

PROJECT ACTION SHEET

RESOURCE EVALUATION BRANCH

PROJECT NUMBER: 9229-P28-20E

COMPANY: PETRO-CANADA

REPORT TITLE: ISLAND RIVER N.W.T.

The following action has been taken:

Receipt acknowledged MAY 8/90

Reports and maps date-stamped ✓

Memo sent to Land Management

Reports for review list edited ✓

Inventory sheet made ✓

Mylar YES

REVIEW AND APPROVAL made by:

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EXPL. LIC.  
328

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(a) WRITTEN REPORTS:

(1) Operations Report

Number: 1

- OPERATIONS, PROCESSING + INTERP

(2) Interpretation Reports

Number: \_\_\_\_\_

COMBINED IN OPERATION REPORT.

(b) MAPS:

(1) Shotpoint Maps

Number: 1

- SEISMIC BAE MAP

(2) Interpretation Maps

Number: 2

- TIME STRUCTURE - JEAN MARIE  
" " - KOTCHO

(3) Other Maps

Number: 0

(c) SEISMIC SECTIONS

Number: 3

(MIGATED)

89-PCR-8060

- 8061

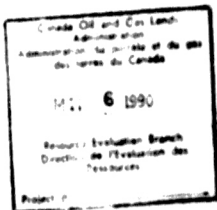
- 8063

9229-P28-1E

REPORT ON THE  
GEOPHYSICAL EXPLORATION SURVEY

PROGRAM NO. 9229-P28-20-E

ISLAND RIVER  
NORTHWEST TERRITORIES  
EXPLORATION LICENCE NO. 328

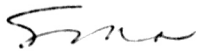



by  
PETRO-CANADA INC.  
FEBRUARY, 1989

<u>Field Work Period:</u>	February 4 - February 16, 1989
<u>Land Use Permit No.:</u>	N88 B063
<u>Area Co-ordinates:</u>	Latitude - 60°00'-60°10'N Longitude - 120°45'-121°00'W
<u>Data Acquisition:</u>	Sonics Exploration Ltd.

Submitted April, 1990

by

  
S. S. Ma  
District Geophysicist

  
D. C. Robertson  
Exploration Supervisor

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**LIST OF ENCLOSURES**

- Enclosure 1: Seismic Base Map
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## 1.0 INTRODUCTION

Petro-Canada Inc. conducted a geophysical survey in the Island River area during the 1989 winter season. The lands involved were 100% operated by Petro-Canada Inc. under Exploration Licence Number 326 (Figure 1). The land shown in this report is the land after August 31, 1989 land relinquishment.

The seismic program was designed as a regional program over the east land block to verify regional dip and perhaps to locate a well. Three lines, (8060, 8061, and 8063) constituting 49.7 km of seismic data were shot (Enclosure 1).

This report summarizes data acquisition procedures, seismic data processing and the results of the interpretation. All maps produced during the work period are included in the report. Data which were sent separately from this report included one mylar copy each of the seismic base map and migrated sections.



## 2.0 DATA ACQUISITION

### 2.1 Operating Conditions

The Island River project was located in the southern region of the Northwest Territories bordering British Columbia. The survey grid is located 300 km southwest of the Hay River Community.

Topographically, the elevation ranges from 575 to 660 metres above mean sea level. Generally field conditions were very flat, frozen terrain with occasional rough muskeg. The ground was generally soft at creek crossings. No drilling and recording problems were noted. The recorded field data were very good.

Weather conditions during the course of the program were normal with average temperature at -25°C. No recording production was lost due to weather conditions or poor terrain.

### 2.2 Seismic Operations

Petro-Canada Inc. contracted Sonics Exploration Ltd. of Calgary, Alberta as the principal contractor to conduct the survey. Due to the short term of the program. A sonics crew working in the vicinity was employed along with two N.W.T. residents. Sonics sub-contracted out surveying, drilling and line cleanup to several other companies.

Tables 2.2.1, 2.2.2, 2.2.3, 2.2.4, and 2.2.5 summarize the project chronology, production, drilling, project organization and contractors.

# WESTERN FRONTIER

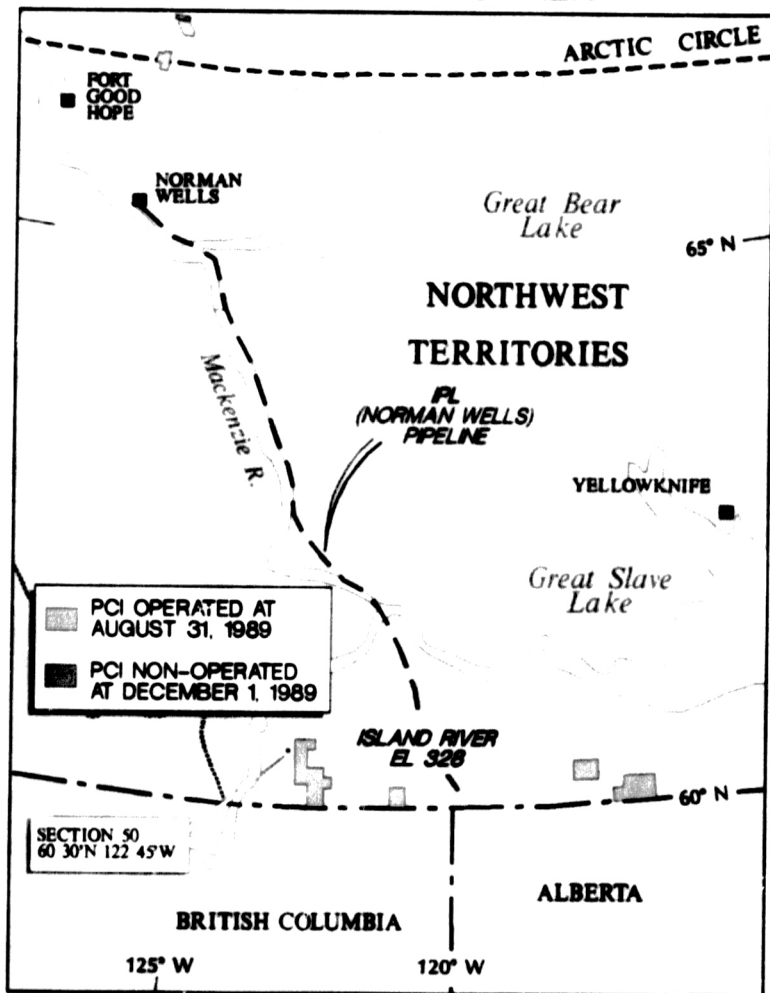


Figure 1

Table 2.2.1 Seismic Project Chronology

Surveying Commenced	February 4, 1989
Recording Commenced	February 8, 1989
Surveying Completed	February 16, 1989
Recording Completed	February 18, 1989

Table 2.2.2 Seismic Production

Total km recorded:	49.7
Total shots taken:	497
Total recording days:	8
Average daily production:	6.21 kms recorded
Days lost to weather:	None
Days lost to equipment failure:	None

Table 2.2.3 Seismic Drilling

Number of holes drilled	497
Total metres drilled	7952
Explosives used	497 kg
Charge per location	1 kg

Table 2.2.4 Project Organization

Supervisor	1	
Party Manager	1	
Observer	1	
Cat Push	1	
Clerk	1	
Recording Helpers	10	
Shooter	1	
Cat Skinners	2	
Drillers and Helpers	10	
Surveyors and Helpers	4	
Slashers	2	(2 natives)
	35	(2 natives)

Table 2.2.5 Contractors

Principle Contractor:

Sonics Exploration Ltd.  
Calgary, Alberta

Sub-Contractors:

Kelly and Associates  
Calgary, Alberta

Nortek Satellite Surveys  
Calgary, Alberta

Jensen Drilling  
Grand Prairie, Alberta

S&S Drilling  
Wetaskawin, Alberta

Adrian Erickson Line Cleanup  
Grand Prairie, Alberta

Trout Lake Band  
N.W.T.

## 2.3 Seismic Data Acquisition

Sonic's line shooting procedure consists of rolling in and out of lines with a full five spread and a gap in the normal split position (Table 2.3.1).

Instrument tests were run according to Petro-Canada's test procedures before recording commenced.

Table 2.3.1 Recording Parameters

Sample Rate:	2 milliseconds
Record Length:	4 seconds
Recording Filter:	8 - 128 Hz
Sub-surface Coverage:	1200%
No. of Groups:	120
Group Interval:	20 metres
Group Array:	In-line over 20 metres
No. of Geophones per Group:	9
Shotpoint Interval:	100 metres
Spread Length:	1180-20-x-20-1180
Energy Source:	Dynamite 1 x 1 kg
Holes per Shot Location:	Single
Hole Depth:	16 metres

Table 2.3.2 Seismic and Survey Instruments

Type of Equipment Used

2	Track Nodwell Drills
1	1987 1 ton 4x4 Recording Unit
1	1987 3/4 ton 4x4 Shooting Unit
4	1987 1 ton 4x4 Cable Units
1	1988 3/4 ton 4x4 Party Manager's Truck
1	1987 3/4 ton 4x4 Mechanic's Truck
2	1987 3/4 ton Fuel Units, Crew Cabs
1	1987 3/4 ton Personnel Carrier
1	1987 1 ton 4x4 Wheeled Line Unit
1	1987 1 ton 4x4 Supply Unit
2	1988 3/4 ton Survey Units

Surveying

Wild T16 Theodolite

Electronic Distance Meter (E. D. M.)

Survey control used N.W.T. baseline and two satellite points by Nortech Surveys.

Recording

DFS V Amplifier

SEGB Tape System

Detection

Geophone Strings

LRS L1011 (14 Hz Spike)

### 3.0 SEISMIC DATA PROCESSING

The 1989 Island River recorded seismic data were processed by Geo-X Systems Ltd. during the months of February - April, 1989. The following Table 3.1 outlines the processing sequence used by Geo-X.

Table 3.1 Processing Sequence

1. Demultiplex and Amplitude Recovery:

The data were edited and processed to three seconds at a demultiplexed sampling rate of 2 msec. An exponential gain recovery was then applied.

2. Deconvolution Before Stack:

A spiking deconvolution operator of 80 ms and 0.1% prewhitening was applied to the data before stack.

3. Structural Corrections:

Refraction analysis was performed through a 'Generalized Linear Inverse' method. Elevation, weathering, and drift corrections were applied using a datum elevation of 700m and datum velocity of 2750m/sec.

4. Velocity Analysis:

Velocity determination occurred twice: -

- a) A preliminary velocity analysis was done before stack.
- b) Velocities after surface residual statics have been applied.

5. Statics and Trace Kills:

Surface consistent residual statics were applied between 200-1600 ms.  
Trim statics were applied after T-P Multiple Attenuation.

6. T-P Multiple Attenuation.

7. F-K Filter:

Surgical F-K filter was applied post stack for the structural sections to attenuate a noise train.

8. Finite Difference Migration:

100% theoretical velocities were used to migrate the data. The noise train on the structural sections was attenuated by the migration so an F-K filter was not required on the migrated sections.

9. Standard scaling and display were used.

Note: Data on stack tapes need a -100 ms shift in order to be the same as film displays.



## 4 0 INTERPRETATION

### 4.1 Location and Regional Geology

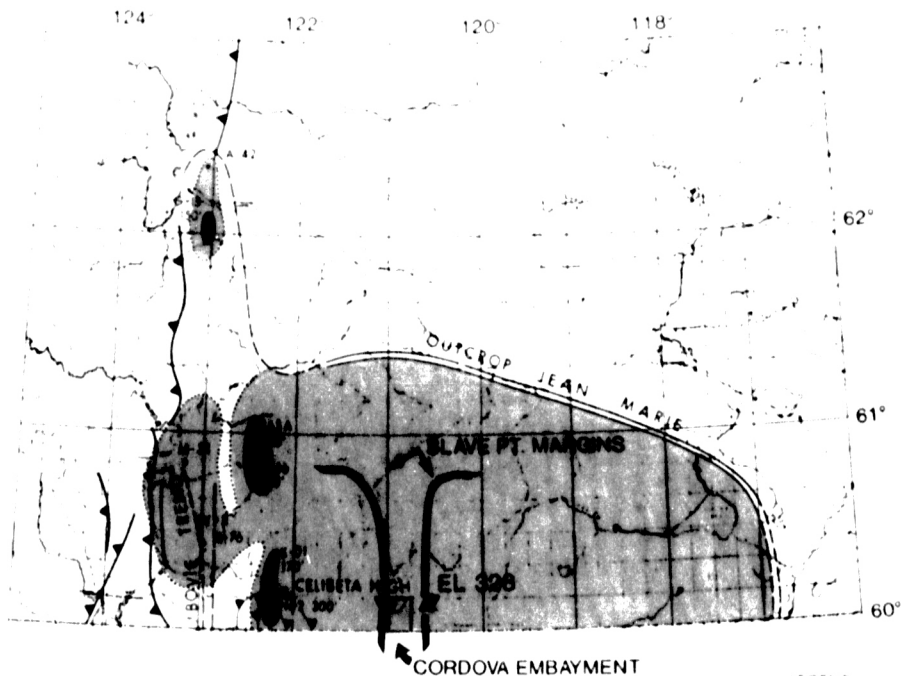
The Island River project area is located within the Great Slave Plain physiographic sub-province, southern part of the Northwest Territories (Figure 2). The town of Fort Liard is situated 40 kilometres to the west of the area.

#### 4.1.1 Stratigraphic Column

The stratigraphic column (Figure 3) of the Island River Area includes Precambrian, Devonian, Mississippian, Permian, Cretaceous, and Quaternary aged sediments.

The Precambrian rocks consist predominantly of sediments with some metamorphic and granitic rocks and are overlain unconformably by Middle and possibly Lower Devonian-aged rocks.

The Middle Devonian carbonates of the Elk Point Group are composed of carbonate shelf, bank and basin, depositional facies, and sabkha deposits of limestones, dolomites, anhydrites and shales. The oldest Middle Devonian rocks consist of evaporites and clastics of the Chinchaga Formation. Keg River carbonate bank dolomites and limestones lie on the Chinchaga Formation. Carbonates of the Pine Point - Sulphur Point reef complex developed on the Keg River bank and were followed by the deposition of shales and clastics of the Watt Mountain Formation. The Slave Point depositional margin commonly occurs directly above the Keg River bank; in other areas, it extends beyond the Keg River's depositional margin.



JEAN MARIE FACIES

SOUTHERN N.W.T.

SCALE 1:1 000 000

LEGEND

- Carbonate Platform
- Carbonate Buildup (100+)

Geology by R.H. Edmunds

AGE	FORMATION	LITHOLOGY
QUATERNARY	Q (UNDIVIDED)	GRAVEL, TILL
		UNCONFORMITY
CRETACEOUS	K (UNDIVIDED)	SHALE
		PRE - CRETACEOUS UNCONFORMITY
PERMIAN	FANTASQUE	CHERT, SANDSTONE
		UNCONFORMITY
	U. MATTSO	SANDSTONE
		UNCONFORMITY
MISSISSIPPIAN	RUNDLE GROUP (FLETT FN)	LIMESTONE, INTERBEDDED SHALE
	BANFF	SHALE, MINOR LS AND SS
	EXSHAW	SHALE
	KOTCHO	LIMESTONE, SHALE
UPPER DEVONIAN	TETCHO	LIMESTONE, SHALE
	TROUT RIVER	
		UNCONFORMITY
	KAKISA	SHALE, SANDSTONE
	REDKNIFE	SHALE
	JEAN-MARIE	LIMESTONE
	FORT SIMPSON	SHALE
	MUSKWA	SHALE, INTERBEDDED LIMESTONE
	??	UNCONFORMITY ??
MIDDLE DEVONIAN	SLAVE POINT	LIMESTONE
	WATT MOUNTAIN	SHALE
		UNCONFORMITY
	SULPHUR POINT	LIMESTONE, DOLOMITE
	MUSKEG	ANHYDRITE, INTERBEDDED DOLOMITE
	KEG RIVER	DOLOMITE
	UPPER LOWER	LIMESTONE OR DOLOMITE PLATFORM
L. DEVONIAN ?	CHINCHAGA	ANHYDRITE, INTERBEDDED DOLOMITE
	BASAL RED BEDS	SHALE, SILTSTONE
		UNCONFORMITY
PRE-CAMBRIAN		SEDIMENTS, METAMORPHICS, GRANITE

**ISLAND RIVER STRATIGRAPHIC CHART**  
**EL 328 - SOUTHERN NORTHWEST TERRITORIES**

The study area is underlain by the Middle Devonian Cordova Embayment. Deposition within the Cordova Embayment is represented by a shale section which is laterally equivalent to carbonates of the Pine Point, Sulphur Point and Slave Point Formations (Figure 4).

The Upper Devonian shales of the Muskwa and Fort Simpson Formations, represent a major marine transgression and overlie the carbonate sequence. The Fort Simpson shale is overlain by the Jean Marie carbonate deposits. The Jean Marie depositional margin follows a north-south line roughly parallel to longitude 122°15'W. West of this edge, deep water lime muds were deposited (Figure 2). The Jean Marie (Figure 4) is overlain by shales of the Redknife Formation and siltstones and shales of the Kakisa and Trout River Formations which are in turn overlain by limestones and shales of the Tetcho and Kotcho Formations, respectively.

The Mississippian sequence consists of Exshaw shales and a thick sequence of Banff shales. These are overlain by interbedded carbonates and shales of the Flett Formation which is equivalent to the Pekisko, Shunda and Debolt Formations in B.C. and Alberta.

Permian rocks of the Fantasque Formation lie unconformably on the Mississippian. They occur in some areas of the western part of the project area and are classed as cherty sandstones. Some sandstones of the Permian Mattson Formation may also occur in the area.

The Cretaceous rocks of the Fort St. John Group unconformably overlie the Paleozoic section and consist predominantly of shales with some basal sandstones. Siltstones and sandstones of the Scatter Formation also occur in the area. The area is covered by Quaternary deposits of glacial drift.

# STRATIGRAPHIC CHART

## CORDOVA EMBAYMENT

### SOUTHERN N.W.T. & N.E. B.C.

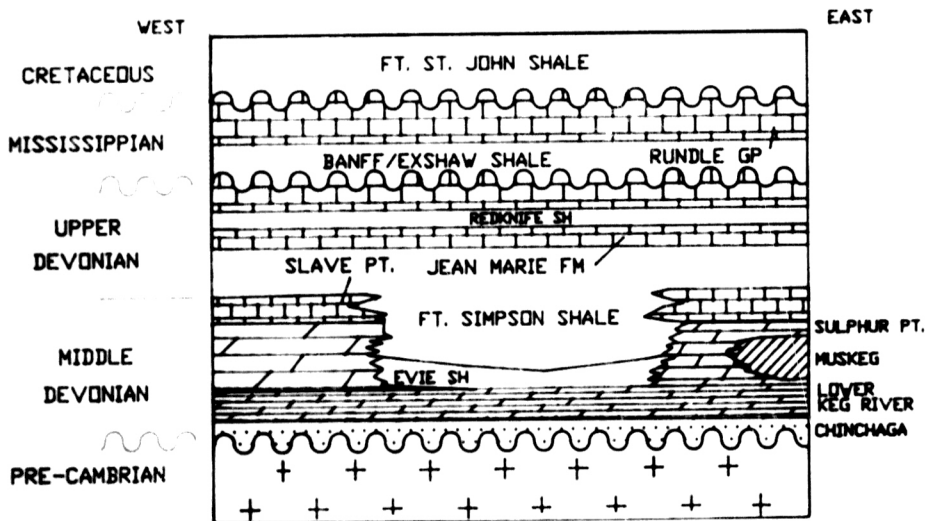


FIGURE 4

#### 4.3 Seismic Data and Interpretation

Only the three 1989 seismic lines as indicated on the seismic base map (Enclosure 1) were used for mapping. In order to identify geological markers for mapping, Line NIR-16 which goes through the Island River D-29 well from the 1985 Northcor survey to the west of the land block was used as a guide.

The data quality is very good. Two geological markers have been picked on the seismic and carried over the area.

Kotcho Marker

Jean Marie Marker

##### 4.3.1 Kotcho Marker

The Kotcho is a strong reflector around 700 ms-800 ms on the seismic data (Enclosures 4, 5, 6). The seismic character is very consistent and easy to pick. The time structure map (Enclosure 2) illustrate regional dip to the south and west. No structural anomaly was observed with the exception of small seismic undulations.

##### 4.3.2 Jean Marie Marker

The Jean Marie is a strong reflector around 900 ms-1000 ms on the seismic data. The synthetic at Island River D-29, did not identify the Jean Marie definitively as a peak or a trough. The peak was picked since both peak and trough are conformable. The time structure map (Enclosure 3) illustrates a regional dip to the south and west. No structural anomaly was observed with the exception of small undulations observed on the seismic lines.

## 5.0 GRAVITY AND MAGNETICS

Gravity and magnetic data were not recorded during the acquisition of these seismic data in the Island River area.

## 6.0 CONCLUSIONS

The 1989 regional seismic program over the E.L. 328 is of good quality. The regional grid only provides a very general trend observation. Two events have been successfully mapped over the surveyed area. The resultant two-way time structure maps indicate general conformable regional dip of the surface from the Jean Marie Marker to the Top of the Kotcho.

The seismic will be used to calibrate the drilling results of the Island Lake N-45 well at a later date.