

9229-S6-7E

BOVIE LAKE, N.W.T.

1989

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2 G

1 REP

PROJECT ACTION SHEET

RESOURCE EVALUATION BRANCH

PROJECT NUMBER 9229-S6-7E

COMPANY SHELL CANADA

REPORT TITLE GEOPHYSICAL SURVEY REPORT ON THE  
BOVIE LAKE AREA, N.W.T.

THE FOLLOWING ACTION HAS BEEN TAKEN

RECEIPT ACKNOWLEDGED            NOT REQUIRED           

REPORTS AND MAPS DATE STAMPED            YES           

REPORTS FOR REVIEW LIST EDITED            YES           

INVENTORY SHEET MADE            YES           

MYLAR            YES           

SHOT POINT TAPE            YES           

REVIEW AND APPROVAL MADE BY

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PROGRAM NUMBER: 9229-86-7E

YEAR: 1989

AREA: N.W.T. BOVIE LAKE

FILED UNDER: SAME

E.A.: 328

OPERATIONS REPORTS:

NUMBER 1

-GEOPHYSICAL SURVEY REPORT ON THE BOVIE LAKE AREA

INTERPRETATION REPORT

NUMBER 0

MAPS

SHOTPOINT MAPS

NUMBER 1

-SEISMIC BASE MAP ENCLOSURE # 1

INTERPRETATION MAPS

NUMBER 2

-TOP TETCHO TO TOP SLAVE POINT ISOCHRON MAP.  
-SLAVE POINT SUBSEA DEPTH.

OTHER

NUMBER 1

-LINE A003000169

SEISMIC SECTIONS

NUMBER 8

MIGRATED STACK REVERSE POLARITY

A003000163  
A003000165  
A003000167  
A003000169

A003000164  
A003000166  
A003000168  
A003000170

GEOPHYSICAL SURVEY REPORT  
ON THE  
BOVIE LAKE AREA, N.W.T.

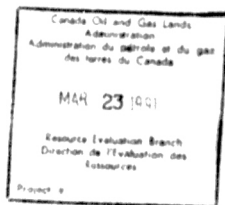
LATITUDE : 60° - 60° 10' N  
LONGITUDE : 122° - 122° 30' W

9229-S6-7E

SUBMISSION TO THE  
GOVERNMENT OF CANADA  
FOR WORK CONDUCTED

IN 1989 BY  
SHELL CANADA LIMITED (OPERATOR)

EXPLORATION ON THE LICENCE E.L. 328  
C.O.G.L.A. REPORT NUMBER 9229-S6-7E



SHELL CANADA LIMITED - EXPLORATION OPERATIONS  
FEBRUARY 1990 D. L. LEAVY

GEOPHYSICAL SURVEY REPORT

C.O.G.L.A. REPORT NUMBER

9229-S6-7E

AREA

BOVIE AND CELIBETA LAKES AREA

YEAR OF WORK

1989

OPERATOR

SHELL CANADA LIMITED

CONTRACTOR

COMPAGNIE GENERALE  
DE GEOPHYSIQUE (CGG)

LAND INTEREST

SHELL CANADA LIMITED 60%  
PETRO-CANADA INC. 20%  
NORTHCOR RESOURCES LTD. 20%

AUTHOR

D. L. LEAVY

DATE

FEBRUARY, 1990

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## **INTRODUCTION**

In 1988, Shell Canada Limited (Shell) obtained from Petro-Canada Inc. and Northcor Resources Ltd. a seismic option to drill on Exploration License 328. This report describes the acquisition, processing, and interpretation of the data obtained to fulfill this option. The acquisition was done by La Compagnie Generale de Geophysique (CGG) during February and March 1989, near the Celibeta and Bovie Lakes, N.W.T. A total of 70 km were shot on E.L. 328 as shown in the locality map, Figure 1. A statistical study of the program is shown in Table 1.

## **ACQUISITION**

The acquisition was done by a 240 channel crew (CGG) and the parameters used are summarized in Table 2. A split spread geometry was used with a maximum source-receiver distance of 2430 m. Both source and station spacing were 20 m. The VIBROSEIS records were correlated in the field. These VIBROSEIS records were used to calculate the refraction static correction. On one line (A003000163) one vibrator was used to generate an impulse every 100 m which was recorded by the full spread. The refraction solution from this data set was compared to the one from the VIBROSEIS correlated records to check for consistency.

The survey control was established using the B.C./N.W.T. Border monuments. The survey was done with a minute reading Wild T16 and Red 1A E.D.M. The relative accuracies maintained were 1:500 for horizontal measurements and 1:2500 for vertical measurements.

## PROCESSING

The processing runstream is detailed in Table 3. Additional comments follow:

- The identifying of the lines and the calculation of refraction statics were done by Seis-Pro Data Consultants Ltd. of Calgary.
- KF filters were applied in both the shot and receiver domains due to strong direct and back-scattered ground roll energy.
- The velocity analysis consisted of semblance measurements on common-velocity stacks of adjacent CDP's.
- The surface-consistent static corrections were derived from cross-correlation in the CDP domain. In the non-surface-consistent trim static derivation, a smoothed mean of the correlations was applied to the traces. This correction was limited to 12 ms and was independent of shot and receiver considerations. To bring out the high frequencies in the zone of interest, a zero phase whitening deconvolution operator was applied.

## INTERPRETATION

The exploration objectives of this survey were to map the shale-out edge of the Slave Point Formation and to find the structural culmination of this edge around the Celibeta High. This edge is shown on seismic section A003000169 (see Enclosure IV). On this section the tops of the Devonian Kotcho, Tetcho, Slave Point and Sulfur Point Formations and the base of the "alpha marker" have been coloured. The edge of the Slave Point Formation is interpreted to be around subsurface point (S.S.P.) 6400 on this section.

The structure map on the top of the Slave Point Formation (see Enclosure II) is based on calculating the depth to that top from the formula:

$$Ds \text{ (Subsea Depth)} = 500 \cdot \frac{Ds \text{ (Time)}}{2} \times 3650 \text{ m/sec}$$

where  $Ds \text{ (Time)}$  is extracted from the seismic sections.

This formula gives values for the top of the Slave Point Formation which are consistent with the tops encountered in well J-13 (-945 m) and I-14 (-893 m)(see Enclosure II).

The structure map shows that within one kilometre of the shale-out edge of the Slave Point Formation, there is an east-west culmination (around S.S.P. 6640 on line A003000169). There does not appear to be enough reversal in the north-south direction, however, to produce a structurally-closed anomaly.

The isochron from the top of the Tetcho Formation to the top of the Slave Point Formation (see Enclosure III) shows some thinning as the shale-out edge of the Slave Point Formation is approached. Some thinning of this interval also occurs as the culmination of the Celibeta High to the north is approached, showing that this structural feature was active during Devonian time.

TABLE 1 STATISTICAL SUMMARY

MOBILIZATION	FEBRUARY 21, 1989
COMMENCEMENT	FEBRUARY 22, 1989
TERMINATION	MARCH 16, 1989
DEMOBILIZATION	MARCH 16, 1989
# TECHNICAL PERSONNEL	2 (ALBERTA RESIDENTS)
# NON-TECHNICAL PERSONNEL	36 (24 from BRITISH COLUMBIA 1 from ALBERTA AND 11 from N.W.T.)
DISTANCE SURVEYED	70 km
TIME LOST	NONE
WEATHER	NORMAL FOR TIME OF YEAR

TABLE 1, STATISTICAL SUMMARY

TABLE 2 ACQUISITION PARAMETERS

INSTRUMENT	SERCEL 368
INSTRUMENT FILTER	178 HZ, 72 db/oct, NO LOW CUT
RECORD LENGTH	3 sec
SAMPLE INTERVAL	2 ms
STATION SPACING	20 m
GEOPHONE	MARK L-28-D
GEOPHONE ARRAY	18 phones over 20 m
TYPICAL SPREAD	
	VP ↓
TRACE 1	120 121 240
	-----
-2430 m	-50 m 50 m 2430 m
VP spacing	20 m
VIBE ELECTRONICS	PELTON ADVANCED 1 MODEL V
CORRELATOR	SERCEL CS2502
VIBRATOR	MERTZ 24 TRUCK MOUNTED VIBE
# OF VIBRATORS	4
SWEEPS PER VP	2
SWEEP LENGTH	16 sec
SWEEP FREQUENCIES	6-74 HZ
TAPER	0.2 sec up and down taper
LISTEN TIME	3 sec
HIGH - FREQ. EMPHASIS	0.2941 db/HZ
SOURCE ARRAY	40 m CENTERED at VB

TABLE 2 ACQUISITION PARAMETERS

TABLE 3 PROCESSING RUNSTREAM

## DEMULTIPLEX

IDENTIFYING AND REFRACTION STATISTICS DONE BY SEIS-PRO

RESAMPLE TO 4 ms

APPLY ANTI-ALIAS FILTER: ZERO PHASE 3 DB DOWN AT 95 HZ

EDIT BAD TRACES

GAIN RECOVERY :  $G(t) = (t \times 1.2) (e^{-0.8 t})$ 

NORMALIZATION : 1 RMS, DERIVE GATE 1000 - 2500 ms

NOISE BLOCK : IF SAMPLE EXCEED SIGNAL BY 18 db

KF FILTER : SHOT AND RECEIVER DOMAIN,  $\pm 2500$  m/sec

DECONVOLUTION : ZERO PHASE WIENER DECONVOLUTION

DERIVE GATE 0-1300 ms

APPLY GATE 0-2400 ms

WITH 0.1% pre-whitening

## VELOCITY ANALYSIS

COMPUTE SURFACE - CONSISTENT STATISTICS : gate: 150-1200 ms

: max. shift 50 ms

COMPUTE NON SURFACE - CONSISTENT STATISTICS : gate: 800-1600 ms

: max shift: 12 ms

APPLY STATICS, NMO CORRECTION, MUTE PATTERN

APPLY ZERO PHASE WHITENING : gate 0-2500 ms

STACK : 120 fold

MIGRATION : KIRCHOFF, 100% STACKING VELOCITIES

RESAMPLE to 1 ms

DISPLAY SCALE: : HORIZONTAL SCALE: 1:20,000

: VERTICAL SCALE: 7.5 in/sec

## MUTE PATTERN

X 1 = 149 m T1 = 4 ms

X 2 = 150 m T2 = 70 ms

X 3 = 375 m T3 = 180 ms

X 4 = 1300 m T4 = 650 ms

X 5 = 1600 m T5 = 1150 ms

X 6 = 2700 m T6 = 2000 ms

X 7 = 3700 m T7 = 3000 ms

DATUM: 500 m CORRECTION VELOCITY 3700 m/s

TABLE 3 PROCESSING RUNSTREAM (Continued)  
 STACKING VELOCITIES : LINE A00300169

SSP 4700		SSP 5870	
Veff	TIME	Veff	TIME
2125	0	2400	0
2326	60	2524	168
2677	184	3183	408
3146	368	3300	528
3332	556	3497	980
3412	788	3700	1184
3671	1056	4228	1500
3824	1152	4578	1932
4156	1364	4719	2164
4375	1716	4776	2236
4436	1816	4835	2304
4493	1892	4989	2452
4596	1972	5025	2500
4758	2152		
4780	2240		
4842	2340		
4950	2500		

SSP 7300		SSP 8610	
Veff	TIME	Veff	TIME
2225	0	2250	0
2629	248	2390	196
3320	460	3170	408
3447	768	3315	448
3752	896	3356	632
4065	1068	3415	744
4398	1236	3464	828
4530	1376	3875	1028
4682	1548	4245	1116
4710	1632	4449	1352
4797	1836	4723	1948
4838	2020	5000	2500
4880	2168		
5066	2500		

TABLE 3 PROCESSING RUNSTREAM