PC I

MORROW CREEK J-71

9211-P28-1-3

D.A. # 1206

E.A. # 159

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 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: PCI et al Morrow Creek J-71

Operator: Petro-Canada Inc. | Drilling Program No.: N/A

Contractor: ATCO/Equtak | Permit or Lease No.: N/A

Drilling Rig or Unit: ATCO/Equtak #76 | Estimated Well Cost: $3,855,000

Location-Unit: J Section: 71 Grid Area: 65-30-127-15

Coordinates: Lat.: 65° 20' 43.72" Long.: 127° 28' 41.74"

Area: MacKenzie Plains | Field/Pool: Undefined

Elevation [redacted]/KB: 142.21 (ASL) | GL 136.01 m (ASL)

Approx. Spud Date: December 5, 1984 | Estimated Days on Location: 30

Anticipated Total Depth: 1200 m KB | Target Horizon(s) Primary: Devonian Kee Scarp
Secondary: Basal Cretaceous Sand

UWI: 300J716530127150

EVALUATION PROGRAM

Ten-metre sample intervals

Five-metre sample intervals 350 - TD (5 bottled sets, 4 bagged sets)

Canned sample intervals 350 - TD (4 sets every 10m)

Conventional cores at 1-18m core (B.Cret.Sand-652m), 1-18m core (Canol/Kee Scarp Fm-897m)

Logs and Tests DLL-MSFL-GR, CNL-LDT-EPT/ML-CAL, BHCS-WE-GP-CAL, SHDT, DIRECTIONAL SURVEY 1 DST (B.Cretaceous Sand), 1 DST (Kee Scarp)

CASING AND CEMENTING PROGRAM

O.D.	Weight:	Grade:	Setting Depth (m KB)	Cementing Program (Volumes):
340mm	101kg/m	K-55, BT&C	30m	6 tonnes permafrost cement
245mm	65/60 kg/m	S00-95/L-80, LT&C	350m	28 tonnes permafrost cement
178mm	43kg/m	S00-95, LT&C	1200m	23 tonnes Class G + 0.5% T.I.+ 0.3%R

BOP Equipment: 1-346mm, 21 Mpa Hydril Annular Preventer
1-346mm, 21 Mpa Blind Rams
1-346mm, 34 Mpa Pipe Rams

Other Information: Diverter system to be used while drilling surface hole, consisting of:
346mm, 21 MPa Mud Cross, w. automatic HCR valve
346mm, 21 MPa Hydrill Annular preventer

Signed: W Kuntz for K McDonald | Title: LAND DRILLING MANAGER

Date: 1984-11-15 | Company: PETRO-CANADA INC.

APPROVAL

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

Signed: [signature]
Engineering Branch

Date: 28 Nov 84

File: 9211-P28-1-3

Department of Energy Mines and Resources | Department of Indian Affairs and Northern Development

Ministère de l'Energie, des Mines et des Ressources | Ministère des Affaires indiennes et du Nord Canadien

Canada

PETRO CANADA INCORPORATED

PCI ET AL MORROW CREEK J-71

Well History Report

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
APR 10 1985
ENGINEERING AND CONTROL
TECHNIQUE ET CONTRÔLE

Prepared by: R. Moscarello
1985-02-27

PCI ET AL MORROW CREEK J-71

WELL HISTORY REPORT

a) INTRODUCTION

- i) Summary
- ii) Location Map

b) GENERAL DATA

- i) Well Name and Number
- ii) Well Location
- iii) Unique Well Identifier
- iv) Operator and Drilling Contractor
- v) Drilling Unit
- vi) Position Keeping
- vii) Support Craft
- viii) Drilling Unit Performance
- ix) Difficulties and Delays

c) SUMMARY OF DRILLING OPERATIONS

- i) Elevations
- ii) Total Depth
- iii) Date Spudded
- iv) Date Drilling Completed
- v) Date of Rig Release
- vi) Well Status
- vii) Hole Sizes and Depth
- viii) Casing and Cementing Record
- ix) Sidetracked Hole
- x) Drilling Fluids
- xi) Fishing Operation
- xii) Well Kicks
- xiii) Formation Leak-Off Tests

c) SUMMARY OF DRILLING OPERATIONS (cont'd)

xiv) Time Breakdown

xv) Deviation Survey

xvi) Abandonment Plugs

xvii) Composite Well Records

APPENDIX

Drilling Data

1. Deviation Records

2. Final Survey Plan

PCI ET AL MORROW CREEK J-71

a) INTRODUCTION

i) Summary:

PCI et al Morrow Creek J-71, located in the MacKenzie Plains area of the Northwest Territories, was drilled to a total depth of 1050 m in 22 days. It was the first well drilled in the 1984 - 85 Northern Interior Plains Project.

The location coordinates for this well are 65° 20' 43.72" North Latitude and 127° 28' 41.74" West Longitude. The ground elevation is 136.31 m above sea level.

Petro-Canada Incorporated of Calgary operated the well. ATCO Drilling Ltd. of Calgary, the contractor, used Atco/Equtak #76, a diesel mechanical rig built in 1983.

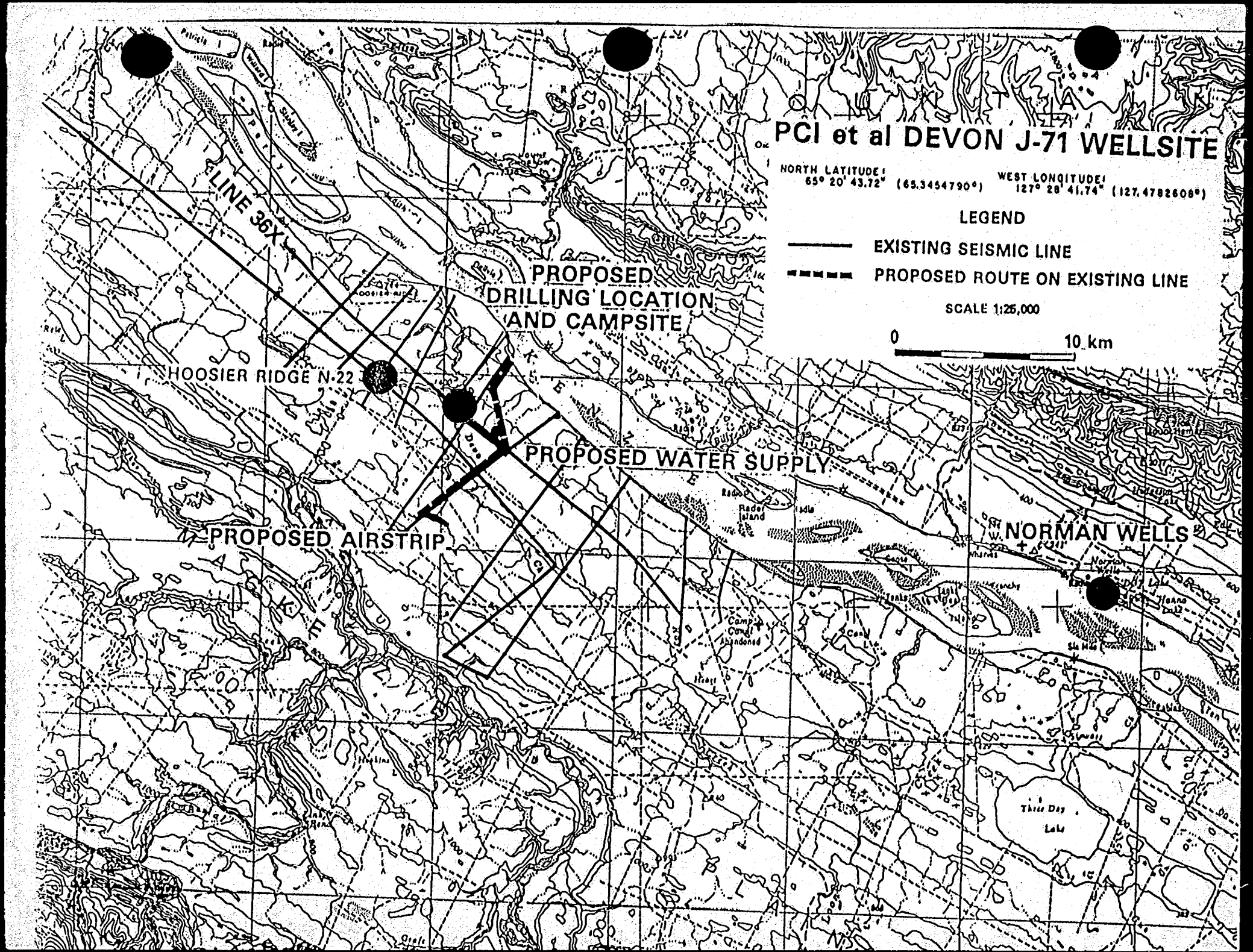
The primary objective of this exploratory well was the Kee Scarp formation. The Basal Cretaceous Sand was also evaluated for oil and/or gas potential as a secondary objective.

PCI et al Morrow Creek J-71 was spudded on 1984-12-04 at 2100 hours. A 445 mm conductor hole was drilled and 340 mm conductor pipe was set at 48.1 m. Using a 346 mm, 21000 KPa diverter stack, a 311 mm surface hole was drilled to 356 m with 245 mm casing set at 356 m.

A 346 mm, 21,000 KPa B.O.P. was nipped up and the 216 mm main hole was drilled to 1050 m and logged. Two cores were cut from the Canol formation. Penetration rates for the main hole averaged 6 m/hr. A drill stem test was run with a pipe recovery of 86 m of slightly salt water cut mud and 410 m of salt water.

30 core in Kee Scarp

Abandonment was completed and the Atco/Equtak #76 Rig was released on 1984-12-26 at 2000 hours.


PCI et al DEVON J-71 WELLSITE
NORTH LATITUDE
65° 20' 43.72" (65.3454790°)
WEST LONGITUDE
127° 28' 41.74" (127.4782608°)
LEGEND
EXISTING SEISMIC LINE
PROPOSED ROUTE ON EXISTING LINE
SCALE 1:25,000
0
10 km
LINE 36X
PROPOSED DRILLING LOCATION AND CAMPSITE
HOOSIER RIDGE N-22
PROPOSED WATER SUPPLY
PROPOSED AIRSTRIP
NORMAN WELLS
MACKENZIE MOUNTAINS
PLATEAU

b) GENERAL DATA

i)	Well Name and Number	PCI et al Morrow Creek J-71
ii)	Well Location:	North Latitude 65° 20' 43.72" West Longitude 127° 28' 41.74"
iii)	Unique Well Identifier:	300J716530127150
iv)	Operator:	Petro-Canada Incorporated P.O. Box 2844 Calgary, Alberta T2P 3E3
	Contractor:	Atco Drilling Limited 700, 800 - 6th Avenue S.W. Calgary, Alberta
v)	Drilling Unit:	Name: Atco/Equtak Rig #76 Type: Triple diesel mechanical Year built: 1983 Location: Nisku, Alberta
vi)	Position Keeping:	N/A to this well
vii)	Support Craft:	N/A to this well
viii)	Drilling Unit Performance:	N/A to this well
ix)	Difficulties & Delays:	No difficulties or delays were encountered while drilling this well that were not directly associated with downhole operations.

c) SUMMARY OF DRILLING OPERATIONS

i) Elevations: Ground: 136.01 m
Kelly Bushing: 142.56 m

ii) Total Depth: Drilled: 1050 m
Logged: 1048 m
PBD: to surface

iii) Date and Hour Spudded: 1984-12-04 2100 hours

iv) Date Drilling Completed: 1984-12-21 300 hours

v) Date of Rig Release: 1984-12-26 2000 hours

vi) Well Status: Plugged and Abandoned

vii) Hole Sizes and Depths:

Classification	Hole Size	Interval
Conductor	445 mm	0 - 51.77 mm
Surface	311 mm	51.77 - 356.29 m
Main	216 mm	356.29 - 1050 m

viii) Casing and Cementing Details:

Hole Classification:	Conductor	Surface	Main
Hole Size:	445 m	311 mm	216 mm
Casing Size:	340 mm	245 mm	-
Weight:	101 Kg/m	60 Kg/m, L-80 65 Kg/m, S00-95	-
Grade:	K-55	L-80 S00-95	-
Coupling:	BT&C	LT&C	-
Number of Joints:	4	30	-
Number of Centralizers:	0	2	-
Date of Run:	1984-12-06	1984-12-11	-

Shoe Depth:	48.1 m	356 m	-
Tonnes of Cement:	26.4	36	26.7
Type of Cement:	Arctic Set	Arctic Set	Class "G"
Additives:	none	none	none
Height of Cement:	Surface	Surface	Surface
Based on:	Returns to Surface	Returns to Surface	-

ix) Sidetracked Hole: N/A to this well

x) Drilling Fluid: The mud type used for the surface and main hole sections was; VISGEL/KELZAN XC POLYMER MUD.

Summary of Properties

Section	Interval (m)	Properties Wieght (kg/m^3)	Funnel Vis (S/L)	Water Loss (average, cm^3)	Ph (average)
Conductor	0 - 51.77	1135	83	8.8	9.50
Surface	51.77- 356.29	1045-1130	36 - 58	10.1	9.75
Main	356.29-1050	1095-1120	39 - 61	6.0	9.50

xi) Fishing Operation: None

xii) Well Kicks: None

xiii) Formation Leak-Off Tests: A formation leak-off test was run on day 9 after drilling out the surface casing shoe at 356 m. Drilling mud (density 1095 kg/m^3) was used for the test and a pressure of 9000 KPa was reached (equivalent mud weight 3672 kg/m^3). The formation did not break down. The pressure gradient was 34.74 KPa/m.

xiv) Time Breakdown:

Operation	Time (Hours)			
	Conductor Hole	Surface Hole	Main Hole	Total
Drilling	5.00	28.75	97.75	131.50
Tripping	3.25	8.25	15.25	26.75
Reaming/Cleaning	15.00	1.50	1.00	17.50
Conditioning	3.50	-	11.50	15.00
Surveying	0.25	6.50	8.75	15.50
Csg - Cmt -WOC	36.00	38.75	14.50	89.25
Head Up and Pressure Test	12.00	28.00	12.25	52.25
DOC	-	5.00	-	5.00
Change Kelly	-	2.25	-	2.25
Rig Service	-	1.00	6.00	7.00
Mechanical Downtime	-	-	1.50	1.50
Rig Down	-	-	8.50	8.50
Plug Back	-	-	4.00	4.00
Lay Down Collars	-	-	1.50	1.50
Coring	-	-	63.25	63.25
Logging	-	-	41.00	41.00
Drill Stem Testing	-	-	25.25	25.25
TOTAL	75.00	120.00	312.00	507.00

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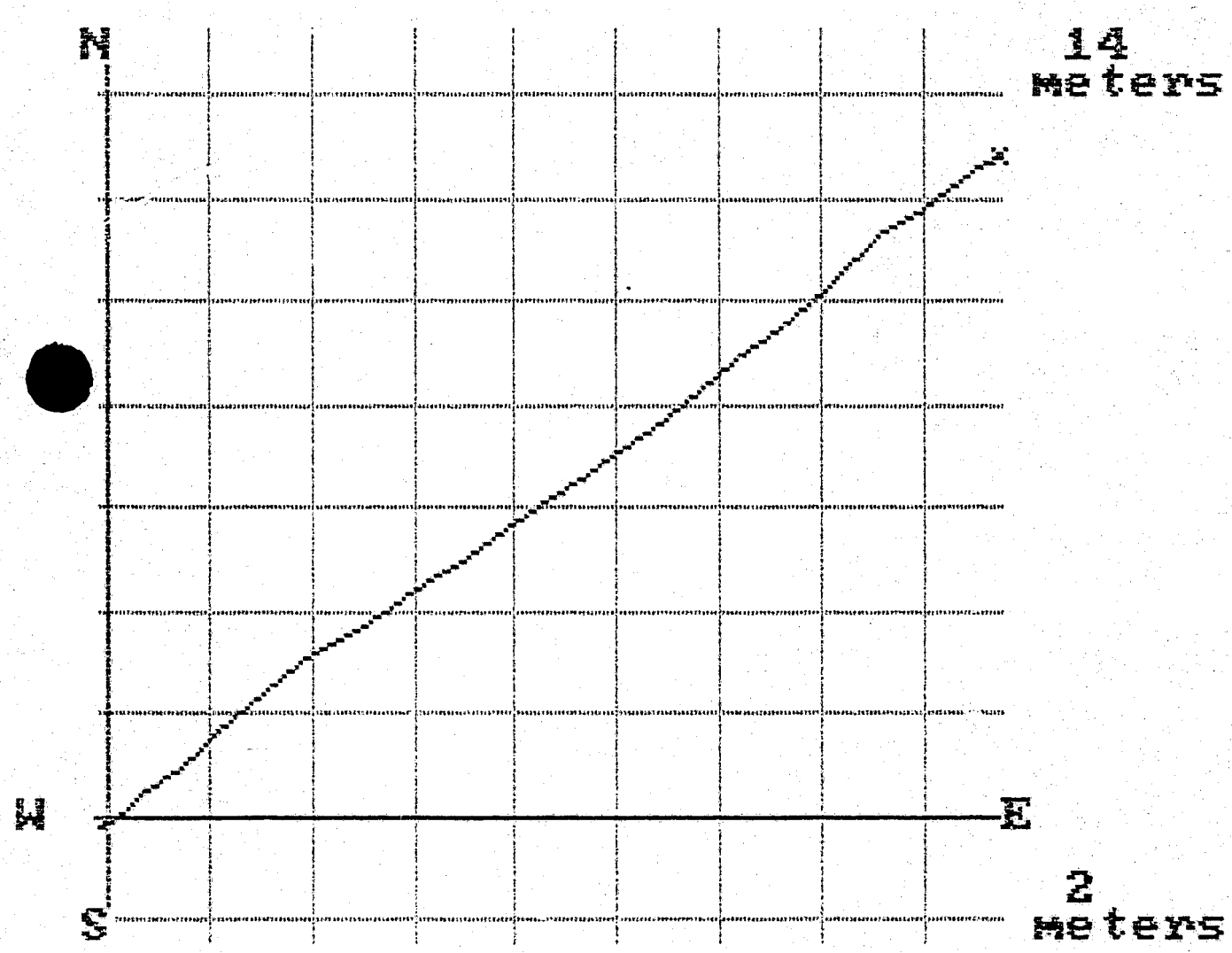
DIRECTIONAL DRILLING PROGRAM

MORROW CREEK J-71

Single shot directional survey. File: MORROW

PCI ET AL MORROW CREEK SURVEY PLAN

Horizontal Projection



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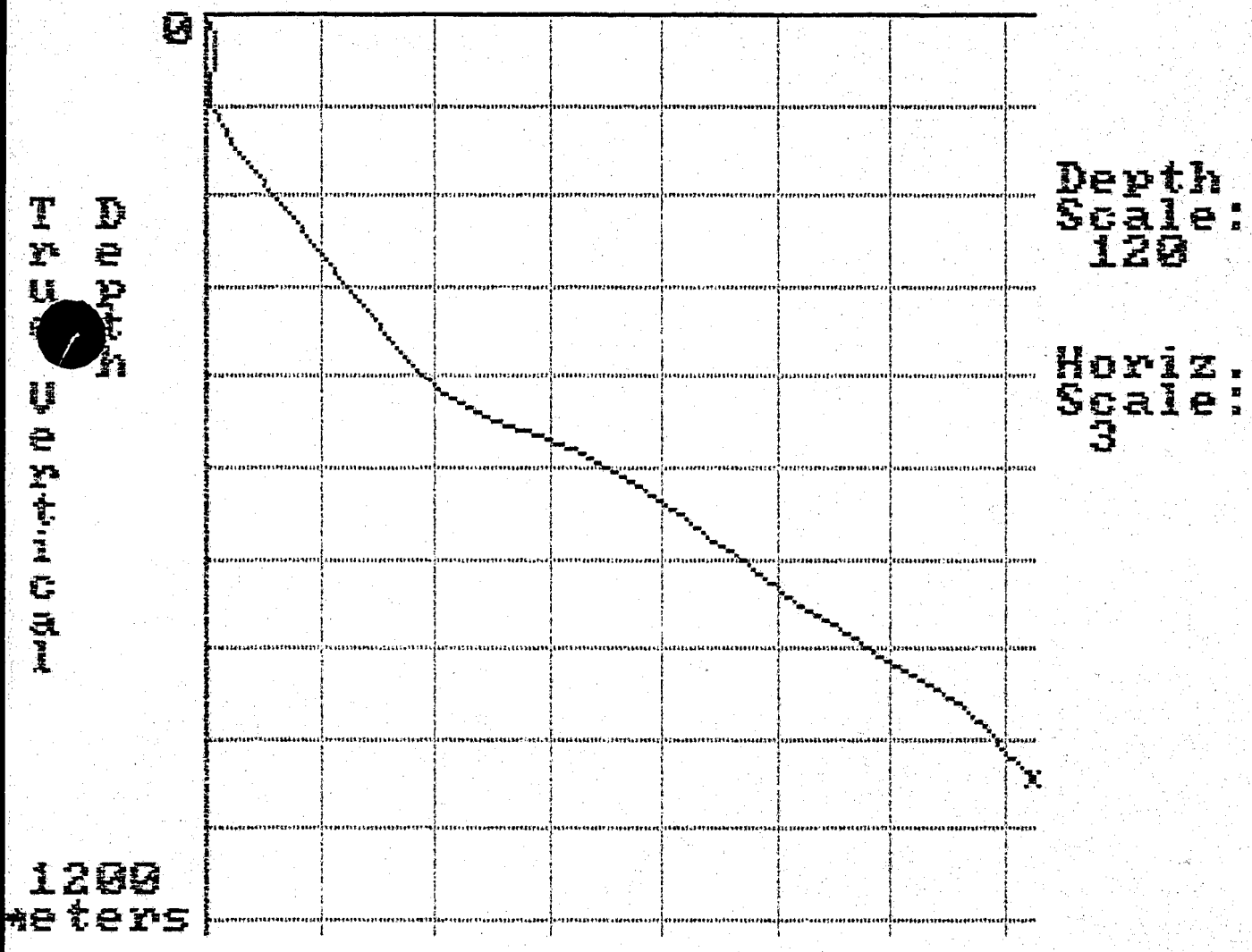
PETRO-CANADA
DIRECTIONAL DRILLING PROGRAM

MORROW CREEK J-71

Single shot directional survey. File: MORROW

PCI ET AL MORROW CREEK FINAL SURVEY PLAN

Horizontal Displacement vs Depth.



xvi) Abandonment Plugs:

Plug No.	Interval (m)	Type	Cement Additives	Fluid Below
1	1050 - 830	Cement Plug	13 tonnes Class "G" cement	on bottom
2	650 - 550	Cement Plug	7 tonnes Class "G" cement	Drilling Fluid
3	380 - 329	Cement Plug	5.5 tonnes Class "G" cement	Drilling Fluid
4	25 m - surface	Cement Plug	1.2 tonnes Class "G" cement	Drilling Fluid

xvii) Composite Well Record: See Geology Section.

APPENDIX

PETRO-CANADA

PETRO-CANADA
DIRECTIONAL DRILLING PROGRAM

MORROW CREEK J-71
Single shot directional survey. File: MORROW
PCI ET AL MORROW CREEK SURVEY PLAN

Measured Depth (meters)	Drift Angle (deg min)	Drift Direction (deg)	Course Length (meters)	True Vertical Depth (meters)	Vertical Section (meters)	Rectangular Co-ordinates (meters)	Closure Distance (meters)	Closure Direction (deg min)	Dogleg Severity (deg/30 M)
30.0	0 35	0	0.0	0.00	0.00	0.00 N 0.00 E	0.00	N 0 0 E	0.00
60.0	0 20	S 47 W	30.0	30.00	0.00	0.16 S 0.18 W	0.24	S 46 60 W	0.26
90.0	0 10	N 51 E	30.0	60.00	0.00	0.23 S 0.12 W	0.26	S 27 49 W	0.50
120.0	0 20	N 55 E	30.0	90.00	0.00	0.15 S 0.02 W	0.15	S 6 14 W	0.16
150.0	0 30	N 43 E	30.0	120.00	0.00	0.01 S 0.15 E	0.15	S 87 29 E	0.18
180.0	0 35	N 56 E	30.0	150.00	0.00	0.18 N 0.36 E	0.41	N 64 7 E	0.14
210.0	0 50	N 55 E	30.0	179.99	0.00	0.39 N 0.67 E	0.77	N 59 54 E	0.25
240.0	1 0	N 54 E	30.0	209.99	0.00	0.67 N 1.06 E	1.25	N 57 46 E	0.16
270.0	1 0	N 49 E	30.0	239.99	0.00	0.99 N 1.47 E	1.77	N 55 55 E	0.08
300.0	0 55	N 41 E	30.0	269.98	0.00	1.35 N 1.82 E	2.27	N 53 31 E	0.16
330.0	0 50	N 43 E	30.0	299.98	0.00	1.69 N 2.13 E	2.72	N 51 35 E	0.09
480.0	1 0	N 58 E	150.0	449.96	0.00	3.21 N 3.98 E	5.11	N 51 7 E	0.06
508.0	1 15	N 66 E	28.0	477.95	0.00	3.47 N 4.46 E	5.65	N 52 10 E	0.31
537.0	1 45	N 61 E	29.0	506.94	0.00	3.80 N 5.14 E	6.40	N 53 31 E	0.53
566.0	3 15	N 53 E	29.0	535.91	0.00	4.49 N 6.20 E	7.66	N 54 5 E	1.59
585.0	3 0	N 57 E	19.0	554.89	0.00	5.09 N 7.05 E	8.69	N 54 12 E	0.52
604.0	2 30	N 55 E	19.0	573.86	0.00	5.60 N 7.81 E	9.61	N 54 22 E	0.80
624.0	2 0	N 62 E	20.0	593.85	0.00	6.01 N 8.48 E	10.39	N 54 41 E	0.85
643.0	1 45	N 51 E	19.0	612.84	0.00	6.35 N 8.99 E	11.01	N 54 47 E	0.69
661.0	1 45	N 53 E	18.0	630.83	0.00	6.69 N 9.43 E	11.56	N 54 39 E	0.09
680.0	1 30	N 60 E	19.0	649.82	0.00	6.98 N 9.88 E	12.10	N 54 44 E	0.50
700.0	1 30	N 55 E	20.0	669.82	0.00	7.27 N 10.32 E	12.62	N 54 51 E	0.19
719.0	1 30	N 55 E	19.0	688.81	0.00	7.55 N 10.72 E	13.12	N 54 51 E	0.00
747.0	1 45	N 49 E	28.0	716.80	0.00	8.04 N 11.35 E	13.91	N 54 41 E	0.32
776.0	1 30	N 50 E	29.0	745.79	0.00	8.57 N 11.98 E	14.73	N 54 24 E	0.26
805.0	1 30	N 50 E	29.0	774.78	0.00	9.06 N 12.56 E	15.49	N 54 11 E	0.00
834.0	1 45	N 60 E	29.0	803.76	0.00	9.53 N 13.23 E	16.31	N 54 13 E	0.39
874.0	1 45	N 36 E	40.0	843.75	0.00	10.34 N 14.13 E	17.51	N 53 48 E	0.55
921.0	2 0	N 58 E	47.0	890.72	0.00	11.39 N 15.25 E	19.03	N 53 15 E	0.48
950.0	1 30	N 60 E	29.0	919.71	0.00	11.84 N 16.01 E	19.91	N 53 30 E	0.52
979.0	1 0	N 59 E	29.0	948.70	0.00	12.21 N 16.53 E	20.55	N 53 33 E	0.56
1008.0	1 0	N 61 E	29.0	977.70	0.00	12.49 N 16.94 E	21.05	N 53 36 E	0.20
1041.0	1 30	N 53 E	33.0	1010.69	0.00	12.88 N 17.55 E	21.77	N 53 43 E	0.48

COGLA-D

CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA

Canada Oil and Gas Lands Administration
Administration du pétrole et du gaz des terres du Canada
APR 9 1985
Tor
File

GAS ANALYSIS

7012-85-1 LABORATORY NUMBER

110 CONTAINER IDENTITY

Petro-Canada Exploration Inc OPERATOR

1 of 5 PAGE

PCI et al Morrow Creek J-71 WELL OR SAMPLE LOCATION NAME

LOCATION

KB ELEV.,m GRD. ELEV.,m

Keescarp POOL OR ZONE

Lynes United Services SAMPLER

FIELD OR AREA

DST #1 TEST TYPE & NO.

TOOL: 2100 mL Water TEST RECOVERY

DST Chamber #110 POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C MUD RESISTIVITY

897-921 TEST INTERVALS OR PERFS.,m

PUMPING FLOWING GAS LIFT SWAB

WATER m^3/d OIL m^3/d GAS m^3/d

SEPARATOR RESERVOIR @ °C CONTAINER WHEN SAMPLED 621 @ 22°C CONTAINER WHEN RECEIVED SEPARATOR

PRESSURES, kPa (gauge) TEMPERATURES, °C

84 12 DATE SAMPLED (Y/M/D) 84 12 28 DATE RECEIVED (Y/M/D) 84 01 02 DATE ANALYSED (Y/M/D) SS ANALYST REMARKS

COMPONENT	MOLE FRACTION AIR FREE AS REC'D	MOLE FRACTION AIR FREE ACID GAS FREE	mL/m³ AIR FREE AS REC'D
[redacted]	0.0027		
He	0.0001		
N_2	0.0592		
CO_2	0.0174		
H_2S	0.0000		
C_1	0.9192		
C_2	0.0013		
C_3	0.0001		0.4
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
[redacted]+	0.0000		0.0
TOTAL	1.0000		0.4
		C_5+	0.0

CALCULATED GROSS HEATING VALUE, MJ/m^3 @ 15° C & 101.325 kPa(abs.)

34.83 MOISTURE FREE 35.44 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

0.729 kg/m^3 DENSITY 0.595 RELATIVE DENSITY 17.2 RELATIVE MOLECULAR MASS

CALCULATED PSEUDOCRITICAL PROPERTIES

AS SAMPLED		ACID GAS FREE	
4572.3 kPa(abs.) pPc	188.5 K pTc	kPa(abs.) pPc	K pTc

REMARKS

NOTE: The Gross Heating Value has been calculated in accordance to AGA Report # 5.

FORM NO. 7012-1

CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA

WATER ANALYSIS

DST Chamber #110 — CONTAINER IDENTITY

7012-85-1 — LABORATORY NUMBER

Petro-Canada Exploration Inc. — OPERATOR

2 of 5 — PAGE

LOCATION

PCI et al Morrow Creek J-71 — WELL OR SAMPLE LOCATION NAME

KB ELEV. | GRD. ELEV.

Keescarp — FIELD OR AREA

POOL OR ZONE

Lynes United Services — SAMPLER

DST #1 — TEST TYPE & NO.

TOOL: 2100 mL Water — TEST RECOVERY

DST Chamber #110 — POINT OF SAMPLE

ANT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

897-921 — TEST INTERVALS OR PERFS.

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 — TEMPERATURES, °C

84 12 — DATE SAMPLED (Y/M/D)

84 12 28 — DATE RECEIVED (Y/M/D)

85 01 03 — DATE ANALYSED (Y/M/D)

LS — ANALYST

REMARKS

ION	mg/L	mg Fraction	MEQ/L
Na	4625.	0.3381	201.2
	20.	0.0015	0.5
Ca	280.	0.0205	14.0
Mg	172.	0.0126	14.2
Ba			
Sr			
Fe		PRESENT	

ION	mg/L	mg Fraction	MEQ/L
Cl	7542.	0.5513	212.7
Br			
I			
HCO_3	1038.	0.0759	17.0
SO_4	4.	0.0003	0.1
CO_3	0.	0.0000	0.0
OH	0.	0.0000	0.0
H_2S	NOT	DETECTED	

TOTAL SOLIDS mg/L

BY EVAPORATION @ 110°C | BY EVAPORATION @ 180°C

AT IGNITION | 13681. CALCULATED

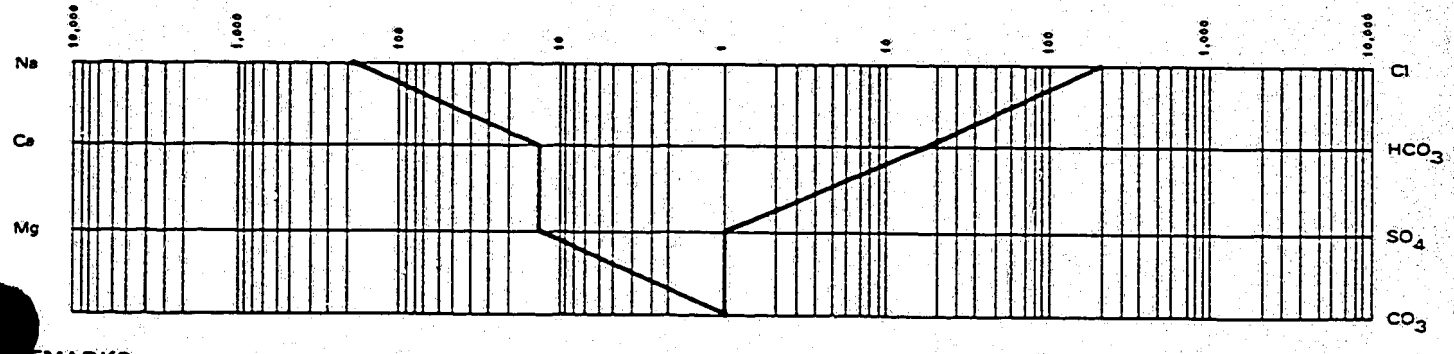
1.0070 @ 15.4°C — SPECIFIC GRAVITY

1.3332 @ 22. — REFRACTIVE INDEX

6.9 — pH

0.400 @ 25°C — RESISTIVITY (OHM/METERS)

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS NaCl equiv. 13079.

FORM NO. 7021-1

CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

7012-85-1 — LABORATORY NUMBER

Petro-Canada Exploration Inc. — OPERATOR

3 of 5 — PAGE

LOCATION

PCI et al Morrow Creek J-71 — WELL OR SAMPLE LOCATION NAME

RB ELEV. | GRD. ELEV.

Keescrap — POOL OR ZONE

Lynes United Services — SAMPLER

DST #1 — TEST TYPE & NO.

TEST RECOVERY

Sample # 2 (Recovery — POINT OF SAMPLE

AMT. & TYPE CUSHION

@ °C — MUD RESISTIVITY

897-921 — TEST INTERVALS OR PERFS.

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 | TEMPERATURES, °C

84 12 — DATE SAMPLED (Y/M/D)

84 12 28 — DATE RECEIVED (Y/M/D)

85 01 03 — DATE ANALYSED (Y/M/D)

LS — ANALYST

REMARKS

ION	mg/L	mg Fraction	MEQ/L
Na	4000.	0.3485	174.0
	38.	0.0033	1.0
Ca	146.	0.0128	7.3
Mg	87.	0.0076	7.2
Ba			
Sr			
Fe		TRACE	

ION	mg/L	mg Fraction	MEQ/L
Cl	6036.	0.5258	170.2
Br			
I			
HCO_3	1122.	0.0978	18.4
SO_4	49.	0.0043	1.0
CO_3	0.	0.0000	0.0
OH	0.	0.0000	0.0
H_2S	NOT DETECTED		

TOTAL SOLIDS mg/L

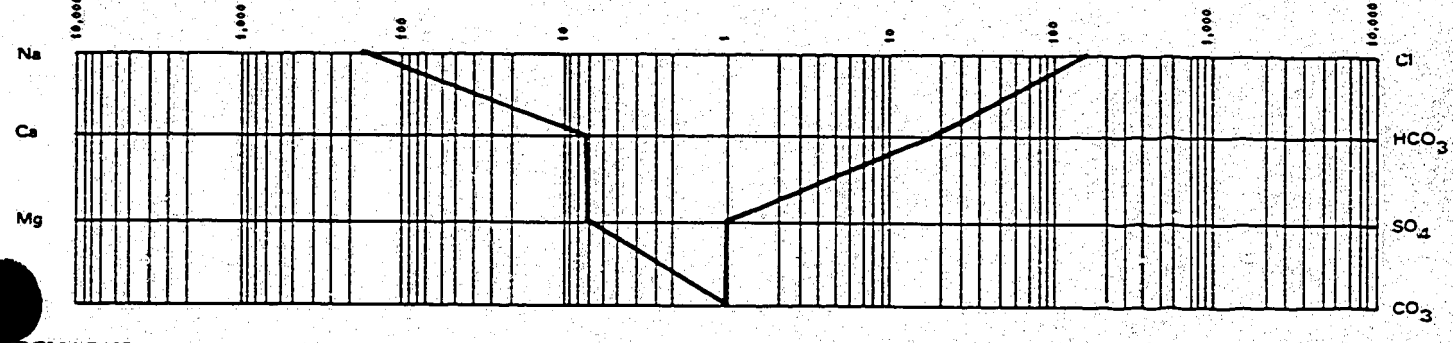
BY EVAPORATION @ 110°C | BY EVAPORATION @ 180°C

AT IGNITION | 11479. CALCULATED

1.0082 @ 15.4°C — SPECIFIC GRAVITY | 1.3332 @ 22. — REFRACTIVE INDEX

7.4 — pH | 0.420 @ 25°C — RESISTIVITY (OHM/METERS)

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS NaCl equiv. 10715.

CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA

WATER ANALYSIS

Plastic — CONTAINER IDENTITY
7012-85-1 — LABORATORY NUMBER
Petro-Canada Exploration Inc. — OPERATOR
4 of 5 — PAGE
LOCATION
PCI et al Morrow Creek J-71 — WELL OR SAMPLE LOCATION NAME
KB ELEV. | GRD. ELEV.
Keescrap — FIELD OR AREA
POOL OR ZONE
Lynes United Services — SAMPLER
DST #1 — TEST TYPE & NO.
TEST RECOVERY
Sample # 5 (Recovery) — POINT OF SAMPLE
AMT. & TYPE CUSHION
@ °C — MUD RESISTIVITY
897-921 — TEST INTERVALS OR PERFS.
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 — TEMPERATURES, °C
84 12 — DATE SAMPLED (Y/M/D)
84 12 28 — DATE RECEIVED (Y/M/D)
85 01 03 — DATE ANALYSED (Y/M/D)
LS — ANALYST
REMARKS

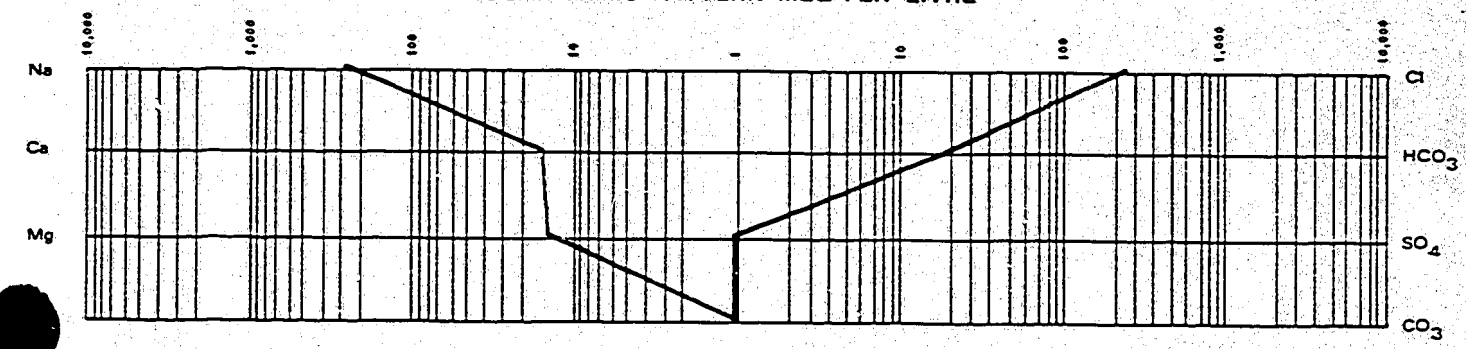
ION	mg/L	mg Fraction	MEQ/L
Na	5800.	0.3451	252.3
	22.	0.0013	0.6
Ca	310.	0.0184	15.5
Mg	172.	0.0103	14.2
Ba			
Sr			
Fe		TRACE	

ION	mg/L	mg Fraction	MEQ/L
Cl	9259.	0.5509	261.2
Br			
I			
HCO_3	1239.	0.0737	20.3
SO_4	4.	0.0002	0.1
CO_3	0.	0.0000	0.0
OH	0.	0.0000	0.0
H_2S	NOT DETECTED		

TOTAL SOLIDS mg/L

BY EVAPORATION @ 110°C | BY EVAPORATION @ 180°C
AT IGNITION | 16807. CALCULATED
1.0115 @ 15.4°C SPECIFIC GRAVITY | 1.3341 @ 22. REFRACTIVE INDEX
7.4 pH | 0.370 @ 25°C RESISTIVITY (OHM/METERS)

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS NaCl equiv. 16057.

FORM NO. 7021-1

CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY ALBERTA

WATER ANALYSIS

Plastic — CONTAINER IDENTITY

7012-85-1 — LABORATORY NUMBER

Petro-Canada Exploration Inc. — OPERATOR

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LOCATION

PCI et al Morrow Creek J-71 — WELL OR SAMPLE LOCATION NAME — KB ELEV. — GRD. ELEV.

Keescrap — FIELD OR AREA — POOL OR ZONE

Lynes United Services — SAMPLER

DST #1 — TEST TYPE & NO.

TEST RECOVERY

Sample # 8 (Recovery) — POINT OF SAMPLE — AMT. & TYPE CUSHION — @ °C MUD RESISTIVITY

897-921 — TEST INTERVALS OR PERFS.

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 — TEMPERATURES, °C

84 12 — DATE SAMPLED (Y/M/D)

84 12 28 — DATE RECEIVED (Y/M/D)

85 01 03 — DATE ANALYSED (Y/M/D)

LS — ANALYST

REMARKS

ION	mg/L	mg Fraction	MEQ/L
Na	6050.	0.3475	263.2
K	21.	0.0012	0.5
Ca	256.	0.0147	12.8
Mg	206.	0.0118	16.9
Ba			
Sr			
Fe		TRACE	

ION	mg/L	mg Fraction	MEQ/L
Cl	9636.	0.5534	271.8
Br			
I			
HCO_3	1239.	0.0711	20.3
SO_4	4.	0.0002	0.1
CO_3	0.	0.0000	0.0
OH	0.	0.0000	0.0
H_2S	NOT	DETECTED	

TOTAL SOLIDS mg/L

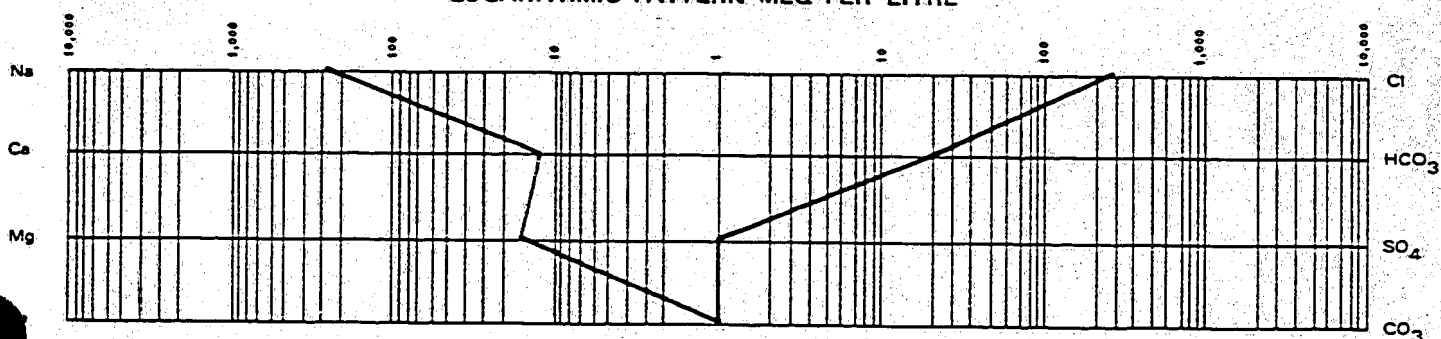
BY EVAPORATION @ 110°C — BY EVAPORATION @ 180°C

AT IGNITION — 17412. CALCULATED

1.0140 @ 15.4°C SPECIFIC GRAVITY — 1.3340 @ 22. REFRACTIVE INDEX

7.3 pH — 0.350 @ 25°C RESISTIVITY (OHM/METERS)

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS NaCl equiv. 16699.

FORM NO. 7021-1

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WELL SUMMARY

WELL NAME:	PCI et al Morrow Creek J-71	
CO-ORDINATES:	65° 20' 43.72" North Latitude 127° 28' 41.74" West Longitude	
ELEVATIONS:	Ground: KB:	136.31 m 142.56 m
OPERATOR:	Petro Canada Inc.	
DRILLING CONTRACTOR:	Atco/Equtak rig #76	
WELLSITE SUPERVISION:	Toolpusher: Engineer: Gologist:	D. Kennedy Y. Hope T. Vader
WELL SPUDDED:	1984-12-03 at 21.00 hours	
DRILLING COMPLETED:	1984-12-21 at 03.00 hours	
BIT SIZES:	Surface: Downhole:	311 mm 216 mm
CASING SIZES:	Surface: Production:	245 mm
TOTAL DEPTH:	Driller: Logger:	1050 m 1048 m
BOTTOM HOLE FORMATION:	Hare Indian River Shale	
CORES CUT:	Three: #1 861-863.2, #2 863.2-874, #3 887-897.6	
LOGS RUN:	DLL-CNL-LDC, Microlog, BHCS	
DRILL STEM TESTS:	One, 897-921.16 m Kee Scarp	
RIG RELEASED:	1984-12-26 at 20.00 hours	
WELL STATUS:	D&A	

DAILY SUMMARY

1984-12-04

- Rig to spud
- Drill 311 mm pilot hole for 445 mm Conductor hole to 33 m with bit #1A (HW X3A)

1984-12-05

- Drill 311 mm pilot hole to 52 m
- POH to add hole opener to string
- Ream pilot hole to 445 mm with hole opener
- Prepare to run 340 mm conductor casing.

1984-12-06

- Run 340 mm conductor casing
- Rig up cementers
- Cement casing (no returns to surface)
- WOC (12 hours)
- Cement casing from top of annulus
- WOC

1984-12-07

- WOC
- Head up diverter system

1984-12-08

- Head up diverter system
- Drill out cement
- POH
- Replace Kelly
- Drill 311 mm surface hole with bit #1A RR

1984-12-09

- Drill 311 mm surface hole to 180 m
- POH for bit
- RIH with bit #2A 311 mm (HW X3A)
- Drill 311 mm hole to 287 m
- Trip for bit
- RIH with bit #3A (HW X1G)
- Drill to 308 m

1984-12-10

- Drill 311 mm hole to 341 m
- Run wiper trip, then drill 311 mm hole to 356 m.
- Circulate and condition hole, POH
- RIH and circulate and condition hole, POH to run surface casing
- Run 245 mm surface casing

1984-12-11

- Run 245 mm surface casing, circulate casing and cement
- WOC
- Run Gyro survey
- Cut off casing
- Head up BOP stack

1984-12-12

- Head up BOP stack
- Pressure test BAG preventer

1984-12-13

- Tighten BOP bolts
- Pressure test rams
- Thaw Dowell Unit 1
- Pressure test rams
- Drill out cement and shoe
- Drill 216 mm hole with bit #1 to 361 m (HW X3A)
- Run pressure integrity test
- Drill to 456 m
- Trip out to add stabilization
- Add Stabilizers and RIH

1984-12-14

- RIH with bit #2 216 mm HW J-11
- Drill to 607 m

1984-12-15

- Drill 216 mm main hole to 747 m

1984-12-16

- Drill 216 mm hole to 858 m
- Circulate sample
- Drill 216 mm hole to 861 m

1984-12-17

- Run dummy trip to collars, add key seat wiper to string
- RIH
- Circulate and condition hole
- POH to cut Core #1
- Make up core barrel and RIH
- Cut Core #1 861.0-863.2, jammed off, POH
- Recover Core #1
- RIH with core barrel
- Cut Core #2

1984-12-18

- Cut Core #2 (863.2-874) jammed off
- POH
- Recover Core #2
- Lay down core barrel
- RIH with Bit #3 (HW JD7 RR)
- Drill to 887 m

1984-12-19

- POH to cut Core #3
- Cut Core #3 (887-897.6) jammed off
- POH
- Recover Core #3
- RIH with Bit #4 HW J-22
- Drill to 919 m

1984-12-20

- Drill 216 mm hole to 1020 m

1984-12-21

- Drill 216 mm hole to 1050 m
- Circulate and condition hole, run 10 stand wiper trip
- Circulate and condition hole, run 10 stand wiper trip
- Mix LCM and circulate, run 10 stand wiper trip
- POH to log
- Log with Schlumberger.

1984-12-22

- Logging with Schlumberger
- RIH

1984-12-23

- RIH, POH for DST #1
- Make up test tool
- RIH for DST #1 (897-921.16), Run DST #1, POH with DST #1
- Recover DST #1

1984-12-24

- Break down test tool, RIH open ended
- Run Plugs #1 and #2

1984-12-25

- Felt Plug #2 and Run Plugs #3 and #4
- Tear out BOP's

1984-12-26

- Tear out BOP's
- Cut off casing bowl
- Rig release at 20.00 hours

ABANDONMENT PROGRAM

Plug #1	1050-830 m Cemented with 13.0 tonnes of Class 'G' Oilwell cement.
Plug #2	650-550 m Cemented with 7.0 tonnes of Class 'G' Oilwell cement. Plug tagged at 522 m
Plug #3	380-340 m Cemented with 5.5 tonnes of Class 'G' Oilwell cement.
Plug #4	25 m - Surface Cemented with 1.0 tonnes of Class 'G' Oilwell cement.

CASING SUMMARY

Conductor Pipe

Ran 4 jts. 340 mm 101 kg/m BT&C Conductor casing. Cemented by Dowell with 26.0 tonnes of "Arctic Set" cement. Landed at 48.10 m. Cement in place at 21.39 hours 1984-12-06.

Surface Casing

Ran 2 jts. 23.86 m of L-80 60 kg/m 245 mm LT&C and 26 jts. Soo 95 65 kg/m 245 mm 8 rd. LT&C and 2 jts. L 80 60 kg/m 245 mm 8 rd. LTC surface casing. Cemented by Dowell-Schlumberger with 36 tonnes of "Arctic Set" cement. Landed at 356.0 m. Plug down at 13.45 hours 1984-12-11. 9 m^3 cement returns to surface.

DRILL STEM TEST SUMMARY

DST #1 897.0-921.17 m Kee Scarp Straddle (Inflate)

Times: 10-60-60-120
PF: N/A
VO: N/A
Recovery: 496 m; 86 m drilling mud, slightly salt water cut, 410 m black brackish salt water. Salinity 15,400 ppm
HP: 9766-9766 kPa
SIP: 8285-8285 kPa
FP: 346-1728-4501 kPa
Remarks: BHT 41.9 °C.

GEOLOGICAL SUMMARY

PCI et al Morrow Creek J-71 was drilled as an exploration well to assess oil potential of the Kee Scarp reefal development in the Norman Wells area. A secondary zone of interest in the well was the Basal Cretaceous Sand unconformably overlying the Devonian Imperial formation.

The Cretaceous in this well consisted of interbedded shales and silt to fine grained sands. The sands were all of poor reservoir quality due to the fine grained size as well as interstitial plugging by argillaceous matrix material. Slight visual shows were observed in many of the sands. The shows consisted of very slight cut fluorescence and did not warrant further investigation through coring or testing. Mud gas detection equipment also showed no significant increases throughout the section. The Basal Cretaceous sand showed as silt to fine grained sand with a slightly argillaceous matrix and minor silica cement. Poor effective porosity was observed throughout. A trace of very weak pale yellow massive cut fluorescence was observed throughout the sand.

The upper 75 meters of the Imperial formation also consisted of interbedded shales and fine grained argillaceous sands. Occasional slight cut fluorescence was observed through this section also. The lower part of the Imperial consisted of medium to dark grey shales with occasional dirty sand and silt laminae and stringers.

The Canol formation showed a black euxinic shale with occasional thin bands of cream to dark brown limestone. The Canol formation showed high to prognosis and was thicker than expected. Cores were cut in the Canol to recover 3 meters of the cap rock and the top of the Kee Scarp. Due to the thickened Canol sections, no Kee Scarp was encountered in Cores #1 or #2. A decision was then made to return to drilling until three meters into the Kee Scarp and then to begin coring again.

The Kee Scarp was then encountered about 17 meters high to prognosis. Three meters of the limestone were drilled up and coring was resumed. 10.6 meters of the Kee Scarp

were cored when the core jammed off. The core showed poor porosity (3-5%) in the detrital matrix. Reefal skeletal fragments and blocks were tight. Patchy fluorescence was observed in the core section with a slow pale green massive cut. Drilling was resumed after one core in the formation.

The Kee Scarp then showed in samples as a detrital-skeletal limestone with poor porosity (0-3%) and very slight fluorescence and cut. Electrical logs later showed that this zone exhibited up to 10% porosity with fair permeability.

The lower part of the Kee Scarp became micritic and contained common dead oil staining and argillaceous bands. This was the platform stage of the reefal development. Occasional crinoid fragments and ostracods were observed in this section.

The upper part of the Hare Indian formation consisted of interbedded dark grey shales and common beds of light to dark brown micritic-detrital limestone. The lime beds in this zone were tight but were slsightly bitumen engrained.

The lower part of the Hare Indian showed as medium to dark grey micromicaceous shales with rare laminae of tight micritic limestone and sandstone.

Final total depth was established at 1050 meters, 61 meters into the Hare Indian formation.

FORMATION TOPS

FORMATION	SAMPLE		LOG	
	Depth (m)	Subsea	Depth (m)	Subsea
Basal Cretaceous Sand	604	-461.44	605	-462.44
Imperial	626	-483.44	627.5	-484.94
Canol	849	-706.44	848	-705.44
Kee Scarp	883	-740.44	883	-740.44
Hare Indian River	990	-847.44	988	-845.44
F.T.D.	1050	-907.44	1048	-905.44

SAMPLE DESCRIPTIONS

Depth (m)	Description
0-57	Glacial till; sands and gravels composed of pre-existing dolomites, limestones, cherts and quartzitic rocks.
57-68	Shale; medium grey, blocky, micromicaceous, soft, silty and sandy
68-85	Shale; medium to dark grey, blocky, soft, micromicaceous, minor disseminated pyrite, occasional black chert grains.
85-95	Shale; a/a, with occasional thin bands or stringers of Sandstone; medium grey, quartz and chert, very fine grained, subangular, well sorted, trace of calcite cement, trace of pyrite cement, very argillaceous matrix, poorly indurated, very poor effective intergranular porosity
95-100	Shale; medium to dark grey, blocky, micromicaceous, micaceous in part, soft, sandy in part, trace of disseminated pyrite, trace of sandstone
100-110	Sandstone; medium grey, salt and pepper, quartz and chert, very fine to fine grained, subangular, well sorted, trace of calcite cement, trace of silica cement, argillaceous matrix, poor to occasionally fair effective intergranular porosity, with occasional thin bads of Shale; a/a
110-120	Interbeds of Sandstone; a/a and Shale; medium grey, blocky, soft, very silty and sandy in part, micromicaceous
120-122	Sandstone; medium grey, salt and pepper, very fine to fine grained, subangular, well sorted, minor calcite cement, argillaceous to very argillaceous matrix, poor effective intergranular porosity
122-128	Shale; a/a
128-142	Interbeds of Sandstone; a/a, and Shale; a/a
142-146	Shale; medium grey, blocky, micromicaceous, soft, silty and sandy in part, with rare laminae of Sandstone; medium grey, quartz and chert, silt to very fine grained, subangular, well sorted, minor calcite and silica cement, argillaceous matrix, poor porosity
146-160	Shale; a/a, with rare laminae or bands of Sandstone; medium grey, salt and pepper, quartz and chert, fine grained, subangular, well sorted, minor calcite and silica cement, slightly argillaceous matrix, poor effective intergranular porosity.

Depth (m)	Description
163-196	Shale; medium grey, blocky, soft, micromicaceous, micaceous in part, slightly silty and sandy in part, trace of pyrite and sandstone.
196-205	Sandstone; light to medium grey, salt and pepper, quartz and chert, fine grained, subangular, well sorted, minor silica cement, moderately hard, slightly argillaceous matrix, occasional mica flakes, poor to occasionally fair effective intergranular porosity, occasional bands of Shale; medium grey, blocky, micromicaceous, soft, slightly silty in part, trace of pyrite.
205-215	Shale; medium grey, blocky, soft, micromicaceous, trace of pyrite, trace of brown sideritic shale, trace of sandstone
215-220	Shale; a/a with rare thin laminae of Sandstone; medium grey, salt and pepper, quartz and chert, very fine to fine grained, subangular, well sorted, minor silica cement, argillaceous matrix, poor effective intergranular porosity
220-255	Shale; medium grey, blocky, soft, micromicaceous, trace of pyrite, trace of brown sideritic shale
255-265	Shale; medium grey, blocky, soft, micromicaceous, sandy in part, trace of pyrite, trace of brown sideritic shale, trace of sandstone
265-275	Shale; a/a, with occasional laminae of Sandstone; medium grey, quartz, silt to very fine grained, subangular, well sorted, minor silica cement, very argillaceous matrix, very poor effective intergranular porosity
275-293	Shale; medium grey, blocky, soft, micromicaceous, silty and sandy in part, trace of chert grains
293-302	Shale; a/a, grading in part into common beds of Sandstone; medium grey, quartz, very fine to fine grained, occasionally medium grained, subangular, well sorted, silica cement, argillaceous to very argillaceous matrix, poor effective intergranular porosity
302-315	Shale; a/a, with rare thin bands of Sandstone; a/a
315-326	Shale; medium grey, blocky, soft, very silty and sandy in part, grades to laminae of very argillacous siltstones and minor bands of Sandstone; medium grey, quartz, silt to very fine grained, subangular, well sorted, silica cement, very argillaceous matrix, poor effective intergranular porosity, trace pyrite
326-332	Shale; a/a, with minor laminae of Siltstone; medium grey, quartz, silt, subangular, well sorted, silica cement, very argillaceous matrix, poor effective intergranular porosity, trace of sandstone a/a

Depth (m)	Description
332-356	Shale; medium grey, blocky, soft, micromicaceous, silty and sandy to very silty and sandy in part, occasionally grades to laminae of very argillaceous siltstone and sandstone
356-373	Shale; medium to dark grey, blocky to subfissile, micromicaceous, slightly silty in part, soft, trace of siltstone, trace of aragonite spicules
373-385	Shale; dark grey, blocky to subfissile, micromicaceous, silty in part, soft, slightly carbonaceous, trace of pyrite, trace of inoceramus
385-390	Missed sample
390-404	Shale; dark grey, blocky to subfissile, micromicaceous, silty to very silty in part, soft, trace of siltstone, trace of pyrite, trace of inoceramus
404-428	Shale; a/a, with rare bands of Siltstone; dark grey, quartz, silt, subangular, well sorted, silica cement, very argillaceous matrix, very poor effective intergranular porosity, grades to shale, trace of pyrite, trace of inoceramus, trace of brown sideritic shale
428-442	Shale; dark grey, blocky to subfissile, micromicaceous, silty to very silty in part, soft, with rare bands of Siltstone; medium to dark grey, quartz, silt subangular, well sorted, silica cement, argillaceous to very argillaceous matrix, very poor effective intergranular porosity, grades to shale in part, trace of pyrite, trace of inoceramus
442-456	Shale; a/a, with occasional bands of Sandstone; medium grey, quartz, silt to very fine grained, subangular, well sorted, silica cement, argillaceous to very argillaceous matrix, very poor effective intergranular porosity, trace pyrite, trace of inoceramus
456-465	Shale; dark grey, blocky, micromicaceous, silty in part, soft, grades to minor siltstone in part, trace of inoceramus, trace of siltstone
465-467	Sandstone; light grey/brown, quartz, silt to very fine grained, subangular, well sorted, silica cement, argillaceous matrix, poor effective intergranular porosity
467-484	Shale; dark grey, grey/brown, blocky, micromicaceous, silty, soft, trace of siltstone, trace of pyrite, trace of inoceramus
484-486	Sandstone; medium grey/brown, quartz, silt to very fine grained, subangular well sorted, silica cement, argillaceous matrix, poor effective intergranular porosity, trace of siltstone.

Depth (m)	Description
486-503	Interbeds and Laminations of Shale; medium to dark grey, grey/brown in part, blocky, micromicaceous, silty in part, soft, and Sandstone; light grey/brown, quartz, very fine to fine grained, occasionally medium grained, subangular to angular, well sorted, silica cement, slightly argillaceous matrix in part, fair intergranular porosity, trace of very weak yellow fluorescence, trace of very weak slow yellow massive cut, traces of carbonaceous matter, traces of inoceramus
503-507	Shale; a/a
507-515	Sandstone; light grey/brown, quartz, silt to fine grained, coarsening upwards, subangular to angular, well sorted, silica cement, argillaceous matrix, poor to fair effective intergranular porosity, no fluorescence, trace slow weak yellow massive cut.
515-520	Sandstone; a/a, with common bands of Shale; a/a
520-529	Sandstone; medium grey, quartz, very fine to fine grained, subangular, well sorted, silica cement, argillaceous to very argillaceous matrix, poor effetive intergranular porosity, with common bands of Shale; medium grey, blocky, micromicaceous, silty and sandy
529-551	Sandstone; light to medium grey/brown, quartz, very fine to fine grained, subangular to subrounded, well sorted, silica cement, argillaceous to very argillaceous matrix, micromicaceous in part, poor effective intergranular porosity, with common bands of Shale; medium grey, blocky, micromicaceous, silty and sandy, soft
551-562	Sandstone; light to medium grey/brown, quartz, very fine to fine grained, subangular to subrounded, well sorted, silica cement (abundant in part) argillaceous to very argillaceous matrix, poor effective intergranular porosity, trace of slow weak yellow massive cut, and bands of Shale; medium grey, blocky, micromicaceous, silty and sandy, soft.
562-568	Sandstone; light to medium grey, quartz, silt to very fine grained, subangular to subrounded, well sorted, silica cement, trace of calcite cement, argillaceous matrix, poor effective intergranular porosity, trace of very weak slow yellow massive cut and common bands of Shale; a/a
568-573	Siltstone; light grey, quartz, occasional mica flakes, silt to very fine grained, subangular to subrounded, well sorted, silica cement, trace of calcite cement, argillaceous matrix, very poor effective intergranular porosity, with occasional bands and laminae of Shale; medium to dark grey, blocky, micromicaceous, silty and sandy, soft

Depth (m)	Description
573-588	Interbeds of Shale; medium grey, blocky, micromicaceous, silty and sandy to very silty and sandy, grades to siltstone and sandstone in part and Siltstone a/a, and Sandstone a/a
588-604	Shale; medium to dark grey, blocky, micromicaceous, silty and sandy in part, with common bands of Sandstone; light to medium grey, quartz, very fine to fine grained, subangular to subrounded, well sorted, silica cement, abundant in part, argillaceous to very argillaceous matrix, poor effective intergranular porosity
BASAL CRETACEOUS SAND (-461.11)	
604-626	Sandstone; light grey, quartz, occasional mica flakes, silt to fine grained, subangular to subrounded, moderately sorted, silica cement, slightly argillaceous matrix, poor effective intergranular porosity, trace of very weak pale yellow massive cut, with occasional bands and laminae of Shale; medium to dark grey, blocky, micromicaceous, silty and sandy in part
IMPERIAL (-483.44)	
626-639	Interbeds of Shale; medium to dark grey, blocky, micromicaceous, silty and sandy to very silty and sandy in part, slightly carbonaceous in part, and Sandstone; light to medium grey, quartz, silt to fine grained, subangular to subrounded, moderately sorted, silica cement, argillaceous to very argillaceous matrix, very poor effective intergranular porosity, grades to shale in part, trace of siltstone, trace of brown sideritic shale
639-653	Interbeds of Shale; dark grey, blocky, micromicaceous, silty and sandy to very silty and sandy in part, slightly carbonaceous in part, and Sandstone; medium grey, quartz, silt to very fine grained, subangular to subrounded, moderately sorted, silica cement, (abundant in part), argillaceous to very argillaceous matrix, poor effective intergranular porosity, grades to shale in part, with occasional thin bands and laminae of Siltstone; medium grey, quartz, silt subangular to subrounded, well sorted silica cement, very argillaceous matrix, very poor effective intergranular porosity
653-657	Interbeds of Shale; a/a and Sandstone; light grey, quartz, very fine to fine grained, subangular, well sorted, silica cement, clean to slightly argillaceous matrix, fair intergranular porosity, trace of glauconite
657-676	Interbeds of Sandstone; light to medium grey, quartz, silt to fine grained, subangular to subrounded, moderately sorted, silica cement, argillaceous to very argillaceous matrix, poor effective intergranular porosity; and

Depth (m)	Description
	Shale; medium to dark grey, blocky, micromicaceous, silty and sandy in part
676–689	Shale; dark grey, blocky to subfissile, micromicaceous, silty and sandy in part, slightly carbonaceous in part
689–704	Shale; a/a with occasional bands and laminae of Sandstone; light grey/brown, quartz, very fine to fine grained, subangular to subrounded, moderately sorted, silica cement, calcite cement, slightly argillaceous to argillaceous matrix, poor effective porosity and; Siltstone; medium grey, quartz, silt, subrounded, well sorted, silica cement, argillaceous to very argillaceous matrix, very poor effective intergranular porosity, traces of brown sideritic shale
704–721	Shale; dark grey, blocky to subfissile, micromicaceous, silty and sandy in part, with rare thin bands and laminae of Siltstone; medium grey, quartz, silt, subangular to subrounded, well sorted, silica cement, minor calcite cement, argillaceous to very argillaceous matrix, very poor effective porosity
721–753	Shale; dark grey, dark grey/brown, blocky to subfissile, micromicaceous in part, silty in part, greasy lustre in part, slightly bituminous occasional silt laminae
753–763	Shale; dark grey, blocky, micromicaceous, silty to very silty, slightly bituminous in part, grades to occasional siltstone laminae
763–775	Shale; medium to dark grey, grey/brown, blocky, micromicaceous, very silty and sandy, grades to sandstone and siltstone in part Sandstone; medium grey quartz, silt to fine grained, subangular to subrounded, moderately sorted, silica cement, trace of calcite cement, very argillaceous matrix, very poor effective intergranular porosity, with occasional bands of siltstone
775–802	Shale; medium to dark grey, grey/brown, blocky, micromicaceous, silty and sandy in part, slightly bituminous in part, traces of sandstone and siltstone
802–803	Siltstone; medium grey, quartz, silt, subrounded, well sorted, silica cement, argillaceous matrix, very poor effective intergranular porosity, grades to shale in part
803–833	Shale; dark grey, dark grey/brown, blocky, micromicaceous in part, silty and sandy in part, slightly bituminous in part, with minor occasional stringers and laminae of sandstone and siltstone
833–849	Shale; medium to dark grey, blocky, micromicaceous, slightly silty and sandy, minor grey/brown bituminous shale, with rare laminae of siltstone

Depth (m)	Description
CANOL (-706.44)	
849-861	Shale; dark grey/brown to black, blocky, micromicaceous in part, moderately hard, slightly bituminous to bituminous, trace of pyrite, slight petroliferous odor on heating, low specific gravity, with occasional stringers of Limestone; cream to dark brown, micritic to fine granular, calcite cement, slightly dolomitic in part, slightly bitumen engrained, tight to very poor porosity.
861-863.2	SEE CORE DESCRIPTION - Core #1
863.7-874	SEE CORE DESCRIPTION - Core #2
874-883	Shale; dark grey/brown to black, blocky to subfissile, slightly micro-micaceous, trace of pyrite, moderately hard, slightly carbonaceous, bituminous, slight petroliferous odor, with occasional thin bands of Limestone; dark brown, micritic to very fine granular calcite cement, trace of dolomite cement, bituminous, argillaceous, tight
KEE SCARP (-740.44)	
883-887	Limestone; white to cream, micritic to chalky, fine granular in part, calcite cement, slightly argillaceous in part, poor earthy and inter-granular porosity, trace of dead oil staining, trace of weak yellow fluorescence, trace of slow pale green massive cut; with minor thin bands and laminae of Shale; a/a
887-897.6	SEE CORE DESCRIPTION - Core #3
897.6-920	Limestone; detrital-skeletal, cream to light brown, calcite cement, slightly argillaceous in part, micritic to very fine granular, tight to very poor porosity, pinpoint porosity, trace of dead oil staining, trace of patchy weak yellow fluorescence, moderately fast pale green massive cut
920-943	Limestone; white to tan, detrital-skeletal, micritic to very fine granular, abundant calcite cement, slightly argillaceous, tight to very poor pinpoint porosity, trace of dead oil staining, trace of weak yellow fluorescence, trace of pale green slow massive cut
943-953	Limestone; white to tan, skeletal-detrital, micritic to very fine granular matrix, slightly argillaceous, tight to very poor porosity, calcite cement, trace of dead oil staining, trace of weak yellow fluorescence, trace of slow pale green massive cut
953-957	Limestone; white to light brown, micritic skeletal, micrite matrix, occasionally very fine granular, common skeletal remains, abundant calcite cement, slightly argillaceous to argillaceous, tight to very poor pinpoint porosity, occasional thin shale laminae

Depth (m)	Description
957-961	Limestone; white to dark brown, micritic-detrital, micrite matrix, very fine granular matrix, slightly argillaceous to argillaceous, abundant calcite cement, minor skeletal fragments, tight to very poor pinpoint porosity, occasional thin shale laminae, trace of dead oil staining
961-967	Limestone; light to dark brown, occasionally black, micritic detrital, micritic to very fine granular, slightly argillaceous to very argillaceous, tight to very poor porosity, occasional shale laminae
967-981	Limestone; tan to medium brown, micritic-detrital, occasional lumps and pellets? slightly argillaceous to argillaceous, calcite cement, tight to very poor porosity, trace of dead oil staining, occasional shale laminae
981-990	Limestone; tan to medium brown, micritic-detrital-skeletal, common lumps and pellets in a micrite to fine granular matrix, occasional ostracods and crinoids, abundant calcite cement, slightly argillaceous in part, tight to very poor porosity, trace of dead oil staining, occasional shale laminae.
HARE INDIA RIVER (-847.44)	
990-992	Limestone; dark brown, micritic-detrital, micritic to fine granular, argillaceous, common calcite cement, bitumen engrained, tight, with common bands of Shale; medium to dark grey, blocky to subfissile, micromicaceous in part, calcareous in part, bituminous in part
992-1000	Limestone; light brown to medium grey/brown, micritic-detrital, micritic to very fine grained, common lumps and intraclasts, argillaceous in part, common calcite cement, tight, minor ostracods and crinoids interbedded with Shale; a/a
1000-1018	Shale; medium grey, blocky, micromicaceous, calcareous to very calcareous, trace of disseminated pyrite, trace of crinoids, with common thin beds of Limestone a/a
1018-1025	Shale; medium to dark grey, blocky, micromicaceous, noncalcareous to calcareous, trace of disseminated pyrite, trace of crinoids, with occasional thin bands of limestone a/a
1025-1044	Shale; medium grey, blocky, micromicaceous to very micromicaceous, trace of carbonaceous flecks, noncalcareous to calcareous
1044-1047	Thin beds of Limestone; white to light brown, micritic to very fine granular, common detrital grains, argillaceous in part, very poor pinpoint porosity and Sandstone; light-medium brown, quartz, silt to very fine grained, sub-angular, well sorted, abundant calcite cement, dolomite cement,

Depth (m)	Description
	argillaceous matrix, very poor effective intergranular porosity
1047-1050	Shale; medium grey, blocky to subfissile, micromicaceous to very micromicaceous, trace of carbonaceous flecks, noncalcareous to calcareous
FTD	

CORE SUMMARY

Core No.1 861-863.2 Cut 2.2 m Rec. 1.4 m

Coring Times: Mins./1/5th m

11,9,9,6,.5; .5,6,6,4,14; 21 Jammed off

Depth (m)	Description
861-862.4	Shale; dark brown to black, blocky, slightly micromicaceous, slightly bituminous, occasional slightly calcareous bands, common horizontal and vertical fractures, slightly silty in part.

Core No.2 863.2-874 Cut 10.8 m REc.10.8 m

Coring Times: Mins./1/5th m

20,13,13,12; 19,13,14,12,12; 10,10,13,12,13; 14,13,11,11,12; 10,18,27,6,7; 7,7,7,7,6; 8,7,6,6,7; 6,7,7,6,6; 7,7,7,7,8; 6,6,7,8,7; 5,10,13,25,16

Depth (m)	Description
863.2-874	Shale; dark grey/brown to black, blocky, to subfissile, slightly micromicaceous, occasional small (2 cm dia.) blebs and bands (2 cm thick) of pyrite. High and low angle slickenslides throughout with very minor calcite and dolomite veining along slickenslides, trace of natural vertical fractures, very slight petroliferous odor, carbonized remains of trilobite

Core No.3 887-897.6 m Cut 10.6 m
Rec. 10.6 m

Coring Times: Mins./1/5th m

13,15,15,14,10; 2,1,1,1,9; 1,4,4,3,4; 6,5,5,6,6; 6,5,5,4,5; 4,5,4,4,4; 5,4,3,4,4; 5,3,4,4,4; 3,5,3,4,4; 5,6,5,5,4; 3,3,3 Jammed off

Depth (m)	Description
887-889.6	Limestone; skeletal-detrital, cream to light grey/brown (80% skeletal material, 20% detrital material), skeletal fragments of branching and rugose corals, pelecypods, stachyodes? and minor tabular stromatoporoids in a matrix of very fine to fine granular, slightly argillaceous skeletal detritus, calcite cement, poor pinpoint and intergranular porosity (around 3-5%) trace of vuggy porosity, minor stylolites, midly bioturbated?, trace of dead oil staining, minor patchy pale gold fluorescence in matrix, slow weak yellow-green streaming cut
887.6-895.4	Limestone; skeletal-detrital, cream to medium grey/brown (60-70% skeletal fragments, 30-40% detrital matrix), skeletal fragments of bulbous stromatoporoids (up to 5 cm dia.), tabular stromatoporoids, amphipora, minor brachiopods, rugose and finger corals, in a slightly argillaceous matrix of micritic to fine granular, skeletal detritus, common calcite cement, poor pinpoint and intergranular porosity, trace of vuggy porosity, total porosity of around 3-5%, trace of dead oil staining, trace of weak yellow fluorescence, trace of weak yellow streaming cut
895.4-897.6	Limestone; detrital-skeletal, cream to medium grey/brown, (40-60% skeletal material, 60-40% detritus), a slightly argillaceous micrite to fine granular calcarenite interspersed with skeletal material consisting of amphipora (90%) and branching corals (10%), calcite cement, poor pinpoint porosity (around 3%), trace of weak gold fluorescence, slow weak yellow ribbon cut
	Environment; Black Reef Shoal?

SIDEWALL CORE DESCRIPTIONS

Depth Req'd	Actual Depth	Description
1400m	1400.2m	Fractured basalt occuring with traces of argillaceous dolomite and arenaceous dolomite Basalt; grey/red to green, firm to hard, generally fine grained, aphanitic, occuring as andesite, visible chlorite, trace hematite and mafic minerals, trace K-feldspar, generally appearing as broken and fractured with argillaceous dolomite Dolomite; white to cream, soft and clay like texture, mudstone, and trace quartz grains supported, locally becoming sand in nature, generally poor ineffective porosity, no shows
1378.0m	1378.0m	Red/brown, clay, (chemically altered basalt) soft earthy texture, trace gain supported horizons and cream to white dolomite mudstone, scattered horizons of green chlorite and trace mafics
1374m	1374.0m	Soft earthy red/brown clay with scattered horizons of grain supported siltstone, quartz grains and mafics in a clay matrix, trace chlorite blebs, trace dolomitic mudstone
1367.5m	1367.0m	Predominantly red/maroon, soft, earthy, clay, with fragments of basalt, grey/red, to green, generally aphanitic. Local fragments of dolomitic siltstone and rare dolomite, occuring as light brown microcrystalline fragments with poor porosity, no shows, trace quartz and chert fragments associated with mafic grains and dolomitic mudstone
1364.0	1364.0	Sandstone; cream to light buff/brown, firm to friable, predominantly fine to medium grained local horizons of very fine grained, predominantly clear to frosty/white quartz, with minor lenses of dolomitic mudstone, cement generally weak, silica and/or dolomitic clay cement, moderately sorted, subangular to angular grains, poor to fair intergranular porosity, trace light brown stain, slow to moderately streaming, pale yellow fluorescence where stained

1362.0m	1362.0m	Sandstone: white to light buff/brown, predominantly friable, generally fine to medium grained, locally scattered coarse grains, predominantly clear to frosty/white quartz, trace horizons of dolomitic mudstone, trace very finely disseminated pyrite, silica and/or clay cement, generally weak, moderately to moderately well sorted in places, subangular to angular grains, poor to fair intergranular porosity, trace light brown stain, slow to moderately streaming, pale yellow fluorescence in solvent where stained
1357.5m	1357m	Soft green/grey shale with horizons of siltstone and sandstone Siltstone: white to cream, poorly compacted and indurated, slightly dolomitic clay matrix, quartz grain supported, sandy nature Sandstone: white to cream, light brown, friable, very fine to trace fine grained, frosty/white quartz, weak silica and/or dolomitic clay cement, generally moderately well sorted, trace argillaceous to very argillaceous grading to quartz grains in a clay matrix, trace very rare light brown stain, very weak fluorescence in solvent fading quickly
1355.6m	1355.0m	Sandstone: light grey, friable to unconsolidated, generally fine to medium grained, local scattered coarse grains, predominantly white to frosty quart, trace very finely disseminated pyrite, cement weak to absent, moderately sorted, subangular to angular grains, generally argillaceous to clay matrix asssociated (filter cake?), porosity generally plugged with mud, no shows
1344.7m	1344.0m	Soft green Shale; Siltstone and Sandstone Shale: light green, soft, waxy Siltstone: light grey, soft, quartz grain supported sandy nature Sandstone: white to light grey, friable to unconsolidated generally fine grained, locally medium grained frosty/white quartz predominantly, trace green shale blebs and/or glauconite, weak cement, generally clay slightly dolomitic, moderately sorted, generally associated with argillaceous matrix, porosity plugged, no shows

1295.0m	1295.0m	Dolomitic Siltstone; light grey, soft to firm, poor to moderately compacted and indurated, generally quartz grain supported with dolomitic matrix, generally grading to very fine grained argillaceous quartz sandstone, poor ineffective porosity, no shows
1294m	1294m	Dolomitic Siltstone as above, with lenses of argillaceous sandstone Sandstone; light grey, friable to unconsolidated, generally very fine grained, predominantly frosty/white quartz, dolomitic clay cement/matrix, moderately well sorted, generally very argillaceous, poor ineffective porosity, no shows
1290.7m	1290.7m	Quartz grain supported dolomitic siltstone; light grey, soft to firm generally poorly compacted and indurated, frosty white quartz grains in slightly dolomitic clay matrix, trace very finely disseminated pyrite, locally grading to argillaceous sandstone, poor ineffective porosity, no shows CORE GUN #2, 21 SHOTS, 1 LOST, 2 EMPTY
1363.8m	1363.8m	Sandstone; white to medium brown, friable to unconsolidated, predominantly fine to medium grained, frosty/white to clear quartz, trace shale fragments, trace very finely disseminated pyrite on occasion, silica and/or clay cement, generally weak when present, moderately well sorted, subangular to angular grains, poor to fair intergranular porosity, rare spotty brown stain, trace slow streaming yellow fluorescence in solvent, fading quickly
1346.7m	1346.7m	(Poor recovery) Sandstone; white to light grey, unconsolidated, predominantly coarse grained to medium grained, generally clear to frosty/white quartz in a soft clay, dolomite cement matrix, poor to moderately sorted, subrounded grains, poor indeterminate porosity, no visible live stain, no shows, appearing argillaceous in nature
1288.5m	1288.5m	Predominantly soft green shale with lenses of grain supported dolomitic clay and mudstone, quartz grains and dolomitic fragments, trace calcite crystals, trace very finely disseminated pyrite
1270.5m	1270.5m	As above

1270m	1270m	Generally grey/green shale associated with siltstone and trace limestone Limestone; light brown, soft to firm, generally microcrystalline mudstone/wackestone, becoming argillaceous and grain supported, grading to sandy nature, poor ineffective porosity, no shows
1266.5m	1266.5m	(Very poor recovery) Limestone; cream to brown, soft to firm, chalky and argillaceous grading to trace microcrystalline, generally argillaceous to very argillaceous grading to calcareous siltstone, poor ineffective porosity, no shows
1261m	1261m	Shale; black, grey, soft to firm, subfissile, calcareous matrix, grading to interbedded siltstone and sandy siltstone Limestone; light brown, soft, generally noncrystalline mudstone, poor porosity, no shows
1229m	1229m	Shale; dark grey/green, slightly micromicaceous, subfissile/blocky, soft, waxy, trace very finely disseminated pyrite, slightly calcareous matrix, generally silty nature
1202m	1202m	Shale; dark grey/green, slightly micromicaceous, subfissile/blocky, soft and waxy Limestone; cream to light grey, brown, soft to firm, grading from noncrystalline mudstone, trace microcrystalline, becoming argillaceous and grain supported, grading to calcareous sandy siltstone, tace pyrite, poor ineffective porosity, no visible live stain no shows
1184m	1184m	Shale; medium green, soft/waxy, subfissile, slight calcareous matrix, trace of brown argillaceous dolomitic mudstone
1180.5m	1180.5m	Sandstone; (argillaceous) light grey/brown, friable and unconsolidated, predominantly very fine grained, clear to frosty quartz, trace shaley, calcareous cement, moderately well sorted, subangular to angular, generally argillaceous and grading to sandy siltstone, poor ineffective porosity, no shows - trace Limestone; light buff to cream, soft, generally noncrystalline mudstone, poor porosity, no shows
1175.5m	1175.5m	Shale; medium to dark grey/green, soft and subfissile, waxy nature, slight calcareous matrix

1171.0m	1171.0m	Shale; as above
1153.2m	1153.2m	Limestone; grey to brown, firm, microcrystalline to trace finely crystalline, locally grading to dolomitic/limestone, generally mudstone/wackestone poor ineffective porosity, no shows - trace Shaley; medium grey/green, soft, waxy Sandy Siltstone; light buff/brown, firm, moderately compacted quartz and dolomitic grains, calcareous matrix, sandy nature
1152.0m	1152.0m	Shale; grey/green, soft to firm, subfissile/blocky locally waxy Limestone; light buff/brown, firm to hard, generally microcrystalline, becoming argillaceous and grain supported to locally interbedded siltstone, poor ineffective porosity, no shows, - trace dolomitic/limestone
1151.5m	1151.5m	Limestone; as above - trace Dolomite; grey/brown, firm to hard, noncrystalline to trace microcrystalline, predominantly mudstone, grading to dolomitic/limestone, trace argillaceous and grain supported, poor porosity no shows
1144.5m	1144.5m	Lenses of Shale and Dolomite Shale; light grey/green, medium grey, soft, subfissile, locally waxy, slight calcareous matrix Dolomite; light to medium brown, soft to firm, generally noncrystalline mudstone, predominantly and grain supported, grading to dolomitic siltstone and argillaceous very fine grained dolomitic sandstone, poor ineffective porosity no shows

COGLA-0

CORE LABORATORIES — CANADA, LTD.

Petroleum Reservoir Engineering

CANADA OIL AND GAS LANDS ADMINISTRATION
ADMINISTRATION DU PÉTROLE ET DU GAZ DES TERRES DU CANADA
APR 12 1985
ENGINEERING AND CONTROL BRANCH
TECHNIQUE ET DU CONTRÔLE

CORE ANALYSIS

PETRO-CANADA EXPLORATION INC.
PCI ET AL MORROW CREEK J-71
MORROW CREEK, NORTHWEST TERRITORIES
65° 20' 43.72" N LAT. 127° 28' 41.74" W LONG.
84-12-23

CORE LABORATORIES — CANADA, LTD.

COMPANY PETRO-CANADA EXPLORATION INC.
WELL PCI ET AL MORROW CREEK J-71
FIELD MORROW CREEK, NORTHWEST TERRITORIES
LOCATION 65° 20' 43.72" N LAT. 127° 28' 41.74" W LONG.

FORMATION KEE SCARP
CORING EQUIPMENT DIAMOND
CORE DIAMETER.(mm) 88
CORING FLUID WATER BASE MUD

PAGE 1
FILE 7004-84-1538B
DATE 84-12-23
ANALYSTS MR

CORE ANALYSIS RESULTS

Sample Number	Depth-Metres (m)	m Rec.	PERM. to Air Md.	PERM. x m	Porosity	Porosity x m	Residual Saturation (Fraction of Pore Volume) Oil	Residual Saturation (Fraction of Pore Volume) Water	Grain Density Kg/(m)3	Visual Examination
	CORE NO. 1	861.00 m -	863.20 m	(core received	1.40 m)	(1 BOXES)				
-	861.00-62.40	1.40	-	-	-	-	-	-	-	sh
LC	862.40-63.20	0.80	-	-	-	-	-	-	-	Lost core
	CORE NO. 2	863.20 m -	874.00 m	(core received	10.80 m)	(9 BOXES)				
-	863.20-74.00	10.80	-	-	-	-	-	-	-	sh
	CORE NO. 3	887.00 m -	897.60 m	(core received	10.60 m)	(8 BOXES)				
1	887.00-87.58	0.58	<0.01	-	0.005	0.003	-	-	2700	ls i
2	887.58-88.93	1.35	<0.01	-	0.011	0.015	-	-	2700	ls i
3	888.93-90.28	1.35	<0.01	-	0.016	0.022	-	-	2700	ls i
4	890.28-90.39	0.11	<0.01	-	0.013	0.001	-	-	2700	ls i
5	890.39-91.89	1.50	<0.01	-	0.040	0.060	-	-	2700	ls i
6	891.89-93.97	2.08	<0.01	-	0.049	0.102	-	-	2700	ls i
7	893.97-95.35	1.38	<0.01	-	0.029	0.040	-	-	2700	ls i
8	895.35-96.65	1.30	<0.01	-	0.027	0.035	-	-	2700	ls i
9	896.65-97.03	0.38	<0.01	-	0.057	0.022	-	-	2700	ls i
10	897.03-97.60	0.57	<0.01	-	0.047	0.027	-	-	2700	ls i

THESE ANALYSES, OPINIONS OR INTERPRETATIONS ARE BASED ON OBSERVATIONS AND MATERIALS SUPPLIED BY THE CLIENT TO WHOM; AND FOR WHOSE EXCLUSIVE AND CONFIDENTIAL USE; THIS REPORT IS MADE. THE INTERPRETATIONS OR OPINIONS EXPRESSED REPRESENT THE BEST JUDGMENT OF CORE LABORATORIES - CANADA LTD.(ALL ERRORS AND OMISSIONS EXCEPTED); BUT CORE LABORATORIES - CANADA LTD. AND ITS OFFICERS AND EMPLOYEES, ASSUME NO RESPONSIBILITY AND MAKE NO WARRANTY OR REPRESENTATIONS, AS TO THE PRODUCTIVITY, PROPER OPERATIONS, OR PROFITABLENESS OF ANY OIL, GAS OR OTHER MINERAL WELL OR SAND IN CONNECTION WITH WHICH SUCH REPORT IS USED OR RELIED UPON.

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WELL PCI ET AL MORROW CREEK J-71 PAGE 2

FORMATION KEE SCARP

SUMMARY INTERVAL 861.00- 897.60 FILE 7004-84-1538B

TOTAL 36.60

METRES ANALYZED 10.60

METRES NOT ANALYZED: TOTAL 26.00 DENSE 12.20 LOST 0.80 *NA 0.00 DRILLED 13.00 RUBBLE 0.00

SUMMARY OF ANALYZED CORE:	METRES	FRACTION OF ANALYZED CORE	WEIGHTED AVERAGE POROSITY	POROSITY METRES	WEIGHTED AV. HORIZONTAL PERMEABILITY	PERMEABILITY METRES	WEIGHTED AVERAGE RESID. OIL	WEIGHTED AVERAGE TOT. WATER
TOTAL	10.600	1.000	0.031	0.326	0.005	0.053	0.000	0.000
BY PERM RANGES								
LESS THAN 0.01 mD	10.600	1.000	0.031	0.326	0.005	0.053	0.000	0.000
0.01 0.09 mD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.10 0.49 mD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.50 0.99 mD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1.0 9.99 mD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
GREATER THAN 9.99 mD	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

*NOT ANALYZED BY REQUEST

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CORE LABORATORIES - CANADA, LTD.

CODE KEY - DESCRIPTIONS

anhy = Anhydrite
AST = Appears similiar to
bk = Break
bldr = Boulder
c = Coarse
calc = Calcite (areous)
carb = Carbonaceous
cbl = Cobble
CEC = Cation exchange capacity
cgl = Conglomerate
cht = Chert
coal = Coal/Coal Inclusion
dol = Dolomite
f = Fine
fest = Ironstone
foss = Fossil (iferous)
frac = Fracture
fri = Friable
glauc = Glauconite (ic)
grnl = Granule
gyp = Gypsum
h frac = Horizontal fracture
hal = Halite (Salt)
i = Intergranular
lam = Laminae (Laminated)
lmy = Limy
ls = Limestone
lv = Large vug
m = Medium
mi = Mud invaded
mic = Micaceous
mshy or shy = Moderately shaly (20-40%)
mv = Medium vug
NA = Not analysed by request
NP = No permeability measurement
ool = Oolitic
OB = Overburden
P = Preserved for future studies
pbl = Pebble
POA = portion removed for oil analysis
ppv = Pinpoint Vug
PSA = Particle size analysis
pyr = Pyrite (ic)
pyrbit = Pyrobitumen
SCAL = removed for special core analysis
sdy = Sandy
SEM = Scanning electron microscope analysis
sh = Shale
sltst = Siltstone
slty = Silty
ss = Sandstone
sshy = Slightly Shaly(<20%)
sty = Stylolite (ic)
sulf = Sulphur
sv = wet/dry sieve analysis
tr = Trace
TS = Thin section
uncons = Unconsolidated
vfrac = Vertical fracture
vf = Very fine
VOB = Vertical overburden sample
vshy = Very shaly (>40%)
vug = Vuggy (ular)
* = broken core
** = Permeability > 10240 mD

CLEANING

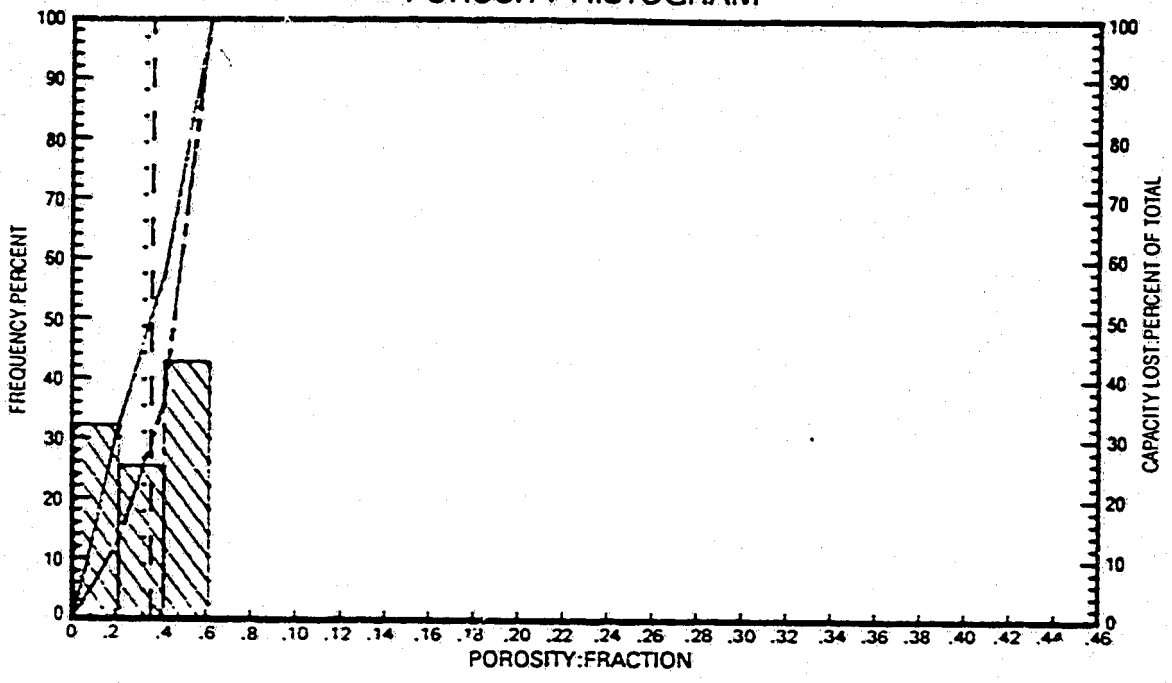
Solvent
Extraction Equipment
Extraction Time
Drying Equipment GRAVITY OVEN
Drying Time 12 HOURS
Drying Temperature 132 DEGREES C

ANALYSIS

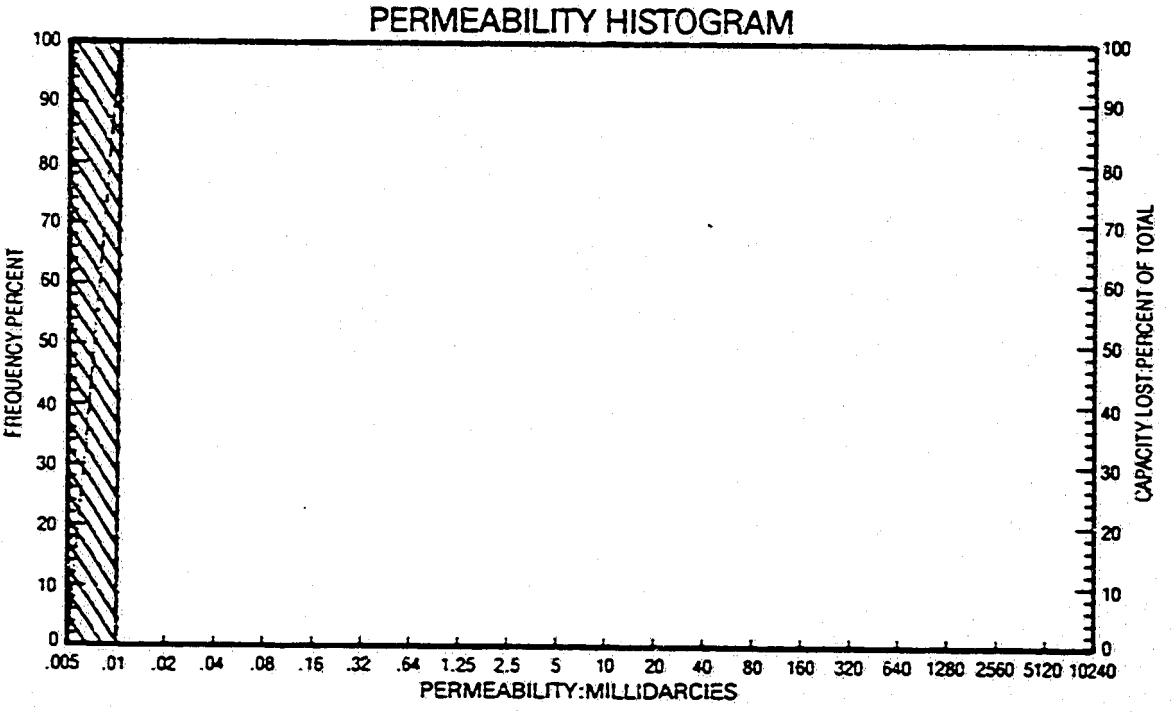
Pore volume measured by Boyle's Law in a Hassler holder using He
Grain vol msrd by Boyle's Law in a modified U.S.B.M. porosimeter using He
X Grain volume measured by Boyle's Law in a matrix cup using He
Bulk volume measured by calipering
X Bulk Volume by Archimedes Principle
Porosity determined by summation of fluids (retort)
Fluid saturations by retort on end pieces of full diameter samples
Fluid saturation by retort
Water saturations by Dean-Stark
Oil saturations by weight difference in Dean-Stark
Permeabilities measured on 20mm cubes
X Permeabilites measured on 25.6 mm diameter drilled plugs
X Core Gamma Composite
Core Gamma Spectral

REMARKS:

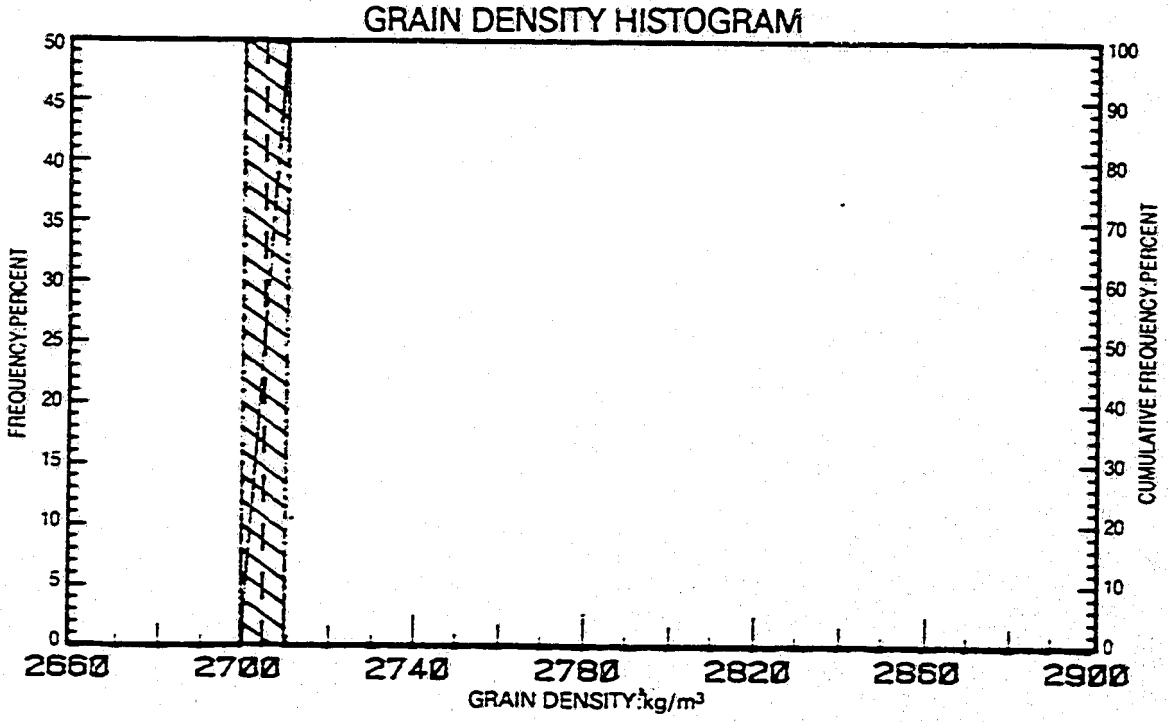
POROSITY HISTOGRAM



PERMEABILITY HISTOGRAM



GRAIN DENSITY HISTOGRAM



PETRO-CANADA EXPLORATION INC.
PCI ET AL MORROW CREEK J-71
MORROW CREEK
NORTHWEST TERRITORIES
881.00- 887.60 FILE 7004-84-15388
Kmax and Helium Porosity

LEGEND

- MEDIAN VALUE
- CUMULATIVE FREQUENCY
- CUMULATIVE CAPACITY LOST
- ARITHMETIC MEAN POROSITY
- GEOMETRIC MEAN PERMEABILITY
- ARITHMETIC MEAN GRAIN DENSITY

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STATISTICAL DATA FOR POROSITY AND PERMEABILITY HISTOGRAM

FILE 7004-84-1338B

COMPANY: PETRO-CANADA EXPLORATION INC.
FIELD : MORROW CREEK

WELL : PCI ET AL MORROW CREEK J-71
PROVINCE: NORTHWEST TERRITORIES

AIR PERMEABILITY : MD. (MAXIMUM) RANGE USED 0.000 TO 10.
POROSITY : FRACTION (HELIUM) RANGE USED 0.000 TO .46

(PERMEABILITY UNCORRECTED FOR SLIPPAGE)

DEPTH LIMITS : 861.00 - 897.60 INTERVAL LENGTH : 36.60
METRES ANALYZED IN ZONE : 10.60 LITHOLOGY EXCLUDED : NONE

DATA SUMMARY

POROSITY AVERAGE	PERMEABILITY AVERAGES ARITHMETIC	HARMONIC	GEOMETRIC
0.031	0.00	0.01	0.00

THESE ANALYSES, OPINIONS OR INTERPRETATIONS ARE BASED ON OBSERVATIONS AND MATERIALS SUPPLIED BY THE CLIENT TO WHOM; AND FOR WHOSE EXCLUSIVE AND CONFIDENTIAL USE; THIS REPORT IS MADE. THE INTERPRETATIONS OR OPINIONS EXPRESSED REPRESENT THE BEST JUDGMENT OF CORE LABORATORIES - CANADA LTD.(ALL ERRORS AND OMISSIONS EXCEPTED); BUT CORE LABORATORIES - CANADA LTD. AND ITS OFFICERS AND EMPLOYEES, ASSUME NO RESPONSIBILITY AND MAKE NO WARRANTY OR REPRESENTATIONS, AS TO THE PRODUCTIVITY, PROPER OPERATIONS, OR PROFITABLENESS OF ANY OIL, GAS OR OTHER MINERAL WELL OR SAND IN CONNECTION WITH WHICH SUCH REPORT IS USED OR RELIED UPON.

STATISTICAL DATA FOR POROSITY AND PERMEABILITY HISTOGRAM

COMPANY: PETRO-CANADA EXPLORATION INC.
FIELD : MORROW CREEK

WELL : PCI ET AL MORROW CREEK J-71
PROVINCE: NORTHWEST TERRITORIES

GROUPING BY POROSITY RANGES

POROSITY RANGE	METRES IN RANGE	AVERAGE POROSITY	AVERAGE PERM. (GEOM.)	AVERAGE PERM. (ARITH)	FREQUENCY (PERCENT)	CUMULATIVE FREQUENCY (%)
0.000 -0.020	3.4	0.012	0.005	0.005	32.0	32.0
0.020 -0.040	2.7	0.028	0.005	0.005	25.3	57.3
0.040 -0.060	4.5	0.046	0.005	0.005	42.7	100.0

TOTAL NUMBER OF METRES = 10.60

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STATISTICAL DATA FOR POROSITY AND PERMEABILITY HISTOGRAM

COMPANY: PETRO-CANADA EXPLORATION INC.
FIELD : MORROW CREEK

WELL : PCI ET AL MORROW CREEK J-71
PROVINCE: NORTHWEST TERRITORIES

GROUPING BY PERMEABILITY RANGES

PERMEABILITY RANGE	METRES IN RANGE	AVERAGE PERM. (GEOM.)	(ARITH)	AVERAGE POROSITY	FREQUENCY (PERCENT)	CUMULATIVE FREQUENCY (%)
0.005 - 0.010	10.6	0.005	0.005	0.031	100.0	100.0

TOTAL NUMBER OF METRES = 10.60

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STATISTICAL DATA FOR POROSITY AND PERMEABILITY HISTOGRAM

COMPANY: PETRO-CANADA EXPLORATION INC.
FIELD : MORROW CREEK

WELL : PCI ET AL MORROW CREEK J-71
PROVINCE: NORTHWEST TERRITORIES

POROSITY-METRES OF STORAGE CAPACITY LOST FOR SELECTED POROSITY CUT OFF

POROSITY CUT OFF	METRES LOST	CAPACITY LOST (%)	METRES REMAINING	CAPACITY REMAINING (%)	ARITH MEAN	MEDIAN
0.000	0.0	0.0	10.6	100.0	0.031	0.034
0.020	3.4	12.5	7.2	87.5	0.040	0.044
0.040	6.1	35.5	4.5	64.5	0.046	
0.060	10.6	100.0	0.0	0.0	0.000	

TOTAL STORAGE CAPACITY IN POROSITY-METRES = 0.326

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STATISTICAL DATA FOR POROSITY AND PERMEABILITY HISTOGRAM

COMPANY: PETRO-CANADA EXPLORATION INC.
FIELD : MORROW CREEK

WELL : PCI ET AL MORROW CREEK J-71
PROVINCE: NORTHWEST TERRITORIES

MILLIDARCY-METRES OF FLOW CAPACITY LOST FOR SELECTED PERMEABILITY CUT OFF

PERMEABILITY CUT OFF	METRES LOST	CAPACITY LOST (%)	METRES REMAINING	CAPACITY REMAINING (%)	GEOM MEAN	MEDIAN
0.005	0.0	0.0	10.6	100.0	0.00	
0.	10.6	100.0	0.0	0.0		

TOTAL FLOW CAPACITY IN MILLIDARCY-METRES(ARITHMETIC) = 0.05

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CORE LABORATORIES – CANADA, LTD.

CORE LAB *Petroleum Reservoir Engineering*

COMPANY PETRO-CANADA EXPLORATION INC. FILE NO. 7004-84-1538B

WELL PCI ET AL MORROW CREEK J-71 DATE

FIELD MORROW CREEK FORMATION KEE SCARP ELEV.

PROVINCE NORTHWEST TERRITORIES DRLG. FLD. WATER BASE MUD CORES 1,2,3

LOCATION 65° 20' 43.72" N LAT. 127° 28' 41.74" W LONG.

CORRELATION COREGRAPH

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories-Canada, Ltd., (all errors or omissions excepted); but Core Laboratories-Canada, Ltd., and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper operation, or profitableness of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

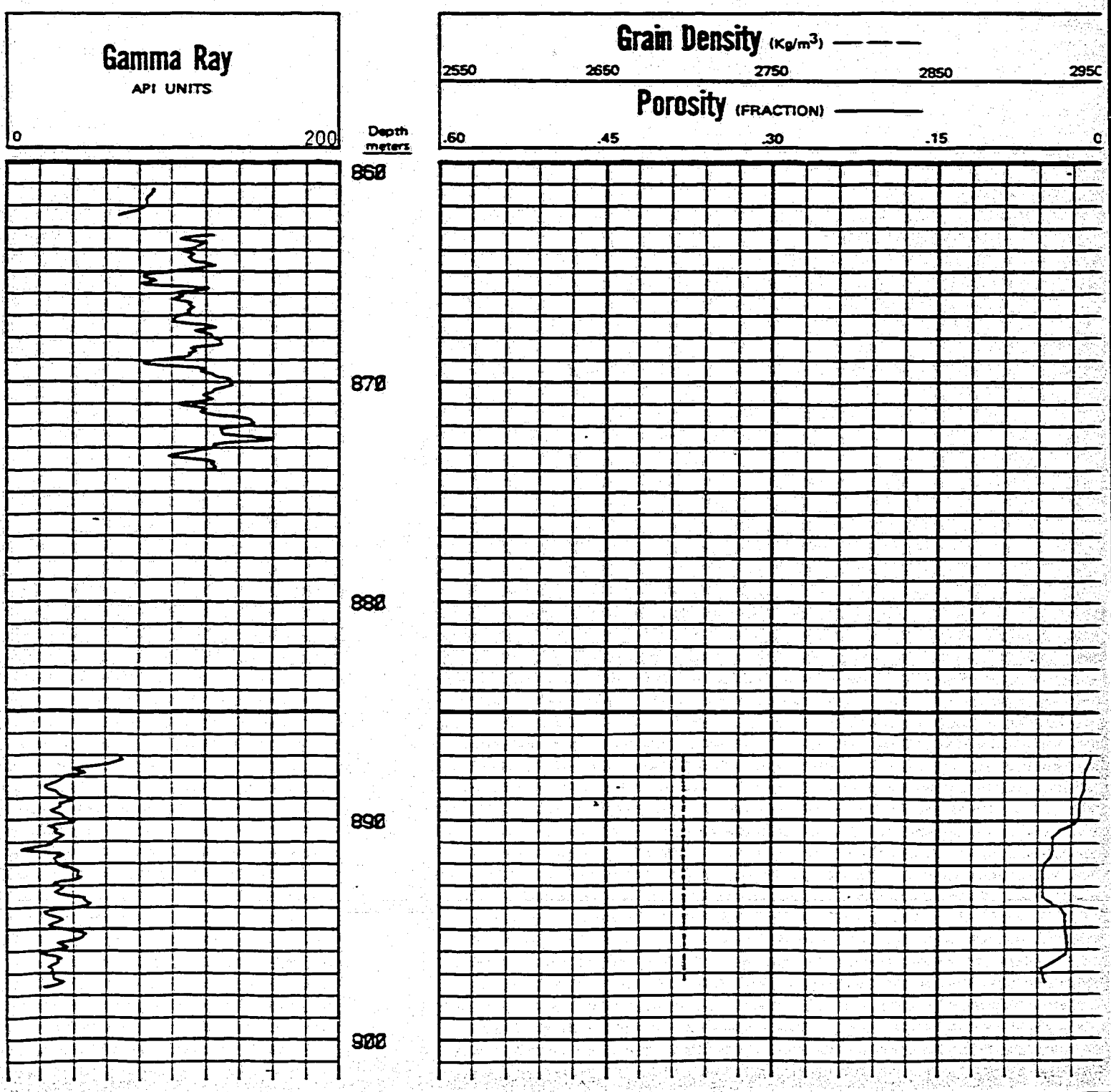
VERTICAL SCALE: 10 cm = 24m

Gamma Ray
API UNITS
0 200

Depth meters

Grain Density (Kg/m³)
2550 2650 2750 2850 2950

Porosity (FRACTION)
.60 .45 .30 .15 0



ORM NO. 7004-6

CORE LABORATORIES – CANADA, LTD. CORE LAB *Petroleum Reservoir Engineering*

COMPANY PETRO-CANADA EXPLORATION INC. FILE NO. 7004-84-1538B
WELL PCI ET AL MORROW CREEK J-71 DATE
FIELD MORROW CREEK FORMATION KEE SCARP ELEV.
PROVINCE NORTHWEST TERRITORIES DRLG. FLD. WATER BASE MUD CORES 1,2,3
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VERTICAL SCALE: 10cm = 24m

Gamma Ray
RADIATION INCREASE
0 API 200

Permeability X .01
MILLIDARCIES
1000 100 10 1

Depth meters
860
870
880
890
900
910

Porosity X 1.0
FRACTION
.30 .20 .10 0

Oil Saturation
FRACTION PORE SP.
0 .20 .40 .60 .80

Total Water
FRACTION PORE SP.
1.00 .80 .60 .40 .20

D.A. 1206

E.A. 159

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

Nova Scotia ☐ Newfoundland ☐ Gulf of St. Lawrence ☐
West Coast ☐ Northern ☒ Hudson Bay ☐

Well Status: Suspended ☐ Completed ☐ 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: PCI et al Morrow Creek J-71 Area: N.W.T.

Grid Area: 65-30 - 127-15 Field/Pool: Undefined

Permit or Lease No.: N/A Final Coordinates: Lat.: 65° 20' 43.72" Long: 127° 28' 41.74"

Drilling Unit: Atco/Equtak #76 Elevations ~~RT~~/KB: 142.56 ~~GR~~/GL: 136.01 m

Spud Date: 1984-12-04 Rig Released: 1984-12-26 Total Depth: 1050 m

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
340 mm	101 Kg/m	K-55	48.1 m	14.4 t Arctic Set
245 mm	60 & 65	L-80, Soo95	356	36.0 t Arctic Set

PLUGGING PROGRAM

Approval of the following program was obtained by (person) K.M. McDonald from (person) M.D. Thomas of the Canada Oil and Gas Lands Administration by means of Letter on December 24 1984.

Type of Plug:	Interval:	Felt:	Cement and Additives:
Abandonment	1050 - 830 m	No., on bottom	13 t Class "G"
Abandonment	650 - 550 m	522 m	7 t Class "G"
Abandonment	380 - 330 m	329 m	5.5 t Class "G"
Abandonment	25 - Surface	N/A	1.2 t Class "G"

Lost Circulation/Overpressure Zones: None

Equipment left on Seafloor (Describe): N/A

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

Cores: Type: Conventional Intervals 861 - 863.2 m & 863.2 - 874 m
887 - 897.8 m

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: Grant Duncan P. Eng. Title: Area Engineer

Name: Grant Duncan Date: 1985-03-11

Acknowledged by: [signature]
Engineering Branch

Date: 22 April 85

File: 9211 - P28 - 1 - 3

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