°C

OBSERVED pH	RESISTIVITY (Ohm m)
5.9 @ 21°C	0.064 @ 25°C

REMARKS

LOGARITHMIC PATTERN Meq/l



Sample consisted of water with black suspended particles and a light green coloured filtrate.
The analysis is characteristic of formation brine.

Core Lab

V1349 (316SS) — CONTAINER IDENTITY
70380-87-203 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR
2 of 4 — PAGE

60° 24' 22.25" NL
123° 35' 07.58" WL — LOCATION
Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME
KB ELEV.(m) GR ELEV.(m)

Northwest Territories — FIELD OR AREA
POOL OR ZONE
Norward Energy — SAMPLER

TEST TYPE & NO.
TEST RECOVERY

Meter Run — POINT OF SAMPLE
AMT. & TYPE CUSHION
@ °C — MUD RESISTIVITY

PUMPING | FLOWING | GAS LIFT | SWAB

TEST INTERVALS (metres)

WATER m³/d | OIL m³/d | GAS m³/d

SEPARATOR	RESERVOIR	@ °C CONTAINER WHEN SAMPLED	@ °C CONTAINER WHEN RECEIVED	SEPARATOR
	4200			52

PRESSURES, kPa (gauge) — TEMPERATURES, °C

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 02 04	87 02 05	87 02 05	RH	

Trace Sulphur Analysis (FPD)

Component	Concentration, ppm v/v
Hydrogen Sulphide	0.46 Mole %
Carbonyl Sulphide	3.2
Methyl Mercaptan	4.3
Ethyl Mercaptan	1.6
Carbon Disulphide	**ND
Propyl Mercaptans	1.4
Butyl Mercaptans	1.4
Dimethyl Disulphide	**ND

Hydrogen sulphide value determined in the lab by tutwiler.

*ND - None Detected. Minimum detectable concentration - 0.1 ppm
**ND - None Detected. Minimum detectable concentration - 0.5 ppm

Core Lab

CONTAINER IDENTITY

70380-87-203
LABORATORY NUMBER

Northcor Energy Ltd.
OPERATOR

3 of 4
PAGE

60° 24' 22.25" NL
123° 35' 07.58" WL
LOCATION

Northcor et al Laird F-25A
WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) GR ELEV.(m)

Northwest Territories
FIELD OR AREA

POOL OR ZONE

Norward Energy
SAMPLER

TEST TYPE & NO.

TEST RECOVERY

Meter Run
POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C
MUD RESISTIVITY

PUMPING FLOWING GAS LIFT SWAB

TEST INTERVALS (metres)

WATER m^3/d OIL m^3/d GAS m^3/d

SEPARATOR RESERVOIR 4200 @ °C CONTAINER WHEN SAMPLED @ °C CONTAINER WHEN RECEIVED SEPARATOR 52

—PRESSURES, kPa (gauge)— —TEMPERATURES, °C—

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 02 04	87 02 05	87 02 05	EW	

Hydrogen Sulphide Values of Duplicate Samples

as Determined in the Lab

Cylinder Number	H_2S (Mole Fraction)
V1358 (316SS)	0.0042
V1348 (316SS)	0.0040

Core Lab

WATER ANALYSIS

Plastic CONTAINER IDENTITY		70380-87-203 LABORATORY NUMBER
	Northcor Energy Ltd. OPERATOR	4 of 4 PAGE
60° 24' 22.25" NL 123° 35' 07.58" WL LOCATION	Northcor et al Laird F-25A WELL OR SAMPLE LOCATION NAME	KB ELEV.(m) GR ELEV.(m)
Northwest Territories FIELD OR AREA	POOL OR ZONE	Norward Energy SAMPLER
TEST TYPE & NO.	TEST RECOVERY	
Separator POINT OF SAMPLE	AMT. & TYPE CUSHION	@ °C MUD RESISTIVITY
PUMPING / FLOWING / GAS LIFT / SWAB		
TEST INTERVALS (metres)	WATER m³/d / OIL m³/d / GAS m³/d	

PRESSURES, kPa (gauge)					TEMPERATURES, °C	
SEPARATOR	RESERVOIR		@ °C CONTAINER WHEN SAMPLED	@ °C CONTAINER WHEN RECEIVED	SEPARATOR	

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 02 04	87 02 05	87 02 05	GK	

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	41500	.2759	1805.1
K	5560	.0370	142.2
Ca	11282	.0750	563.0
Mg	836	.0056	68.7
Ba			
Sr			
Fe	Present		

ANIONS

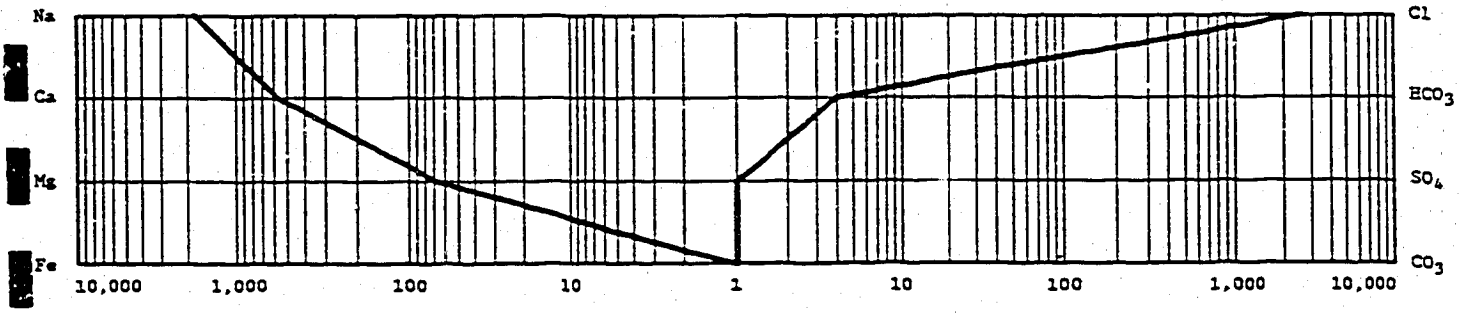
ION	mg/L	mg Fraction	MEQ/L
Cl	91010	.6050	2567.1
Br			
I			
HCO_3	239	.0016	3.9
SO_4	11	.0001	0.2
CO_3	0	.0000	0.0
OH	0	.0000	0.0
H_2S	Present		

TOTAL SOLIDS (mg/L)

BY EVAPORATION @ 110°C	BY EVAPORATION @ 180°C
AT IGNITION	150438 CALCULATED
1.1055 @15.6°C SPECIFIC GRAVITY	1.3555 @21 °C REFRACTIVE INDEX
5.4 pH	0.052 @25°C RESISTIVITY (OHM-METRES)

? to 0.614 Gp/m

LOGARITHMIC PATTERN OF DISSOLVED IONS (mg/L)



REMARKS: NaCl equiv. 150530

Core Lab

GAS ANALYSIS

199 — CONTAINER IDENTITY

70380-87-304 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

1 of 2 — PAGE

60° 24' 22.25" NL
123° 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) — GR ELEV.(m)

Northwest Territories — FIELD OR AREA

Zone 4 — POOL OR ZONE

Norward Energy — SAMPLER

TEST TYPE & NO. — TEST RECOVERY

Meter Run Gas (Test No. 3) — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

PUMPING | FLOWING | GAS LIFT | SWAB

TEST INTERVALS (metres)

WATER m^3/d | OIL m^3/d | GAS m^3/d

SEPARATOR | RESERVOIR | 3220 @ °C CONTAINER WHEN SAMPLED | 3034 @22°C CONTAINER WHEN RECEIVED | SEPARATOR 56

PRESSURES, kPa (gauge) — *TEMPERATURES, °C*

87 02 17	87 02 23	87 02 23	EW	
DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS

COMPONENT	MOLE FRACTION AIR FREE AS RECEIVED	MOLE FRACTION AIR FREE ACID GAS FREE	mL/m^3 AIR FREE AS RECEIVED
H_2	0.0001		
He	0.0015		
N_2	0.0422		
CO_2	0.1978		
H_2S	0.0038		
C_1	0.7545		
C_2	0.0001		
C_3	0.0000		0.0
iC_4	0.0000		0.0
C_4	0.0000		0.0
iC_5	0.0000		0.0
C_5	0.0000		0.0
C_6	0.0000		0.0
C_{7+}	0.0000		0.0
TOTAL	1.0000		0.0
		C_{5+}	0.0

CALCULATED GROSS HEATING VALUE MJ/m^3 @15°C & 101.325 kPa (abs.)

28.60 MOISTURE FREE | 35.71 MOISTURE & ACID GAS FREE

CALCULATED VAPOUR PRESSURE kPa (abs.) @37.8°C

0.0 PENTANES PLUS

CALCULATED TOTAL SAMPLE PROPERTIES (AIR=1) @ 15° C & 101.325 kPa
MOISTURE FREE AS SAMPLED

0.936 kg/m^3	0.764	22.1
DENSITY	RELATIVE DENSITY	RELATIVE MOLECULAR MASS

CALCULATED PSEUDOCRITICAL PROPERTIES

AS SAMPLED		ACID GAS FREE	
5113.2 kPa (abs)	210.8 K	kPa (abs)	K
pPc	pTc	pPc	pTc

REMARKS

Note: The Gross Heating Value has been calculated in accordance to AGA Report #5.

Core Lab

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

70380-87-304 — LABORATORY NUMBER

Northcor Energy Ltd. — OPERATOR

2 of 2 — PAGE

60° 24' 22.25" NL
123o 35' 07.58" WL — LOCATION

Northcor et al Laird F-25A — WELL OR SAMPLE LOCATION NAME

KB ELEV.(m) GR ELEV.(m)

Northwest Territories — FIELD OR AREA

Zone 4 — POOL OR ZONE

Norward Energy — SAMPLER

TEST TYPE & NO.

TEST RECOVERY

Separator — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

PUMPING | FLOWING | GAS LIFT | SWAB

TEST INTERVALS (metres)

WATER m³/d | OIL m³/d | GAS m³/d

SEPARATOR | RESERVOIR | @ °C CONTAINER WHEN SAMPLED | @ °C CONTAINER WHEN RECEIVED | SEPARATOR

PRESSURES, kPa (gauge) — *TEMPERATURES, °C*

DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST	REMARKS
87 02 17	87 02 23	87 02 24	LS	

CATIONS

ION	mg/L	mg Fraction	MEQ/L
Na	33000	.2706	1435.4
K	4300	.0353	110.0
Ca	9633	.0790	480.7
Mg	780	.0064	64.2
Ba			
Sr			
Fe	Not Detected		

ANIONS

ION	mg/L	mg Fraction	MEQ/L
Cl	74028	.6069	2088.1
Br			
I			
HCO_3	223	.0018	3.7
SO_4	8	.0001	0.2
CO_3	0	.0000	0.0
OH	0	.0000	0.0
H_2S	Present		

TOTAL SOLIDS (mg/L)

BY EVAPORATION @ 110°C

BY EVAPORATION @ 180°C

AT IGNITION

121972 — CALCULATED

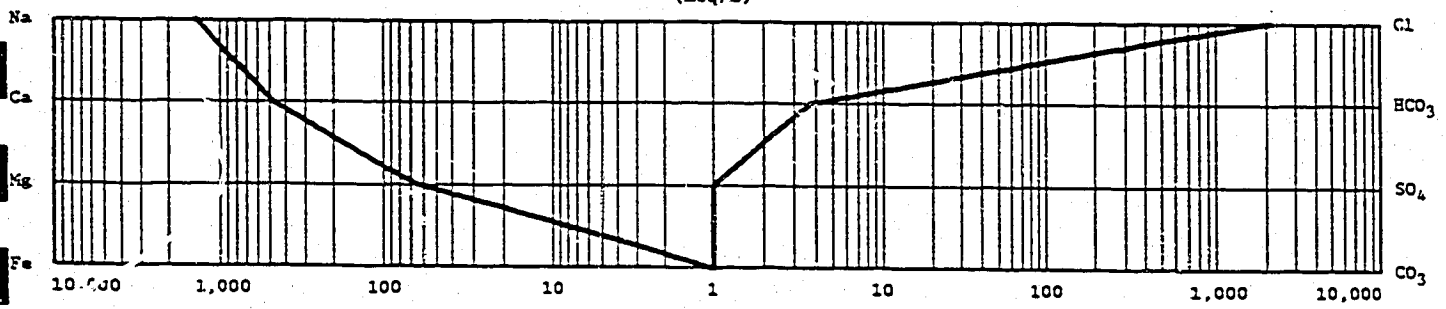
1.0843 @15.6°C — SPECIFIC GRAVITY

1.3535 @22 °C — REFRACTIVE INDEX

6.1 — pH

0.070 @25°C — RESISTIVITY(OHM-METRES)

LOGARITHMIC PATTERN OF DISSOLVED IONS (meq/L)



REMARKS: NaCl equiv. 122104

BASIC TIME FUNCTIONS

Flow Time t

Shut-In Time Δt

Horner Time $\dfrac{t + \Delta t}{\Delta t}$

Superposition Time

$$t_n = \sum_{j=1}^{n} \frac{q_j - q_{j-1}}{q_n} \log (t - t_{j-1})$$

$$\Delta t_n = \sum_{j=1}^{n} \frac{q_j}{q_n} \log \frac{t_n + \Delta t - t_{j-1}}{t_n + \Delta t - t_j}$$

Equivalent Time $\Delta t_e = \dfrac{t \cdot \Delta t}{t + \Delta t}$

Pseudo Time

$$t_a = \int_o^t \frac{dt}{\mu c}$$

$$\Delta t_a = \int_o^{\Delta t} \frac{dt}{\mu c}$$

Root Time $\sqrt{t}$

$\sqrt{\Delta t}$

Tandem Root Time $\sqrt{t + \Delta t} - \sqrt{\Delta t}$

Quad Root Time $\sqrt[4]{t}$

$\sqrt[4]{\Delta t}$

Tandem Quad Root Time $\sqrt[4]{t + \Delta t} - \sqrt[4]{\Delta t}$

NOTE: 1. Complex time functions like "pseudo-super-linear-equivalent time" and many others are simply derived from the above.

2. Subscripts not shown above, but used for linear and bilinear functions are 'l' and 'b', respectively.

T. Fekete Associates Inc. Consultants Ltd.

WTP

TYPE CURVES - DIMENSIONLESS VARIABLES

$$\Delta p_D = \frac{kh\,\Delta p^2}{1.295 \times 10^3\, q\mu ZT}$$

$$t_D = \frac{3.6 \times 10^{-3}\, kt}{\phi \mu c r_w^2}$$

$$t_{Dxf} = \frac{3.6 \times 10^{-3}\, kt}{\phi \mu c x_f^2}$$

$$t_D/C_D = 0.02262\, \frac{kh}{\mu}\, \frac{t}{C}$$

$$C_D e^{2s} = \frac{0.1592\, C\, e^{2s}}{\phi c h r_w^2}$$

$$x_{eD} = \frac{x_e}{x_f}$$

$$(k_f w)_D = \frac{k_f w}{k x_f}$$

NOTE: t represents the time function used for the type curve data plot.

BUILDUP/FALLOFF

SEMILOG ANALYSIS

Flow Capacity

$$kh = \frac{1491\ quZT}{m}$$

Apparent Skin

$$s' = 1.151\left[\frac{p^2_{wsl} - p^2_{wfo}}{m} - \log\left(\frac{k}{\phi\mu c r_w^2}\right) + 2.09\right]$$

Pressure Drop due to Skin

$$\Delta p_s = (p^2_{wfo} + 0.869\ ms')^{\frac{1}{2}} - p_{wfo}$$

Flow Efficiency

$$FE = \frac{\bar{p}^2_R - p^2_{wfo} - 0.869\ ms'}{\bar{p}^2_R - p^2_{wfo}}$$

Damage Ratio

$$DR = \frac{1}{FE}$$

Radius of Investigation

$$r_{inv} = \left(\frac{kt}{69.44\ \phi\mu c}\right)^{\frac{1}{2}}$$

Time to Stabilization

$$t_s = \frac{\phi\mu cA}{3.6\times10^{-3}k}\ (t_{DA})_{pss}$$

Stabilized Rate

$$q_s = \frac{\bar{p}^2_R - p^2_{wfo}}{\frac{2982\ uZT}{kh}\left[\log\left\{\left(\frac{4A}{1.781\ r_w^2 C_A}\right)^{\frac{1}{2}}\right\} + \frac{s'}{2.303}\right]}$$

T.Fekete Consultants Ltd

BUILDUP/FALLOFF (cont'd)

MBH AVERAGE PRESSURES

$$t_{DA} = \frac{3.6\times10^{-3}\ kt}{\phi\mu cA}$$

F = MBH dimensionless pressure function based on t_{DA} and reservoir shape

$$\bar{P}_R = \left(p^{*2} - \frac{mF}{2.303} \right)^{\frac{1}{2}}$$

MDH AVERAGE PRESSURES

$$\Delta t_{De} = \frac{3.6\times10^{-3}\ kt}{\phi\mu c r_e^{\ 2}} \quad , \quad r_e^{\ 2} = A/\pi$$

Δp_D = MDH dimensionless pressure function based on t_{De} and reservoir shape

$$\bar{P}_R = \left(p^2_{ws} + \frac{m\ \Delta p_D}{1.151} \right)^{\frac{1}{2}}$$

BUILDUP/FALLOFF (cont'd)

LINEAR ANALYSIS

$$x_f \, k^{\frac{1}{2}} = \frac{137.72 \, quZT}{mh(\phi\mu c)^{\frac{1}{2}}}$$

Fracture half-length $$x_f = \frac{x_f \, k^{\frac{1}{2}}}{k^{\frac{1}{2}}}$$

Skin Factor $$s = \ln \frac{2 \, r_w}{x_f}$$

T. Fekete Consultants Ltd.

NOMENCLATURE

Symbol	Description	Metric (SI)	Field
a	LIT flow equation coefficient	-	-
A	drainage area	m^2	ft^2
AOF	absolute open flow potential (gas)	$10^3 m^3/d$	MMcfd
b	LIT flow equation coefficients	-	-
B	formation volume factor	-	-
c	compressibility	kPa^{-1}	$psia^{-1}$
C	wellbore storage/unloading constant	m^3/kPa	$ft^3/psia$
C	simplified flow equation coefficient	-	-
C_A	shape factor	-	-
DR	damage ratio	-	-
F	MBH dimensionless pressure function	-	-
FE	flow efficiency	-	-
G	relative density	-	-
GOR	gas oil ratio	m^3/m^3	ft^3/bbl
h	net pay	m	ft
k	permeability	mD	md
k_f	fracture permeability	mD	md
kh	flow capacity	mD.m	md.ft
k/μ	mobility	mD/mPa.s	md/cp
kh/μ	transmissivity	-	-
m	slope of transient plots	-	-
n	simplified flow equation coefficient	-	-

Symbol	Description	Metric (SI)	Field
p	pressure	kPa	psi
p_{bp}	bubble point pressure	kPa	psia
p_c	gas pseudo-critical pressure	kPa	psia
p_i	initial pressure	kPa	psia
p_R	average reservoir pressure	kPa	psia
p_{tf}	flowing wellhead pressure	kPa	psia
p_{ts}	static wellhead pressure	kPa	psia
p_{wf}	flowing sandface pressure	kPa	psia
p_{ws}	static sandface pressure	kPa	psia
p_{wfo}	final flowing pressure	kPa	psia
p^*	extrapolated pressure	kPa	psia
p_{ws1}	1 hour shut-in pressure	kPa	psia
Δp_D	dimensionless pressure MDH dimensionless pressure function	-	-
q	flow rate - gas - liquid	$10^3 m^3/d$ m^3/d	MMcfd bbl/d
q_s	stabilized rate - gas - liquid	$10^3 m^3/d$ m^3/d	MMcfd bbl/d
q_{max}	maximum liquid rate	m^3/d	bbl/d
r_e	external radius	m	ft
r_{inv}	radius of investigation	m	ft
r_w	wellbore radius	m	ft
R_s	solution gas ratio	m^3/m^3	ft^3/bbl
s	skin factor	-	-
s'	apparent skin factor	-	-
S	liquid saturation	-	-
t	time	hr	hr

T. Fekete Consultants Ltd.

Symbol	Description	Metric (SI)	Field
Δt	shut-in time	hr	hr
$(t_{DA})_{pss}$	dimensionless time at pseudo steady state	-	-
t_s	time to stabilization	hr	hr
T	temperature	K	°R
T_c	gas pseudo critical temperature	K	°R
V_{ws}	wellbore volume - gas - liquid	m^3 m^3	ft^3 bbl
w	fracture width	m	ft
x_f	fracture half-length	m	ft
x_e	drainage half-length	m	ft
Z	gas compressibility factor	-	-
μ	viscosity - gas - liquid	μPa.s mPa.s	cp cp
ϕ	porosity	-	-
Ψ	pseudo pressure	$kPa^2/\mu Pa.s$	$psia^2/cp$

Subscripts

D	dimensionless
f	formation
g	gas
i	initial
o	oil
w	water
t	total, transient

T. Fekete Consultants Ltd.

UNITS CONVERSION AND PREFIXES

TO CONVERT METRIC (SI) UNIT	TO FIELD UNIT	DIVIDE BY	
$10^3m^3/d$	MMcfd	2.817 399	E+01
kPa	psia	6.894 757	E+00
mD	md	9.869 233	E-01
mD.m	md.ft	3.008 142	E-01
m	ft	3.048	E-01
m^3	bbl (35 Imp gal) (42 US gal)	1.589 873	E-01
µPa.s	cp	1.0	E+03
°C	°F	(°F-32)5/9	E+00
K	°R	5/9	E+00
m^2	section (640 acres)	2.589 988	E+06
ha	section (640 acres)	2.589 988	E+02
m^3	gallon (Imp)	4.546 09	E-03
m^3	gallon (US)	3.785 412	E-03
$m^3/10^3m^3$	bbl/MMcf	5.643 052	E-03

Standard conditions: Metric (SI) 15°C, 101.325 kPa
Field 60°F, 14.65 psia

T. Fekete Consultants Ltd

PROPERTY CORRELATION REFERENCES

GAS PROPERTIES:

ERCB GUIDE G-3. "Gas Well Testing - Theory and Practice" Appendix A, Fourth Edition, 1979.

OIL PROPERTIES:

Beggs, H.D. and Robinson, J.R., "Estimating the Viscosity of Crude Oil Systems", JPT Forum, September 1975, pp. 1140-1141.

Vazquez, M.E., and Beggs, H.D., "Correlations for Fluid Physical Property Prediction" Journal of Petroleum Technology, June 1980, pp. 968-970.

WATER PROPERTIES:

Craft, B.C. and M.F. Hawkins, "Applied Petroleum Reservoir Engineering", Prentice-Hall, 1959, p. 131.

Meehan, D.N. "A Correlation for Water Compressibility", Petroleum Engineer, November 1980, pp. 125-126.

Meehan, D.N. "Estimating Water Viscosity at Reservoir Conditions", Petroleum Engineer, July 1980, pp. 117-118.

Numbere, D., W.E. Brigham and M.B. Standing "Correlations for Physical Properties of Petroleum Reservoir Brines", Petroleum Research Institute, Stanford University, November 1977, pp. 8-16.

ROCK PROPERTIES:

Craft, B.C. and M.F. Hawkins, M.F., "Applied Petroleum Reservoir Engineering", Prentice-Hall, 1959, p132.

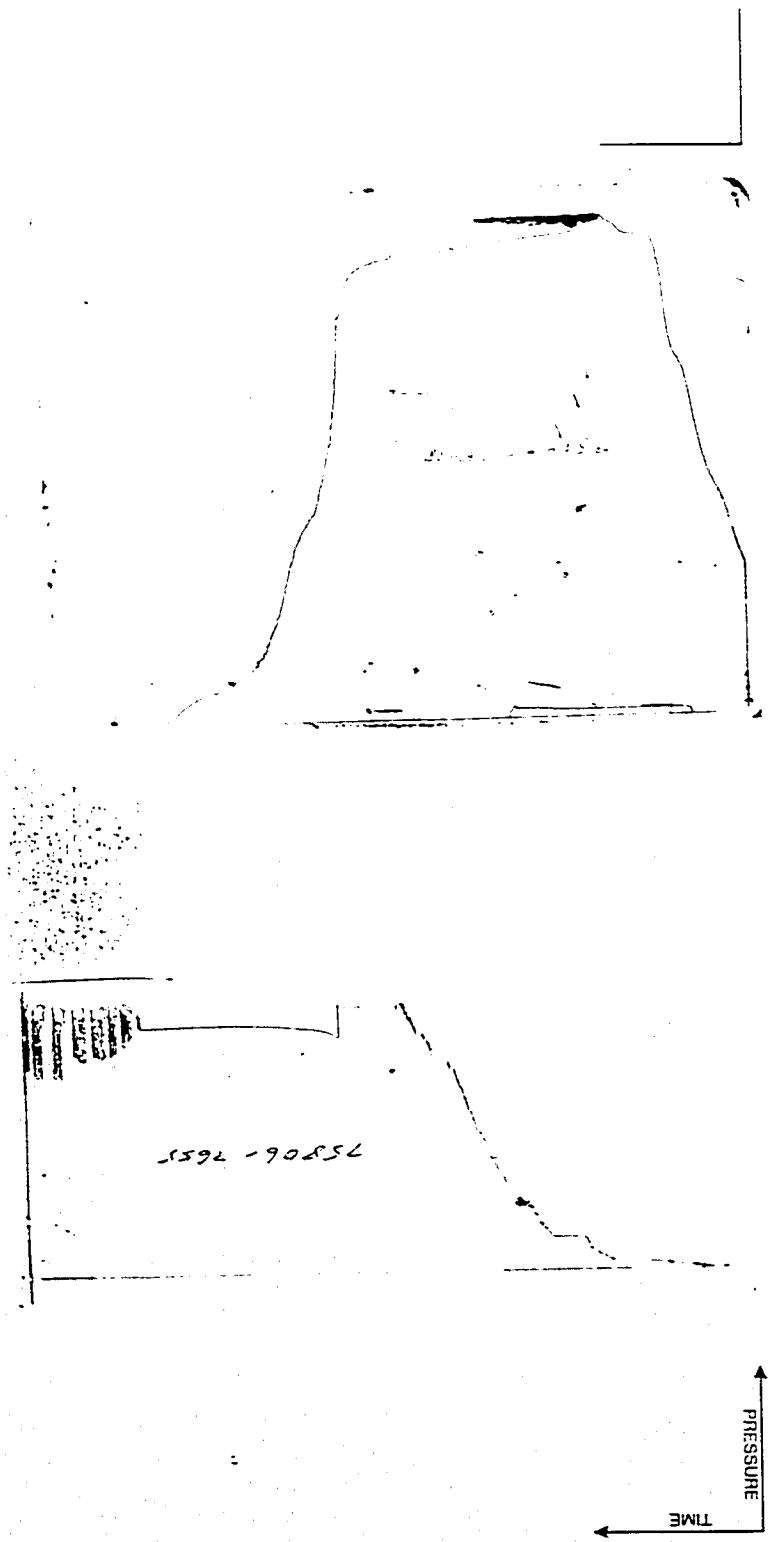
MAJOR REFERENCES FOR WELL TEST INTERPRETATION

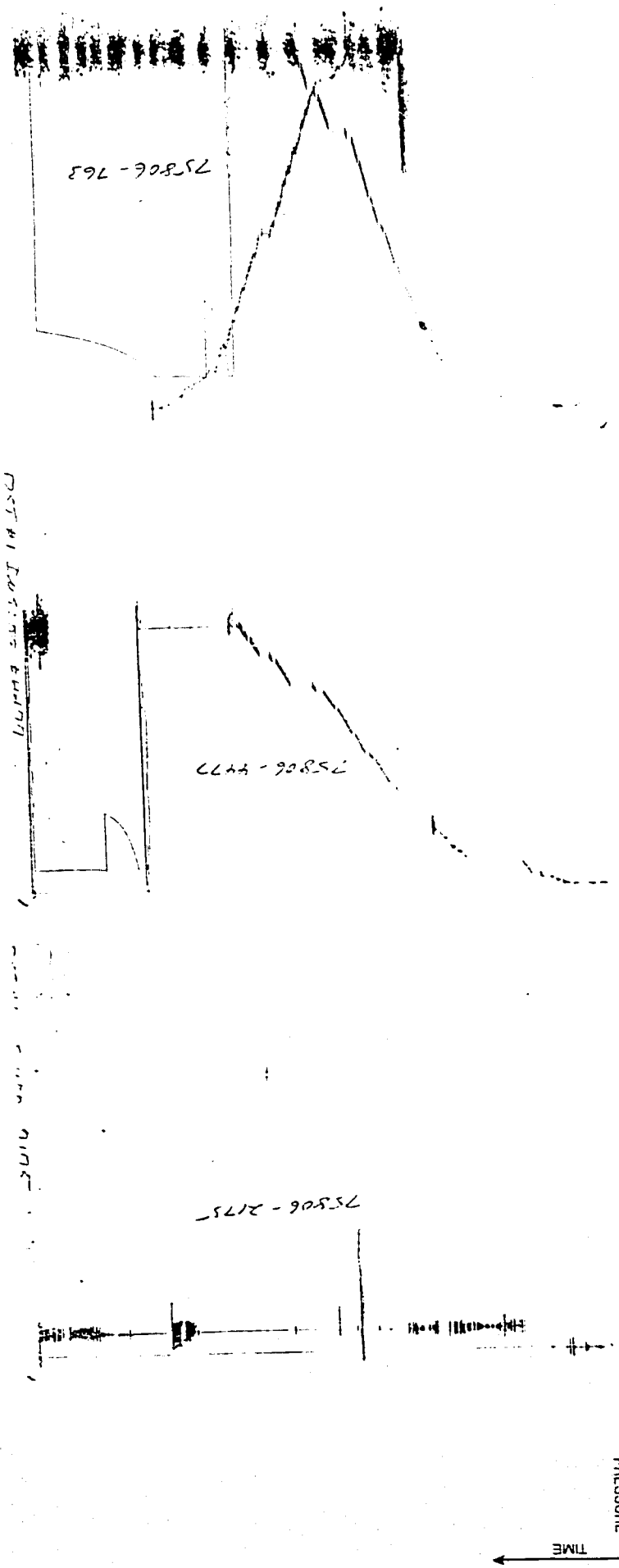
1. Gas Well Testing - Theory and Practice, ERCB Guide G-3.
2. Pressure Buildup and Flow Tests in Wells - Matthews and Russell, SPE Monograph Vol 1.
3. Advances in Well Test Analysis - Earlougher, SPE Monograph Vol 5.

REPORT DISTRIBUTION

"Twenty Five" (25) Copies of the Report to: Pajak Engineering Ltd.
Calgary, Alberta

Attention: Mr. Syd Robertson


75806 - 7651
PRESSURE
TIME


75806 - 763
75806 - 7775
75806 - 2175
PRESSURE
TIME

TESTERS	R. McIntosh
WITNESS	D. Kilpatrick
DRILLING CONTRACTOR	Bawden 33

HALLIBURTON SERVICES LIMITED
FORMATION TESTING
DATA SHEET

REFER TO INVOICE NO.	75 806
DATE OF TEST	86-11-19
TEST No.	1
JOB TYPE	Dual Straddle

COMPANY	NORTHCOR ENERGY LTD.
LEGAL DESCRIPTION	60-24-22 123-35-07
PROVINCE OR TERRITORY	N.W.T.
FIELD OR AREA	LIARD
TEST NUMBER	1
WELL NAME AND NUMBER	NORTHCOR ET AL LIARD F-25A
TESTED INTERVAL	3377.88 - 3414.09

PRESSURE SUMMARY kPa

GAUGE NUMBER	2175	4477	763	3655		
GAUGE DEPTH	3365.01	3370.28	3381.83	3464.75		
BLANKED OFF	~~YES~~ / NO	~~YES~~ NO	YES / ~~NO~~	YES / ~~NO~~	YES / NO	YES / NO
HOUR CLOCK TRAVEL	24	24	24	24		
INITIAL HYDROSTATIC		35 432	35 500	36 404		
FIRST FLOW INITIAL	3 204	3 463	3 351			
FIRST FLOW FINAL	3 204	3 360	3 329			
FIRST CLOSED IN	3 258	10 924	10 897			
SECOND FLOW INITIAL	3 066	3 257	3 327			
SECOND FLOW FINAL	3 266	*	3 456			
SECOND CLOSED IN	3 266	*	8 126			
THIRD FLOW INITIAL						
THIRD FLOW FINAL						
THIRD CLOSED IN						
FINAL HYDROSTATIC		*	35 507	35 804		

TIME PERIODS

	FIRST	SECOND	THIRD		TIME
FLOW	10	104		TESTER VALVE OPENED	16:10
CLOSED IN	45	240		PACKER UNSEATED	22:49

LIQUID RECOVERY DATA

METRES	DESCRIPTION OF LIQUID
304	Gas cut water.
50	Gas cut drilling mud.
354	TOTAL LIQUID RECOVERY

MEASURED FROM TESTER VALVE

EQUIPMENT AND WELL DATA

FORMATION TESTED	Nahanni	TEMP. REC. No.	TE38
		DEPTH	3383.08 m
		MAX. TEMP.	150 °C
NET PRODUCTIVE THICKNESS	m	MUD TYPE	Gel
K.B. ELEVATION	723 m	MUD DENSITY	1100 kg/m³
		MUD VISC	45 s/L
ALL DEPTHS MEASURED FROM:	☒ KB ☐ GROUND	CASING OR HOLE SIZE	216 mm
PACKER DEPTHS	TOP 3378.9 BOTTOM 3414.1 m	RATHOLE SIZE	N/A mm
DEPTH OF TESTER VALVE	m	DRILL PIPE OD mm	127 kg/m 29
CASING PERFORATED INTERVAL	N/A m	DRILL COLLARS ABOVE TESTER VALVE ID mm	73 LENGTH m 56.36
TOTAL DEPTH	3466 m	SURFACE CHOKE	25.4 mm
AMOUNT AND TYPE CUSHION	304 m Water	BOTTOM CHOKE	19.1 mm

SAMPLE DATA

OIL GRAVITY _____ @ _____ °C
GAS / OIL RATIO _____
REFRACTOMETER / RELATIVE DENSITY
RECOVERY WATER _____ @ _____ °C
CHLORIDE CONTENT _____ mg/L

SAMPLE SHIPPED TO LABORATORY	YES	NO
SAMPLER No. 503	☒	☐
GAS SAMPLE BOTTLE No.	☐	☐

LABORATORY Taken by Northor

REMARKS

* Clock ran out.

TICKET NO. 75 806

DATES AND TIMES (00:00-24:00 HRS.)	CHOKE SIZE (mm)	SURFACE PRESSURE (kPa)	GAS RATE (m^3/day)	LIQUID RATE (m^3/day)	REMARKS
86-11-19					
03:00					Rig out out hole.
					Pull all tools onto floor.
					Steam off tools.
03:20					Load hydrostatic recorder.
04:51					Load temp. recorder.
04:54					Loac outside recorder.
05:57					Load fluid recorder.
06:14					Load inside recorder with 12 hr. clock
					at engineer's request.
06:30					Tool built. Weight below hydrospring
					8000 daN.
					Run in 300 m of collars and pipe, add
					water cushion. Rig slip and cut line.
					Trip in.
14:12					On bottom, string weight 80 000 daN with
					15 000 drag. Head up.
14:40					Rig up flare line riser to floor.
16:09					Set 15 000 daN on tools.
16:10					Tool open. Very weak blow throughout
					Preflow.
16:20					Shut in tool.
16:47					While shut in blow to pail bottom. Vent
					to pit.
16:53					Return to pail and was dead.
17:05					Open tool. Strong blow to pail bottom in
					10 minutes. Vent to pit for 5 minutes.
					No gas. Return to pail. Increase to
					pail bottom in 20 minutes. Vent to pit
					for 5 minutes. No gas. Return to pail
					with a 4" blow through remainder.
18:49					Shut in tool.
22:49					Pull 100 000 to unset packers. Free for
					6 m then tight. Work and jar pulling to
					a maximum of 165 000. Find string
					84 000.
24:00					Tool free. Pull out of hole.

TICKET NO. 75 806

DATES AND TIMES (00:00-24:00 HRS.)	CHOKE SIZE (mm)	SURFACE PRESSURE (kPa)	GAS RATE (m^3/day)	LIQUID RATE (m^3/day)	REMARKS
09:30					On surface. Recover 354 m total.
					304 m water. 50 m drilling fluid. All
					gas cut.
					Obtain 4 samples.
					Break down tools.
					Bottom packer of the top set was damaged
					4 - 5" of rubber left down hole.
					Jars were damaged and no longer recock.
					Bottom packers both stripped off.
11:30					Job complete.

PRODUCTION TEST DATA

Form 825

HALLIBURTON SERVICES LIMITED

SPECIAL PRESSURE DATA

DATE: 86-11-19 TICKET # 75806

* Gauge Number	:	763.	*
* Gauge Depth	:	3382. m	*
* Time of Flow	:	10.0 min.	*
* Final Pressure	:	3329.1 kPa.	*

Initial Hydrostatic Pressure = 35499.7 kPa
Final Hydrostatic Pressure = 35507.1 kPa

GAUGE 1, FLOW 1

	Time Deflection (in)	Time (minutes)	Pressure (kPa)
1.	0.0000	0.0	3351.3
2.	0.0174	5.0	3329.1
3.	0.0350	10.0	3329.1

HALLIBURTON SERVICES LIMITED

GAUGE 1, CIP 1

	Time Deflection (in)	Time (minutes)	Log T+dt / dt	Pressure (kPa)
1.	0.0067	2.0	0.7713	4477.3
2.	0.0131	4.0	0.5452	5223.0
3.	0.0198	6.0	0.4249	5828.2
4.	0.0262	8.0	0.3530	6420.0
5.	0.0330	10.0	0.3002	6909.8
6.	0.0395	12.0	0.2629	7412.5
7.	0.0493	15.0	0.2218	7999.7
8.	0.0657	20.0	0.1762	8895.3
9.	0.0822	25.0	0.1461	9504.7
10.	0.0985	30.0	0.1250	9994.0
11.	0.1150	35.0	0.1092	10349.9
12.	0.1315	40.0	0.0969	10646.5
13.	0.1479	45.0	0.0872	10897.1

HALLIBURTON SERVICES LIMITED

SPECIAL PRESSURE DATA

DATE: 86-11-19 TICKET # 75806

* Gauge Number	:	763.	*
* Gauge Depth	:	3382. m	*
* Time of Flow	:	104.0 min.	*
* Final Pressure	:	3456.4 kPa.	*

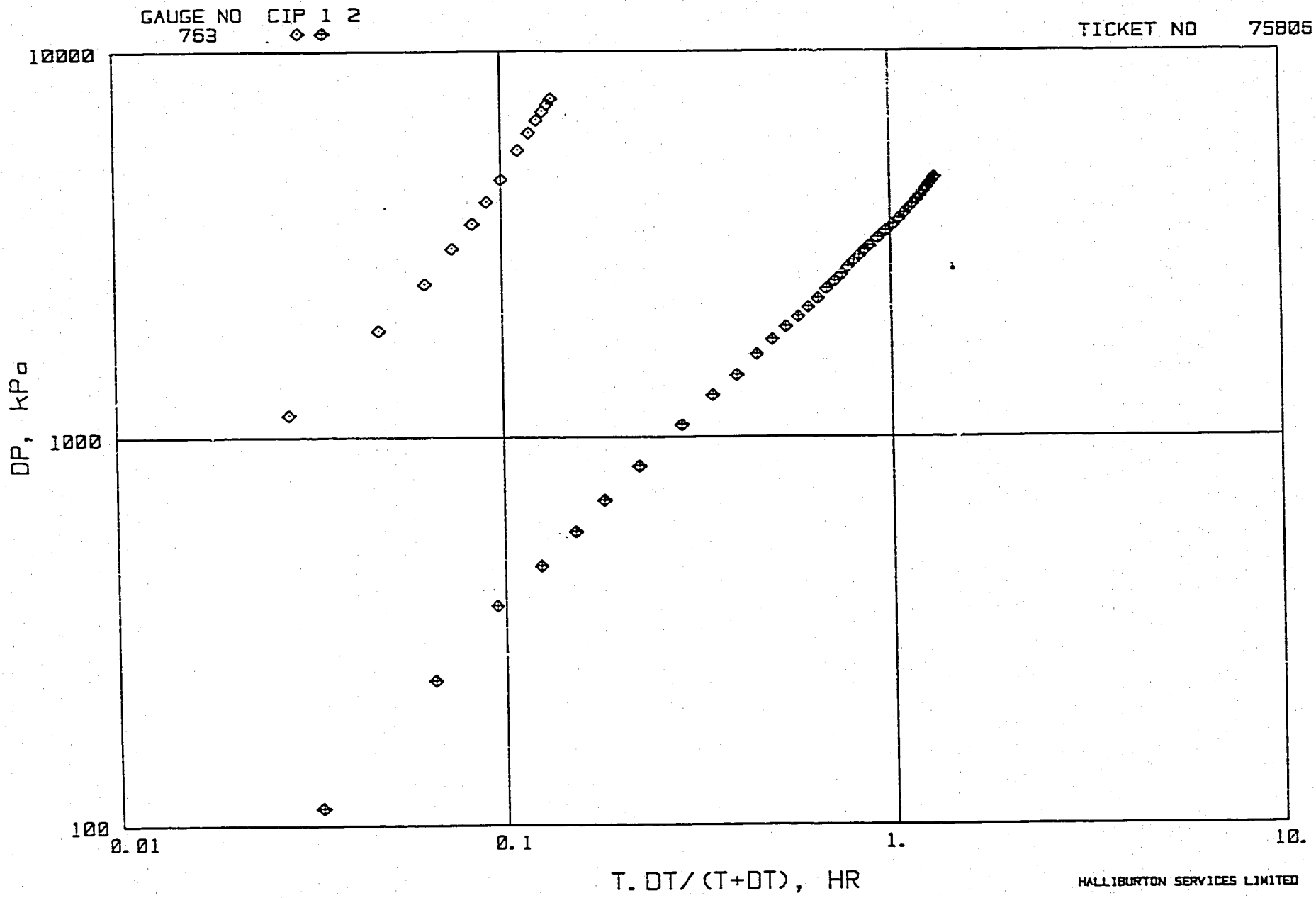
GAUGE 1, FLOW 2

	Time Deflection (in)	Time (minutes)	Pressure (kPa)
1.	0.0000	0.0	3327.7
2.	0.0332	10.0	3410.5
3.	0.0661	20.0	3432.7
4.	0.0994	30.0	3432.7
5.	0.1325	40.0	3447.5
6.	0.1654	50.0	3462.3
7.	0.1985	60.0	3462.3
8.	0.2317	70.0	3462.3
9.	0.2647	80.0	3462.3
10.	0.2975	89.9	3462.3
11.	0.3308	100.0	3462.3
12.	0.3441	104.0	3456.4

HALLIBURTON SERVICES LIMITED

GAUGE 1, CIP 2

	Time Deflection (in)	Time (minutes)	Log T+dt / dt	Pressure (kPa)
1.	0.0068	2.0	1.7547	3528.9
2.	0.0134	4.0	1.4675	3654.6
3.	0.0199	6.0	1.3028	3786.3
4.	0.0267	8.0	1.1825	3884.0
5.	0.0333	10.0	1.0936	3989.0
6.	0.0399	12.0	1.0219	4105.9
7.	0.0500	15.0	0.9343	4261.3
8.	0.0667	20.0	0.8257	4496.5
9.	0.0832	25.0	0.7454	4705.2
10.	0.0999	30.0	0.6814	4867.9
11.	0.1166	35.0	0.6291	5058.8
12.	0.1334	40.0	0.5851	5208.2
13.	0.1499	45.0	0.5482	5348.8
14.	0.1667	50.0	0.5156	5467.2
15.	0.1831	55.0	0.4877	5585.5
16.	0.2000	60.0	0.4622	5703.9
17.	0.2164	65.0	0.4401	5837.1
18.	0.2333	70.0	0.4196	5946.6
19.	0.2500	75.0	0.4012	6051.6
20.	0.2666	80.0	0.3846	6177.4
21.	0.2832	85.0	0.3694	6273.6
22.	0.2998	90.0	0.3554	6362.3
23.	0.3166	95.0	0.3423	6458.5
24.	0.3332	100.0	0.3304	6539.9
25.	0.3664	110.0	0.3089	6695.3
26.	0.3998	120.0	0.2900	6835.8
27.	0.4332	130.0	0.2734	6963.2
28.	0.4664	140.0	0.2587	7095.2
29.	0.4998	150.0	0.2455	7213.8
30.	0.5331	160.0	0.2336	7332.4
31.	0.5664	170.0	0.2228	7436.2
32.	0.5995	180.0	0.2131	7540.0
33.	0.6329	190.0	0.2041	7645.3
34.	0.6663	200.0	0.1959	7755.0
35.	0.6997	210.0	0.1883	7851.4
36.	0.7328	220.0	0.1813	7941.9
37.	0.7661	230.0	0.1748	8029.3
38.	0.7995	240.0	0.1688	8125.7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763
TICKET NO 75805
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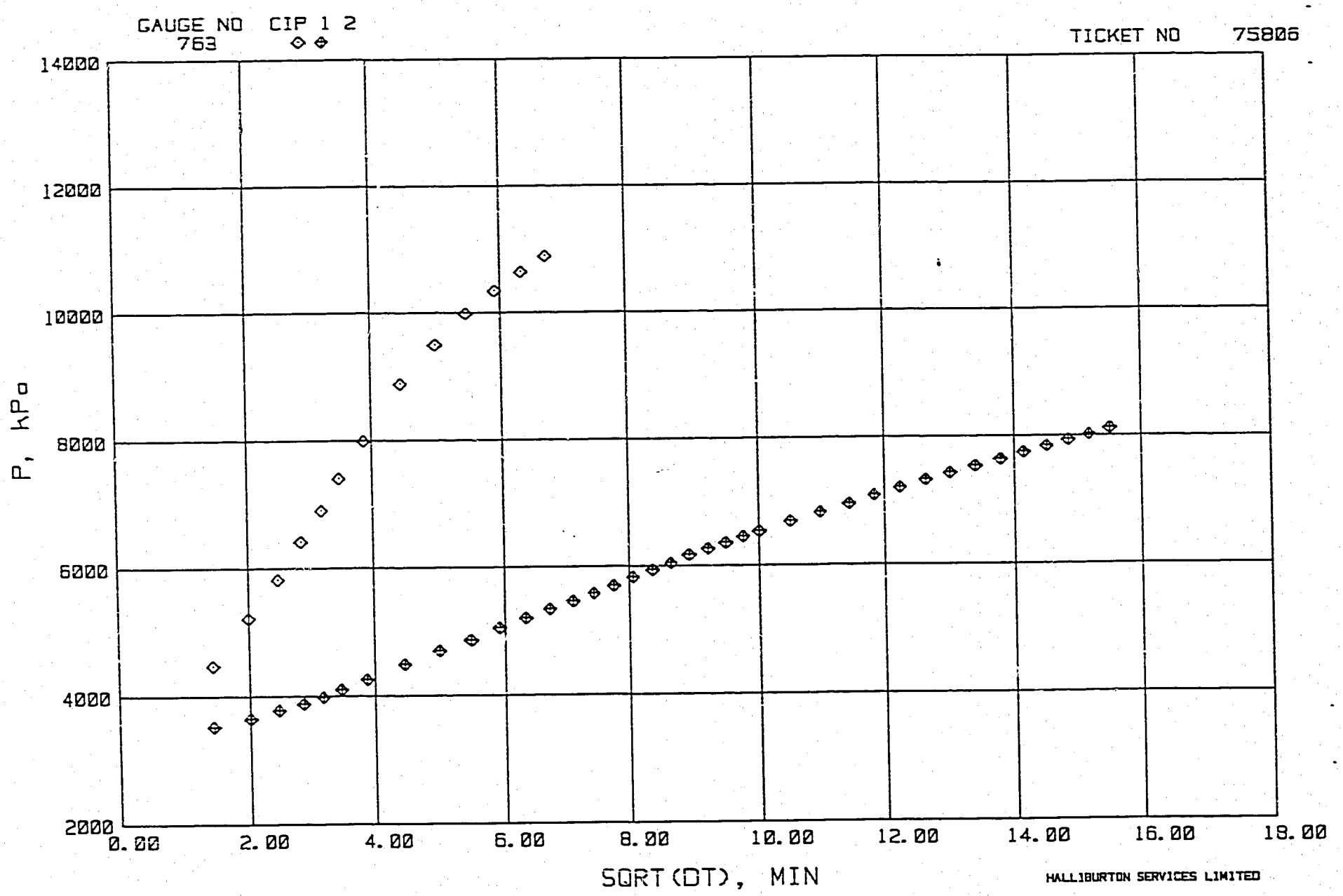
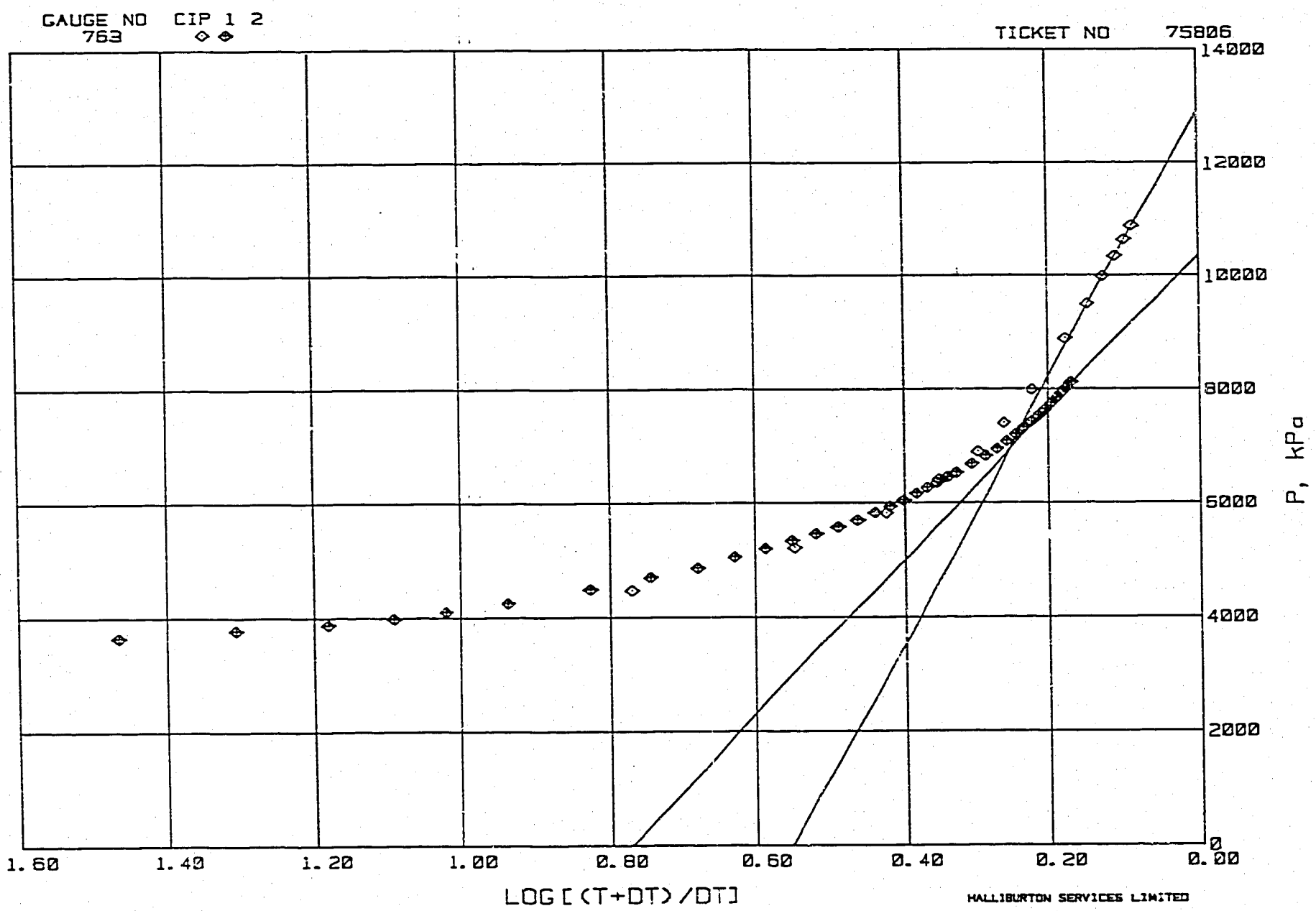
1000
100
DP, kPa
0.01
0.1
1.
10.
T. DT/(T+DT), HR
HALLIBURTON SERVICES LIMITED


GAUGE NO
763
CIP 1 2
TICKET NO 75806
14000
12000
10000
8000
6000
4000
2000
P, kPa
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
SQRT(DT), MIN
HALLIBURTON SERVICES LIMITED


GAUGE NO
763
CIP 1 2
TICKET NO 75806
14000
12000
10000
8000
5000
4000
2000
0
P, kPa
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
LOG [(T+DT) /DT]
HALLIBURTON SERVICES LIMITED

HALLIBURTON SERVICES LIMITED TICKET NO. 75866

		O.D.(mm)	I.D.(mm)	LENGTH(m)	DEPTH(m)
4	FLEX WEIGHT.....	166.0	80.0	28.30	
3	DRILL COLLARS.....	171.0	73.0	28.21	
50	IMPACT REVERSING SUB.....	171.0	73.0	0.30	
3	DRILL COLLARS.....	171.0	73.0	28.15	
5	CROSSOVER.....	171.0	73.0	0.30	
80	AP RUNNING CASE.....	127.0	57.0	1.25	
12	DUAL CIP VALVE.....	127.0	22.1	1.79	
62	MULTIPLE CIP SAMPLER.....	127.0	19.1	2.54	
80	AP RUNNING CASE.....	127.0	57.0	1.25	
15	JAR.....	127.0	44.5	1.52	
16	VR SAFETY JOINT.....	127.0	25.4	0.86	
17	PRESSURE EQUALIZING CROSSOVER...	127.0	19.1	0.31	
70	OPEN HOLE PACKER.....	197.0	38.9	1.83	
70	OPEN HOLE PACKER.....	197.0	38.9	1.83	3377.90
20	FLUSH JOINT ANCHOR.....	127.0	60.2	3.05	
17	PRESSURE EQUALIZING CROSSOVER...	127.0		0.31	
81	BLANKED-OFF RUNNING CASE.....	127.0		1.25	
82	TEMPERATURE RUNNING CASE.....	127.0	57.0	1.25	
5	CROSSOVER.....	127.0	60.2		
5	CROSSOVER.....	171.0	73.0	0.30	
3	DRILL COLLARS.....	171.0	73.0	27.96	
5	CROSSOVER.....	171.0	73.0	0.30	
5	CROSSOVER.....	127.0	57.0	0.30	
70	OPEN HOLE PACKER.....	197.0	38.9	1.83	3414.09
70	OPEN HOLE PACKER.....	197.0	38.9	1.83	
5	CROSSOVER.....	127.0	60.2	0.31	
5	CROSSOVER.....	171.0	57.0	0.30	
1	DRILL PIPE.....	127.0	107.0	46.72	
5	CROSSOVER.....	171.0	57.0	0.30	

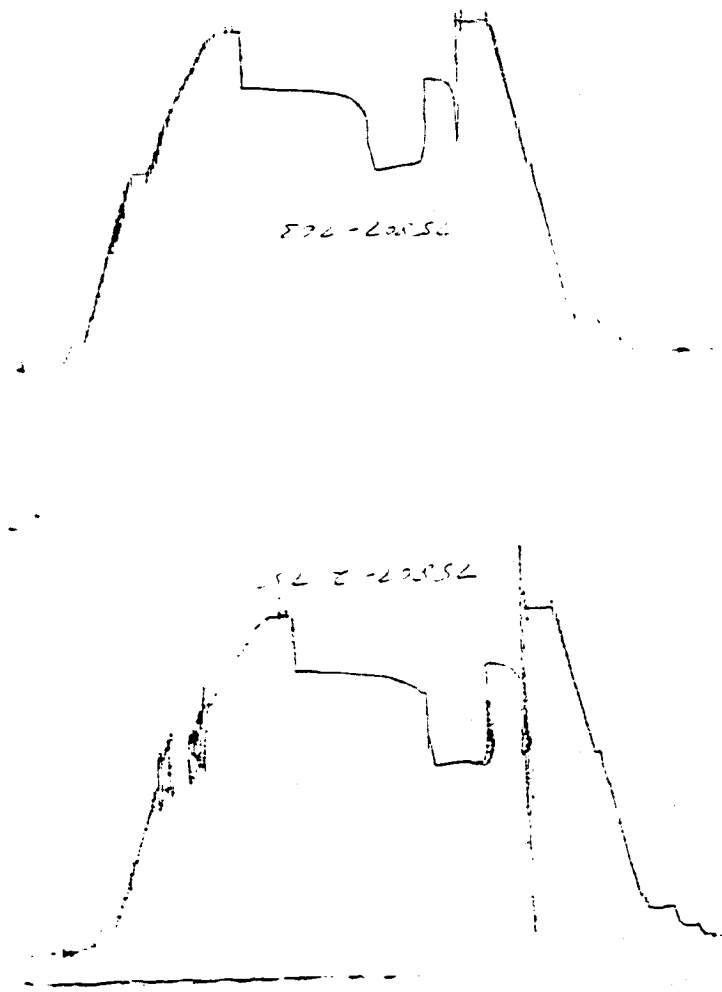
CONTINUED

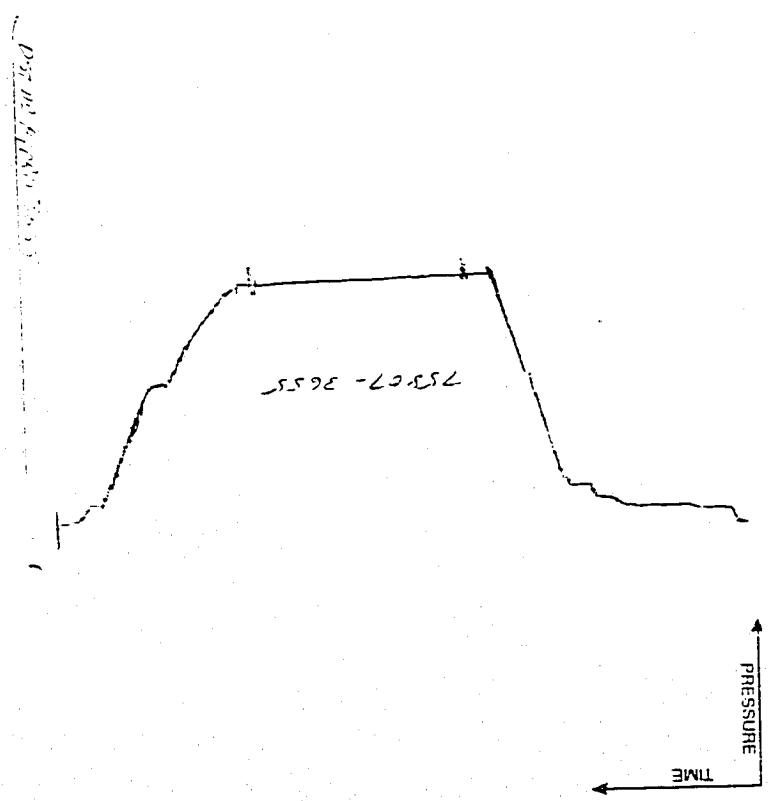
EQUIPMENT DATA

HALLIBURTON SERVICES LIMITED TICKET NO. 75505

		O.D. (mm)	I.D. (mm)	LENGTH (m)	DEPTH (m)
81	BLANKED-OFF RUNNING CASE.....	127.0	62.0	1.25	

EQUIPMENT DATA


TIME
PRESSURE


TIME
PRESSURE

TESTERS	R. McIntosh
WITNESS	W. Kyster
DRILLING CONTRACTOR	Bawden 33

HALLIBURTON SERVICES LIMITED
FORMATION TESTING
DATA SHEET

REFER TO INVOICE NO.	75 807
DATE OF TEST	86-11-22
TEST No.	2
JOB TYPE	Dual Straddle

PRESSURE SUMMARY kPa

GAUGE NUMBER		4477	2175	763	3655		
GAUGE DEPTH		3215.05	3220.92	3230.95	3464.75		
BLANKED OFF		~~YES~~/NO	~~YES~~/NO	YES/~~NO~~	YES/~~NO~~	YES/NO	YES/NO
HOUR CLOCK TRAVEL		24	24	24	24		
INITIAL HYDROSTATIC			33 875	33 800	36 184		
FIRST FLOW	INITIAL	2 710	*	24 426			
	FINAL	10 170	*	21 724			
FIRST CLOSED IN		634	28 373	28 178			
SECOND FLOW	INITIAL	634	18 041	23 260			
	FINAL	20 983	18 175	21 798			
SECOND CLOSED IN		2 447	28 066	27 861			
THIRD FLOW	INITIAL						
	FINAL						
THIRD CLOSED IN							
FINAL HYDROSTATIC			33 804	33 572	35 872		

TIME PERIODS

	FIRST	SECOND	THIRD		TIME
FLOW	8	120		TESTER VALVE OPENED	06:30
CLOSED IN	67	240		PACKER UNSEATED	13:45

LIQUID RECOVERY DATA

MEASURED FROM TESTER VALVE	METRES	DESCRIPTION OF LIQUID
	244	Salt water.
	244	TOTAL LIQUID RECOVERY

EQUIPMENT AND WELL DATA

FORMATION TESTED	Nahans	TEMP. REC. No. DEPTH / MAX. TEMP.	157 m °C
NET PRODUCTIVE THICKNESS	10 m	MUD TYPE	Gel
K B ELEVATION	723 m	MUD DENSITY kg/m³ / MUD VISC s/L	1110 / 45
ALL DEPTHS MEASURED FROM:	☒ KB ☐ GROUND	CASING OR HOLE SIZE	216 mm
PACKER DEPTHS TOP / BOTTOM	3227 / 3263 m	RATHOLE SIZE	N/A mm
DEPTH OF TESTER VALVE	m	DRILL PIPE OD mm / kg/m	127 / 30.5
CASING PERFORATED INTERVAL	N/A m	DRILL COLLARS ABOVE TESTER VALVE ID mm / LENGTH m	73 / 75.14
TOTAL DEPTH	3466 m	SURFACE CHOKE	25.4 mm
AMOUNT AND TYPE CUSHION	300 m Water	BOTTOM CHOKE	19.1 mm

SAMPLE DATA

OIL GRAVITY _____ @ _____ °C
GAS / OIL RATIO _____
REFRACTOMETER / RELATIVE DENSITY
RECOVERY WATER _____ @ _____ °C
CHLORIDE CONTENT _____ mg/L

SAMPLE SHIPPED TO LABORATORY	YES	NO
SAMPLER No. 507	☒	☐
GAS SAMPLE BOTTLE No.	☒	☐
LABORATORY 9153		

REMARKS

* Not readable.

Samples taken by Northcor.

COMPANY: NORTHCOR ENERGY LTD.
LEGAL DESCRIPTION: 60-24-22 123-35-07
PROVINCE OR TERRITORY: N.W.T.
FIELD OR AREA: LIARD
TEST NUMBER: 2
WELL NAME AND NUMBER: NORTHCOR ET AL LIARD F-25A
TESTED INTERVAL: 3227 - 3263

TICKET NO. 75 807

DATES AND TIMES (00:00-24:00 HRS.)	CHOKE SIZE (mm)	SURFACE PRESSURE (kPa)	GAS RATE (m^3/day)	LIQUID RATE (m^3/day)	REMARKS
86-11-22					
21:00					Start to pick up tools. Repair 4 packers.
					Steam all tools as they were badly iced up.
86-11-23					
00:45					Tools built, weight below hydrospring
					8000 daN.
01:00					Start to run collars.
					Note: Add drilling jars as mine were
					damaged on DST #1.
					Add 304 m water cushion.
					Run in hole.
05:30					On bottom. String weight 80 000 daN.
					Head up.
06:30					Tool open for Preflow. Very weak initial
					to very strong in 1 minute.
06:34					Water cushion. Unloading gas to surface.
06:38					Shut in tool.
06:50					Still 250 PSI on manifold.
					Bleeding down sour 1600 PPM.
07:02					25 PSI on mainfold. Bleeding down.
07:45					Open for Preflow.
07:49	25.4	1379	162 022		Gas is quite wet.
07:50	25.4	1379	162 022		
07:55	25.4	1586	184 698		
08:00	25.4	1655	192 257		Close at manifold to relight flare.
08:05	25.4	2896	328 206		
08:10	25.4	3034	343 324		
08:15	25.4	3103	350 882		
08:20	25.4	3103	350 882		
08:25	25.4	3103	350 882		
08:30	25.4	3172	358 441		Very wet, fluid reading 124 000 PPM salt.
08:35	25.4	3172	358 441		
08:40	25.4	3172	358 441		
08:45	25.4	3172	358 441		
08:50	25.4	3172	358 441		
08:55	25.4	3172	358 441		
09:00	25.4	3172	358 441		

TICKET NO. 75 807

DATES AND TIMES (00:00-24:00 HRS.)	CHOKE SIZE (mm)	SURFACE PRESSURE (kPa)	GAS RATE (m^3/day)	LIQUID RATE (m^3/day)	REMARKS
09:05	25.4	3172	358 441		
09:10	25.4	3172	358 441		
09:15	25.4	3172	358 441		
09:20	25.4	3172	358 441		
09:25	25.4	3172	358 441		
09:30	8	8274			Pinch down choke. Try to keep a flare burning.
09:42	8	10 343			
09:45					Rotate pipe to shut in tool
					Open manifold to pit.
13:45					Pull to 120 000 and work pipe to free up packers.
14:15					Start out of hole.
20:00					Hit fluid 244 mm above tool.
					Take 3 samples at 244 m, at 112 m, and at tool.
21:00					Recover and read charts.
					Breakdown and load out.
24:00					Job complete.

PRODUCTION TEST DATA

Form 905

H A L L I B U R T O N S E R V I C E S L I M I T E D

SPECIAL PRESSURE DATA

DATE: 86-11-22 TICKET # 75807

* Gauge Number	:	763.	*
* Gauge Depth	:	3231. m	*
* Time of Flow	:	8.0 min.	*
* Final Pressure	:	21724.4 kPa.	*

Initial Hydrostatic Pressure = 33800.3 kPa
Final Hydrostatic Pressure = 33572.4 kPa

GAUGE 1, FLOW 1

	Time Deflection (in)	Time (minutes)	Pressure (kPa)
1.	0.0000	0.0	24426.3
2.	0.0098	4.0	22425.7
3.	0.0196	8.0	21724.4

HALLIBURTON SERVICES LIMITED

GAUGE 1, CIP 1

	Time Deflection (in)	Time (minutes)	T+dt Log ---- dt	Pressure (kPa)	M(P) (P Pa.Pa/Pa.s)
1.	0.0065	2.0	0.7044	26434.3	41264.1
2.	0.0133	4.0	0.4751	26796.0	42249.8
3.	0.0198	6.0	0.3681	27047.0	42933.8
4.	0.0265	8.0	0.3003	27238.9	43456.8
5.	0.0331	10.0	0.2548	27392.5	43875.3
6.	0.0395	12.0	0.2224	27495.8	44156.9
7.	0.0494	15.0	0.1860	27637.7	44547.2
8.	0.0660	20.0	0.1462	27807.9	45021.5
9.	0.0826	25.0	0.1205	27918.8	45330.8
10.	0.0992	30.0	0.1025	28007.6	45578.3
11.	0.1154	35.0	0.0895	28052.0	45702.0
12.	0.1322	40.0	0.0791	28089.0	45805.1
13.	0.1486	45.0	0.0710	28117.1	45883.5
14.	0.1651	50.0	0.0644	28126.0	45908.3
15.	0.1817	55.0	0.0589	28148.2	45970.1
16.	0.1980	60.0	0.0544	28161.5	46007.2
17.	0.2145	65.0	0.0504	28176.3	46048.5
18.	0.2212	67.0	0.0490	28177.8	46052.6

HALLIBURTON SERVICES LIMITED

SPECIAL PRESSURE DATA

DATE: 86-11-22 TICKET # 75807

* Gauge Number	:	763.	*
* Gauge Depth	:	3231. m	*
* Time of Flow	:	120.0 min.	*
* Final Pressure	:	21798.2 kPa.	*

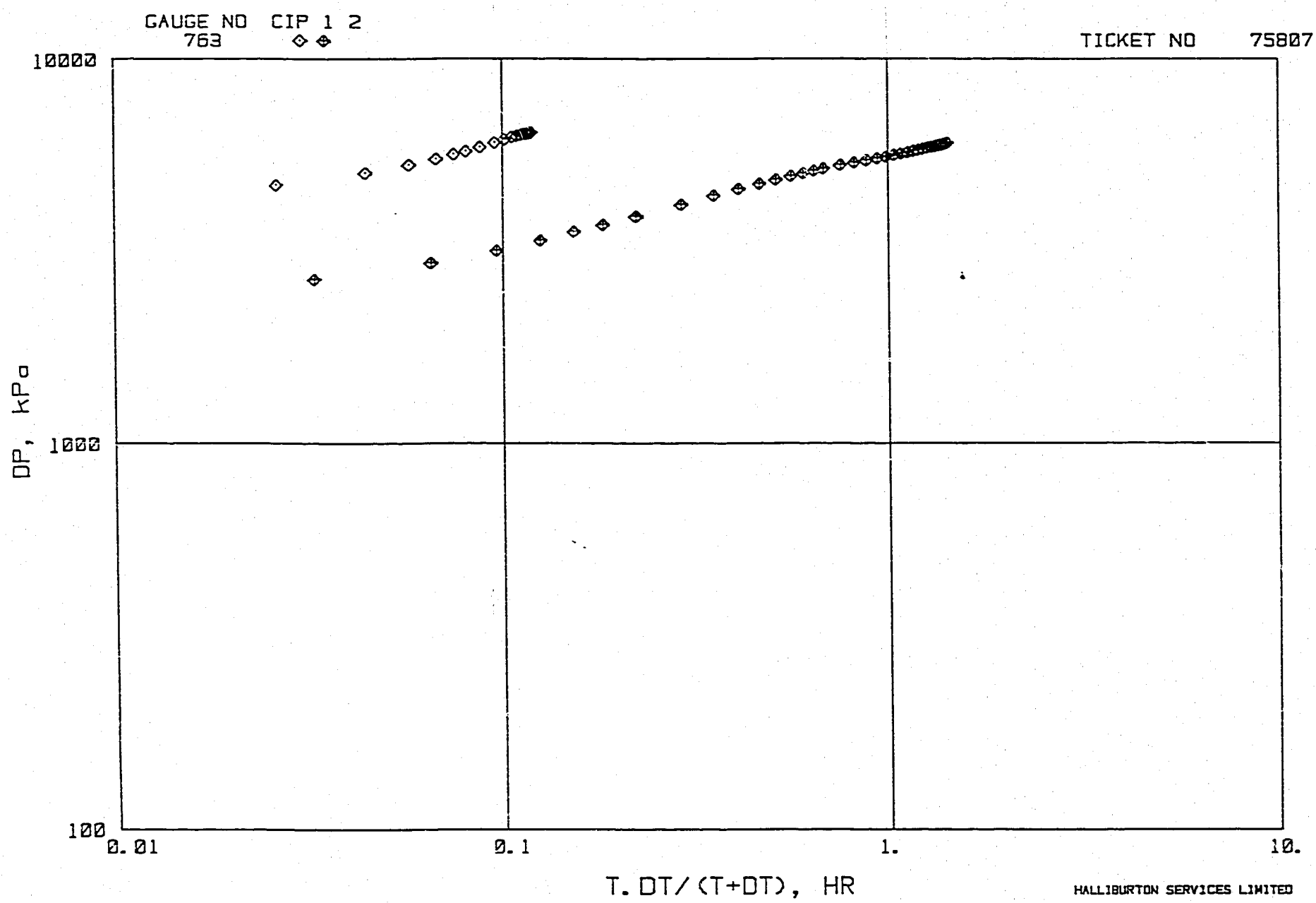
GAUGE 1, FLOW 2

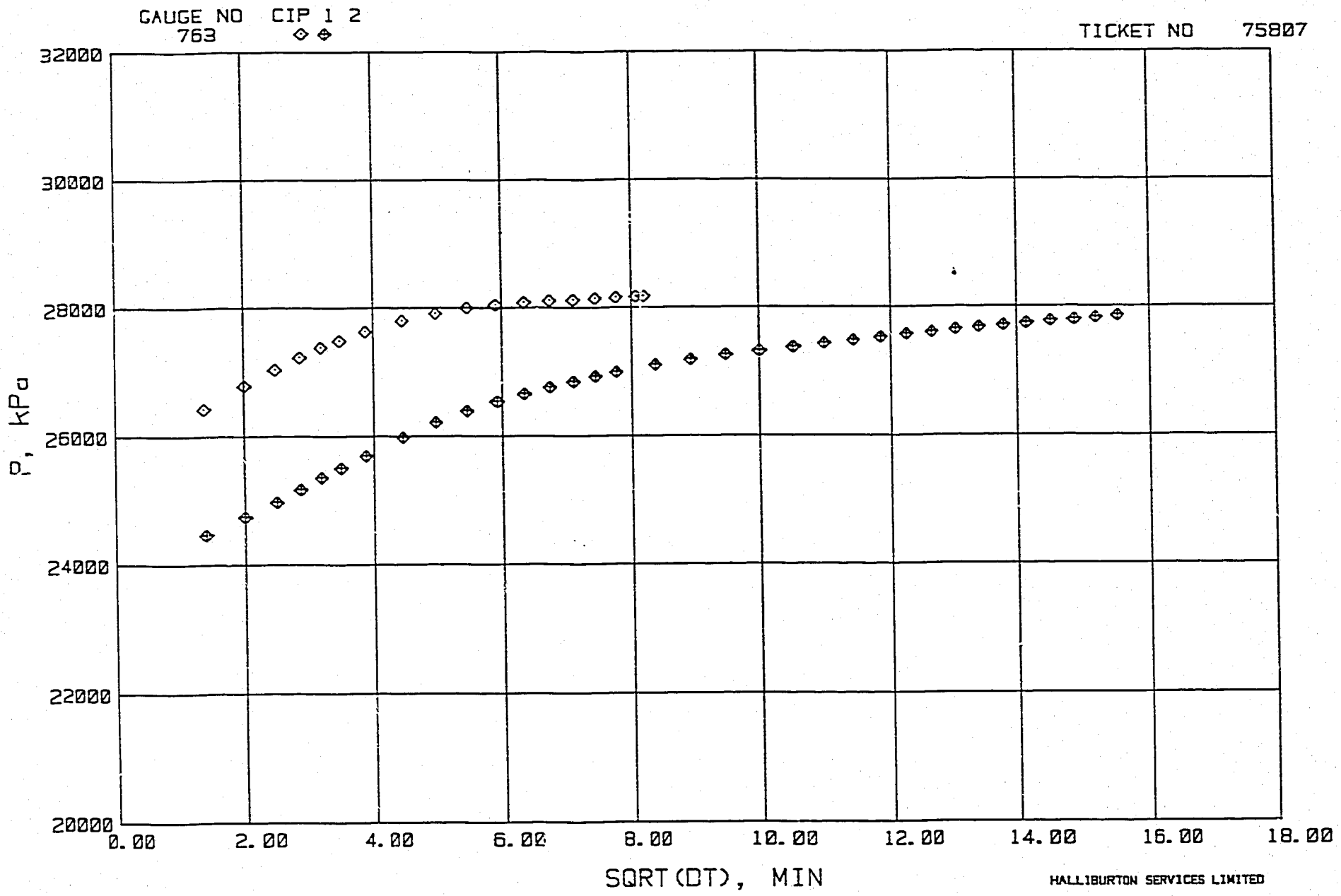
	Time Deflection (in)	Time (minutes)	Pressure (kPa)
1.	0.0000	0.0	23259.9
2.	0.0332	10.0	20120.1
3.	0.0664	20.0	19755.3
4.	0.0994	30.0	19586.3
5.	0.1326	40.0	19660.4
6.	0.1657	50.0	19592.2
7.	0.1988	60.0	19526.9
8.	0.2323	70.1	19439.5
9.	0.2653	80.1	19363.8
10.	0.2985	90.1	19289.7
11.	0.3314	100.0	19215.6
12.	0.3645	110.0	19526.9
13.	0.3977	120.0	21798.2

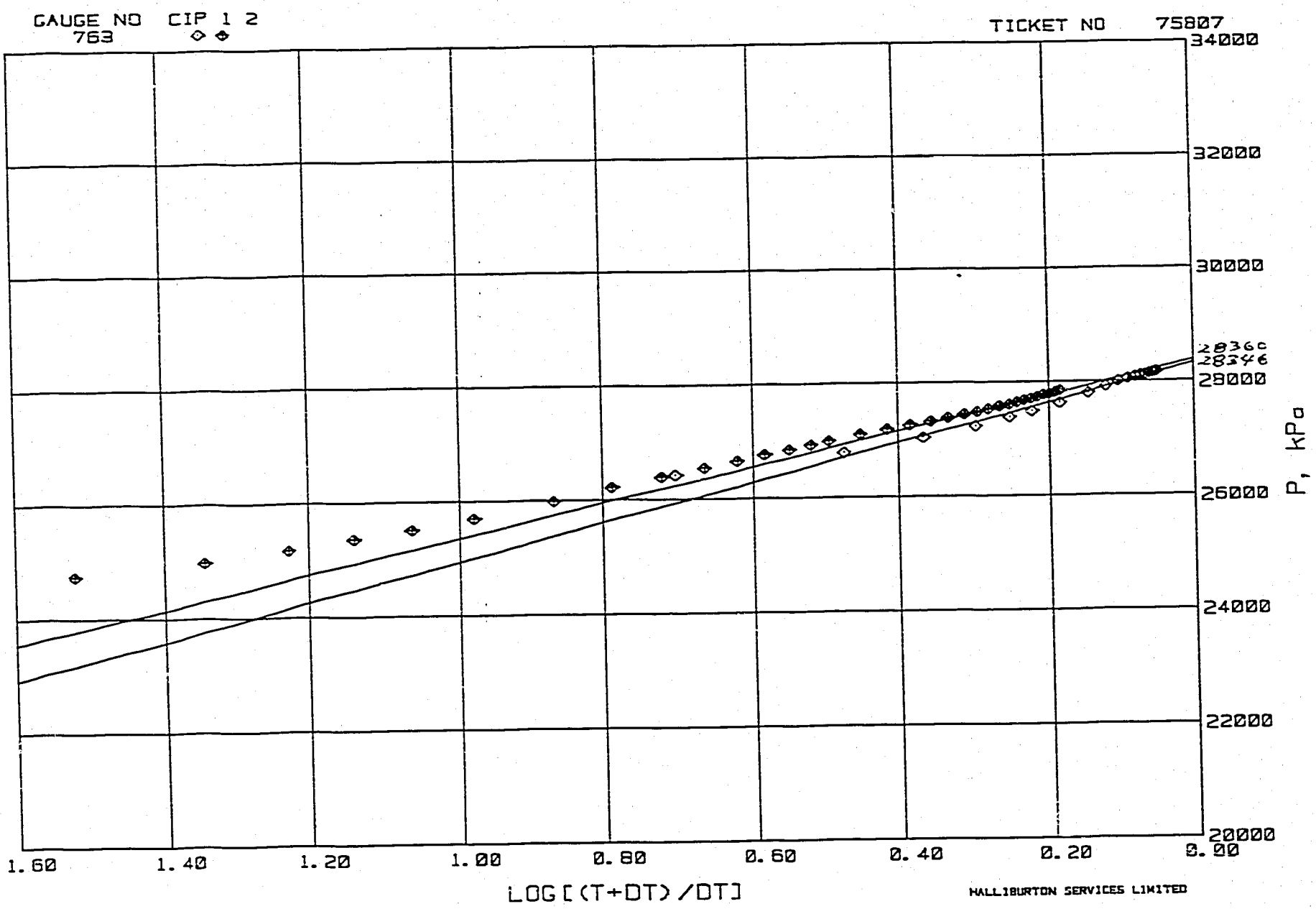
HALLIBURTON SERVICES LIMITED

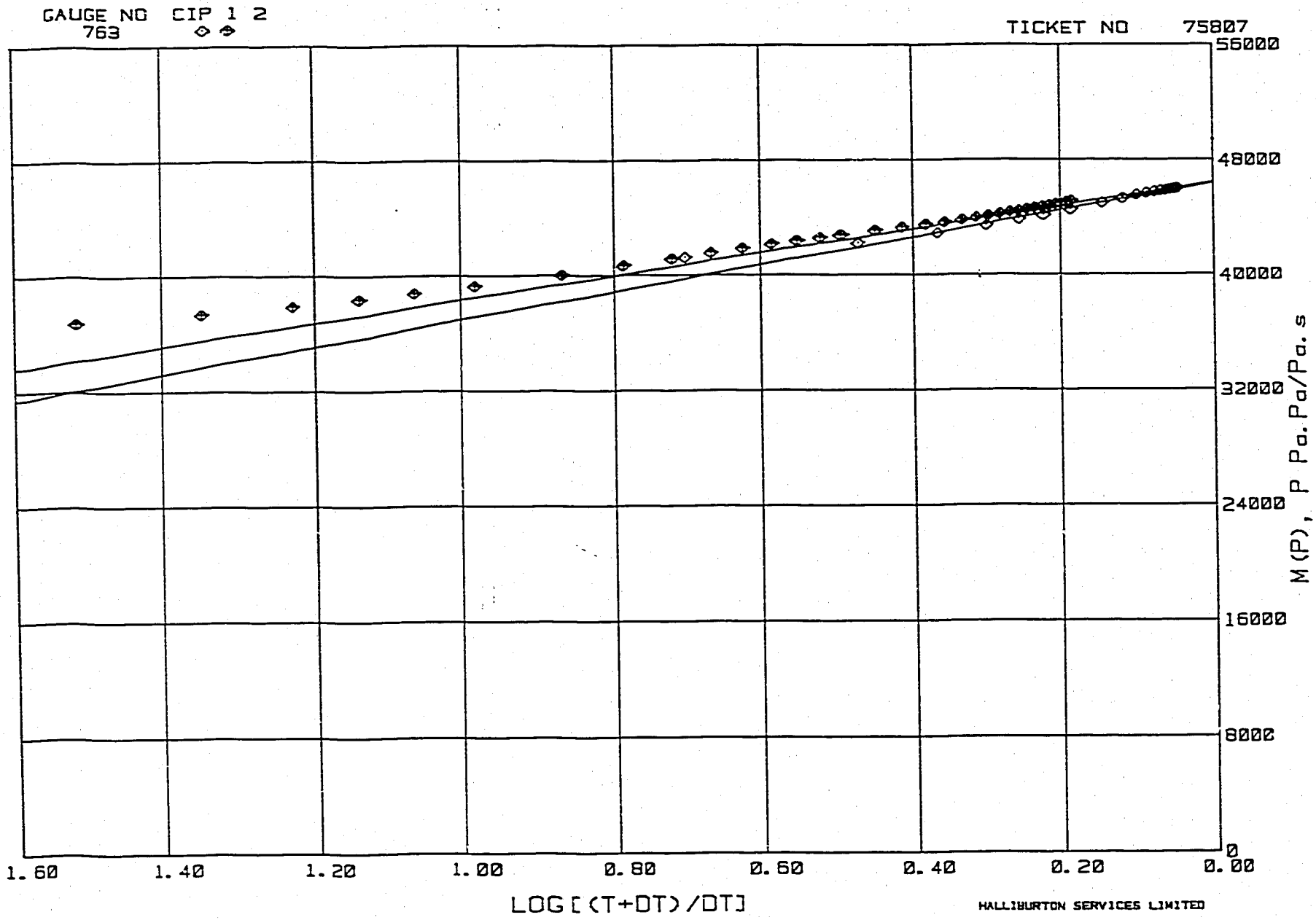
GAUGE 1, CIP 2

	Time Deflection (in)	Time (minutes)	T+dt Log ---- dt	Pressure (kPa)	M(P) (P Pa.Pa/Pa.s)
1.	0.0067	2.0	1.8101	24470.6	36058.5
2.	0.0133	4.0	1.5189	24751.1	36782.5
3.	0.0201	6.0	1.3463	24980.0	37385.1
4.	0.0267	8.0	1.2293	25179.3	37914.6
5.	0.0333	10.0	1.1397	25363.9	38404.8
6.	0.0401	12.0	1.0654	25513.0	38800.9
7.	0.0498	15.0	0.9802	25703.4	39306.8
8.	0.0666	20.0	0.8690	25991.3	40071.5
9.	0.0831	25.0	0.7872	26227.6	40700.8
10.	0.0997	30.0	0.7221	26404.8	41183.7
11.	0.1168	35.1	0.6672	26552.4	41586.0
12.	0.1331	40.0	0.6233	26669.0	41903.8
13.	0.1497	45.0	0.5850	26772.4	42185.5
14.	0.1663	50.0	0.5517	26856.5	42414.8
15.	0.1831	55.0	0.5220	26936.3	42632.1
16.	0.1997	60.0	0.4960	27002.7	42813.1
17.	0.2329	70.0	0.4517	27113.4	43114.9
18.	0.2663	80.0	0.4149	27196.1	43340.2
19.	0.2997	90.0	0.3841	27268.5	43537.3
20.	0.3327	100.0	0.3580	27327.5	43698.2
21.	0.3662	110.0	0.3351	27386.6	43859.2
22.	0.3995	120.0	0.3152	27445.6	44020.1
23.	0.4328	130.0	0.2976	27489.9	44140.8
24.	0.4660	140.0	0.2820	27535.7	44265.5
25.	0.4996	150.1	0.2678	27584.4	44398.7
26.	0.5327	160.1	0.2552	27615.5	44485.3
27.	0.5658	170.0	0.2438	27654.0	44592.5
28.	0.5992	180.0	0.2332	27689.5	44691.5
29.	0.6323	190.0	0.2237	27717.6	44769.9
30.	0.6656	200.0	0.2149	27748.7	44856.5
31.	0.6991	210.0	0.2067	27785.7	44959.6
32.	0.7323	220.0	0.1991	27801.9	45005.0
33.	0.7655	230.0	0.1922	27830.1	45083.3
34.	0.7988	240.0	0.1856	27861.1	45170.0


GAUGE NO CIP 1 2
763
TICKET NO 75807
10000
1000
100
DP, kPa
0.01
0.1
1.
10.
T. DT/(T+DT), HR
HALLIBURTON SERVICES LIMITED


GAUGE NO 763
CIP 1 2
TICKET NO 75807
32000
30000
28000
26000
24000
22000
20000
P, kPa
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
SQRT(DT), MIN
HALLIBURTON SERVICES LIMITED


GAUGE NO CIP 1 2
763
TICKET NO 75807
34000
32000
30000
28360
28346
29000
26000
24000
22000
20000
P, kPa
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
LOG [(T+DT)/DT]
HALLIBURTON SERVICES LIMITED


GAUGE NO CIP 1 2
763
TICKET NO 75807
56000
48000
40000
32000
24000
16000
8000
0
M(P), P Pa.Pa/Pa.s
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
LOG [(T+DT)/DT]
HALLIBURTON SERVICES LIMITED

HALLIBURTON SERVICES LIMITED

--- INTERPRETATIONS AND CALCULATIONS FOR GAS WELLS ---
USING HORNER METHOD

TICKET NO. 75807

FORMATION/FLUID PROPERTIES

TEMP =	150.0 C	SPGR =	0.600	Z =	1.0
POROS =	10. %	VISG =	20. uPa.s	CT =	0.00004 1/kPa

EXTRAPOLATED PRESSURE DATA

GAUGE	CIP	m3/d	P*	M(P*) (P Pa.Pa/Pa.s	M(Pf)	SLOPE)
763.	1	0.0	28345.5	46520.3	0.0	9432.3
763.	2	358441.0	28359.8	46560.0	29319.4	8100.0

RESULTS

PARAMETER NAME		GAUGE NO. 763. FIRST	SECOND	THIRD	GAUGE NO. 0. FIRST	SECOND	THIRD
Theor. Flow Cap.	Kh	0.0	28.4	0.0	0.0	0.0	0.0
Avg. Permeability	K	0.000	2.839	0.000	0.000	0.000	0.000
Skin Factor	S	0.0	-2.9	0.0	0.0	0.0	0.0
Damage Ratio	DR	0.000	0.454	0.000	0.000	0.000	0.000
Ind. Flow Rate, Max	QF1	0.	968009.	0.	0.	0.	0.
Ind. Flow Rate, Min	QF2	0.	589045.	0.	0.	0.	0.
Theor. Pot.Rate Max	QF3	0.	968009.	0.	0.	0.	0.
Theor. Pot.Rate Min	QF4	0.	589045.	0.	0.	0.	0.
Radius of Invest.	b	0.0	31.5	0.0	0.0	0.0	0.0
Transmissibility	Kh/u	0.0	1407.9	0.0	0.0	0.0	0.0
Productivity Index	PI	0.0000	54.6275	0.0000	0.0000	0.0000	0.0000
Damage Zone Pr Drop	Pd	0.0	-20771.9	0.0	0.0	0.0	0.0

HALLIBURTON SERVICES LIMITED TICKET NO. 75807

		O.D.(mm)	I.D.(mm)	LENGTH(m)	DEPTH(m)
4	FLEX WEIGHT.....	166.0	80.0	28.30	
3	DRILL COLLARS.....	171.0	73.0	46.74	
15	JAR.....	171.0	73.0	4.66	
50	IMPACT REVERSING SUB.....	171.0	73.0	0.30	
3	DRILL COLLARS.....	171.0	73.0	28.40	
5	CROSSOVER.....	171.0	73.0	0.30	
80	AP RUNNING CASE.....	127.0	57.0	1.25	
12	DUAL CIP VALVE.....	127.0	22.1	1.79	
62	MULTIPLE CIP SAMPLER.....	127.0	19.1	2.54	
80	AP RUNNING CASE.....	127.0	57.0	1.25	
16	VR SAFETY JOINT.....	127.0	25.4	0.86	
17	PRESSURE EQUALIZING CROSSOVER...	127.0	19.1	0.31	
70	OPEN HOLE PACKER.....	197.0	38.9	1.83	
18	DISTRIBUTOR VALVE.....	127.0	42.7	0.61	
70	OPEN HOLE PACKER.....	197.0	38.9	1.83	3227.00
20	FLUSH JOINT ANCHOR.....	127.0	60.2	3.05	
17	PRESSURE EQUALIZING CROSSOVER...	127.0		0.31	
81	BLANKED-OFF RUNNING CASE.....	127.0		1.25	
22	BLANK ANCHOR.....	127.0	60.2	0.70	
5	CROSSOVER.....	127.0	60.2		
5	CROSSOVER.....	171.0	73.0	0.30	
3	DRILL COLLARS.....	171.0	73.0	28.30	
5	CROSSOVER.....	171.0	73.0	0.30	
5	CROSSOVER.....	127.0	57.0	0.30	
70	OPEN HOLE PACKER.....	197.0	38.9	1.83	3263.00
70	OPEN HOLE PACKER.....	197.0	38.9	1.83	
21	PERFORATED TAIL PIPE.....	127.0	57.0	1.52	
22	BLANK ANCHOR.....	127.0	60.2	5.56	

CONTINUED

EQUIPMENT DATA

HALLIBURTON SERVICES LIMITED TICKET NO. 75807

		O.D.(mm)	I.D.(mm)	LENGTH(m)	DEPTH(m)
5	CROSSOVER.....	127.0	60.2	0.31	
1	DRILL PIPE.....	127.0	107.0	191.03	
5	CROSSOVER.....	171.0	57.0	0.30	
81	BLANKED-OFF RUNNING CASE.....	127.0	62.0	1.25	

EQUIPMENT DATA

9211-N10-6-1

OTTAWA COPY

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
JAN 8 1987
ENGINEERING AND CONTROL
TECHNIQUE ET DU CONTRÔLE

FRACTURE REPORT

utilizing the Long Spaced Sonic Wavetrain
and Stoneley derived Permeability

prepared for:

NORTHCOR ENERGY LIMITED
NORTHCOR ET AL LAIRD F 25 A

Bob Dennis P. Eng.
Product Development Engineer
Schlumberger of Canada
Calgary, Alberta

November 22, 1986

Fracture Locations and Relative Producibility - Stoneley

From the Long Spaced Sonic energy measurement and Attenuation along with the interference patterns on the Color enhanced VDL (Sonata), fractures are indicated in the following sections. The Stoneley Energy or Pseudo Perm was used to rate the fractures in productivity from poor to Best. For detailed information on the techniques used please refer to the attached section on Acoustic Attenuation using the Array Sonic (SDT).

1. (*Some fractures*)

- 3455 - 3451 m (Good perm / VDL Interference / P & S Attenuation - Clean)
- 3439 - 3436 m (Good perm / VDL Interference / P & S Attenuation - Shaly)
- 3427 - 3424 m (Good perm / VDL Interference / P & S Attenuation - Clean)
- 3396 - 3393 m (Good perm / VDL Interference / P & S Attenuation - Clean)
- 3359 - 2257 m (Good perm / VDL Interference / P & S Attenuation - Clean)
- 3354 - 3353 m (Good perm / P & S Attenuation - Clean)
- 3341 - 3338 m (Best perm / VDL Interference / P & S Attenuation - Shaly)
- 3326 - 3322 m (Good perm / VDL Interference / P & S Attenuation - Clean)
- 3320 - 3319 m (Good perm / P & S Attenuation - Clean)
- 3289 - 3286 m (Good perm / VDL Interference / P & S Attenuation - Clean)
- 3281 - 3277 m (Good perm / VDL Interference / P & S Attenuation - Clean)
- 3253 - 3250 m (Best perm / VDL Interference / P & S Attenuation - Clean)
- 3236 - 3231 m (poor perm / VDL Interference / P & S Attenuation - Clean)
- 3204 - 3202 m (poor perm / VDL Interference / P & S Attenuation - Clean)

These fracture sets also correspond to the Skips and Dt crossovers on the Dt log and rugose borehole.

ADDITIONAL INFORMATION

APPROVAL TO ALTER CONDITION OF A WELL

National Energy Board / Office national de l'énergie

APPROVAL TO ALTER CONDITION OF A WELL

This application is to be submitted to the Chief Conservation Officer at least 45 days before commencement of operations.

Well Name: PURCELL ET AL LAIRD F-25A Area: FORT LAIRD NWT

Operator: PURCELL ENERGY LTD Contractor: BONUS WELL SERVICES

Drilling Rig or Unit: 152 Depth: 3478

Coordinates: Lat: 60° 24' 22.3" Long: 123° 35' 07.6"

Date ADW Issued: Date of last Operation:

Elevation-KB/RT: 723 m (ASL) GL / Seafloor: 716.6 m

TYPE OF OPERATION

REACTIVATION OF A LONG TERM SUSPENDED WELL

(WORKOVER / RECOMPLETION)

SUMMARY OF PROPOSED OPERATIONS

- DRILL THROUGH CEMENTED BRIDGE PLUGS
- CEMENT OFF NON PRODUCTIVE PERFORATED INTERVALS
- INCREASE THE PRODUCTIVE PERFORATED INTERVAL
- STIMULATE THE PRODUCTIVE PERFORATED INTERVAL
- RE-TEST THE WELLBORE.

Signed: Title: OPERATIONS ENGINEER

Responsible Officer

Name: ROBERT STINN Company: PURCELL ENERGY LTD

Date: APRIL 18/2000 Phone (403) 269-5803

APPROVAL

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

Signed: D M Baker

Chief Conservation Officer

Date: Jan 10/01

Current Well Status

Suspended ☒

Completed ☐

Abandoned ☐

File: 9211-N10-6-1

UWI: 300 F256030123301 WID: 1621

444 Seventh Avenue SW
Calgary, Alberta T2P 0X8

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

Canada

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

WELL TERMINATION RECORD (with attachment)

National Energy Board | Office national de l'énergie

WELL TERMINATION RECORD

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

Well Name: Purcell et al Laird F-25A Area: Fort Laird NWT

Grid Area: 60 30 – 123 30 Field/Pool: Nahanni

Interest ____ Final Lat 60° 24' 22.3" Long: 123° 35' 07.6"

Drilling ____ Elevations- 723m (ASL GL/Seafloo 716.6 m

Scud Date: Aug 5/85 AE Jan 3/01 R.R.: Feb. 25/87 Feb 12/01 Total Depth: 3478.0

C.D.(mm)	Weight(kg/m)	Grade	Depth Set(mKB)	Cement(m³)
508.0	139.9	K-55	196.45	60.0t 0-1-0 class G
340.0	91.0	K-55	765.40	100.0t 0-1-0 class G
244.5	64.7	L-80	3187.0	25.0t 0-1-0 G
				12.0t 0-1-0 G

PLUGGING PROGRAM

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

from (person) ____ of the ____

by means of ____ on ____

Type of Plug	Interval (mKB)	Felt	Cement(m³)

Lost Circulation/Overpressure Zones: ____

Equipment left on Seafloor (Describe): ____

Provision for Re-entry (Describe and attach sketch): ____

Cores: Type: ____ Interval ____

Other Downhole Completion/Suspension: as per attached wellbore diagram

CERTIFICATION

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

Signed: [signature] Title: VP Engineering

Name: Lawrence Backmeyer Date: August 9, 2001

Company: Purcell Energy Ltd.

Well Status

- Suspended ☐
- Completed ☒
- Abandoned ☐

Acknowledged by: [signature]

Chief Conservation Officer

Date: Sept 05/01

File: 9211-N10-6-1 KE

UWI: 300F256030123302 WID: 1621

Canada

WELLBORE

Purcell Energy Ltd.

Purcell et al Liard
F-25A
Wellbore Diagram

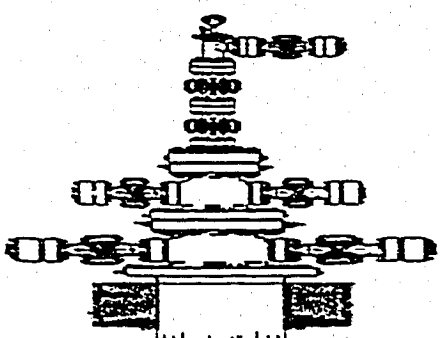


ABB Vetco 7 1/16" 5000# X 11" 5000#

KB elev	723.0m
GL	716.6m
KB to CF	6.40m
KB to TSF	4.40m

196.45mKB — **Surface Casing: 508mm 139.9kg/m H-40**
Cemented with 60.0t 0-1-0 Class G

765.40mKB — **1st Intermediate Csg: 340mm 91 kg/m K-55**
Cemented with 60.0t 0-1-0 Class G

Production Tubing (2001-01-00):

1)	88.9mm NUE Incoloy 925 Re-Entry Guide, 121mm OD.	0.15
2)	88.9mm Incoloy 925 "XN" nipple, 69.85mm profile & 66mm No-Go.	0.55
3)	88.9mm 13.69kg/m Hastelloy G-3 NUE pup joint, perfed.	3.09
4)	88.9mm Incoloy "X" nipple c/w 69.85mm profile. (X-over)	0.45
5)	88.9mm 13.69kg/m Hastelloy G-3 Nu Vam pup joint.	2.89
6)	88.9mm Incoloy "X" nipple c/w 69.85mm profile.	0.45
7)	88.9mm 13.69kg/m Hastelloy G-3 Nu Vam pup joint.	2.89
8)	Incoloy Cross Over.	0.34
9)	177.8mm Magnum GT packer c/w HNBR Elements, Incoloy 925.	1.07
10)	Premium Latch/Seal Assembly c/w ATR seal units, Incoloy 925.	0.33
11)	Halliburton SD 177.8mm X 88.9mm on-off c/w 69.85mm X profile. Incoloy 925, AFLAS seals Nu Vam connections.	0.53
12)	88.9mm 13.69kg/m Hastelloy G-3 Nu Vam pup joint.	2.89
13)	88.9mm Incoloy "X" nipple c/w 69.85mm profile.	0.45
14)	88.9mm 13.69kg/m Hastelloy G-3 Nu Vam pup joint.	2.89
15)	88.9mm Injection Valve c/w 71.45mm profile, Incoloy 925.	0.78
16)	88.9mm 13.69kg/m L-80 Nu Vam pup joint.	1.85
17)	343 joints 88.9mm 13.69kg/m L-80 Nu Vam tubing.	3162.00
18)	3 88.9mm 13.69kg/m L80 pup joints. (2.8, 2.5 & 0.43m)	5.73
19)	ABB Vetco tubing hanger c/w 88.9mm Nu Vam X 88.9mm Acme lift threads & 3" BPV threads.	0.24
	Total Tubing Length:	3189.57
	KB to THF:	4.40
	Landed Depth (mkB):	3193.97

Halliburton Injection Nipple c/w 3/8" Incoloy Injection Line. 3174.22mKB

3177.82mKB — **Tie Back Liner: 177.8mm 43.16, 38.69 & 34.23kg/m L-80 LT&C**
Tie Back: Liner cemented into place.

3168.0mKB

3181.22mKB

3178.0mKB — **2nd Intermediate Csg: 244.5mm 64.74kg/m L-80 LT&C**
2 Stage Cement Job.

3186.39mKB — **NOTE: Cannon tbg collar guards installed on all connections and 1 monel band/joint to hold chemical injection line.**

3189.73mKB — **Annulus filled with inhibited Trysol Kilsol, 1052kg/m3.**

3193.27mKB

Upper Nahanni Perfs: (101.6mm EHSC 36 gram DP, 17 spm)
3195.0 to 3246.0mKB

3249.0 to 3260.0mKB

Cement Top@3304.0mKB

Bridge Plug 3320.0mKB

Middle Nahanni Perfs:
3324.6 to 3340.0mKB

3444.0mKB

Lower Nahanni Perfs:
3451.0 to 3456.0mKB

PBTD: 0000.0 mKB
TD: 3478.0 mKB

Liner: 177.8mm 43.16 & 38.69kg/m L-80 Production Casing
Landed @ 3477.0mKB. Top of liner @ 3165.0mKB.

3 – Day build-up report

Purcell Energy Ltd.

3 - Day Build-Up

Purcell Et Al Liard F-25A

F-25A

Jan 26, 01 to Jan 29, 01

Service Company Contact Info		
Report Writer	Service Company	
Wade Nicks, 309-7940	Combined Services Ltd.	
Operator	Job ID	Test Date
Dale Sallstrom, (780) 778-1165	F-25ext(asc)	Jan 26, 01 to Jan 29, 01

Gauge: Lee Memory Recorder Model 3000s (Quartz)

Manufacturer: Lee Tool, Division of Schlumberger Canada Limited

3 - Day Build-Up

Purcell Energy Ltd.
North West Territories, Canada — **Jan 26, 01 to Jan 29, 01**

Purcell Et Al Liard F-25A — **F-25A** — **Liard, Upper Nahanni**

Well

Client: Purcell Energy Ltd.		Province: North West Territories	Country: Canada
Well Name: Purcell Et Al Liard F-25A		Deviated Well: No	Well Status: Gas
Well No.: F-25A		KB Elevation: 723.00 m	CF Elevation: 716.60 m
Field: Liard	Pool: Upper Nahanni	Pool Datum:	

Test

Test Name: 3 - Day Build-Up		Atmospheric: 101.30 KPa A	
Test Start (mm/dd/yy): 01/26/01 08:24 AM	Test Finish: 01/29/01 08:49 AM	Casing ID:	Tubing ID: 88.90 mm
On Bottom: 01/26/01 09:13 AM	Off Bottom: 01/29/01 08:53 AM	C. Pres. Before:	T. Pres. Before:
Shut In: 01/26/01 06:00 AM	ETD: 01/26/01 08:24 AM	C. Pres. After:	T. Pres. After:

	Meas. Depth [mCF]	TVD [mCF]	Est. Pressure [KPa G]	Est. Gradient [KPa/m]	Est. Temperature [DegC]	Grad. Threshold
Well Datum						Grad. Recorder
Landed Depth	3161.60	3161.60				
Avg. MPP Depth	3221.10	3221.10				

Operator: Dale Sallstrom, (780) 778-1165 — Service Company: Combined Services Ltd.

Remarks: 9448Q-16E Bot. Rec. & 9449Q-16E Top Rec.

Depth References

Depth Reference	Offset [m]	Elevation [mMSL]
Casing Flange (CF)		716.60
Kelly Bushing (KB)	CF + 6.40	723.00

Perforations

	Intvl. Top MD, [mCF]	Intvl. Bottom MD, [mCF]	MPP TVD, [mCF]	Pressure	Gradient
Interval 1	3188.60	3253.60	3221.10		

Top Recorder

Model	Serial	Latest Calibration	
LMR 3000S	9449Q-16E		
Max. Rated Press.	Max. Rated Temp.		

Bottom Hole Pressure

	Tool String MD, [mCF]	Sample R/T [mmm dd, yy 24 hr.]	Pressure [KPa G]	
Sample 1	3161.60			
Sample 2				
Difference:				Build Up Rate

Bottom Recorder

Model	Serial	Latest Calibration	
LMR 3000S	9448Q-16E		
Max. Rated Press.	Max. Rated Temp.		

Bottom Hole Pressure

	Tool String MD, [mCF]	Sample R/T [mmm dd, yy 24 hr.]	Pressure [KPa G]	
Sample 1	3161.60	Jan 28,01 22:00:00	27734.64	
Sample 2		Jan 29,01 04:00:00	27736.03	
Difference:		06:00:00	1.39	Build Up Rate 0.23 KPa/Hr.

Tool Summary

Purcell Energy Ltd.
North West Territories, Canada **Jan 26, 01 to Jan 29, 01**

Purcell Et Al Liard F-25A **F-25A** **Liard, Upper Nahanni**

Top Recorder

Tool	Serial	Latest Calibration	Battery Serial
LMR-3000S	9449Q-16E	03/29/00	165 C
Landed Depth		**Depth Offset**	**Min. Battery**
3160.10 mCF MD		-1.50 m	14.07 V

Program: Static Gradient – 2 Meg

	Intervals				Expected Samples			Actual Samples				
Mode	Interval [d hh:mm:ss]	Rate [hh:mm:ss]	Delta [KPa]	Periodic [hh:mm:ss]	Regular Samples	Percent Storage	Energy [Ahr]	Regular Samples	Delta Samples	Percent Storage	Energy [Ahr]	Duration [d hh:mm:ss]
HB	10:00	1			600	0.2%	0.0022	600		0.2%	0.0022	10:00
HB	30	10			259200	74.2%	5.4747	26056		7.5%	0.5503	3 22:40
Totals:	30 10:00				259800	74.3%	5.4769	26656		7.6%	0.5525	3 32:40

Bottom Recorder

Tool	Serial	Latest Calibration	Battery Serial
LMR-3000S	9448Q-16E	03/29/00	165 C
Landed Depth		**Depth Offset**	**Min. Battery**
3161.60 mCF MD		0.00 m	15.24 V

Program: Static Gradient – 2 Meg

	Intervals				Expected Samples			Actual Samples				
Mode	Interval [d hh:mm:ss]	Rate [hh:mm:ss]	Delta [KPa]	Periodic [hh:mm:ss]	Regular Samples	Percent Storage	Energy [Ahr]	Regular Samples	Delta Samples	Percent Storage	Energy [Ahr]	Duration [d hh:mm:ss]
HB	10:00	1			600	0.2%	0.0022	600		0.2%	0.0022	10:00
HB	30	10			259200	74.2%	5.4747	174755		50.0%	3.6911	20 5:25:50
Totals:	30 10:00				259800	74.3%	5.4769	175355		50.2%	3.6933	20 5:35:50

Calibration Summary

Purcell Energy Ltd.
North West Territories, Canada **Jan 26, 01 to Jan 29, 01**

Purcell Et Al Liard F-25A **F-25A** **Liard, Upper Nahanni**

Top Recorder

Tool	Serial	Latest Calibration	Battery Serial
LMR-3000S	9449Q-16E	03/29/00	165 C
Landed Depth		**Depth Offset**	**Min. Battery**
3160.10 mCF MD		-1.50 m	14.07 V

Equations

FP = Pres Freq (Hz)
FT = Temp Freq (Hz)

XP = 2.462200e+004 + (1.000000e-002) FP
XT = 4.723100e+004 + (1.000000e-002) FT

P_0 = 4.989534e+001+ (-3.902255e-001) XT + (-1.855615e-002) XT^2 + (5.088434e-006) XT^3 + (-8.951243e-009) XT^4
P_1 = 4.063515e+001+ (-2.079806e-002) XT + (1.917719e-005) XT^2 + (-5.144029e-008) XT^3 + (4.273402e-011) XT^4
P_2 = -1.742285e-003+ (1.211279e-005) XT + (2.786062e-009) XT^2 + (1.774028e-010) XT^3 + (8.722979e-014) XT^4
P_3 = 1.493738e-007+ (-9.761696e-009) XT + (-5.156483e-011) XT^2 + (-3.606334e-013) XT^3 + (-4.598399e-016) XT^4
Pressure (psiA) = $P_0 + P_1 XP + P_2 XP^2 + P_3 XP^3$

T_0 = 2.680852e+001
T_1 = -7.133169e-001
T_2 = -7.982094e-004
T_3 = -5.880153e-007
Temperature (degC) = $T_0 + T_1 XT + T_2 XT^2 + T_3 XT^3$

Bottom Recorder

Tool	Serial	Latest Calibration	Battery Serial
LMR-3000S	9448Q-16E	03/29/00	165 C
Landed Depth		**Depth Offset**	**Min. Battery**
3161.60 mCF MD		0.00 m	15.24 V

Equations

FP = Pres Freq (Hz)
FT = Temp Freq (Hz)

XP = 2.125900e+004 + (1.000000e-002) FP
XT = 4.948900e+004 + (1.000000e-002) FT

P_0 = 4.985274e+001+ (-1.987699e+000) XT + (-2.090967e-002) XT^2 + (1.835410e-006) XT^3 + (-1.010364e-008) XT^4
P_1 = 3.987036e+001+ (-2.008412e-002) XT + (3.582244e-005) XT^2 + (3.996012e-008) XT^3 + (2.035782e-010) XT^4
P_2 = -1.744175e-003+ (9.029986e-006) XT + (-7.559929e-008) XT^2 + (-3.248991e-010) XT^3 + (-8.550158e-013) XT^4
P_3 = 5.634373e-007+ (-1.033434e-009) XT + (9.722206e-011) XT^2 + (5.566489e-013) XT^3 + (1.260567e-015) XT^4
Pressure (psiA) = $P_0 + P_1 XP + P_2 XP^2 + P_3 XP^3$

T_0 = 2.680904e+001
T_1 = -7.457396e-001
T_2 = -8.915548e-004
T_3 = -7.003675e-007
Temperature (degC) = $T_0 + T_1 XT + T_2 XT^2 + T_3 XT^3$

Recorded Data

Purcell Energy Ltd.
North West Territories, Canada **Jan 26, 01 to Jan 29, 01**

Purcell Et Al Liard F-25A **F-25A** **Liard, Upper Nahanni**

Data

9448Q-16E Real Time (mmm dd,yy 24 hr)	Elapsed Time (DDD:HH:MM:SS)	9448Q-16E Pressure (KPa G)	9449Q-16E Pressure (KPa G)	9448Q-16E vs 9449Q-16E Press. Diff. (KPa)	9448Q-16E Temperature (DegC)	9449Q-16E Temperature (DegC)	Comments
Jan 26, 01 08:24:00	0:00:00:00	39.355	5.250	34.105	19.23	18.98	
08:25:00	0:00:01:00	38.061	-5.234	43.295	12.27	11.60	9448Q-16E Bottom Recorder
08:26:00	0:00:02:00	38.053	-4.165	42.218	12.54	11.73	9449Q-16E Top Recorder
08:41:00	0:00:17:00	17817.797	17845.117	-27.320	9.26	7.17	
08:56:00	0:00:32:00	20384.437	20352.902	31.535	62.73	55.08	
09:11:00	0:00:47:00	22711.193	22737.480	-26.287	127.94	123.65	
09:13:00	0:00:49:00	22808.856	22834.614	-25.758	134.36	130.76	On Bottom
09:28:00	0:01:04:00	23171.423	23161.258	10.165	152.53	151.52	
09:43:00	0:01:19:00	23393.239	23381.552	11.687	155.55	155.23	
09:58:00	0:01:34:00	23554.722	23543.791	10.931	156.20	156.03	
10:13:00	0:01:49:00	23699.136	23687.910	11.225	156.35	156.23	
10:28:00	0:02:04:00	23833.237	23821.901	11.336	156.37	156.28	
10:43:00	0:02:19:00	23959.915	23948.548	11.368	156.35	156.27	
10:58:00	0:02:34:00	24080.339	24068.923	11.416	156.32	156.25	
11:13:00	0:02:49:00	24195.870	24184.353	11.517	156.30	156.23	
11:28:00	0:03:04:00	24307.154	24295.601	11.554	156.27	156.21	
11:43:00	0:03:19:00	24414.335	24402.565	11.770	156.25	156.19	
11:58:00	0:03:34:00	24517.656	24505.887	11.769	156.22	156.17	
12:13:00	0:03:49:00	24617.673	24605.790	11.883	156.18	156.13	
12:28:00	0:04:04:00	24713.845	24702.029	11.816	156.17	156.12	
12:43:00	0:04:19:00	24807.103	24795.336	11.767	156.14	156.09	
12:58:00	0:04:34:00	24897.614	24885.793	11.821	156.13	156.08	
13:13:00	0:04:49:00	24985.376	24973.409	11.967	156.12	156.06	
13:28:00	0:05:04:00	25070.536	25058.387	12.149	156.10	156.05	
13:43:00	0:05:19:00	25153.046	25137.299	15.747	156.09	156.05	
13:58:00	0:05:34:00	25233.297	25217.354	15.944	156.07	156.03	
14:13:00	0:05:49:00	25311.191	25295.365	15.826	156.06	156.01	
14:28:00	0:06:04:00	25387.036	25371.333	15.703	156.04	155.99	
14:43:00	0:06:19:00	25460.766	25444.864	15.903	156.03	155.98	
14:58:00	0:06:34:00	25532.485	25516.652	15.833	156.01	155.97	
15:13:00	0:06:49:00	25602.090	25586.648	15.442	156.00	155.95	
15:28:00	0:07:04:00	25669.842	25657.033	12.809	155.98	155.94	
15:43:00	0:07:19:00	25735.312	25722.852	12.459	155.97	155.92	
15:58:00	0:07:34:00	25799.040	25786.287	12.752	155.96	155.91	
16:13:00	0:07:49:00	25860.935	25848.080	12.855	155.95	155.90	
16:28:00	0:08:04:00	25920.950	25908.135	12.815	155.93	155.89	
16:43:00	0:08:19:00	25979.340	25966.352	12.988	155.92	155.88	
16:58:00	0:08:34:00	26035.996	26022.929	13.066	155.91	155.87	
17:13:00	0:08:49:00	26090.948	26077.819	13.129	155.90	155.86	
17:28:00	0:09:04:00	26144.294	26130.967	13.327	155.89	155.85	
17:43:00	0:09:19:00	26193.992	26182.777	11.215	155.91	155.84	
17:58:00	0:09:34:00	26244.168	26230.184	13.985	155.90	155.84	
18:13:00	0:09:49:00	26293.108	26279.308	13.800	155.89	155.83	
18:28:00	0:10:04:00	26340.735	26329.562	11.173	155.88	155.81	
18:43:00	0:10:19:00	26389.565	26375.717	13.848	155.83	155.80	
18:58:00	0:10:34:00	26434.186	26420.480	13.705	155.83	155.80	
19:06:00	0:10:42:00	26457.630	26443.852	13.778	155.83	155.79	9449Q-16E Tool Failure
19:21:00	0:10:57:00	26500.528			155.82		
19:36:00	0:11:12:00	26542.162			155.81		
19:51:00	0:11:27:00	26582.484			155.80		

Data

9448Q-16E Real Time (mmm dd,yy 24 hr)	Elapsed Time (DDD:HH:MM:SS)	9448Q-16E Pressure (KPa G)	9449Q-16E Pressure (KPa G)	9448Q-16E vs 9449Q-16E Press. Diff. (KPa)	9448Q-16E Temperature (DegC)	9449Q-16E Temperature (DegC)	Comments
20:06:00	0:11:42:00	26621.562			155.80		
20:21:00	0:11:57:00	26659.454			155.79		
20:36:00	0:12:12:00	26696.297			155.78		
20:51:00	0:12:27:00	26731.925			155.78		
21:06:00	0:12:42:00	26766.485			155.77		
21:21:00	0:12:57:00	26799.975			155.76		
21:36:00	0:13:12:00	26832.349			155.76		
21:51:00	0:13:27:00	26863.799			155.75		
22:06:00	0:13:42:00	26894.251			155.74		
22:21:00	0:13:57:00	26923.537			155.74		
22:36:00	0:14:12:00	26951.900			155.73		
22:51:00	0:14:27:00	26977.215			155.76		
23:06:00	0:14:42:00	27003.817			155.75		
23:21:00	0:14:57:00	27029.560			155.74		
23:36:00	0:15:12:00	27054.568			155.74		
23:51:00	0:15:27:00	27078.661			155.73		
Jan 27, 01 00:06:00	0:15:42:00	27102.073			155.73		
00:21:00	0:15:57:00	27126.876			155.69		
00:36:00	0:16:12:00	27148.722			155.69		
00:51:00	0:16:27:00	27169.797			155.69		
01:06:00	0:16:42:00	27190.075			155.68		
01:21:00	0:16:57:00	27209.695			155.68		
01:36:00	0:17:12:00	27228.636			155.67		
01:51:00	0:17:27:00	27246.973			155.67		
02:06:00	0:17:42:00	27262.115			155.70		
02:21:00	0:17:57:00	27279.209			155.69		
02:36:00	0:18:12:00	27295.682			155.69		
02:51:00	0:18:27:00	27311.471			155.68		
03:06:00	0:18:42:00	27326.822			155.68		
03:21:00	0:18:57:00	27341.495			155.67		
03:36:00	0:19:12:00	27355.758			155.67		
03:51:00	0:19:27:00	27371.683			155.64		
04:06:00	0:19:42:00	27384.916			155.64		
04:21:00	0:19:57:00	27397.497			155.64		
04:36:00	0:20:12:00	27409.814			155.63		
04:51:00	0:20:27:00	27421.501			155.63		
05:06:00	0:20:42:00	27432.897			155.63		
05:21:00	0:20:57:00	27441.588			155.66		
05:36:00	0:21:12:00	27452.626			155.64		
05:51:00	0:21:27:00	27462.615			155.64		
06:06:00	0:21:42:00	27471.907			155.65		
06:21:00	0:21:57:00	27481.266			155.64		
06:36:00	0:22:12:00	27490.614			155.63		
06:51:00	0:22:27:00	27499.066			155.63		
07:06:00	0:22:42:00	27507.601			155.62		
07:21:00	0:22:57:00	27515.620			155.62		
07:36:00	0:23:12:00	27523.348			155.63		
07:51:00	0:23:27:00	27532.400			155.61		
08:06:00	0:23:42:00	27539.524			155.61		
08:21:00	0:23:57:00	27546.406			155.61		
08:36:00	1:00:12:00	27552.900			155.61		
08:51:00	1:00:27:00	27559.276			155.61		
09:06:00	1:00:42:00	27565.382			155.61		
09:21:00	1:00:57:00	27571.224			155.61		
09:36:00	1:01:12:00	27576.846			155.61		
09:51:00	1:01:27:00	27582.252			155.60		
10:06:00	1:01:42:00	27585.198			155.63		

Data

9448Q-16E Real Time (mmm dd,yy 24 hr)	Elapsed Time (DDD:HH:MM:SS)	9448Q-16E Pressure (KPa G)	9449Q-16E Pressure (KPa G)	9448Q-16E vs 9449Q-16E Press. Diff. (KPa)	9448Q-16E Temperature (DegC)	9449Q-16E Temperature (DegC)	Comments
10:21:00	1:01:57:00	27592.358			155.60		
10:36:00	1:02:12:00	27597.156			155.60		
10:51:00	1:02:27:00	27601.808			155.60		
11:06:00	1:02:42:00	27606.218			155.60		
11:21:00	1:02:57:00	27610.712			155.60		
11:36:00	1:03:12:00	27614.580			155.60		
11:51:00	1:03:27:00	27618.576			155.60		
12:06:00	1:03:42:00	27620.493			155.63		
12:21:00	1:03:57:00	27624.383			155.62		
12:36:00	1:04:12:00	27627.899			155.62		
12:51:00	1:04:27:00	27630.891			155.63		
13:06:00	1:04:42:00	27634.085			155.63		
13:21:00	1:04:57:00	27637.693			155.62		
13:36:00	1:05:12:00	27640.240			155.63		
13:51:00	1:05:27:00	27645.511			155.60		
14:06:00	1:05:42:00	27648.115			155.60		
14:21:00	1:05:57:00	27650.825			155.60		
14:36:00	1:06:12:00	27653.415			155.61		
14:51:00	1:06:27:00	27655.909			155.61		
15:06:00	1:06:42:00	27658.354			155.61		
15:21:00	1:06:57:00	27660.728			155.61		
15:36:00	1:07:12:00	27662.931			155.61		
15:51:00	1:07:27:00	27664.171			155.62		
16:06:00	1:07:42:00	27667.125			155.61		
16:21:00	1:07:57:00	27669.205			155.61		
16:36:00	1:08:12:00	27671.091			155.61		
16:51:00	1:08:27:00	27673.051			155.61		
17:06:00	1:08:42:00	27674.818			155.61		
17:21:00	1:08:57:00	27676.633			155.62		
17:36:00	1:09:12:00	27676.570			155.64		
17:51:00	1:09:27:00	27678.072			155.64		
18:06:00	1:09:42:00	27679.601			155.64		
18:21:00	1:09:57:00	27681.050			155.64		
18:36:00	1:10:12:00	27682.478			155.64		
18:51:00	1:10:27:00	27683.782			155.64		
19:06:00	1:10:42:00	27685.359			155.64		
19:21:00	1:10:57:00	27686.690			155.64		
19:36:00	1:11:12:00	27689.780			155.62		
19:51:00	1:11:27:00	27690.983			155.63		
20:06:00	1:11:42:00	27692.191			155.63		
20:21:00	1:11:57:00	27693.301			155.63		
20:36:00	1:12:12:00	27694.438			155.63		
20:51:00	1:12:27:00	27693.494			155.66		
21:06:00	1:12:42:00	27694.714			155.65		
21:21:00	1:12:57:00	27696.057			155.65		
21:36:00	1:13:12:00	27697.369			155.65		
21:51:00	1:13:27:00	27697.987			155.65		
22:06:00	1:13:42:00	27698.956			155.65		
22:21:00	1:13:57:00	27699.723			155.66		
22:36:00	1:14:12:00	27701.190			155.65		
22:51:00	1:14:27:00	27701.811			155.65		
23:06:00	1:14:42:00	27704.215			155.64		
23:21:00	1:14:57:00	27704.744			155.64		
23:36:00	1:15:12:00	27705.388			155.65		
23:51:00	1:15:27:00	27706.256			155.65		
Jan 28, 01 00:06:00	1:15:42:00	27706.979			155.65		
00:21:00	1:15:57:00	27707.653			155.65		

Data

9448Q-16E Real Time (mmm dd,yy 24 hr)	Elapsed Time (DDD:HH:MM:SS)	9448Q-16E Pressure (KPa G)	9449Q-16E Pressure (KPa G)	9448Q-16E vs 9449Q-16E Press. Diff. (KPa)	9448Q-16E Temperature (DegC)	9449Q-16E Temperature (DegC)	Comments
00:36:00	1:16:12:00	27708.376			155.66		
00:51:00	1:16:27:00	27709.125			155.66		
01:06:00	1:16:42:00	27709.703			155.66		
01:21:00	1:16:57:00	27710.403			155.66		
01:36:00	1:17:12:00	27710.981			155.66		
01:51:00	1:17:27:00	27711.681			155.66		
02:06:00	1:17:42:00	27712.259			155.67		
02:21:00	1:17:57:00	27712.863			155.67		
02:36:00	1:18:12:00	27711.258			155.70		
02:51:00	1:18:27:00	27711.716			155.70		
03:06:00	1:18:42:00	27712.500			155.69		
03:21:00	1:18:57:00	27713.059			155.69		
03:36:00	1:19:12:00	27714.459			155.68		
03:51:00	1:19:27:00	27714.913			155.69		
04:06:00	1:19:42:00	27715.491			155.69		
04:21:00	1:19:57:00	27715.448			155.70		
04:36:00	1:20:12:00	27716.082			155.70		
04:51:00	1:20:27:00	27716.514			155.70		
05:06:00	1:20:42:00	27716.722			155.70		
05:21:00	1:20:57:00	27717.726			155.70		
05:36:00	1:21:12:00	27718.158			155.70		
05:51:00	1:21:27:00	27717.943			155.71		
06:06:00	1:21:42:00	27718.700			155.71		
06:21:00	1:21:57:00	27719.036			155.71		
06:36:00	1:22:12:00	27719.494			155.71		
06:51:00	1:22:27:00	27719.653			155.72		
07:06:00	1:22:42:00	27720.037			155.72		
07:21:00	1:22:57:00	27720.473			155.72		
07:36:00	1:23:12:00	27720.883			155.72		
07:51:00	1:23:27:00	27721.143			155.72		
08:06:00	1:23:42:00	27721.627			155.72		
08:21:00	1:23:57:00	27721.963			155.73		
08:36:00	2:00:12:00	27722.672			155.72		
08:51:00	2:00:27:00	27722.382			155.73		
09:06:00	2:00:42:00	27724.530			155.71		
09:21:00	2:00:57:00	27724.786			155.72		
09:36:00	2:01:12:00	27725.143			155.72		
09:51:00	2:01:27:00	27725.430			155.72		
10:06:00	2:01:42:00	27725.717			155.73		
10:21:00	2:01:57:00	27725.955			155.73		
10:36:00	2:02:12:00	27726.290			155.73		
10:51:00	2:02:27:00	27726.479			155.73		
11:06:00	2:02:42:00	27726.766			155.74		
11:21:00	2:02:57:00	27724.741			155.77		
11:36:00	2:03:12:00	27727.374			155.73		
11:51:00	2:03:27:00	27727.559			155.74		
12:06:00	2:03:42:00	27727.771			155.74		
12:21:00	2:03:57:00	27728.058			155.75		
12:36:00	2:04:12:00	27725.905			155.78		
12:51:00	2:04:27:00	27726.301			155.78		
13:06:00	2:04:42:00	27726.495			155.78		
13:21:00	2:04:57:00	27726.737			155.78		
13:36:00	2:05:12:00	27727.178			155.77		
13:51:00	2:05:27:00	27727.394			155.78		
14:06:00	2:05:42:00	27729.592			155.75		
14:21:00	2:05:57:00	27729.676			155.76		
14:36:00	2:06:12:00	27730.059			155.76		

Data

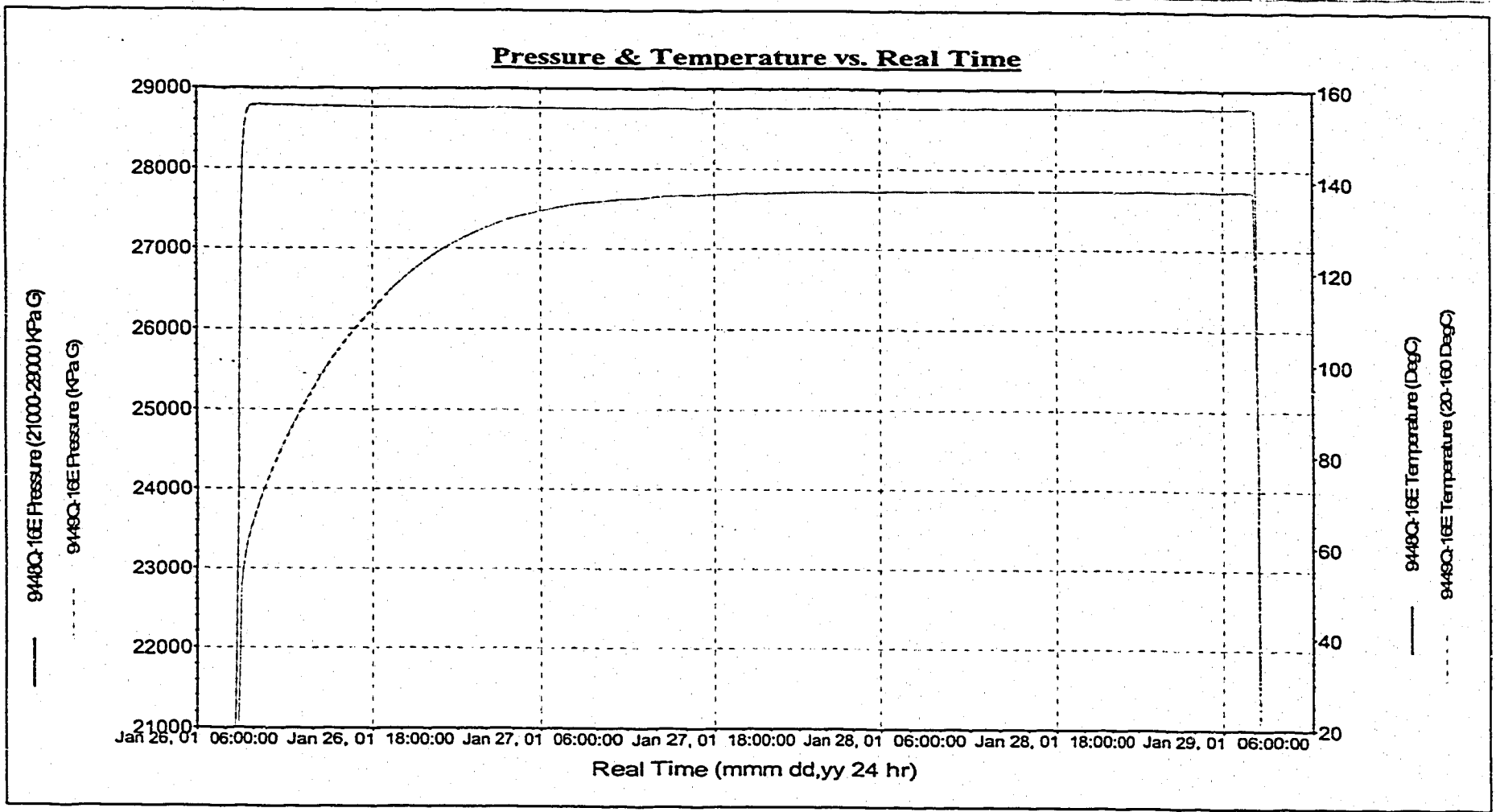
9448Q-16E Real Time (mmm dd,yy 24 hr)	Elapsed Time (DDD:HH:MM:SS)	9448Q-16E Pressure (KPa G)	9449Q-16E Pressure (KPa G)	9448Q-16E vs 9449Q-16E Press. Diff. (KPa)	9448Q-16E Temperature (DegC)	9449Q-16E Temperature (DegC)	Comments
14:51:00	2:06:27:00	27730.174			155.77		
15:06:00	2:06:42:00	27730.412			155.77		
15:21:00	2:06:57:00	27730.553			155.77		
15:36:00	2:07:12:00	27730.694			155.77		
15:51:00	2:07:27:00	27731.007			155.77		
16:06:00	2:07:42:00	27731.148			155.78		
16:21:00	2:07:57:00	27728.893			155.82		
16:36:00	2:08:12:00	27729.245			155.81		
16:51:00	2:08:27:00	27731.752			155.78		
17:06:00	2:08:42:00	27729.629			155.81		
17:21:00	2:08:57:00	27729.950			155.81		
17:36:00	2:09:12:00	27730.541			155.80		
17:51:00	2:09:27:00	27730.307			155.81		
18:06:00	2:09:42:00	27730.774			155.81		
18:21:00	2:09:57:00	27732.576			155.79		
18:36:00	2:10:12:00	27732.735			155.80		
18:51:00	2:10:27:00	27732.947			155.80		
19:06:00	2:10:42:00	27733.136			155.80		
19:21:00	2:10:57:00	27733.476			155.80		
19:36:00	2:11:12:00	27733.467			155.81		
19:51:00	2:11:27:00	27733.608			155.81		
20:06:00	2:11:42:00	27733.604			155.81		
20:21:00	2:11:57:00	27733.842			155.81		
20:36:00	2:12:12:00	27733.886			155.82		
20:51:00	2:12:27:00	27734.075			155.82		
21:06:00	2:12:42:00	27734.243			155.82		
21:21:00	2:12:57:00	27734.340			155.82		
21:36:00	2:13:12:00	27734.428			155.82		
21:51:00	2:13:27:00	27734.520			155.83		
22:06:00	2:13:42:00	27734.661			155.83		
22:21:00	2:13:57:00	27734.754			155.83		
22:36:00	2:14:12:00	27734.846			155.83		
22:51:00	2:14:27:00	27733.025			155.86		
23:06:00	2:14:42:00	27733.700			155.85		
23:21:00	2:14:57:00	27734.520			155.84		
23:36:00	2:15:12:00	27734.894			155.85		
23:51:00	2:15:27:00	27735.057			155.85		
Jan 29, 01 00:06:00	2:15:42:00	27735.225			155.85		
00:21:00	2:15:57:00	27735.269			155.85		
00:36:00	2:16:12:00	27735.533			155.85		
00:51:00	2:16:27:00	27735.604			155.85		
01:06:00	2:16:42:00	27735.723			155.86		
01:21:00	2:16:57:00	27735.767			155.86		
01:36:00	2:17:12:00	27735.908			155.86		
01:51:00	2:17:27:00	27734.064			155.88		
02:06:00	2:17:42:00	27734.466			155.88		
02:21:00	2:17:57:00	27735.008			155.87		
02:36:00	2:18:12:00	27735.422			155.87		
02:51:00	2:18:27:00	27735.687			155.87		
03:06:00	2:18:42:00	27735.827			155.88		
03:21:00	2:18:57:00	27735.871			155.88		
03:36:00	2:19:12:00	27735.867			155.88		
03:51:00	2:19:27:00	27736.083			155.88		
04:00:00	2:19:36:00	27736.030			155.88		Build-Up Rate Sample (Ext)
04:15:00	2:19:51:00	27735.999			155.89		
04:30:00	2:20:06:00	27736.933			155.88		
04:45:00	2:20:21:00	27735.835			155.90		

Data

9448Q-16E Real Time (mmm dd,yy 24 hr)	Elapsed Time (DDD:HH:MM:SS)	9448Q-16E Pressure (KPa G)	9449Q-16E Pressure (KPa G)	9448Q-16E vs 9449Q-16E Press. Diff. (KPa)	9448Q-16E Temperature (DegC)	9449Q-16E Temperature (DegC)	Comments
05:00:00	2:20:36:00	27736.055			155.90		
05:15:00	2:20:51:00	27736.099			155.90		
05:30:00	2:21:06:00	27736.465			155.90		
05:45:00	2:21:21:00	27736.482			155.90		
06:00:00	2:21:36:00	27736.526			155.90		
06:15:00	2:21:51:00	27736.742			155.90		
06:30:00	2:22:06:00	27737.430			155.90		
06:45:00	2:22:21:00	27735.731			155.92		
07:00:00	2:22:36:00	27737.518			155.90		
07:15:00	2:22:51:00	27737.460			155.91		
07:30:00	2:23:06:00	27728.529			155.92		
07:45:00	2:23:21:00	27731.584			156.01		
07:58:00	2:23:34:00	27725.901			155.99		Off Bottom
08:13:00	2:23:49:00	24538.396			111.63		
08:28:00	3:00:04:00	20841.784			20.43		
08:43:00	3:00:19:00	-17.071			-6.72		
08:49:00	3:00:25:00	1.917			-10.16		End of Test

Well

Client	Well Name	Well No.	Province
Purcell Energy Ltd.	Purcell Et Al Liard F-25A	F-25A	North West Territories
Test Name	**Test Date**	**Field**	**Pool**
3 - Day Build-Up	Jan 26, 01 to Jan 29, 01	Liard	Upper Nahanni

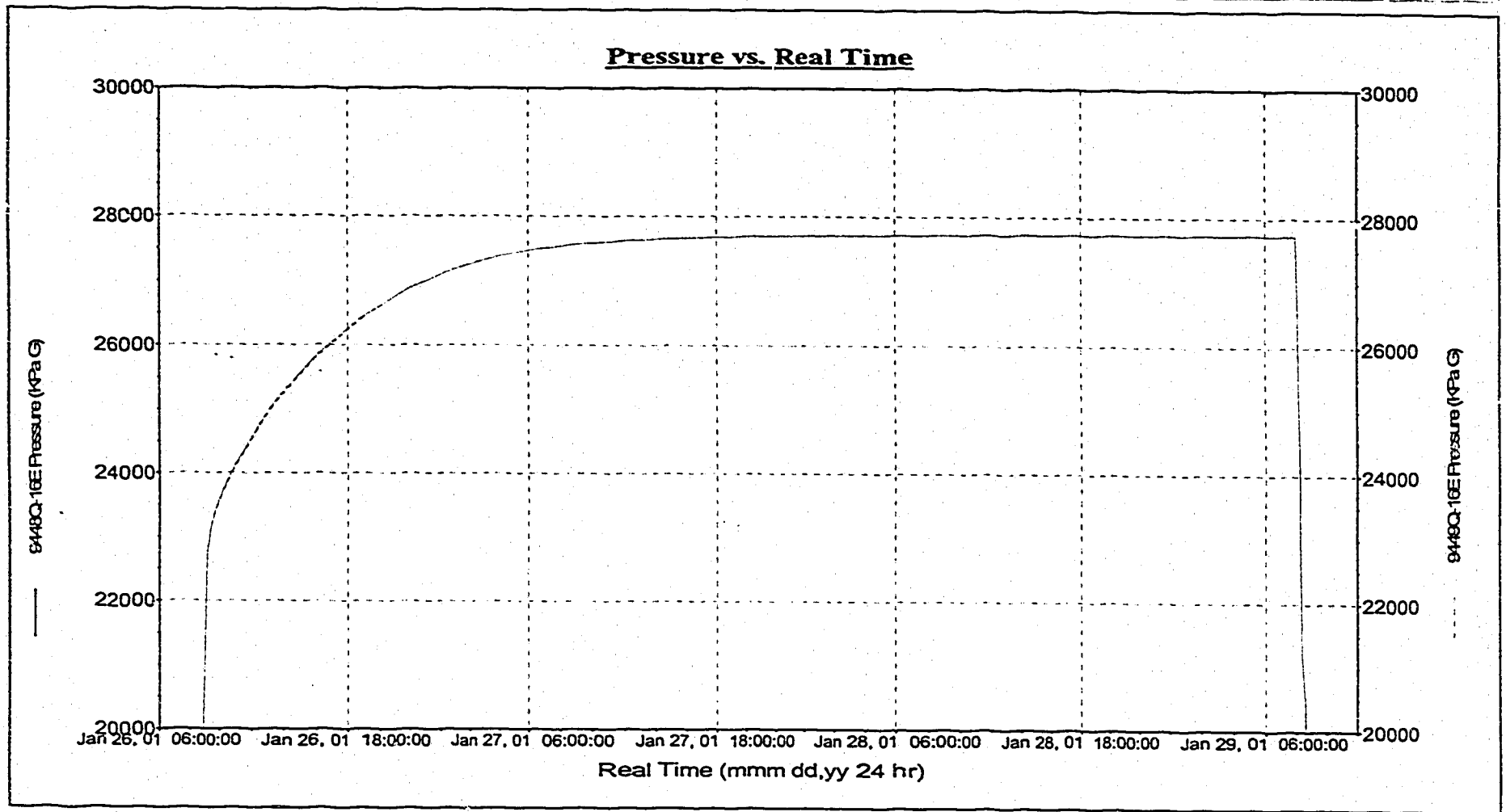


Remarks

9448Q-16E Bot. Rec. & 9449Q-16E Top Rec.

Well

Client	Well Name	Well No.	Province
Purcell Energy Ltd.	Purcell Et Al Liard F-25A	F-25A	North West Territories
Test Name	**Test Date**	**Field**	**Pool**
3 - Day Build-Up	Jan 26, 01 to Jan 29, 01	Liard	Upper Nahanni



Remarks

9448Q-16E Bot. Rec. & 9449Q-16E Top Rec.

STATIC GRADIENT REPORT

Purcell Energy Ltd.

Static Gradient
Purcell Et Al Liard F-25A
F-25A
Jan 29, 01

Service Company Contact Info			
Report Writer	Wade Nicks, 309-7940	Service Company	Combined Services Ltd.
Operator	Dale Sallstrom, (780) 778-1165	Job ID	F-25sg
		Test Date	Jan 29, 01

Gauge: Lee Memory Recorder Model 3000s (Quartz)
Manufacturer: Lee Tool, Division of Schlumberger Canada Limited

Static Gradient

Purcell Energy Ltd.
North West Territories, Canada **Jan 29, 01**

Purcell Et Al Liard F-25A **F-25A** **Liard, Upper Nahanni**

Well

Client: Purcell Energy Ltd.		Province: North West Territories	Country: Canada
Well Name: Purcell Et Al Liard F-25A		Deviated Well: No	Well Status: Gas
Well No.: F-25A		KB Elevation: 723.00 m	CF Elevation: 716.60 m
Field: Liard	Pool: Upper Nahanni	Pool Datum:	

Test

Test Name: Static Gradient			Atmospheric: 101.30 KPa A		
Test Start (mm/dd/yy): 01/29/01 09:55 AM		Test Finish: 01/29/01 01:55 PM	Casing ID:		Tubing ID: 88.90 mm
On Bottom: 01/29/01 11:57 AM		Off Bottom: 01/29/01 12:27 PM	C. Pres. Before:		T. Pres. Before:
Shut In: 01/26/01 06:00 AM		ETO: 01/29/01 09:55 AM	C. Pres. After:		T. Pres. After:

	Meas. Depth [mCF]	TVD [mCF]	Est. Pressure [KPa G]	Est. Gradient [KPa/m]	Est. Temperature [DegC]
Well Datum					
Run Depth	3221.10	3221.10	27823.33	1.62	
Avg. MPP Depth	3221.10	3221.10	27823.33	1.62	

Grad. Threshold: 2.00 KPa/m
Grad. Recorder: 9432Q-16D

Operator: Dale Sallstrom, (780) 778-1165
Service Company: Combined Services Ltd.
Remarks: 9448Q-16E Bot. Rec. & 9432Q-16E Top Rec.

Depth References

Depth Reference	Offset [m]	Elevation [mMSL]
Casing Flange (CF)		716.60
Kelly Bushing (KB)	CF + 6.40	723.00

Perforations

	Intvl. Top MD. [mCF]	Intvl. Bottom MD. [mCF]	MPP TVD. [mCF]	Pressure [KPa G]	Gradient [KPa/m]
Interval 1	3188.60	3253.60	3221.10	27823.33	1.62

Top Recorder

Model	Serial	Latest Calibration
LMR-3000S	9432Q-16D	01/05/01

Max. Rated Press.	Max. Rated Temp.
110213.06 KPa G	174.96 DegC

Gradient Stops

Depth					
Tool String MD, [mCF]	Recorder MD, [mCF]	Sample R/T [mmm dd, 24hr]	Pressure [KPa G]	Gradient [KPa/m]	Temperature [DegC]
0.00	-1.50	Jan 29,01 10:10:00	21113.13		-5.01
993.60	992.10	10:32:00	23676.07	2.58	41.17
1993.60	1992.10	10:51:00	25665.33	1.99	97.58
2493.60	2492.10	11:05:00	26562.47	1.79	121.55
2993.60	2992.10	11:20:00	27368.21	1.61	145.68
3093.60	3092.10	11:31:00	27582.73	2.15	152.13
3143.60	3142.10	11:42:00	27684.06	2.03	154.80
3168.60	3167.10	11:53:00	27735.94	2.07	155.95
3221.10	3219.60	12:06:00	27820.90	1.62	157.29

Bottom Hole Pressure

	Tool String MD, [mCF]	Sample R/T [mmm dd, yy 24 hr.]	Pressure [KPa G]	
Sample 1	3221.10	Jan 29,01 12:05:00	27819.80	
Sample 2		12:25:00	27829.22	
Difference:		00:20:00	9.42	Build Up Rate 28.26 KPa/Hr.

Bottom Recorder

Model	Serial	Latest Calibration
LMR-3000S	9448Q-16E	03/29/00

Max. Rated Press.	Max. Rated Temp.
110213.61 KPa G	174.97 DegC

Gradient Stops

Depth					
Tool String MD, [mCF]	Recorder MD, [mCF]	Sample R/T [mmm dd, 24hr]	Pressure [KPa G]	Gradient [KPa/m]	Temperature [DegC]
0.00	0.00	Jan 29,01 10:10:00	21151.14		0.82
993.60	993.60	10:32:00	23694.14	2.56	45.23
1993.60	1993.60	10:51:00	25685.32	1.99	102.15
2493.60	2493.60	11:05:00	26575.46	1.78	124.09
2993.60	2993.60	11:20:00	27380.94	1.61	147.94
3093.60	3093.60	11:31:00	27596.20	2.15	152.92
3143.60	3143.60	11:42:00	27692.97	1.94	155.10
3168.60	3168.60	11:53:00	27741.36	1.94	156.09
3221.10	3221.10	12:06:00	27826.14	1.61	157.47

Bottom Hole Pressure

	Tool String MD, [mCF]	Sample R/T [mmm dd, yy 24 hr.]	Pressure [KPa G]	
Sample 1	3221.10	Jan 29,01 12:05:00	27825.03	
Sample 2		12:25:00	27835.34	
Difference:		00:20:00	10.31	Build Up Rate 30.93 KPa/Hr.

Tool Summary

Purcell Energy Ltd.
North West Territories, Canada

Jan 29, 01

Purcell Et Al Liard F-25A | **F-25A** | **Liard, Upper Nahanni**

Top Recorder

Tool	Serial	Latest Calibration	Battery Serial
LMR-3000S	9432Q-16D	01/05/01	
Landed Depth		**Depth Offset**	**Min. Battery**
3219.60 mCF MD		-1.50 m	14.85 V

Program

	Intervals				Expected Samples			Actual Samples				
Mode	Interval [d hh:mm:ss]	Rate [hh:mm:ss]	Delta [KPa]	Periodic [hh:mm:ss]	Regular Samples	Percent Storage	Energy [Ahr]	Regular Samples	Delta Samples	Percent Storage	Energy [Ahr]	Duration [d hh:mm:ss]
HB	10:00	1			600	0.7%	0.0022	600		0.7%	0.0022	10:00
HB	5	10			43200	49.4%	0.9125	1152		1.3%	0.0243	3:12:00
Totals:	5 10:00				43800	50.1%	0.9146	1752		2.0%	0.0265	3:22:00

Bottom Recorder

Tool	Serial	Latest Calibration	Battery Serial
LMR-3000S	9448Q-16E	03/29/00	165 C
Landed Depth		**Depth Offset**	**Min. Battery**
3221.10 mCF MD		0.00 m	14.37 V

Program: Static Gradient – 2 Meg

	Intervals				Expected Samples			Actual Samples				
Mode	Interval [d hh:mm:ss]	Rate [hh:mm:ss]	Delta [KPa]	Periodic [hh:mm:ss]	Regular Samples	Percent Storage	Energy [Ahr]	Regular Samples	Delta Samples	Percent Storage	Energy [Ahr]	Duration [d hh:mm:ss]
HB	10:00	1			600	0.2%	0.0022	600		0.2%	0.0022	10:00
HB	5	10			43200	12.4%	0.9125	43200		12.4%	0.9125	5
Totals:	5 10:00				43800	12.5%	0.9146	43800		12.5%	0.9146	5 10:00

Calibration Summary

Purcell Energy Ltd.
North West Territories, Canada

Jan 29, 01

Purcell Et Al Liard F-25A | **F-25A** | **Liard, Upper Nahanni**

Top Recorder

Tool	Serial	Latest Calibration	Battery Serial
LMR-3000S	9432Q-16D	01/05/01	
Landed Depth		**Depth Offset**	**Min. Battery**
3219.60 mCF MD		-1.50 m	14.85 V

Equations

FP = Pres Freq (Hz)
FT = Temp Freq (Hz)

XP = 1.864600e+004 + (1.000000e-002) FP
XT = 4.594500e+004 + (1.000000e-002) FT

P_0 = 1.981109e+001+ (-2.301010e+000) XT + (-2.276958e-002) XT^2 + (-1.495188e-007) XT^3 + (-1.184193e-008) XT^4
P_1 = 4.368879e+001+ (-2.095285e-002) XT + (4.005309e-005) XT^2 + (4.836144e-008) XT^3 + (2.050039e-010) XT^4
P_2 = -1.789180e-003+ (8.943820e-006) XT + (-8.308399e-008) XT^2 + (-3.513594e-010) XT^3 + (-8.469247e-013) XT^4
P_3 = 6.609623e-007+ (-4.395498e-010) XT + (1.087461e-010) XT^2 + (6.120768e-013) XT^3 + (1.285222e-015) XT^4
Pressure (psiA) = $P_0 + P_1 XP + P_2 XP^2 + P_3 XP^3$

T_0 = 2.531495e+001
T_1 = -7.482286e-001
T_2 = -9.821123e-004
T_3 = -1.254958e-006
T_4 = -9.928415e-010
Temperature (degC) = $T_0 + T_1 XT + T_2 XT^2 + T_3 XT^3 + T_4 XT^4$

Bottom Recorder

Tool	Serial	Latest Calibration	Battery Serial
LMR-3000S	9448Q-16E	03/29/00	165 C
Landed Depth		**Depth Offset**	**Min. Battery**
3221.10 mCF MD		0.00 m	14.37 V

Equations

FP = Pres Freq (Hz)
FT = Temp Freq (Hz)

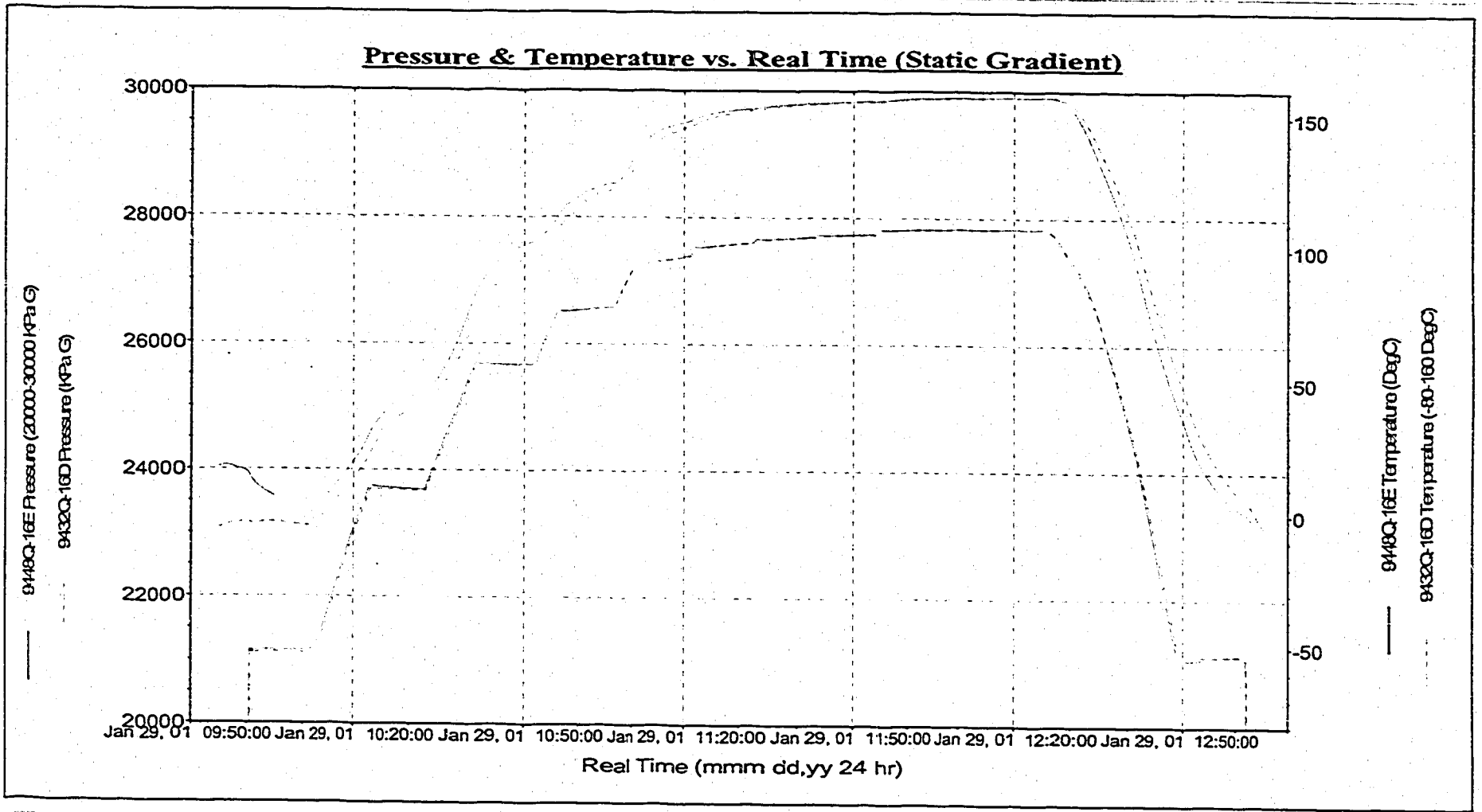
XP = 2.125900e+004 + (1.000000e-002) FP
XT = 4.948900e+004 + (1.000000e-002) FT

P_0 = 4.985274e+001+ (-1.987699e+000) XT + (-2.090967e-002) XT^2 + (1.835410e-006) XT^3 + (-1.010364e-008) XT^4
P_1 = 3.987036e+001+ (-2.008412e-002) XT + (3.582244e-005) XT^2 + (3.996012e-008) XT^3 + (2.035782e-010) XT^4
P_2 = -1.744175e-003+ (9.029986e-006) XT + (-7.559929e-008) XT^2 + (-3.248991e-010) XT^3 + (-8.550158e-013) XT^4
P_3 = 5.634373e-007+ (-1.033434e-009) XT + (9.722206e-011) XT^2 + (5.566489e-013) XT^3 + (1.260567e-015) XT^4
Pressure (psiA) = $P_0 + P_1 XP + P_2 XP^2 + P_3 XP^3$

T_0 = 2.680904e+001
T_1 = -7.457396e-001
T_2 = -8.915548e-004
T_3 = -7.003675e-007
Temperature (degC) = $T_0 + T_1 XT + T_2 XT^2 + T_3 XT^3$

Well

Client	Well Name	Well No.	Province
Purcell Energy Ltd.	Purcell Et Al Liard F-25A	F-25A	North West Territories
Test Name	**Test Date**	**Field**	**Pool**
Static Gradient	Jan 29, 01	Liard	Upper Nahanni

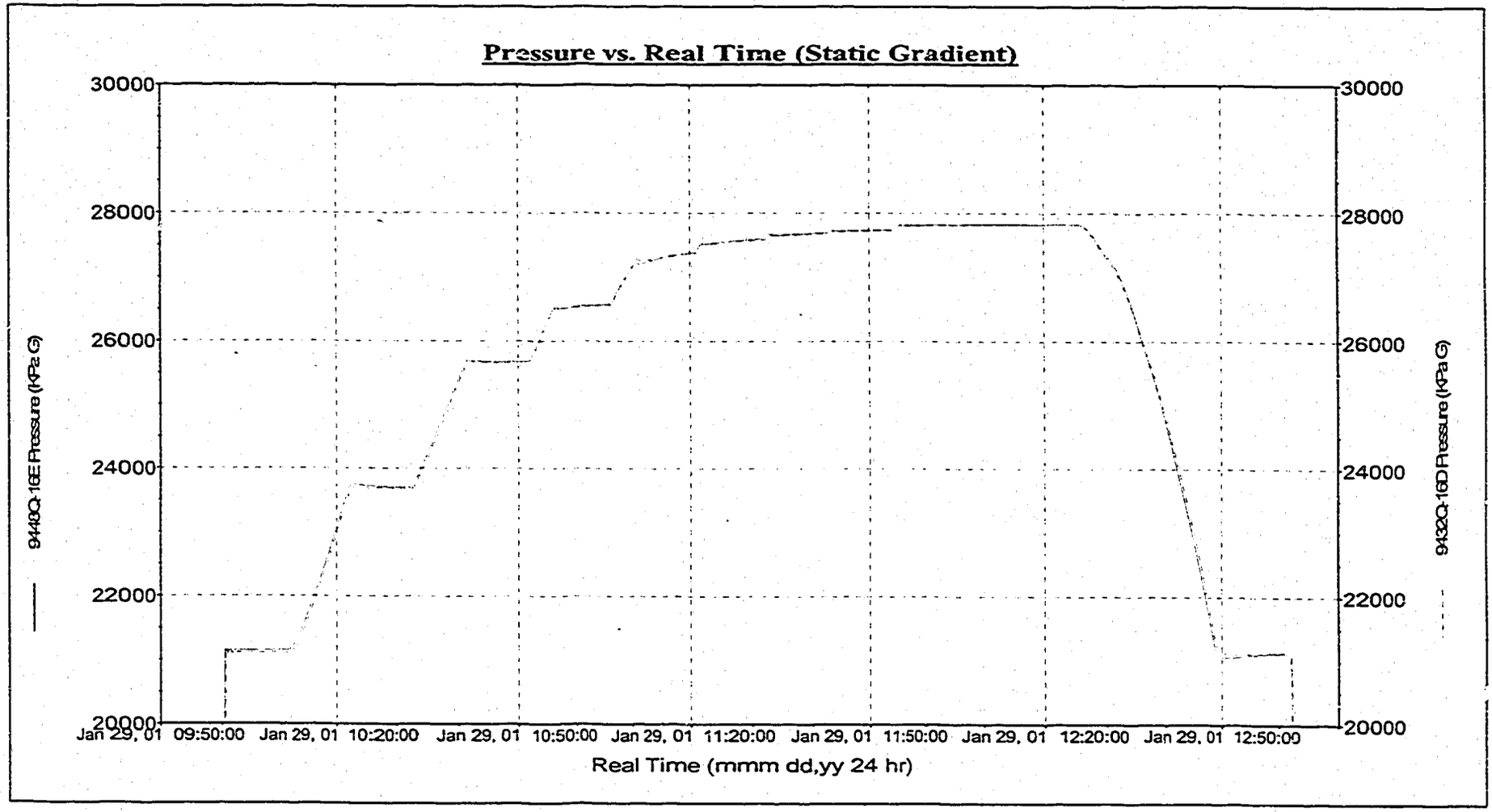


Remarks

9448Q-16E Bot. Rec. & 9432Q-16E Top Rec.

Well

Client	Well Name	Well No.	Province
Purcell Energy Ltd.	Purcell Et Al Liard F-25A	F-25A	North West Territories
Test Name	**Test Date**	**Field**	**Pool**
Static Gradient	Jan 29, 01	Liard	Upper Nahanni

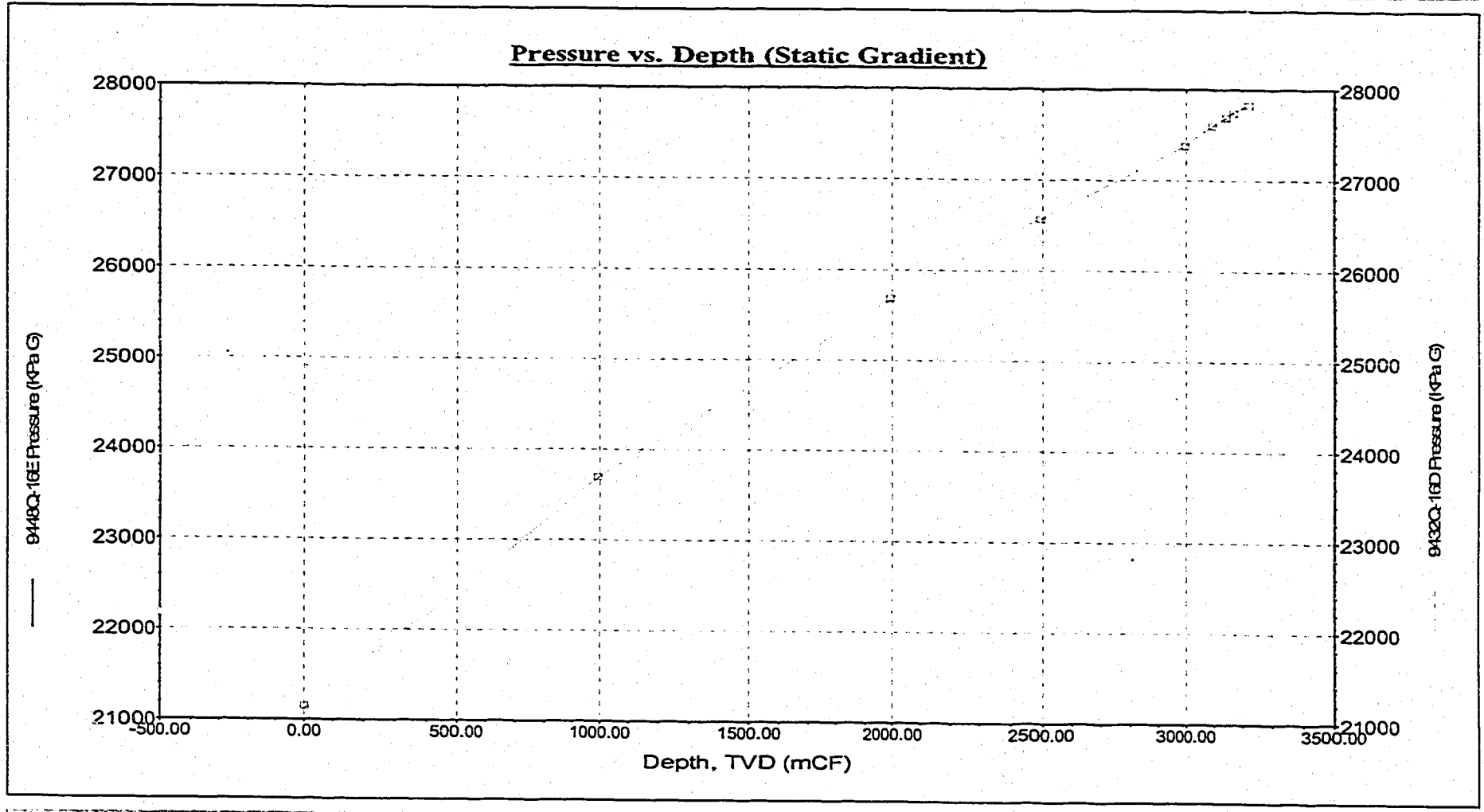


Remarks

9448Q-16E Bot. Rec. & 9432Q-16E Top Rec.

Well

Client	Well Name	Well No.	Province
Purcell Energy Ltd.	Purcell Et Al Liard F-25A	F-25A	North West Territories
Test Name	**Test Date**	**Field**	**Pool**
Static Gradient	Jan 29, 01	Liard	Upper Nahanni



Remarks

9448Q-16E Bot. Rec. & 9432Q-16E Top Rec.

Transient gauge reports (reference #'s 527114TRa, 527114tr)

Weatherford®
Completion Systems

TRANSIENT GAUGE REPORT

Bottom Hole Build-up

Prepared For: **PURCELL ENERGY LTD.**

950, 250 - 6th Ave. S.W.
Calgary, Ab

ATTN: Bob Stinn

F-25-A

PURCELL ET AL LIARD

Perforation: 3195 to 3260 m (KB) (TVD)

Formation: UPPER NAHANNI

Start Date: 2001.02.05 09:06:00
End Date: 2001.02.27 06:43:00
Reference Number: 527114tr

Weatherford Completion Systems
2460, 240 - 4th Ave. SW Calgary, Alberta T2P 4H4
ph 263-7800 fax. 264-7260

Weatherford Completion Systems

TRANSIENT GAUGE REPORT

PURCELL ENERGY LTD.

950, 250 - 6th Ave. S.W.
Calgary, Ab

ATTN: Bob Stinn

PURCELL ET AL LIARD

F-25-A

Licence No:

Test Start: 2001.02.05 09:06:00

GENERAL INFORMATION:

Bottom Hole Build-up

Formation: UPPER NAHANNI
Well Status: Gas
Deviated: No
Shut In Date: 2001.02.10 05:59:30

Company Rep: Ken Moen
Unit No.:
Reference Elevations: 723 m (KB)
716.6 m (CF)

Perforations:		3195 m (KB)	To	3260 m (KB) (TVD)	**MPP:**	**3227.5** m (KB)
Tubing Press:	Initial	20650 kPaa	Final	13500 kPaa	**Press@MPP:**	**27787.32** kPaa
Casing Press:	Initial	93 kPaa	Final	93 kPaa	**B.H. Temp:**	**158.53** deg C
					Assumed Gradient:	1.2 kPaa/m

Serial #: 3759 Bottom

Run Depth:	3189.73 m (KB)	Press@RunDepth:	27742 kPaa	Capacity:	14000 kPaa
Start Date:	2001/02/05	End Date:	2001/02/27	Last Calib.:	2001.01.19
Start Time:	09:06:00	End Time:	06:43:00	Time On Btm:	2001.02.05 10:02:00
				Time Off Btm:	2001.02.27 06:43:00

TEST COMMENT: Both recorders memory expired prior to pull date.

RESULTS SUMMARY

Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Annotation
525.53333	3189.73	27742.00	158.53	Pressure @ RunDepth

TRANSIENT GAUGE REPORT

Weatherford Completion Systems

PURCELL ENERGY LTD.
950, 250 - 6th Ave. S.W.
Calgary, Ab

ATTN: Bob Stinn

PURCELL ET AL LIARD

F-25-A
Licence No:

Test Start: 2001.02.05 09:06:00

GENERAL INFORMATION:

Bottom Hole Build-up

Formation: UPPER NAHANNI
Well Status: Gas
Deviated: No
Shut In Date: 2001.02.10 05:59:30

Company Rep: Ken Moen
Unit No.:
Reference Elevations: 723 m (KB)
716.6 m (CF)

Perforations:		3195 m (KB)	To	3260 m (KB) (TVD)	**MPP:**	**3227.5**	m (KB)
Tubing Press:	Initial	20650 kPaa	Final	13500 kPaa	**Press@MPP:**	**27763.58**	kPaa
Casing Press:	Initial	93 kPaa	Final	93 kPaa	**B.H. Temp:**	**158.53**	deg C
					Assumed Gradient:	1.2	kPaa/m

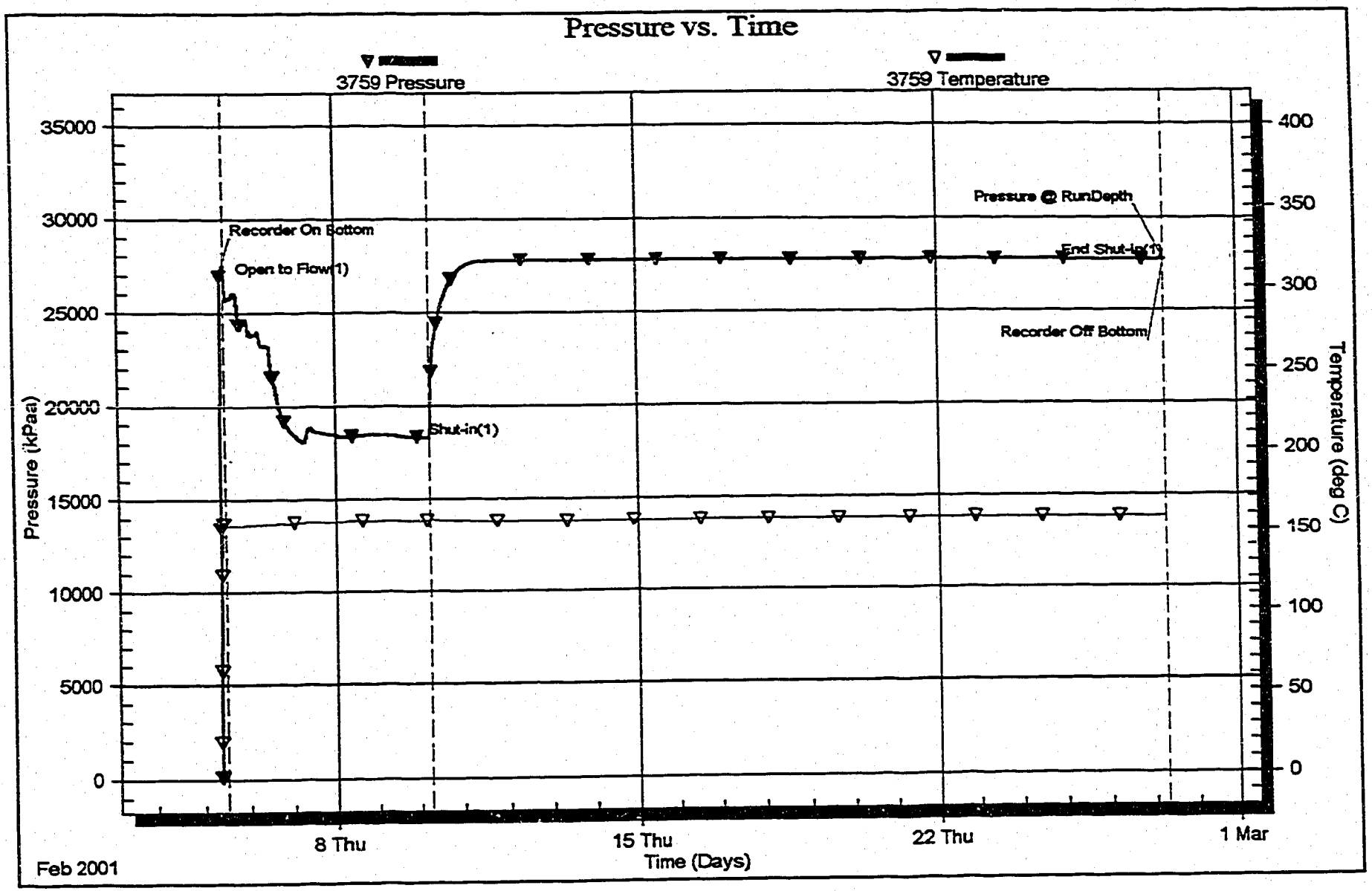
Serial #: 3758 Top

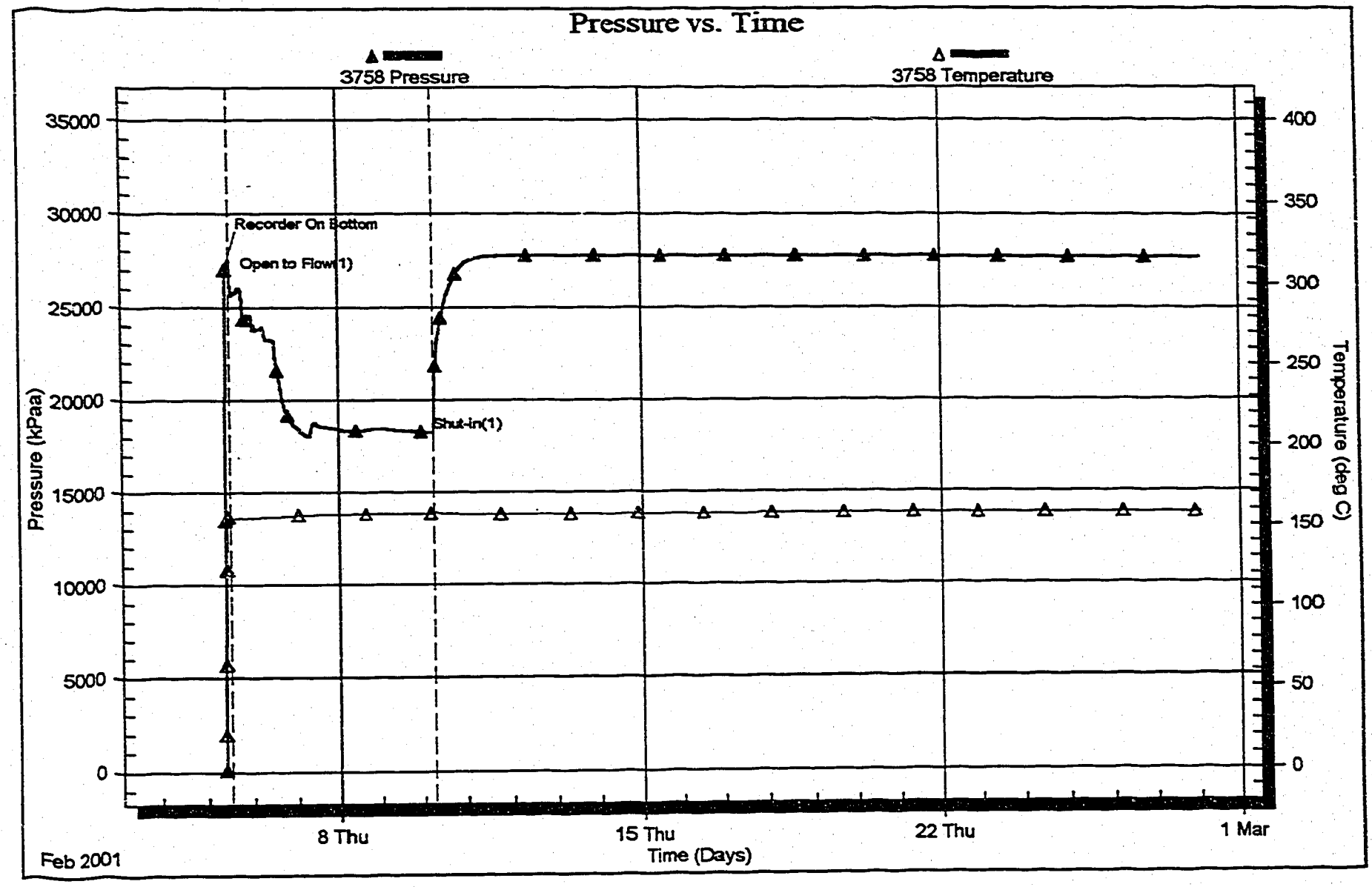
Run Depth:	3188.73 m (KB)	Press@RunDepth:	27717.05 kPaa	Capacity:	14000 kPaa
Start Date:	2001/02/05	End Date:	2001/02/28	Last Calib.:	2001.01.19
Start Time:	09:06:00	End Time:	14:23:00	Time On Btm:	2001.02.05 10:02:00
				Time Off Btm:	2001.02.28 14:23:00

TEST COMMENT: Both recorders memory expired prior to pull date.

RESULTS SUMMARY

Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Annotation
557.20000	3188.73	27717.05	158.53	Pressure @ RunDepth


Pressure vs. Time
3759 Pressure
3759 Temperature
35000
30000
25000
20000
15000
10000
5000
0
Pressure (kPaa)
400
350
300
250
200
150
100
50
0
Temperature (deg C)
Recorder On Bottom
Open to Flow(1)
Shut-in(1)
Pressure @ RunDepth
End Shut-in(1)
Recorder Off Bottom
8 Thu
15 Thu
22 Thu
1 Mar
Time (Days)
Feb 2001


Pressure vs. Time
3758 Pressure
3758 Temperature
35000
30000
25000
20000
15000
10000
5000
0
400
350
300
250
200
150
100
50
0
Pressure (kPaa)
Temperature (deg C)
Recorder On Bottom
Open to Flow(1)
Shut-in(1)
8 Thu
15 Thu
22 Thu
1 Mar
Feb 2001
Time (Days)

Weatherford®
Completion Systems

TRANSIENT GAUGE DATA LISTING

PURCELL ENERGY LTD.

950, 250 - 6th Ave. S.W.
Calgary, Ab

ATTN: Bob Stinn

PURCELL ET AL LIARD

F-25-A

Licence No:

Test Start: 2001.02.05 09:06:00

Serial # 3759 Bottom

Actual Time (Date/Time)	Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Comments
2001.02.05 09:06:02	0.00056		97.57	33.85	
2001.02.05 10:01:00	0.91667		27020.13	125.55	
2001.02.05 10:01:30	0.92500		27070.04	127.82	
2001.02.05 10:02:00	0.93333		27072.75	130.00	Recorder On Bottom
2001.02.05 10:02:30	0.94167		27092.57	132.05	
2001.02.05 10:03:00	0.95000		27113.76	133.92	
2001.02.05 10:03:30	0.95833		27130.69	135.66	
2001.02.05 12:00:00	2.90000		27507.15	156.92	
2001.02.05 12:00:30	2.90833		27507.73	156.92	
2001.02.05 12:01:00	2.91667		27508.31	156.92	Open to Flow(1)
2001.02.05 12:01:30	2.92500		27495.15	156.92	
2001.02.05 12:02:00	2.93333		27483.93	156.92	
2001.02.05 12:02:30	2.94167		27474.26	156.92	
2001.02.05 21:40:00	12.56667		24527.67	156.13	
2001.02.06 07:17:30	22.19167		23344.51	156.46	
2001.02.06 16:55:00	31.81667		19844.55	157.01	
2001.02.07 02:32:30	41.44167		18335.91	157.58	
2001.02.07 12:10:00	51.06667		18654.91	157.88	
2001.02.07 21:47:30	60.69167		18499.76	158.10	
2001.02.08 07:25:00	70.31667		18365.31	158.26	
2001.02.08 17:02:30	79.94167		18464.55	158.38	
2001.02.09 02:40:00	89.56667		18473.93	158.46	
2001.02.09 12:17:30	99.19167		18402.94	158.53	
2001.02.09 21:55:00	108.81667		18348.29	158.59	
2001.02.10 05:58:30	116.87500		18294.70	158.62	
2001.02.10 05:59:00	116.88333		18294.80	158.62	
2001.02.10 05:59:30	116.89167		18294.21	158.62	Shut-in(1)
2001.02.10 06:00:00	116.90000		18394.62	158.62	
2001.02.10 06:00:30	116.90833		18513.01	158.63	
2001.02.10 06:01:00	116.91667		18606.16	158.64	
2001.02.10 15:39:00	126.55000		26213.04	158.54	
2001.02.11 01:16:30	136.17500		27486.16	158.28	
2001.02.11 10:54:00	145.80000		27734.55	158.09	

Printing every 1155 samples

Serial # 3759 Bottom

Actual Time (Date/Time)	Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Comments
2001.02.11 20:31:30	155.42500		27777.81	158.13	
2001.02.12 06:09:00	165.05000		27790.76	158.11	
2001.02.12 15:46:30	174.67500		27796.26	158.11	
2001.02.13 01:24:00	184.30000		27799.06	158.12	
2001.02.13 11:01:30	193.92500		27800.42	158.13	
2001.02.13 20:39:00	203.55000		27800.80	158.15	
2001.02.14 06:16:30	213.17500		27800.80	158.16	
2001.02.14 15:54:00	222.80000		27800.13	158.17	
2001.02.15 01:31:30	232.42500		27799.55	158.19	
2001.02.15 13:11:00	244.08333		27798.20	158.21	
2001.02.16 08:26:00	263.33333		27795.78	158.23	
2001.02.17 03:41:00	282.58333		27792.88	158.26	
2001.02.17 22:56:00	301.83333		27789.60	158.29	
2001.02.18 18:11:00	321.06333		27786.22	158.31	
2001.02.19 13:26:00	340.33333		27782.45	158.34	
2001.02.20 08:41:00	359.58333		27778.68	158.36	
2001.02.21 22:46:00	397.66667		27770.76	158.41	
2001.02.23 13:16:00	436.16667		27762.36	158.45	
2001.02.25 03:46:00	474.66667		27753.76	158.48	
2001.02.27 06:23:00	525.28333		27741.97	158.53	
2001.02.27 06:28:00	525.36667		27741.97	158.53	
2001.02.27 06:33:00	525.45000		27742.29	158.53	End Shut-in(1)
2001.02.27 06:38:00	525.53333	3189.73	27742.00	158.53	Pressure @ RunDepth
2001.02.27 06:43:00	525.61667		27740.06	158.53	Recorder Off Bottom

Printing every 1155 samples

Weatherford
Completion Systems

TRANSIENT GAUGE DATA LISTING

PURCELL ENERGY LTD.

950, 250 - 6th Ave. S.W.
Calgary, Ab

ATTN: Bob Stinn

PURCELL ET AL LIARD

F-25-A

Licence No:

Test Start: 2001.02.05 09:06:00

Serial # 3758 Top

Actual Time (Date/Time)	Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Comments
2001.02.05 09:06:02	0.00056		97.08	33.45	
2001.02.05 10:01:00	0.91667		27068.39	123.90	
2001.02.05 10:01:30	0.92500		27126.33	126.16	
2001.02.05 10:02:00	0.93333		27137.84	128.35	Recorder On Bottom
2001.02.05 10:02:30	0.94167		27155.45	130.44	
2001.02.05 10:03:00	0.95000		27174.41	132.41	
2001.02.05 10:03:30	0.95833		27196.17	134.25	
2001.02.05 12:00:00	2.90000		27499.21	156.94	
2001.02.05 12:00:30	2.90833		27499.89	156.94	
2001.02.05 12:01:00	2.91667		27500.47	156.94	Open to Flow(1)
2001.02.05 12:01:30	2.92500		27487.61	156.94	
2001.02.05 12:02:00	2.93333		27477.45	156.94	
2001.02.05 12:02:30	2.94167		27467.78	156.94	
2001.02.05 21:40:00	12.56667		24518.68	156.12	
2001.02.06 07:17:30	22.19167		23325.84	156.44	
2001.02.06 16:55:00	31.81667		19815.53	156.99	
2001.02.07 02:32:30	41.44167		18307.66	157.55	
2001.02.07 12:10:00	51.06667		18630.63	157.85	
2001.02.07 21:47:30	60.69167		18473.84	158.08	
2001.02.08 07:25:00	70.31667		18340.94	158.24	
2001.02.08 17:02:30	79.94167		18440.56	158.35	
2001.02.09 02:40:00	89.56667		18449.17	158.44	
2001.02.09 12:17:30	99.19167		18379.14	158.51	
2001.02.09 21:55:00	108.81667		18324.20	158.56	
2001.02.10 05:58:30	116.87500		18270.52	158.60	
2001.02.10 05:59:00	116.88333		18270.52	158.60	
2001.02.10 05:59:30	116.89167		18268.00	158.60	Shut-in(1)
2001.02.10 06:00:00	116.90000		18345.96	158.60	
2001.02.10 06:00:30	116.90833		18472.00	158.60	
2001.02.10 06:01:00	116.91667		18569.98	158.61	
2001.02.10 15:39:00	126.55000		26199.79	158.45	
2001.02.11 01:16:30	136.17500		27472.71	158.16	
2001.02.11 10:54:00	145.80000		27720.92	158.01	

Printing every 1155 samples

Serial # 3758 Top

Actual Time (Date/Time)	Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Comments
2001.02.11 20:31:30	155.42500		27764.29	158.09	
2001.02.12 06:09:00	165.05000		27777.04	158.05	
2001.02.12 15:46:30	174.67500		27782.45	158.05	
2001.02.13 01:24:00	184.30000		27785.25	158.06	
2001.02.13 11:01:30	193.92500		27786.41	158.06	
2001.02.13 20:39:00	203.55000		27786.70	158.09	
2001.02.14 06:16:30	213.17500		27786.60	158.11	
2001.02.14 15:54:00	222.80000		27785.83	158.12	
2001.02.15 01:31:30	232.42500		27785.06	158.14	
2001.02.15 13:11:00	244.08333		27783.71	158.16	
2001.02.16 08:26:00	263.33333		27781.19	158.19	
2001.02.17 03:41:00	282.58333		27777.91	158.21	
2001.02.17 22:56:00	301.83333		27774.43	158.24	
2001.02.18 18:11:00	321.08333		27770.76	158.27	
2001.02.19 13:26:00	340.33333		27766.80	158.29	
2001.02.20 0[illegible]:1:00	359.58333		27762.74	158.32	
2001.02.21 22:46:00	397.66667		27754.34	158.36	
2001.02.23 13:16:00	436.16667		27746.51	158.40	
2001.02.25 03:46:00	474.66667		27737.24	158.43	
2001.02.28 14:03:00	556.95000		27717.15	158.53	
2001.02.28 14:08:00	557.03333		27717.15	158.53	
2001.02.28 14:13:00	557.11667		27717.05	158.53	End Shut-in(1)
2001.02.28 14:18:00	557.20000	3188.73	27717.05	158.53	Pressure @ RunDepth
2001.02.28 14:23:00	557.28333		27717.05	158.53	Recorder Off Bottom

Printing every 1155 samples

Weatherford®
Completion Systems

TRANSIENT GAUGE REPORT

Bottom Hole Build-up

Prepared For: **PURCELL ENERGY LTD.**

950, 250 - 6th Ave. S.W.
Calgary, Ab

ATTN: Bob Stinn

F-25-A

PURCELL ET AL LIARD

Perforation: 3195 to 3260 m (KB) (TVD)

Formation: UPPER NAHANNI

Start Date: 2001.02.05 07:39:00
End Date: 2001.03.01 16:21:00
Reference Number: 527114TRa

Weatherford Completion Systems
2460, 240 - 4th Ave. SW Calgary, Alberta T2P 4H4
ph 263-7800 fax. 264-7260

TRANSIENT GAUGE REPORT

Weatherford Completion Systems

PURCELL ENERGY LTD.

950, 250 - 6th Ave. S.W.
Calgary, Ab

ATTN: Bob Stinn

PURCELL ET AL LIARD

F-25-A

Licence No:

Test Start: 2001.02.05 07:39:00

GENERAL INFORMATION:

Bottom Hole Build-up

Formation: UPPER NAHANNI
Well Status: Gas
Deviated: No
Shut In Date: 2001.02.10 05:59:00

Company Rep: Ken Moen
Unit No.:
Reference Elevations: 723 m (KB)
716.6 m (CF)

Perforations: 3195 m (KB) To 3260 m (KB) (TVD)
Tubing Press: Initial 20650 kPaa Final 13500 kPaa
Casing Press: Initial 93 kPaa Final 93 kPaa

MPP: 3227.5 m (KB)
Press@MPP: 28976.62 kPaa
B.H. Temp: 158.65 deg C
Assumed Gradient: 1.2 kPaa/m

Serial #: 3757 Top
Run Depth: 2188.73 m (KB)
Start Date: 2001/02/05
Start Time: 07:39:00

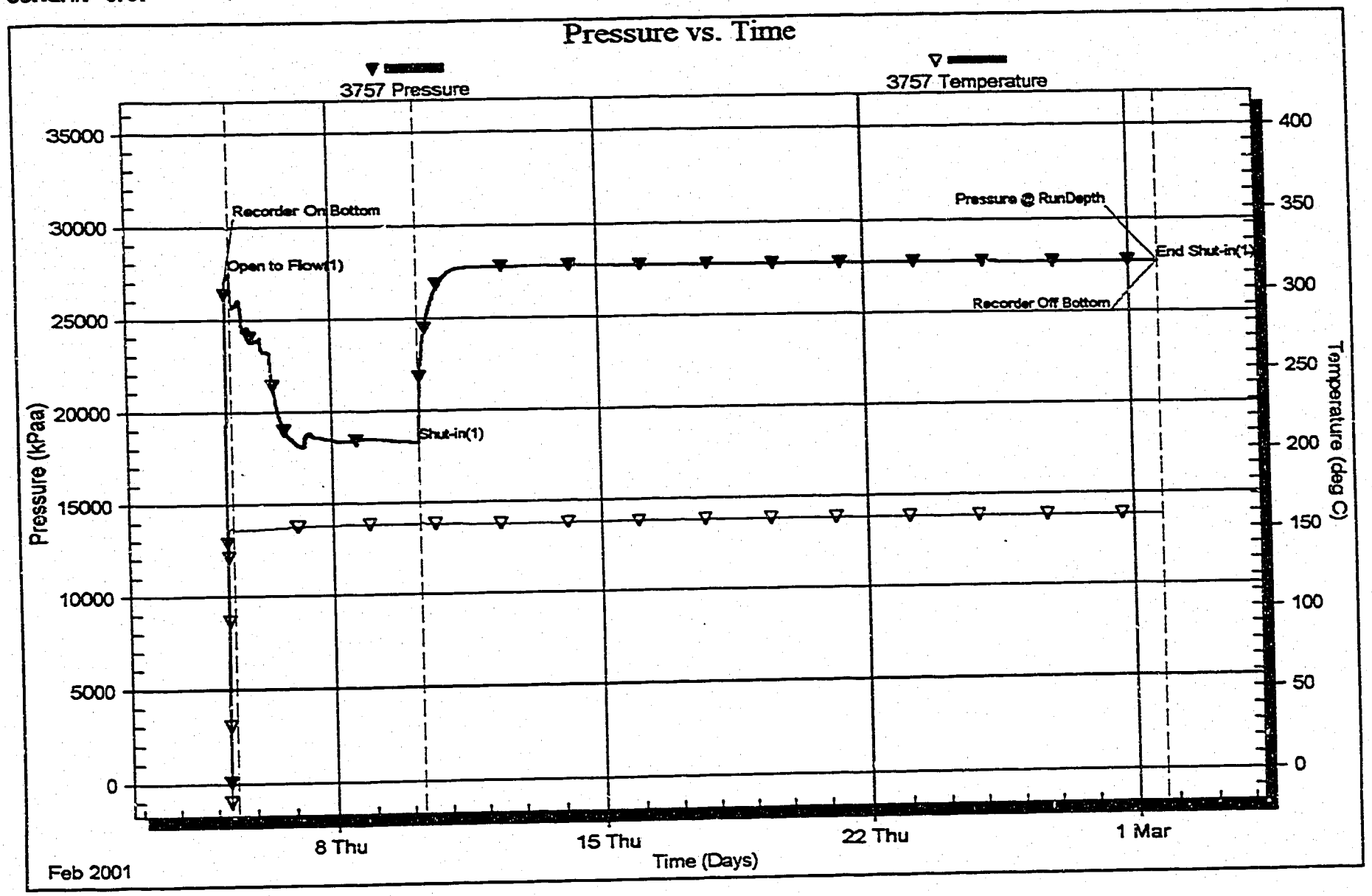
Press@RunDepth: 27730.09 kPaa
End Date: 2001/03/01
End Time: 16:21:00

Capacity: 14000 kPaa
Last Calib.: 2001.01.19
Time On Btm: 2001.02.05 08:43:30
Time Off Btm: 20[illegible]..03.01 16:21:00

TEST COMMENT: Bottom gauge 3759 being sent to ASE shop for downloading. Gauge ran out of memory prior to being pulled.

RESULTS SUMMARY

Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Annotation
584.61667	2188.73	27730.09	158.65	Pressure @ RunDepth


Pressure vs. Time
3757 Pressure
3757 Temperature
35000
30000
25000
20000
15000
10000
5000
0
400
350
300
250
200
150
100
50
0
Pressure (kPaa)
Temperature (deg C)
Recorder On Bottom
Open to Flow(1)
Shut-in(1)
Pressure @ RunDepth
End Shut-in(1)
Recorder Off Bottom
8 Thu
15 Thu
22 Thu
1 Mar
Time (Days)
Feb 2001

Weatherford® Completion Systems

TRANSIENT GAUGE DATA LISTING

PURCELL ENERGY LTD.

950, 250 - 6th Ave. S.W.
Calgary, Ab

ATTN: Bob Stinn

PURCELL ET AL LIARD

F-25-A

Licence No:

Test Start: 2001.02.05 07:39:00

Serial # 3757 Top

Actual Time (Date/Time)	Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Comments
2001.02.05 07:39:02	0.00056		43.04	-15.59	
2001.02.05 08:42:30	1.05833		26970.31	117.52	
2001.02.05 08:43:00	1.06667		26975.63	119.73	
2001.02.05 08:43:30	1.07500		26991.69	121.83	Recorder On Bottom
2001.02.05 08:44:00	1.08333		27007.84	123.82	
2001.02.05 08:44:30	1.09167		27025.45	125.71	
2001.02.05 08:45:00	1.10000		27026.61	127.51	
2001.02.05 12:00:00	4.35000		27511.40	156.98	
2001.02.05 12:00:30	4.35833		27511.98	156.98	
2001.02.05 12:01:00	4.36667		27512.76	156.98	Open to Flow(1)
2001.02.05 12:01:30	4.37500		27503.28	156.98	
2001.02.05 12:02:00	4.38333		27492.15	156.98	
2001.02.05 12:02:30	4.39167		27482.19	156.98	
2001.02.05 15:17:30	7.64167		25795.18	155.87	
2001.02.05 18:32:30	10.89167		25444.54	155.81	
2001.02.05 21:47:30	14.14167		24553.02	156.18	
2001.02.06 01:02:30	17.39167		23992.77	156.35	
2001.02.06 04:17:30	20.64167		23866.74	156.48	
2001.02.06 07:32:30	23.89167		23310.66	156.51	
2001.02.06 10:47:30	27.14167		23237.43	156.72	
2001.02.06 14:02:30	30.39167		21143.01	156.79	
2001.02.06 17:17:30	33.64167		19730.61	157.07	
2001.02.06 20:32:30	36.89167		18983.68	157.30	
2001.02.06 23:47:30	40.14167		18580.72	157.48	
2001.02.07 03:02:30	43.39167		18303.21	157.63	
2001.02.07 06:17:30	46.64167		18099.12	157.76	
2001.02.07 09:32:30	49.89167		18834.92	157.86	
2001.02.07 12:47:30	53.14167		18643.50	157.93	
2001.02.07 16:02:30	56.39167		18609.35	158.01	
2001.02.07 19:17:30	59.64167		18563.50	158.08	
2001.02.07 22:32:30	62.89167		18519.49	158.15	
2001.02.08 01:47:30	66.14167		18414.25	158.20	
2001.02.08 05:02:30	69.39167		18383.30	158.26	

Printing every 390 samples

Serial # 3757 Top

Actual Time (Date/Time)	Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Comments
2001.02.08 08:17:30	72.64157		18374.21	158.31	
2001.02.08 11:32:30	75.89167		18414.06	158.35	
2001.02.08 14:47:30	79.14167		18442.98	158.39	
2001.02.08 18:02:30	82.39167		18476.93	158.42	
2001.02.08 21:17:30	85.64167		18494.92	158.45	
2001.02.09 00:32:30	88.89167		18484.28	158.48	
2001.02.09 03:47:30	92.14167		18469.58	158.51	
2001.02.09 07:02:30	95.39167		18443.76	158.53	
2001.02.09 10:17:30	98.64167		18409.80	158.56	
2001.02.09 13:32:30	101.89167		18395.78	158.58	
2001.02.09 16:47:30	105.14167		18368.50	158.60	
2001.02.09 20:02:30	108.39167		18361.24	158.61	
2001.02.09 23:17:30	111.64167		18343.84	158.63	
2001.02.10 02:32:30	114.89167		18297.79	158.64	
2001.02.10 05:47:30	118.14167		18302.44	158.66	
2001.02.10 05:58:00	118.31567		18299.34	158.66	
2001.02.10 05:58:30	118.32500		18299.05	158.66	
2001.02.10 05:59:00	118.33333		18298.96	158.66	Shut-in(1)
2001.02.10 05:59:30	118.34167		18300.31	158.66	
2001.02.10 06:00:00	118.35000		18297.79	158.66	
2001.02.10 06:00:30	118.35833		18364.63	158.66	
2001.02.10 09:16:00	121.61667		23800.29	158.70	
2001.02.10 12:31:00	124.86667		25286.20	158.70	
2001.02.10 15:46:00	128.11667		26240.22	158.62	
2001.02.10 19:01:00	131.36667		26868.07	158.56	
2001.02.10 22:16:00	134.61667		27265.33	158.46	
2001.02.11 01:31:00	137.86667		27501.25	158.39	
2001.02.11 04:46:00	141.11667		27633.08	158.33	
2001.02.11 08:01:00	144.36667		27703.02	158.26	
2001.02.11 11:16:00	147.61667		27740.14	158.23	
2001.02.11 14:31:00	150.86667		27760.91	158.23	
2001.02.11 17:46:00	154.11667		27773.37	158.22	
2001.02.11 21:01:00	157.36667		27781.29	158.22	
2001.02.12 00:16:00	160.61667		27786.80	158.20	
2001.02.12 03:31:00	163.86667		27790.76	158.20	
2001.02.12 06:46:00	167.11667		27793.66	158.19	
2001.02.12 10:01:00	170.36667		27795.88	158.19	
2001.02.12 13:16:00	173.61667		27797.52	158.19	
2001.02.12 16:31:00	176.86667		27798.97	158.19	
2001.02.12 19:46:00	180.11667		27800.13	158.20	
2001.02.12 23:01:00	183.36667		27801.00	158.20	

Printing every 390 samples

Serial # 3757 Top

Actual Time (Date/Time)	Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Comments
2001.02.13 02:16:00	186.61667		27801.67	158.20	
2001.02.13 05:31:00	189.86667		27802.16	158.20	
2001.02.13 08:46:00	193.11667		27802.54	158.21	
2001.02.13 12:01:00	196.36667		27802.74	158.21	
2001.02.13 15:16:00	199.61667		27802.93	158.21	
2001.02.13 18:31:00	202.86667		27803.22	158.22	
2001.02.13 21:46:00	206.11667		27803.22	158.22	
2001.02.14 01:01:00	209.36667		27803.12	158.23	
2001.02.14 04:16:00	212.61667		27803.03	158.23	
2001.02.14 07:31:00	215.86667		27802.93	158.24	
2001.02.14 10:46:00	219.11667		27802.74	158.24	
2001.02.14 14:01:00	222.36667		27802.54	158.24	
2001.02.14 17:16:00	225.61667		27802.35	158.25	
2001.02.14 20:31:00	228.86667		27802.06	158.25	
2001.02.14 23:46:00	232.11667		27801.96	158.26	
2001.02.15 03:01:00	235.36667		27801.58	158.26	
2001.02.15 06:16:00	238.61667		27801.38	158.27	
2001.02.15 11:22:00	243.71667		27800.71	158.28	
2001.02.15 17:52:00	250.21667		27799.93	158.28	
2001.02.16 00:22:00	256.71667		27799.16	158.29	
2001.02.16 06:52:00	263.21667		27798.20	158.30	
2001.02.16 13:22:00	269.71667		27797.33	158.31	
2001.02.16 19:52:00	276.21667		27796.36	158.32	
2001.02.17 02:22:00	282.71667		27795.20	158.33	
2001.02.17 08:52:00	289.21667		27794.14	158.34	
2001.02.17 15:22:00	295.71667		27793.08	158.35	
2001.02.17 21:52:00	302.21667		27791.92	158.36	
2001.02.18 04:22:00	308.71667		27790.76	158.37	
2001.02.18 10:52:00	315.21667		27789.60	158.38	
2001.02.18 17:22:00	321.71667		27788.34	158.39	
2001.02.18 23:52:00	328.21667		27787.18	158.40	
2001.02.19 06:22:00	334.71667		27785.93	158.41	
2001.02.19 12:52:00	341.21667		27784.67	158.41	
2001.02.19 19:22:00	347.71667		27783.32	158.42	
2001.02.20 01:52:00	354.21667		27782.06	158.43	
2001.02.20 09:05:00	361.43333		27780.52	158.44	
2001.02.20 22:05:00	374.43333		27777.91	158.46	
2001.02.21 11:05:00	387.43333		27775.11	158.47	
2001.02.22 00:05:00	400.43333		27772.40	158.49	
2001.02.22 13:05:00	413.43333		27769.51	158.50	
2001.02.23 02:05:00	426.43333		27766.70	158.51	

Printing every 390 samples

Serial # 3757 Top

Actual Time (Date/Time)	Relative Time (Hours)	Depth (m)	Pressure (kPaa)	Temperature (deg C)	Comments
2001.02.23 15:05:00	439.43333		27763.81	158.53	
2001.02.24 04:05:00	452.43333		27760.81	158.54	
2001.02.24 17:05:00	465.43333		27757.91	158.55	
2001.02.25 06:05:00	478.43333		27754.92	158.57	
2001.02.26 12:16:00	508.61667		27748.64	158.59	
2001.02.27 20:46:00	541.11667		27740.53	158.62	
2001.03.01 05:16:00	573.61667		27732.41	158.65	
2001.03.01 16:01:00	584.36667		27730.09	158.65	
2001.03.01 16:06:00	584.45000		27730.09	158.65	
2001.03.01 16:11:00	584.53333		27730.09	158.65	End Shut-in(1)
2001.03.01 16:16:00	584.61667	2188.73	27730.09	158.65	Pressure @ RunDepth
2001.03.01 16:21:00	584.70000		27730.09	158.65	Recorder Off Bottom

Printing every 390 samples

GAS ANALYSIS

AGAT® Laboratories

GAS ANALYSIS

Container Identification	Laboratory Number
AGAT 18321	GG65955A

Operator Name
PURCELL ENERGY LIMITED

Unique Well Identifier	Well Name	Elevation
NOT AVAILABLE	PURCELL et al LIARD F-25A	KB m 723.00 GRD m 716.60

Field or Area	Pool or Zone	Sampler's Company
LIARD	NAHANNI	NORTHLAND

Test Type	Test No.	Test Recovery	Name of Sampler

Test Interval or Perfs	Sampling Point
3195.00-3260.00 mKB	METER RUN

	Separator	Reservoir	Source	Sampled	Received
Pressure (kPa)			3500	3500	3900
Temperature (°C)			54	54	21

Date Sampled	Date Received	Date Reported	Analyst
Feb 10, 2001	Feb 14, 2001	Feb 21, 2001	LQ

Other Information
FIELD H2S = 500 ppm/LAB = 213 ppm

COMP	MOLE FRACTION		PETROLEUM LIQUID
	AIR FREE AS RECEIVED	AIR FREE ACID GAS FREE	mL • m³
H2	0.0002	0.0003	
He	0.0016	0.0020	
N2	0.0451	0.0565	
CO2	0.2018	0.0000	
H2S	0.0005	0.0000	
C1	0.7508	0.9412	
C2	0.0000	0.0000	
C3	0.0000	0.0000	0.0
IC4	0.0000	0.0000	0.0
NC4	0.0000	0.0000	0.0
IC5	0.0000	0.0000	0.0
NC5	0.0000	0.0000	0.0
C6	0.0000	0.0000	0.0
C7+	0.0000	0.0000	0.0
Total	1.0000	1.0000	0.0

NOTE: The following have exceeded normal limits: CO2

GROSS HEATING VALUE MJ/m³
15° C AND 101.325 kPa

Air Free As Received	Moisture & Acid Gas Free
28.39	35.51

RELATIVE DENSITY (CALCULATED)

Moisture Free	Moisture & Acid Gas Free
0.767	0.576

PSEUDO CRITICAL PROPERTIES (CALCULATED)

As Sampled		Acid Gas Free	
pPc (abs) kPa	pTc K	pPc (abs) kPa	pTc K
5105	210.3	4526	186.5

RELATIVE MOLECULAR MASS

Total Gas	C_7+
22.2	0.0

VAPOUR PRESSURE (Pentanes +)	H_2S g/m³
0.00 kPa	0.72

Water Analysis

AGAT® Laboratories

WATER ANALYSIS

Container Identification	Laboratory Number
PB 1A	WG65955A

Operator Name
PURCELL ENERGY LIMITED

Unique Well Identifier	Well Name	Elevation			
F-025-A	PURCELL ET AL LIARD F-025-A	KB m	736.00	GRD m	716.60

Field or Area	Pool or Zone	Sampler's Company
LIARD	NAHANNI	NORTHLAND

Test Type	Test No.	Test Recovery	Name of Sampler

Test Interval or Perfs		Sampling Point		Separator	Reservoir	Source	Sampled	Received
3195.00-3260.00		FLOW LINE	Pressure (kPa)					
mKB			Temperature (°C)					

Date Sampled	Date Received	Date Reported	Analyst
Feb 10, 2001	Feb 14, 2001	Feb 26, 2001	LN

Other Information

Cations

ION	mg/L	Mass Fraction	mmol/L
Na	24570.0	0.273	1068.7
K	3500.0	0.039	89.5
Ca	7400.0	0.082	184.6
Mg	570.0	0.006	23.5
Fe	12.6	Trace	0.2

Anions

ION	mg/L	Mass Fraction	mmol/L
Cl	53983.0	0.600	1522.7
HCO_3	Nil	Nil	Nil
SO_4	1.2	Trace	Trace
CO_3	Nil	Nil	Nil
OH	Nil	Nil	Nil

Other Measurements

Measurement	Value
Mineral Acidity (g/m³ as CaCO3)	330.73
Total Dissolved Solids (Calculated) mg/L	90036
Observed pH	4.13
H2S (25°C) mg/L	51.12
Relative Density (25°C)	1.053
Resistivity / OHM-m (25°C)	0.090
Salinity %	9.17

Total Cations	1574.9	Total Anions	1522.7

Logarithmic Pattern mmol/L