

1995 BOVIE
SOUTHERN NORTHWEST TERRITORIES
REFLECTION SEISMIC REPORT

SUBMISSION TO THE
GOVERNMENT OF CANADA
FOR WORK CONDUCTED
IN 1995 BY
SHELL CANADA LIMITED (OPERATOR)

NATIONAL ENERGY BOARD PROGRAM NUMBER N94B343
(9229 - S6 - 9E)

SHELL CANADA LIMITED

**1995 BOVIE 2D
REFLECTION SEISMIC REPORT**

NEB Program Number:	N94B343 (9229 - S6 - 9E)
Exploration Agreement:	369
Report Name:	1995 BOVIE 2D REFLECTION SEISMIC REPORT
Survey Type:	2D Reflection Seismic
Survey Location:	Latitude 60°00' - 60°20' N Longitude 122°30' - 123°30' E
Name of Program Operator:	Shell Canada Limited
Name of Prime Contractor:	Geco - Prakla - a division of Schlumberger Canada Limited
Specific Interests Involved:	100% Shell Canada Limited
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Signed:	_____
Date:	October 14, 1996

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1.0 INTRODUCTION

Two 2D seismic reflection surveys were conducted for Shell Canada Limited in the Southern Northwest Territories (in the Ft. Liard area) in February and March of 1995 by Geco-Prakla (a division of Schlumberger Canada), Shell party 68, over Shell's exploration licences E.L. 367 and E.L. 369. The program acquired approximately 175 kilometers of 2D seismic reflection data. Figure 2 shows the location of the program in the Bovie area and enclosure 1 shows the location of the new data in both the Netla and Bovie areas. The seismic program around E.L. 367 is included in the logistical statistics, as both programs were shot by the same crew at the same time.

The program was designed to investigate the prospectivity of E.L. 369 in an area where trade lines could not be acquired or were of too poor quality. The topography around the Bovie program consisted of tree-covered rolling hills with some muskeg areas in the west part of the program.

Weather conditions were very favorable during the acquisition of the program and zero days were lost due to weather.

The seismic data was processed in-house by Shell Canada Limited. This new data was loaded into a Landmark workstation for interpretation along with recently and previously purchased, reprocessed trade lines. Location of the recently purchased trade lines and older vintage seismic which were also used is also shown on enclosure 2. Total kilometers shot and purchased are tabulated in Table 1.

A depth map of the top of the Middle Devonian Carbonate was interpreted and then corrected to nearby wells.

2.0 STATISTICAL SUMMARY

2.1 Job History (EL 367 and EL 369)

Feb. 01	- Party Manager arrives onsite
Feb. 08	- Bulldozing begins
Feb. 20	- Surveyors begin
Feb. 27	- Recording begins
Mar. 18	- Bulldozing complete
Mar. 27	- Surveyors complete
Mar. 27	- Recording complete
Mar. 28	- Demobilization

2.2 Weather / Terrain Conditions / Downtime Factors

Weather conditions were very favorable during the acquisition of the program and zero days were lost due to weather.

2.3 Production Statistics (EL 367 and EL 369)

Number of Profiles Shot	5758
Number of Days Production	29
Number of Kilometers recorded	173.0
Number of Weather Days	0
Average Daily Production	6.0 km

2.4 Northern Benefits (EL 367 and EL 369)

Shell Canada's policy is to utilize regional and local suppliers of goods, services and manpower, provided local businesses are competitive and manpower is available. Shell requires that its contractors operate while under contract to Shell in the same manner as Shell would and monitors its contractor performance in these areas. With the exception of the major seismic crew contract, Shell did not solicit bids but negotiated with local contractors to supply support services. Local manpower requirements were coordinated through the local employment representatives. A total of 22 local residents were employed with the seismic contractor, line clearing contractor and catering contractor and made up 36% of the manpower requirements. A total of 6 local businesses provided goods and services to the operations.

3.0 SAFETY PROGRAM

All personnel were required to attend a safety orientation meeting prior to commencement of work. Safety meetings were held weekly for all personnel.

All new personnel and visitors were given safety orientation before going to the field. Copies of all minutes from these meetings were forwarded to Shell.

Safety committees and emergency response plans were set up for the camp. Periodic inspections of the camp and equipment were made by the various committees and any findings were brought forward and discussed at safety meetings to correct any hazards.

All safety related events and statistics were administered by Shell Canada. They have been forwarded to the National Energy Board March 28, 1995.

4.0 SURVEY PROCEDURE

Positioning for the shot and receiver points employed the use of conventional survey techniques. Total Stations were used to obtain survey measurements of all grade breaks and shot/receiver points. Control for the survey was established using GPS receivers. GPS positions were established at the start and end points of all lines. Previously established Federal government control stations were used as the reference and three dimensional positioning (Northing, Easting and Height) were computed. All survey positions were transformed to NAD 27.

Absolute horizontal accuracy obtained was 3 metres radial at 2 sigma, with a relative accuracy between receiver points of 0.1%. Absolute vertical accuracy obtained was 1 metre with a relative accuracy between receiver points of 0.5 meters.

5.0 SEISMIC DATA ACQUISITION

Details of the seismic data acquisition parameters are outlined below. Refer to Figure 1 for the schematic of the acquisition geometry.

INSTRUMENT

Model	IO System II
Number of channels	400
Sample Interval	2 ms
Record Length	5.0 sec
Low-cut Filter	3 Hz. (12 dB / octave)
High-cut Filter	188 Hz.
60 Hz. Notch	Out
Tape Format	SEGD

GEOPHONES

Model	OYO Geospace 20DX
Frequency	14 Hz.
Damping	70%
Pattern	12 inline, centered on station
Spacing	1.8 m deployed evenly over 20 m

5.0 (con't)

SOURCE: VIBROSEIS

Linear sweep
6 - 72 Hz.

ACQUISITION GEOMETRY (refer to figure 1)

receiver interval	20 m
source interval	40 m

6.0 SEISMIC DATA PROCESSING

Listed below is the data processing sequence as applied to the seismic data acquired or reprocessed.

• demultiplex, ident and calculate refraction statics (C & C Systems)

 Datum: 448 metres

 Replacement Velocity: 3050 m/sec

• reformat to Shell format

• resample, anti-alias filter

• apply refraction statics

• gain recovery

• trace edits

• surface consistent residual statics

• KF Filter

• minimum phase deconvolution

• surface consistent residual statics

• velocity analysis

• surface consistent residual statics

• pre stack time migration

• cmp stack

• post stack frequency filtering and normalization

• display : hor scale: 1:20000
 vert scale: 7.5 ips

7.0 INTERPRETATION

All the seismic data was reprocessed and loaded onto a Landmark workstation for interpretation. The main zone of interest is the Middle Devonian carbonate. The event was picked, posted and then hand contoured. The contours were then digitized and converted to depth using the formula:

$$Z = (3795 \text{ m/s} * (\frac{1.78 - T}{2}) \text{ s}) - 2583 \text{ m.}$$

The formula is based on the Bovie J-72 and M-78 wells. The depths are accurate near the two wells, but were in error to the North and West. A correction depth map was hand contoured, digitized and used to produce the final depth map. This technique was used because the layer-stripping method failed to give realistic features in the vicinity of the Bovie Lake fault zone.

The Middle Devonian carbonate structure map (Enclosure 2) shows the Bovie Lake fault zone as a series of en echelon faults downthrown to the west connected by transverse ramps. Associated with the fault zone are anticlines and synclines. A number of anomalies were identified on the upthrown side of the Bovie Lake fault zone:

- 1) Bovie Lake anomaly - the Middle Devonian carbonate encountered in Bovie M-78 is 379 m structurally higher than in Bovie J-72. A combination structure/stratigraphic trap is envisioned rising from south of line 68-91 to an east-west fault north of line 68-88. The anomaly has three way structural closure with the fault forming a lateral seal for northern closure. A potential drilling location was identified on line 68-87 where the Middle Devonian carbonate is interpreted to be 180 m structurally higher than the gas bearing carbonates in Bovie J-72.
- 2) On lines 68-98 and 68-92 several small structural anomalies are identified on the upthrown side of the Bovie Lake fault zone. These low relief features are structurally low relative to Bovie J-72, and are not deemed drillable at this time.

Table 1 Seismic Line Acquisition and Purchase for EL 369

New seismic program shot in 1995, NEB program number 9229-S6-9E

Seismic Line Number	Total kms shot	Allowable kms(within 3kms)
A006800085	15.9	14.8
A006800086	13.45	13.4
A006800087	14.0	14.0
A006800088	11.5	11.5
A006800089	13.1	12.6
A006800090	13.2	13.2
A006800091	13.2	9.6
A006800092	7.85	6.3
A006800098	10.15	10.15
Total	112.25	<u>105.55</u>

Trade Lines Purchased for Reprocessing

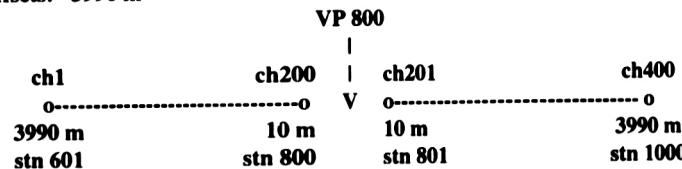
Seismic Line Number	Total kms shot	Allowable kms(within 3kms)
AT00101778	7.2	7.2
AT00301644	48.8	11.0
AT00301645	11.6	8.9
AT00701366	9.3	3.7
AT00701367	12.6	12.1
AT00701368	21.9	19.2
AT00701369	18.0	14.9
AT00701370	10.3	10.3
AT02301370	5.3	5.3
AT02301371	3.9	3.9
AT02301372	9.2	9.2
AT02301373	9.4	9.4
AT02301374	9.2	9.2
AT02301375	17.7	17.7
AT02301393	8.3	6.6
AT10001959	22.0	16.4
AT10002007/2008	41.0	21.0
Total	265.7	<u>186.0</u>

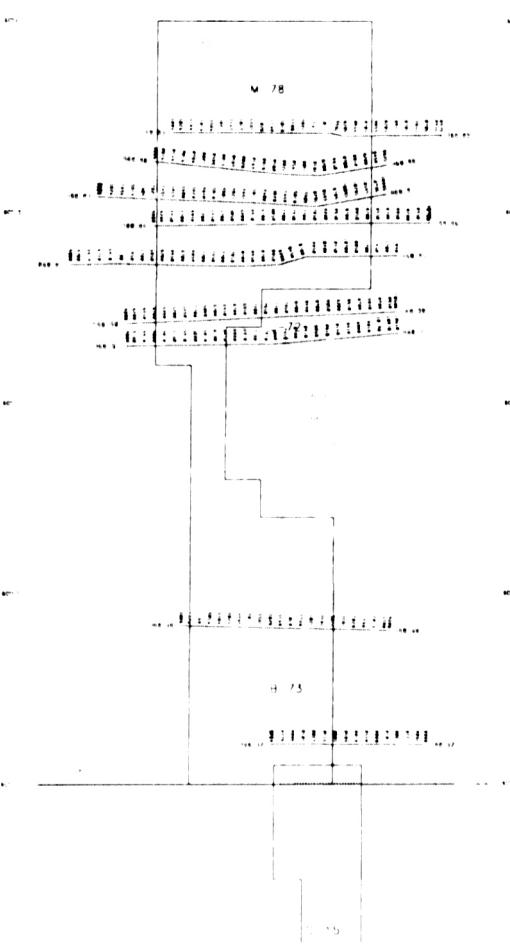
Figure 1 Seismic Line Acquisition Spread Geometry

200 x 200 Split Spread Geometry

Near Offsets: 10 m

Far Offsets: 3990 m





STATUTE MILES: 0000 1 2 STATUTE MILES
KILOMETERS: 0000 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Shell Canada Limited	
Calgary Agents	
E	560 - Box (Southern NW) 1995 2D seismic survey Location Map