NS 24-N11 -1E

FINAL REPORT ON THE

3-D SEISMIC SURVEY ON

PENOBSCOT E.L. 2353 OFFSHORE NOVA SCOTIA

60° - 60° 7'30" W, 44°05' - 44° 15' N

FOR

NOVA SCOTIA RESOURCES (VENTURES) LTD.

UNDER

CNSOPB PROGRAM NO. NS 24-N11-1E

DURING

? 1 ? 6 1

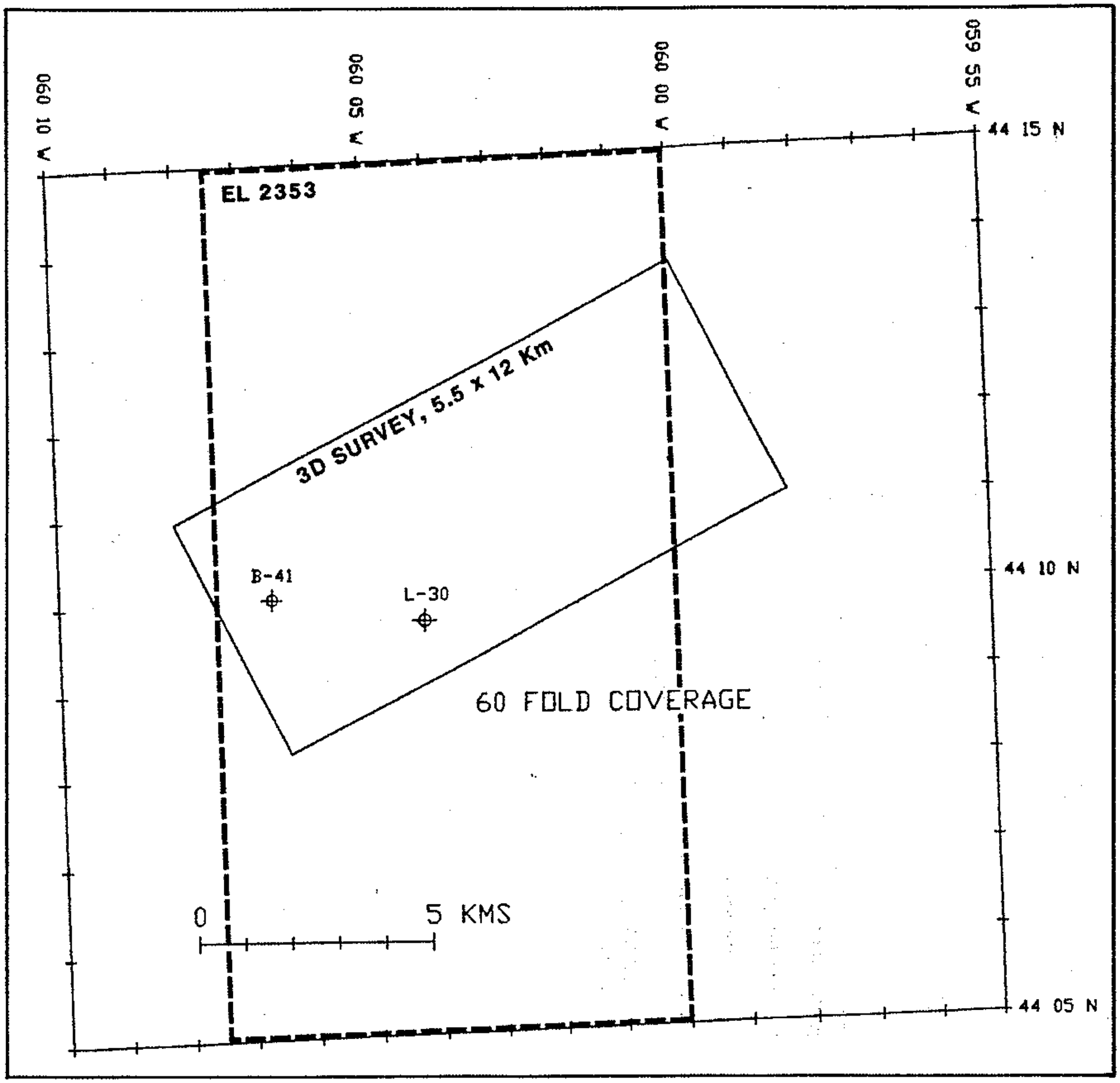
JUNE 3, 1992 - JULY 8, 1992

February, 1992

JDT Crane, P. Geoph.

WJF Clack, P. Geol.

RECEIVED
MAR [illegible] 1992
CANADA-NOVA SCOTIA
OFFSHORE PETRO BOARD



NOVA SCOTIA RESOURCES LTD.

PENOBSCOT EL 2353
3D SURVEY
JUNE 3 TO JULY 8, 1992

J.D.T. CRANE
FEBRUARY, 1992

TABLE OF CONTENTS

Figures

Appendices

Enclosures

Top Petrel Structure in time

Top Petrel Structure in depth (m)

Mid Logan Structure in time

Mid Logan Stucture in depth(m)

"O" Marker Structure in time

"O" Marker Structure in depth(m)

Baccaro Structure in time

Baccaro Structure in depth(m)

"O" marker to Baccaro isopach(m)

Displays

Montage - Section Flattened on "0" Marker

Montage - Fault detail "0" Marker

Seismic Sections Enclosed

Inline and Crossline sections - Normal Polarity, 5 inches per second

Every Tenth line and Every 100th Crossline

Reconstructed sections - Well to Well, Recon 3, Recon L-30

FINAL REPORT

3-D Seismic Survey - Penobscot Area

Introduction

Exploration Licence Number 2353 was issued to Nova Scotia Resources (Ventures) Ltd. under a work commitment of $1.3 MM in June, 1989. This E.L. is located between 44°05’ - 44°15’ W and 60° - 60°07’30" N, offshore Nova Scotia in the vicinity of Sable Island. To satisfy the work requirements NSRL conducted a marine 3D seismic survey (program number NS24-N11-IE) over the central part of the holding from June 3 to July 8, 1991. Finch Resources Inc. was engaged to plan and supervise the program while the actual field work was done by Haliburton Geophysical Services. Processing was undertaken by Western Geophysical Ltd. in Calgary.

The final processed material was loaded onto a Geoquest work station with Zycor support and the interpretation and maps were prepared in Calgary by Finch Resources Ltd. and Bill Clack Consulting.

Field Operations

A detailed report and field operations as compiled by H.G.S. is enclosed as appendix 1, a summary of which follows.

The M/V E.O. Vetter marine seismic recorder collected a total of 1691.1 km of data from June 3 to July 8, 1991, covering a 3D area of 66 sq km in a 5.5 by 12 km grid. Weather and noise problems were minimal and quality was excellent. Four Trisponder stations located on Sable Island provided survey control and a fathometer provided accurate control on the very variable water depths. The 6000% coverage acquired by the 240 channel single 3000m cable was designed primarily for data less than three seconds in depth. Downtime and infill recording was minimal.

Data Processing

The processing was done by Western Geophysical under Finch Resources Ltd. supervision and the final stream is that outlined in the enclosed report, in appendix 2. This program included water replacement statics, 3D DMO, and migration with excellent results.

Seismic Data

The Penobscot Area was previously evaluated by 2D seismic data shot in the 1970's and 1980's. About 20 lines in those surveys were interpreted and a major uplifted and faulted structure was shown to be present and tested by the two Penobscot wells, L-30 and B-41. The outline of this feature was used in planning the 3D survey. A total of 241 field lines were recorded in a NW-SE direction in order to traverse the known features, to tie two wells and to provide the 66 sq Km, 6000%, 3D coverage.

Following processing by Western the data was loaded onto a Geoquest work station with accompanying Zycor facilities. Data was recorded into 6.25 + 50 m Bins, processed and mapped using 12.5 + 50 m bin size.

Identification

Identification of reflections was made using synthetic seismograms for the L-30 and B-41 wells, see Figures 3&4. The correlation between migrated seismic data and the synthetics was particularly good for the Wyandot, Petrel, Mid Missisauga No. 2 sand, and Baccaro (all Peaks). The base of Chalk (Wyandot) was picked at a zero crossing, the Number Five sand at a trough and the "O" marker at the zero crossing below a peak. The "O" carbonate is thin and response is severely affected by tuning to such a degree that with variable frequencies and Wavelet shape, the "O" event appears to vary from a peak on high frequency to a modified trough with lower frequencies. The one stable event appeared to be the zero crossing at the base of a peak, about .010 second below the "O" time. This was picked as the "O" marker.

Mapping

Every north-south, in-line section was picked on the work station and time, interval and depth maps prepared on the following markers. Cross lines were also picked and used where the strike of structure and faults changed near the western side of the survey area.

Wyandot - very reliable peak over entire area
Base of Chalk - fair to good zero crossing pick
Petrel Top - very good peak over entire area
Mid Logan Canyon - fair Peak, locally near L-30
"O" Marker - zero crossing pick below top of "O" good over entire area
No. Five Sand (Mid Missisauga) - fair trough picked in central region.
Baccaro - good peak over entire area.

The major, prospect oriented maps were prepared on a scale of 1:20,000. Back up, and interim, maps and those used in preparation were plotted on 1:50,000 scale and included in Appendix 3.

Depth Conversion

Water corrections were incorporated into the processing whereby both source and receiver water depths were input from fathometer readings. Water velocity of 1500 m/s and replacement velocity of 1900 m/s were used to prepare sections from a sea level datum.

To convert the Petrel Mid Logan, "O" Marker and Baccaro maps to metres sub-sea depth, the layer stacking method was used. Various intervals in time were converted to isopach using the seismic two way time and the isopach observed in the L-30 and B-41 wells. The interval velocities, so derived are as follows:

VELOCITY CALCULATION

Well B-41				Well L-30			
	Depth	2T	ViCalc	Depth	2T	ViCalc	Average Vi
SL	0	0					
			1906m/s			1879	1892 m/s
Wyandot	-828	.869		-837	.891		
			3242m/s			3269	3255 m/s
Base Chalk	-935	.935		-922	.943		
			2133m/s			2228	2180 m/s
Top Petrel	-1063	1.055		-1049	1.057		
			2966m/s			2960	2963 m/s
"O" Marker	-2380	1.943		-2378	1.955		
			4135m/s			4028	4081 m/s
Baccaro	-3391	2.432		-3375	2.450		
Mid Logan	-1716	1.539	(vi 2698)	-1682	1.530(vi 2632), vi Ave 2665		

Each succeeding isopach was hung from the preceding horizon to create depth maps. Misties in depth were noted and corrections due to slight velocity and regional differences were applied after the initial depth map was calculated. The correction gradients across the survey area were established by regional dips and thicknesses as follows. Illustrations of the correctional gradients are shown on Plate 22, in Appendix 3.

* Petrel depth modifications were made based on the overlying Wyandot to Base of Chalk isochon. This trended NE-SW and corrections varied between +1m at B-41 to -4m at L-30.

* Modifications of the "0" Marker depth map were also derived using the same gradient strike as the Petrel. They were +3m at B-41 and -3m at L-30.

In preparing values for the "0" depth map severe distortions were noticed in the zone underlying the upper fault zones, ie. those in the Wyandot Chalk & Petrel. Stacking and time values under these zones are reliable because long offsets provided travel paths to undershoot the upper faults. However in this method of depth conversion vertical stacking of isopachs varied due to the presence or absence of different velocity layers. Three maps were prepared for "0" depth showing the upper fault zone areas as follows:

A: 1:20,000 - "0" Depth values were blanked out under the upper fault zones and machine contouring was prepared across these areas - This map was used for evaluation of prospects.

B: 1:50,000 - This "0" depth map shows the upper fault zone area blanked out, with no contouring in these regions.

* The Baccaro corrections were the largest and were established using the structural E-W trend and required +16m at B-41 and -14m at L-30. This mistie may be due in part to the position of the L-30 well on the very steeply dipping Baccaro event or possibly survey location differences between the 1976 L-30 well and the more accurate trisponder positioning in this survey.

General Geology

The project area lies on the transition zone from the western end of the Abenaki sub-Basin to the northern updip flank of the Sable Sub-Basin (See Figure 6). Wade and MacLean (1990) interpret approximately 12 to 14 km of Triassic/Early Jurassic to Tertiary sedimentary rocks overlying block faulted Lower Palaeozoic metasedimentary and igneous basement. The seismic does not show reliable events below approximately 3.0 seconds (5000 m). Two wells, Petro-Canada/Shell Penobscot L-30 and Shell/Petro-Canada Penobscot B-41, were drilled in the area to depths of -4,237 and -3,414 m in the Misaine and Baccaro Members of the Jurassic Abenaki Formation. Stratigraphic tops in the two wells are given in Figure 2.

Structure in the area consists of two en echelon anticlines. The northeastern anticline is approximately 5 km long, trending east northeast. Regionally it appears to be the western culmination of the salt ridge tested by the Abenaki wells approximately 12 km to the east northeast. The southern anticline, offset 1.5 km from the northeastern anticline, is also approximately 5 km long, but has a slightly more easterly trend, swinging around to east-west at its western end. At the Abenaki Baccaro level the anticlines are complexly faulted, generally down-to-the-north. In the extreme western end of the area there are two sets of down-to-the-south faults trending west northwest.

The anticlines appear to be salt cored, possibly lying at the front of faulted basement highs. Growth and down-to-the-north fault movement, which commenced in Abenaki time or earlier, continued until approximately mid Logan Canyon time. Near the end of Logan Canyon time down-to-the-south let-out faulting commenced, and was active until late Tertiary. These faults are at least in part connected to the earlier faults and reversed the sense of movement on the deeper fault planes.

Penobscot is at the eastern end of the Late Jurassic Baccaro Member carbonate shelf (Figure 6), where the edge is ramp-like and carbonates interfinger with Mic Mac sands and shales and Verrill Canyon basinal shales. Zones of fair to poor porosity occur in the sands and Carbonate in Penobscot L-30. The top of the Baccaro limestone produces an excellent seismic event and is the deepest horizon mapped.

The overlying Late Jurassic to early Neocomian Lower Missisauga/Mic Mac consists of delta front to pro-delta shales and upward coarsening sands. The unit is interpreted by Wade and MacLean (1990) to pinch out not far updip from Penobscot, marking the limit of deepest and most rapid subsidence of the Sable Sub-Basin in front of the south southeasterly progading Mic Mac and Missisauga deltas.

The Middle Missisauga consists of thicker sands and less shale than the Mic Mac/Lower Missisauga. The sands in the lower half of the unit cannot be correlated between L-30 and B-41 (3.25 km) with any certainty, and appear to be distributary channel, mouth bar, and possibly barrier beach sands deposited in a delta margin setting. Repeat Formation Test (RFT) #8 in Penobscot L-30 recovered a trace of oil with water.

The thick sands in the upper half of the Middle Missisauga are much more correlative between L-30 and B-41 (see Figure 1). There is an upward increase in glauconite, shelly fossils, oolites and limestone, reflecting a general transgression which culminated in deposition of the "O" Limestone Marker at the base of the Upper Missisauga. The sands in the upper Middle Missisauga were deposited in marginal delta front (barrier beaches, distributary mouth bar and distributary channel) and shallow shelf environments.

From logs, five sands in this interval contain hydrocarbons. RFT;s in L-30 recovered light oil and condensate and gas from four of the sands (Figure 1). The top of the fifth sand probably represents a hydrocarbon/water transition zone, and is potentially productive higher on the structure. Thick porous sand #5 produces a poor seismic event at the base of a generally fast section of calcareous shale, limestone, siltstone and sandstone, and has been mapped in the southern part of the area.

The "O" Limestone Marker, at the base of the Upper Missisauga, produces a seismic event that has been mapped over the entire area. The overlying thick sands of the Upper Missisauga represent the final and possibly furthest progradation of the Missisauga delta as outlined on Figure 6.

A reduction in sediment supply and regional transgression in Aptian time resulted in deposition of the Naskapi shales over the Missisauga, followed by progradation of Logan Canyon sands and shales. The Logan Canyon consists of thinner, more widespread sands with more shale than the Missisauga, and was deposited in strand plain and shallow shelf environments.

Approximately 390 m above the base of the Logan Canyon a series of thick, coarsening upwards, porous sands produce a seismic event that was mapped in the southeastern part of the area (Mid Logan Reflector).

Starting in early Late Cretaceous time, sediment supply to the entire Scotian shell was greatly reduced, resulting in the deposition of shale, limestone and chalk with minor sand. The Petrel Member limestone, within the argillaceous Dawson Canyon Formation, and the top and bottom of the Wyandot chalk produce seismic events that were mapped.

The latest Cretaceous and Tertiary Banquereau Formation is mainly shale, displaying clinoform seismic events downlapping on the upper surface of the Wyandot Formation.

Interpretation

Maps included in the report are:

1:20,000 Scale (Enclosure)

Top of Petrel - Time and Depth
Mid Logan Canyon - Time and Depth (near and west of L-30)
"O" Marker - Time and Depth
Baccaro - Time and Depth
Mid Missisauga 5 sand - Time and Depth (partial map only) → This map was not generated with Report. This referen[ce] is not accurate MSD July 6/98
"0" Marker - Baccaro Isopach

1:50,000 Scale (See Appendix 3)

1. Wyandot time structure
2. Base Chalk time structure
3. Top Petrel time structure
4. Mid Logan time structure
5. "O" marker time structure
6. 5 Sand time structure
7. Baccaro time structure
8. Top Petrel depth(m)
9. Mid Logan depth(m)
10. "0" Marker Depth(m)
11. Baccaro depth(m)
12. Wyandot to Base Chalk Isochron
13. Base Chalk to a Top of Petrel Isochron
14. Top of Petrel to Mid Logan Isochron
15. Top of Petrel to "O" marker Isochron
16. "O" marker to 5 Sand Isochron
17. "O" marker to Baccaro Isochron
18. 5 Sand to Baccaro Isochron
19. Petrel to "O" marker Isopach
20. "O" marker to Baccaro Isopach
21. Bathymetry
22. Depth adjustments
23. Time Slice 1.960 seconds

Each in-line section was picked and the maps were displayed using a 5 point running average grid smoother.

There is a the striking difference in the time and depth maps both in location of structure, magnitude and relative ties. The Petrel and "O" time maps show B-41 to be structurally higher than at L-30 but with conversion to depth the true elevations are shown.

The main target is considered the several sands immediately below the "O" marker where oil was found in the L-30 well. From the sections, sands one to five are congruent with the "O" structure although some evidence for an asymetrical axis exists on the south side of Fault "A". This would possibly enhance the prospectivness and reserve estimates for the 5 Sand, about 950 feet (290 m) below the "O" marker. Illustrations of these relationships are shown on the composite display called Fault Detail "O" marker, and on the series of cuts called "Flattered on "O" marker", (in enclosure).

An elongated uplift shown on the "O" marker, encloses two areas of interest, one on each side of the major associated fault "A". A third area of interest to the north-east lies on a similar, offset faulted structure. As shown on the enclosed in-line sections movements on the fault are re-current in three stages. As interpreted, the Baccaro was forced upward on the south side by salt flowage against an ancient Precambrian high. Following deposition of the "O" Limestone further upward movement occurred. Finally a load induced reverse movement took place following "O" deposition, active to recent times. The resultant discord in viewing the fault where the "O" and Baccaro have opposite throws is therefore believed valid.

Prospects

Three main areas of interest on three prospective geologic formations were located as follows.

1. South Area

This elongated structure on the south side of fault A shows four way dip with closure of about 8 metres on the Mid Missisauga Sands. These sands found productive in L-30 all show enhanced prospects updip from the well and some proven and possible reserves are anticipated in this structure.

2. North Area

North of Fault A the Mid-Missisauga Sands have been uplifted from zero to 85 meters while the Baccaro is down to the north. The prospect for the Mid Missisauga Sands is developed by three, four way closed features within the uplifted area as well as a possible fault closed high of far greater magnitude and areal extent.

2a. North and South Area Baccaro

The Baccaro porous carbonate and sand prospects are shown as a major closed feature severed by the large "A" fault. Approximately 270 Hectares of closure is shown while the throw on the fault varies between zero and 60 metres. The fault dependent closure may either provide enhanced porosity and permeability in the carbonates or conversely may downgrade the prospect due to lack of seal.

3. Northeast Area

This feature is an elongated, fault bounded high slightly offset from the L-30 area by what is intepreted as a transverse fault in the vicinity of in-line 160. About 180 hectares are enclosed along the 4 km axis and local four way dip closures are present in the Mid-Missauga sand levels. This area also has a risk due to possible poor fault seal.

Near and southwest of L-30 the Petrel structure map illustrates two high closed areas which are untested. The Mid-Logan Canyon structure map in depth shows these closures offset to the east and suggest they have been tested dry by the L-30 well. Prospects for oil accumulations in the upper Logan Canyon Sands are considered slight at this time.

Conclusions:

The various maps supporting the structural plays in the area suggest that a well in A-21 (inline 108, crossline 1388) would effectively test the south structure. Both the Mid-Missisauga sand group and the Baccaro Carbonate and sand formations have a structural culminiation at this location.

CORRELATION OF U. MIDDLE MISSISAUGA AT PENOBSCOT

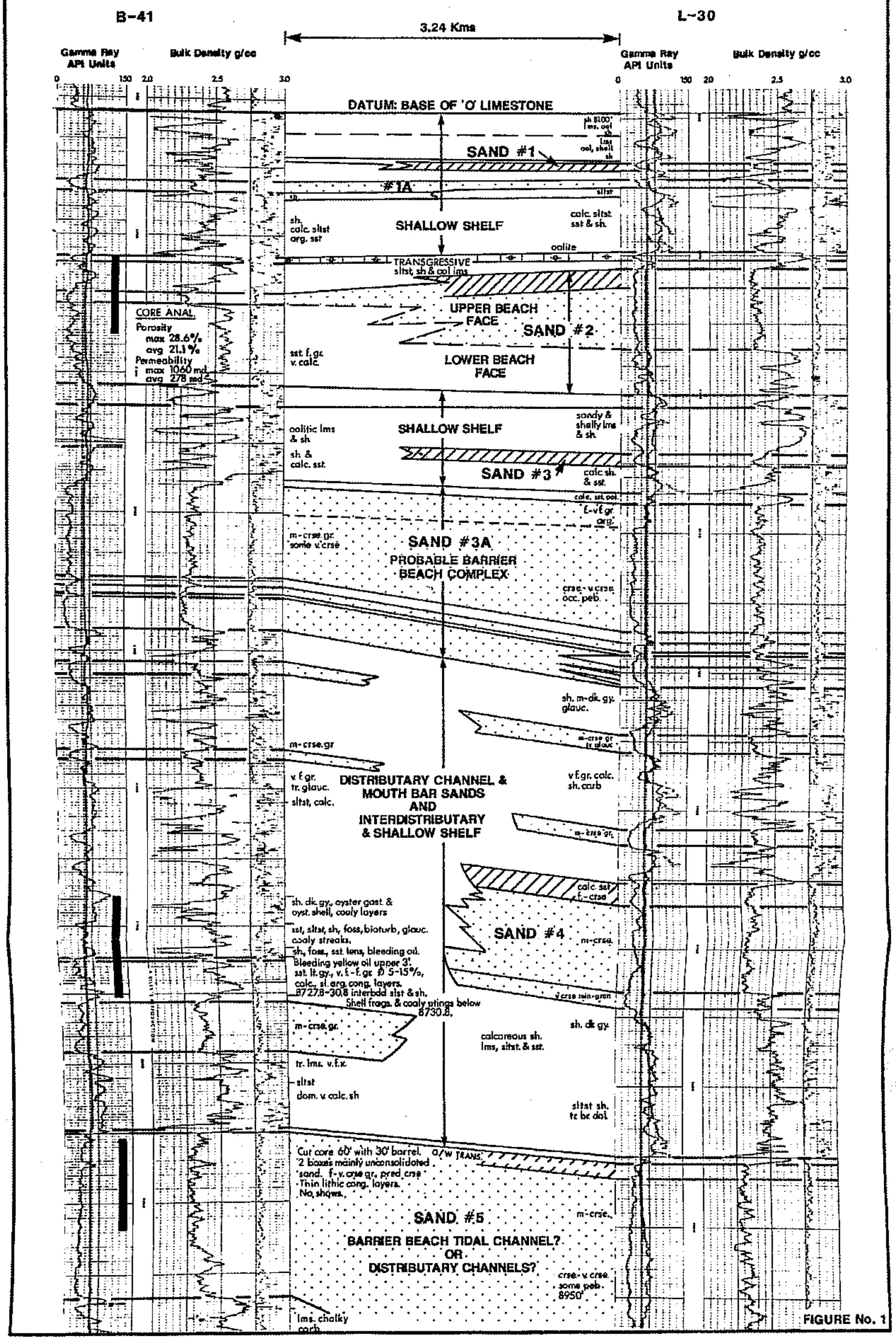


FIGURE No. 1

FORMATION TOPS

Stratigraphic Unit (GR-Sonic)	**Well: Petro-Can Shell Penobscot L-30** Location: 44-09'43.558" N. Lat, 60-09.335" W. KB & RT: 99'(30.2m) & (29.9m) Water Depth: 451' (137.5m)		**Well: Shell Petro-Can Penobscot B-41** Location: 44-10'02.27" N. Lat, 60-06.34.53 W. KB & RT: 99'(30.2m) & 98 (29.9m) Water Depth: 387' (118.0m)	
	Drill Depth (ft. from RT)	Elevation (m)	Drill Depth (ft. from RT)	Elevation (m)
Unknown thickness of Quat/Pleist over Tertiary Banquereau Fm.	549	-137.5	485	-118.0
WYANDOT FORMATION (Main Chalk)	2845	-867.3	2817	-828.8
Transitional Claystone and argillaceous chalk	3086	-910.7	3144	-928.4
DAWSON CANYON FM. (GSC picked 3122' in L-30, Equiv. in B-41 @ 3126')	3230	-954.6	3232	-955.2
PETREL MEMBER	3539	-1048.8	3586	-1063.1
LOWER DAWSON CANYON FORMATION	3592	-1065.0	3653	-1083.6
LOGAN CANYON FORMATION	3730	-1107.0	3796	-1127.2
Mid Logan Canyon Seismic Pick (Approx. Reservoir @ Cohasset)	5616	-1681.9	5728	-1716.0
NORMAL FAULTS IN B-41 (6975' - 7028 - Approx. 24m missing)			6975	-2096.1
NASKAPI MEMBER	7018	-2109.2	7031	-2113.2
UPPER MISSISAUGA FORMATION	7386	-2221.4	7372	-2217.1
MIDDLE MISSISAUGA FM. (TOP "O" LIMESTONE MRKR.)	7900	-2378.0	7908	-2380.5
BASE "O" LIMESTONE MARKER	8099	-2438.7	8110	-2442.1
Sand #1 (1.5m in L-30, Tight Siltstone in B-41)	8130	2448.2	8142	-2451.8
Sand #2 (18.3m in L-30, 2.7m in B-41)	8212	-2473.1	8245	-2483.2
Sand #3 (2.7m in L-30, Absent in B-41)	8345	-2513.7		
Sand #4 (29.9m in L-30, Absent in B-41)	8656	-2608.5		
Sand #5 (59.4m in L-30, 35.4m in B-41)	8856	-2669.4	8850	-2667.6
LOWER MISSISAUGA/MIC MAC	10468	-3160.8	10468	-3160.8
ABENAKI FORMATION - BACCARO MEMBER	11169	-3374.4	11224	-3391.2
MIC MAC FORMATION TONGUE	11278	-3407.7		
MIDDLE BACCARO MEMBER	11434	-3455.2		
VERRILL CANYON FORMATION TONGUE	12128	-3666.7		
LOWER BACCARO MEMBER	13007	-3934.7		
ABENAKI FORMATION - MISAINE MEMBER	13492	-4082.5		
TOTAL DEPTH	14000	-4237.5	11300	-3414.4

FIGURE 2

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT L-30
SYNTHETIC SEISMOGRAM
INLINE SECTION 77

FEBRUARY, 1992 J.D.T. CRANE

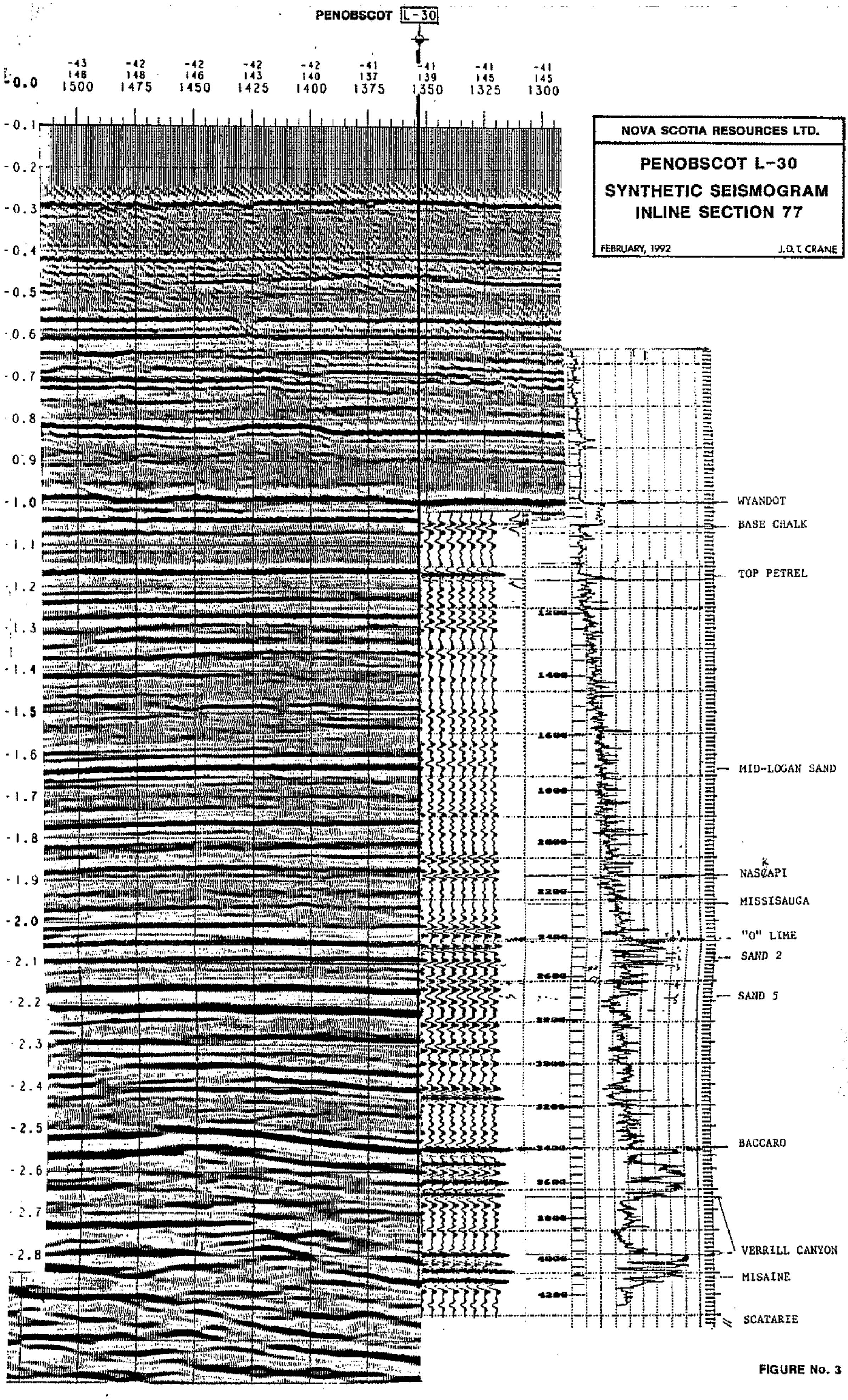


FIGURE No. 3

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT B-41
SYNTHETIC SEISMOGRAM
INLINE SECTION 24

FEBRUARY, 1992 J.D.T. CRANE

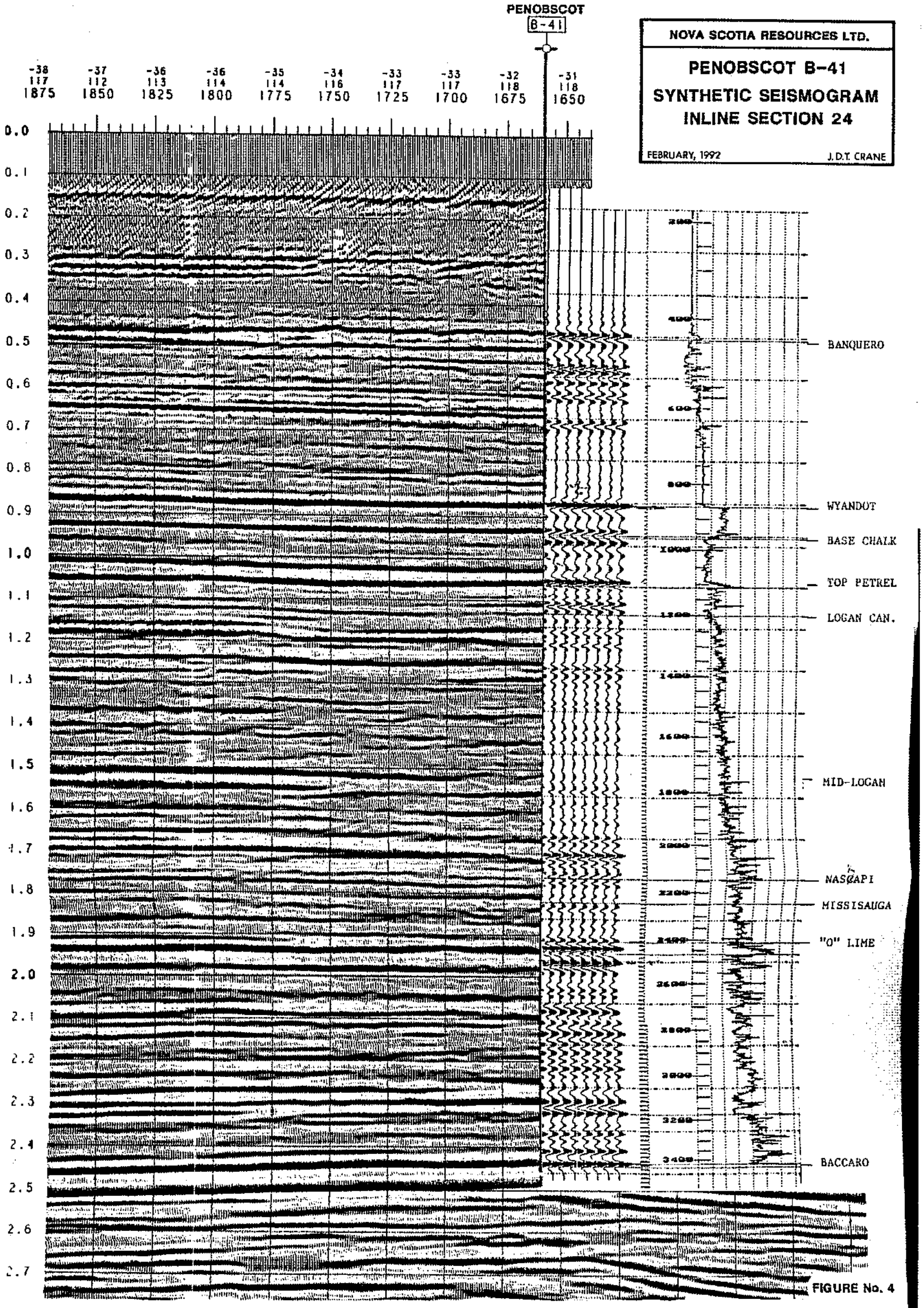
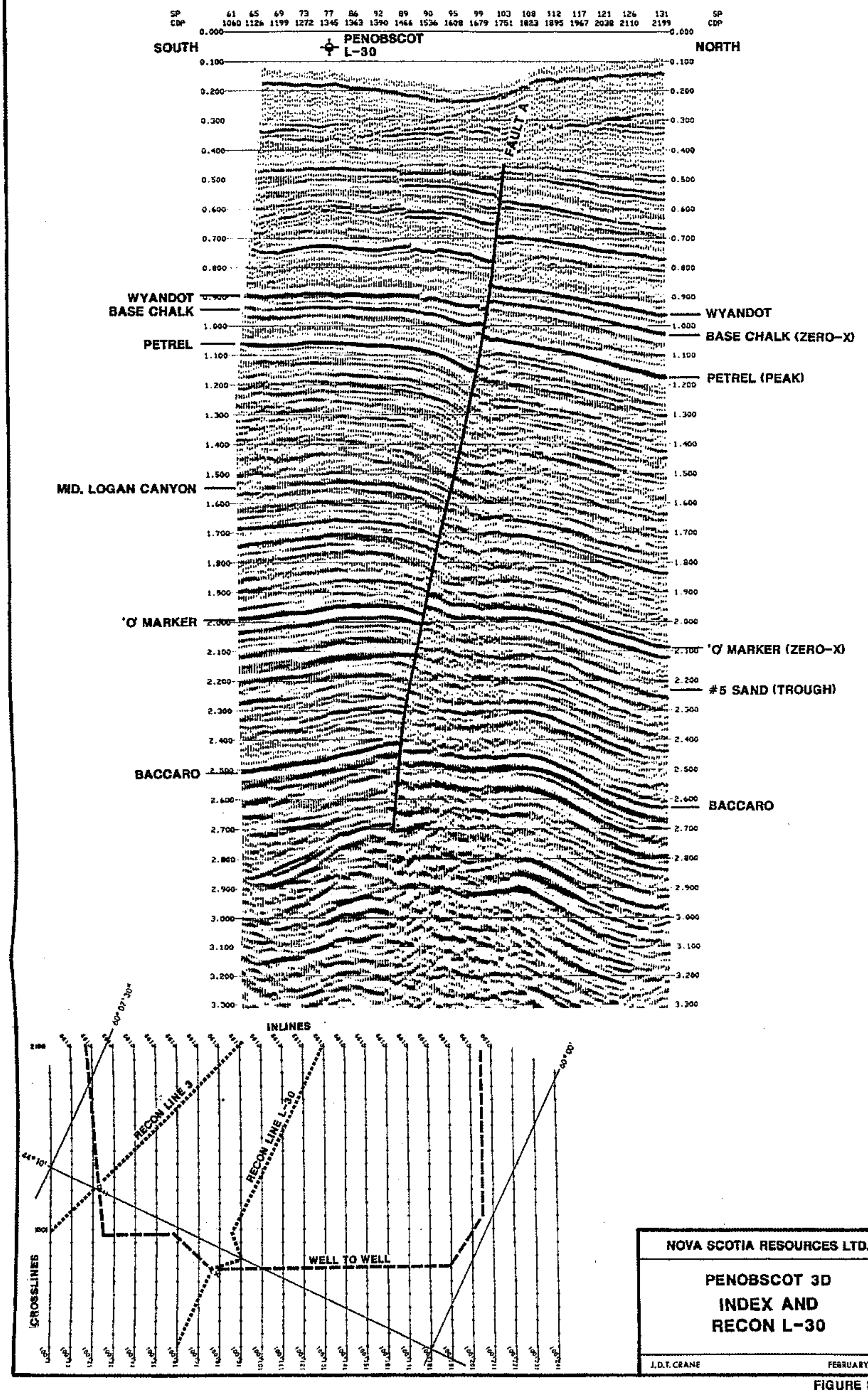


FIGURE No. 4

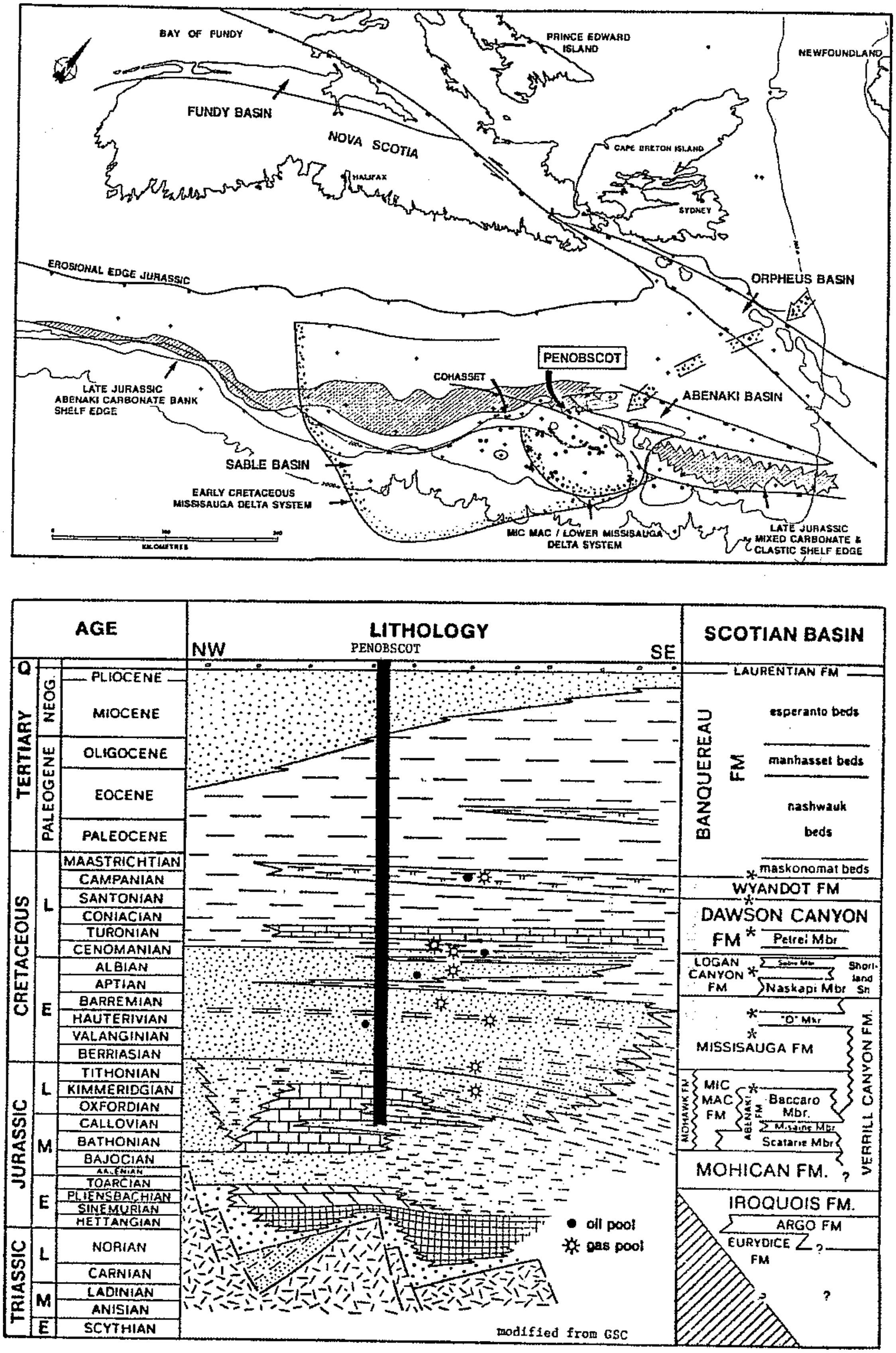


NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D
INDEX AND
RECON L-30

J.D.T. CRANE
FEBRUARY, 1992

FIGURE No. 5



Geologic setting and generalized lithology and stratigraphy of Penobscot Prospect

* Mapped seismic events

FIGURE NO.6

APPENDIX I

HGS FIELD REPORT

FINAL REPORT
HGS CANADA LTD.
SABLE ISLAND
PENOBSCOT 3-D
M/V EDWARD O. VETTER
1991

TABLE OF CONTENTS

I INTRODUCTION

HGS Canada Ltd., conducted a marine seismic survey in the Sable Island area. The M/V Edward O. Vetter, Party No. 2472 collected a total of 1691.100 km of seismic reflection data during the period of June 1, 1991 to July 8, 1991.

II EQUIPMENT

A. VESSEL

The M/V Edward O. Vetter, a Canadian flag vessel of 56.4 m in length and 997.18 gross tons, was engaged in this single vessel operation.

For vessel details and crew lists refer to Appendices 1, 2 and 3.

B. RECORDING INSTRUMENTS

An HGS TITAN 1000 real time recording system was used to record 240 channels of data from the Digital Fiber Optic streamer. Data was sampled at 2 msec and recorded through 128 Hz 72 dB/octave high cut and 8 Hz 18 dB/octave low cut filters. Data was recorded for 6 s on three Storage Tek 1950 tape drives in SEG D, GCR format at 6250 BPI.

Recording instrument details are found in Appendix 4, 4A, 4B and 4C.

C. STREAMER

A 3000 m 240 channel Digital Fiber Optic streamer with 12.5 m group intervals, each containing 32 dish hydrophones, was used. The cable was towed at an average depth of 8m - 10m.

Streamer details and diagrams are presented in Appendices 5 and 6.

D. SOURCE

The energy source for this survey consisted of a four string gun array comprising 57 active airguns with a total capacity of 59.25 L(3616 cubic inches) and 7 spares with a volume of 13.96 L (852 cubic inches).

The timing and firing of the guns was controlled by a Texas Instruments Airgun Controller (TIGER II) system. This system continually adjusted the firing pulse to each gun causing the whole array to fire simultaneously. Individual gun firing delays were continuously controlled to maintain array timing within +/- 2 ms of the operational 51.2 ms. The status of the entire array and individual guns was logged on the ADL (Automatic Data Logger), and monitored on a VDU while data collection took place.

Source details and diagrams are presented in Appendices 7.

F. NAVIGATION

Navigation for this program was provided by Nortech Surveys Ltd.

Primary navigation was a Trisponder Radio Positioning system. The Primary Master system, (Ship's unit), consisted of a Digital Distance Measuring Unit (DDMU), Antenna Cable, Trisponder Beacon and Antenna. Four (4) base station (slave units) were located on Sable Island.

A complete secondary master system was also calibrated and used as back-up.

Survey instrument details found in Appendix 9.

II OPERATIONS

After a brief resupply, the M/V Edward O. Vetter departed Halifax at 20:30 GMT on June 1, 1991 for the prospect area. At 08:00 GMT on June 2, 1991 the vessel was 50 kilometres from the centre of the prospect.

The crew began deployment of the streamer at 09:30 GMT. Trouble shooting and ballasting of the streamer continued until the morning of June 3, 1991 at which time the streamer checked good.

Problems with the navigation system delayed the start of the program. Trisponders located on Sable Island were "coming in and out". At 22:34 on June 3, 1991 the first line (P91-1270) was started.

Data acquisition continued reasonably uninterrupted until June 13th, at which time navigation interruptions were experienced. It was determined that fog in the area was the cause of the signal interruptions from the transponders located on Sable Island. Directional antennas were sent out to Sable Island to replace the Omni antennas on the trisponder units. After some weather delays on June 15th, recording resumed on June 16th.

On June 27th, the crew of the M/V Edward O. Vetter pulled the streamer onboard and departed for Halifax to resupply. At the completion of the resupply the vessel returned to the prospect area and resumed operations on June 29th. The Penobscot 3D was completed on July 8, 1991.

PRODUCTION STATISTICS

Total Kilometres	1691.100
Total Hours	912.00
Recording Hours	213.98
Line Change Hours	343.48
Km / Total Hour	1.85
Km / Recording Hour	7.90
Km / Record & L/C Hour	3.03
Km / Total Day	44.50
Km / Recording Day	189.67
Km / Record & L/C Day	72.81

Total Pops	79753
Pops / Total Hour	87.45
Pops / Recording Hour	372.71
Pops / Record & L/C Hour	143.06
Pops / Total Day	2098.76
Pops / Recording Day	8945.10
Pops / Record & L/C Day	3433.56

TIME STATISTICS

			Hours	%
Recording Activities			213.98	23.5
Line Change			343.48	37.7
Travel			41.88	4.6
Supply			45.92	5.0
Streamer Handling			20.33	2.2
Airgun Handling			17.34	1.9
Weather			25.05	2.7
Other Downtime	Hours	%	204.02	22.4
Seismic Interfere	1.23	0.6		
Vessel	2.78	1.4		
Navigation	75.60	37.1		
CMS	57.74	28.3		
Airgun & System	1.97	1.0		
Streamer	25.00	12.3		
Instruments	28.33	13.9		
Other	11.37	5.6		
Total	**204.02**	**100.0**		
TOTAL			**912.00**	**100.0**

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.	ACQUIRED LST S.P.	CHARGED 1ST S.P.	CHARGED LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
06-01																	
"											20.50						20.50
"										3.50							3.50
																	24
06-02																	
"										9.50							9.50
"												6.50					6.50
"																8.00 STM	8.00
																	24
06-03																	
"																0.68 STM	0.68
"																6.65 NAV	6.65
"																3.67 OTH	3.67
"																2.48 OTH	2.48
"																1.72 OTH	1.72
"																7.37 NAV	7.37
"	1270	101	381	101	381	281	7.025	0.83									0.83
"									0.60								0.60
																	24
06-04																	
"									0.72								0.72
"	1341	314	33	314	33	282	7.050	0.77									0.77
"									1.22								1.22
"	1271	101	382	101	382	282	7.050	0.77									0.77
"									1.20								1.20
"	1340	341	60	341	60	282	7.050	0.77									0.77
"									1.22								1.22
"	1272	101	382	101	382	282	7.050	0.78									0.78
"									1.43								1.43
"	1339	314	33	314	33	282	7.050	0.78									0.78
"									1.30								1.30
"	1273	101	382	101	382	282	7.050	0.73									0.73
"									1.15								1.15
"	1338	314	33													1.93 INS	1.93
"	1280	101	382	101	382	282	7.050	0.75									0.75
"									1.22								1.22
"	1338A	314	33	314	33	282	7.050	0.75									0.75
"									1.18								1.18
"	1274	101	382	101	382	282	7.050	0.77									0.77
"									0.98								0.98
"	1337	314	62													2.16 INS	2.16
"	1275	101	382	101	382	282	7.050	0.75									0.75
"									0.67								0.67
																	24

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED			CHARGED			TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT		HOURS
		1ST S.P.		LST S.P.	1ST S.P.		LST S.P.													
06-05			-			-					0.60									0.60
″	1371A	314	-	33		-												2.45	CMS	2.45
″	1337B	341	-	34	291	-	34	258	6.450	0.77										0.77
″			-			-					1.17									1.17
″	1276	101	-	382	101	-	382	282	7.050	0.77										0.77
″			-			-					1.28									1.28
″	1336	314	-	33	314	-	33	282	7.050	0.77										0.77
″			-			-					1.20									1.20
″			-			-												1.82	INS	1.82
″	1277	101	-	382	101	-	382	282	7.050	0.77										0.77
″			-			-					0.50									0.50
″			-			-												1.23	INT	1.23
″	1335	314	-	168		-												2.45	INS	2.45
″	1335A	314	-	33	314	-	33	282	7.050	0.75										0.75
″			-			-					1.33									1.33
″	1278	101	-	382	101	-	382	282	7.050	0.83										0.83
″			-			-					1.23									1.23
″	1334	314	-	33	314	-	33	282	7.050	0.77										0.77
″			-			-					1.08									1.08
″			-			-										2.23				2.23
″			-			-														24
06-06			-			-										3.07				3.07
″	1279	101	-	382	101	-	382	282	7.050	0.80										0.80
″			-			-					1.24									1.24
″	1333	314	-	33	314	-	33	282	7.050	0.78										0.78
″			-			-					1.32									1.32
″	1269	101	-	382	101	-	382	282	7.050	0.77										0.77
″			-			-					1.27				—					1.27
″	1332	314	-	33	314	-	33	282	7.050	0.73										0.73
″			-			-					1.27									1.27
″	1268	101	-	382	101	-	382	282	7.050	0.75										0.75
″			-			-					1.25									1.25
″			-			-									0.17					0.17
″	1331	314	-	33		-												1.77	INS	1.77
″	1267	101	-	382	101	-	382	282	7.050	0.90										0.90
″			-			-					1.43									1.43
″	1331A	314	-	33	314	-	33	282	7.050	0.77										0.77
″			-			-					1.37									1.37
″			-			-												1.73	CMS	1.73
″	1266	101	-	382	101	-	382	282	7.050	0.75										0.75
″			-			-					1.00									1.00

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.	ACQUIRED LST S.P.	CHARGED 1ST S.P.	CHARGED LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT		HOURS
06-06	1330	314 -	33	288 -	33	256	6.400	0.75										0.75
"		-		-					0.11									0.11
"		-		-														24
06-07		-		-					0.82									0.82
"	1265	101 -	382	101 -	382	282	7.050	0.76										0.76
"		-		-					1.30									1.30
"		-		-									0.33					0.33
"	1329	314 -	158	-												1.96	VSL	1.96
"	1264	101 -	382	101 -	382	282	7.050	0.76										0.76
"		-		-					1.07									1.07
"	1329A	314 -	33	314 -	33	282	7.050	0.73										0.73
"		-		-					1.20									1.20
"	1263	101 -	382	101 -	382	282	7.050	0.73										0.73
"		-		-					1.22									1.22
"	1328	314 -	33	314 -	33	282	7.050	0.75										0.75
"		-		-					1.27									1.27
"	1262	101 -	382	101 -	382	282	7.050	0.77										0.77
"		-		-					1.18									1.18
"	1327	314 -	33	314 -	33	282	7.050	0.73										0.73
"		-		-					1.30									1.30
"	1261	-		-												4.22	INS	4.22
"	1261A	-		-														----
"	1261B	101 -	382	101 -	382	282	7.050	0.77										0.77
"		-		-					1.20									1.20
"	1326	314 -	101	314 -	33	282	7.050	0.75										0.75
"		-		-					0.18									0.18
"		-		-														24
06-08		-		-					0.98									0.98
"	1260	101 -	382	101 -	382	282	7.050	0.75										0.75
"		-		-					1.18									1.18
"	1325	314 -	33	314 -	33	282	7.050	0.75										0.75
"		-		-					1.17									1.17
"	1259	101 -	382	101 -	382	282	7.050	0.73										0.73
"		-		-					1.15									1.15
"	1324	314 -	33	314 -	33	282	7.050	0.73										0.73
"		-		-					1.20									1.20
"	1258	101 -	382	101 -	382	282	7.050	0.77										0.77
"		-		-					1.30									1.30
"	1323	314 -	33	314 -	33	282	7.050	0.72										0.72
"		-		-					1.23									1.23
"	1257	101 -	382	101 -	382	282	7.050	0.73										0.73

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED		CHARGED		TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
		1ST S.P.	LST S.P.	1ST S.P.	LST S.P.												
06-08																	
″									1.20								1.20
″	1322	314 -	33	314 -	33	282	7.050	0.73									0.73
″									1.23								1.23
″	1256	101 -	382	101 -	382	282	7.050	0.77									0.77
″									1.22								1.22
″	1321	314 -	33	314 -	33	282	7.050	0.77									0.77
″									1.25								1.25
″	1255	101 -	382	101 -	382	282	7.050	0.77									0.77
″									1.25								1.25
″	1320	314 -	33	314 -	33	282	7.050	0.73									0.73
″									0.69								0.69
																	24
06-09																	
″									0.48								0.48
″	1254	101 -	136													1.97 CMS	1.97
″	1254A	101 -	382	101 -	382	282	7.050	0.73									0.73
″									1.18								1.18
″	1319	314 -	33	314 -	33	282	7.050	0.77									0.77
″									1.23								1.23
″	1253	101 -	382	101 -	382	282	7.050	0.74									0.74
″									1.20								1.20
″	1318	314 -	33	314 -	33	282	7.050	0.75									0.75
″									1.17								1.17
″	1252	101 -	381	101 -	381	281	7.025	0.75									0.75
″									1.18								1.18
″	1317	314 -	33	314 -	33	282	7.050	0.73									0.73
″									1.37								1.37
″	1251	101 -	382	101 -	382	282	7.050	0.73									0.73
″									1.23								1.23
″	1316	314 -	34	314 -	33	282	7.050	0.75									0.75
″									1.27								1.27
″	1250	101 -	9999													2.27 INS	2.27
″	1250A	101 -	382	101 -	382	282	7.050	0.75									0.75
″									1.18								1.18
″	1315	314 -	33	314 -	33	282	7.050	0.77									0.77
″									0.80								0.80
																	24
06-10																	
″									0.47								0.47
″	1249	101 -	321	101 -	381	281	7.025	0.72									0.72
″									1.22								1.22
	1314	314 -	33	314 -	33	282	7.050	0.75									0.75

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.	ACQUIRED LST S.P.	CHARGED 1ST S.P.	CHARGED LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
06-10		-		-					1.18								1.18
"	1248	101 -	381	101 -	381	281	7.025	0.75									0.75
"		-		-					1.25								1.25
"	1313	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.22								1.22
"	1247	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.23								1.23
"	1312	314 -	33	314 -	33	282	7.050	0.72									0.72
"		-		-					1.25								1.25
"	1246	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.27								1.27
"	1311	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.30								1.30
"		-		-									0.47				0.47
"	1245	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.30								1.30
"		-		-									0.50				0.50
"	1310	314 -	33	314 -	33	282	7.050	0.77									0.77
"		-		-					1.23								1.23
"	1244	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.25								1.25
"	1309	314 -	32	314 -	32	283	7.075	0.73									0.73
"		-		-					0.04								0.04
																	24
06-11		-		-					1.25								1.25
"	1243	101 -	382	101 -	382	282	7.050	0.80									0.80
"		-		-					1.23								1.23
"	1308	314 -	199	-												2.02 INS	2.02
"	1242	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.72								1.72
"	1308A	314 -	33	314 -	33	282	7.050	0.75									0.75
"		-		-					1.20								1.20
"	1241	101 -	382	101 -	382	282	7.050	0.72									0.72
"		-		-					1.20								1.20
"	1307	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.27								1.27
"	1240	101 -	382	101 -	382	282	7.050	0.77									0.77
"		-		-					1.23								1.23
"	1306	314 -	33	314 -	33	282	7.050	0.77									0.77
"		-		-					1.25								1.25
"		-		-									0.50				0.50

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.		CHARGED 1ST S.P.		TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
		1ST S.P.	LST S.P.	1ST S.P.	LST S.P.												
06-11	1239	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.28								1.28
"	1305	314 -	311	-												2.05 NAV	2.05
"	1238	101 -	382	101 -	382	282	7.050	0.76									0.76
"		-		-					1.00								1.00
"		-		-													24
06-12		-		-					0.22								0.22
"	1305a	314 -	211	-												1.97 GUN	1.97
"	1237	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.25								1.25
"	1305b	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.25								1.25
"	1236	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.27								1.27
"		-		-									0.33				0.33
"	1304	314 -	33	314 -	33	282	7.050	0.75									0.75
"		-		-					1.42								1.42
"		-		-									0.47				0.47
"	1235	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.27								1.27
"	1303	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.45								1.45
"		-		-									0.55				0.55
"	1234	101 -	382	101 -	382	282	7.050	0.77									0.77
"		-		-					1.47								1.47
"	1302	314 -	210	-												2.30 NAV	2.30
"	1233	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.23								1.23
"	1302a	314 -	33	314 -	33	282	7.050	0.74									0.74
"		-		-					0.85								0.85
"		-		-													24
06-13		-		-					0.33								0.33
"	1232	101 -	382	101 -	382	282	7.050	0.72									0.72
"		-		-					1.35								1.35
"	1301	314 -	33	314 -	33	282	7.050	0.75									0.75
"		-		-					1.28								1.28
"	1231	101 -	196	-												19.57 NAV	19.57
"	1231A	101 -	186	-													---
"	1231C	314 -	164	-													---
"		-		-													24
"		-		-													

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.		ACQUIRED LST S.P.	CHARGED 1ST S.P.		CHARGED LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
06-14			-			-					1.23								1.23
"	1300A	314	-	33	314	-	33	282	7.050	0.73									0.73
"			-			-					1.22								1.22
"	1231D	101	-	382		-												2.17 NAV	2.17
"	1299	314	-	33	314	-	33	282	7.050	0.73									0.73
"			-			-					1.55								1.55
"	1161C	101	-	382		-												16.37 NAV	16.37
"			-			-													24
06-15			-			-										17.50			17.50
"			-			-								3.33					3.33
"			-			-									3.17				3.17
"			-			-													24
06-16			-			-									0.60				0.60
"	1298	314	-	33	314	-	33	282	7.050	0.72									0.72
"			-			-					1.20								1.20
"	1231E	101	-	382	101	-	382	282	7.050	0.73									0.73
"			-			-					1.25								1.25
"	1297	314	-	33	314	-	33	282	7.050	0.73									0.73
"			-			-					1.27								1.27
"			-			-												0.82 OTH	0.82
"	1230	101	-	382	101	-	382	282	7.050	0.77									0.77
"			-			-					1.20								1.20
"	1296	314	-	33	314	-	33	282	7.050	0.73									0.73
"			-			-					1.33								1.33
"	1229	101	-	382	101	-	382	282	7.050	0.75									0.75
"			-			-					1.18								1.18
"			-			-												0.22 CMS	0.22
"			-			-												8.92 STR	8.92
"	1295	314	-	33	314	-	33	282	7.050	0.73									0.73
"			-			-					0.85								0.85
"			-			-													24
06-17			-			-					0.35								0.35
"	1228	101	-	381	101	-	381	281	7.025	0.73									0.73
"			-			-					1.25								1.25
"			-			-												2.17 CMS	2.17
"			-			-												1.87 NAV	1.87
"	1227	101	-	381	101	-	381	281	7.025	0.73									0.73
"			-			-					1.25								1.25
"	1294	314	-	33	314	-	33	282	7.050	0.75									0.75

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.	ACQUIRED LST S.P.	CHARGED 1ST S.P.	CHARGED LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT		HOURS
06-17		-		-					1.27									1.27
"	1226	101 -	382	101 -	382	282	7.050	0.77										0.77
"		-		-					1.25									1.25
"	1293	314 -	33	314 -	33	282	7.050	0.75										0.75
"		-		-					1.23									1.23
"	1225	101 -	382	101 -	382	282	7.050	0.74										0.74
"		-		-					1.22									1.22
"	1292b	314 -	33	314 -	33	282	7.050	0.72										0.72
"		-		-					1.30									1.30
"		-		-												1.80	CMS	1.80
"	1224	101 -	382	101 -	382	282	7.050	0.77										0.77
"		-		-					1.23									1.23
"	1291	314 -	34	314 -	34	281	7.025	0.77										0.77
"		-		-					1.08									1.08
																		24
06-18		-		-					0.07									0.07
"		-		-												1.83	CMS	1.83
"	1223	101 -	382	101 -	382	282	7.050	0.77										0.77
"		-		-					1.23									1.23
"	1290	314 -	33	314 -	33	282	7.050	0.73										0.73
"		-		-					1.22									1.22
"	1222	101 -	158	-												2.02	INS	2.02
"	1222a	101 -	381	101 -	381	281	7.025	0.73										0.73
"		-		-					1.27									1.27
"	1289	314 -	33	314 -	33	282	7.050	0.75										0.75
"		-		-					1.20									1.20
"	1221	101 -	129	-												1.75	STR	1.75
"	1221a	101 -	381	101 -	381	281	7.025	0.73										0.73
"		-		-					1.22									1.22
"	1288	314 -	33	314 -	33	282	7.050	0.73										0.73
"		-		-					1.20									1.20
"	1220	101 -	382	101 -	382	282	7.050	0.75										0.75
"		-		-					1.17									1.17
"		-		-												1.75	CMS	1.75
"	1287	314 -	33	314 -	33	282	7.050	0.75										0.75
"		-		-					1.45									1.45
"	1219	101 -	381	101 -	381	281	7.025	0.68										0.68
																		24

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.		ACQUIRED LST S.P.	CHARGED 1ST S.P.		CHARGED LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT		HOURS
06-19			-			-					1.22									1.22
"	1286	314	-	33	314	-	33	282	7.050	0.73										0.73
"			-			-					1.20									1.20
"	1218	101	-	382	101	-	382	282	7.050	0.75										0.75
"			-			-					1.18									1.18
"	1285	314	-	33	314	-	33	282	7.050	0.73										0.73
"			-			-					1.17									1.17
"	1217	101	-	381	101	-	381	281	7.025	0.73										0.73
"			-			-					1.17									1.17
"	1284	314	-	33	314	-	33	282	7.050	0.73										0.73
"			-			-					1.10									1.10
"	1216	101	-	381	101	-	381	281	7.025	0.73										0.73
"			-			-					1.22									1.22
"	1283	314	-	33	314	-	33	282	7.050	0.72										0.72
"			-			-					1.13									1.13
"	1215	101	-	382	101	-	382	282	7.050	0.75										0.75
"			-			-					1.20									1.20
"	1282	314	-	33	314	-	33	282	7.050	0.73										0.73
"			-			-					1.18									1.18
"	1214	101	-	382	101	-	382	282	7.050	0.73										0.73
"			-			-					1.15									1.15
"	1281	314	-	33	314	-	33	282	7.050	0.75										0.75
"			-			-					1.12									1.12
"	1213	101	-	382	101	-	382	282	7.050	0.75										0.75
"			-			-					1.13									1.13
"			-			-														24
06-20			-			-					0.05									0.05
"	1156	314	-	33	314	-	33	282	7.050	0.73										0.73
"			-			-					1.07									1.07
"	1212	101	-	382	101	-	382	282	7.050	0.75										0.75
"			-			-					1.23									1.23
"	1155	314	-	234		-												12.93	NAV	12.93
"	1211	101	-	269		-														---
"	1211A	101	-	299		-														---
"	1211B	101	-	289	101	-	382	282	7.050	0.73										0.73
"			-			-					1.25									1.25
"			-			-									0.47					0.47
"	1155A	314	-	313		-												1.65	INS	1.65
"	1155B	314	-	33	314	-	33	282	7.050	0.77										0.77
"			-			-					1.18									1.18
"	1210	101	-	382	101	-	382	282	7.050	0.77										0.77

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

		ACQUIRED		CHARGED													
DATE	LINE	1ST S.P.	LST S.P.	1ST S.P.	LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
06-20		-		-					0.42								0.42
"		-		-													24
06-21		-		-					0.78								0.78
"		-		-									1.75				1.75
"		-		-												3.20 CMS	3.20
"	1154	314 -	33	314 -	33	282	7.050	0.77									0.77
"		-		-					1.25								1.25
"		-		-									0.32				0.32
"	1209	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.25								1.25
"	1153	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.23								1.23
"		-		-									0.68				0.68
"	1208	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.27								1.27
"	1152	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.17								1.17
"	1207	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.02								1.02
"		-		-												1.67 CMS	1.67
"	1151	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.38								1.38
"		-		-												1.70 INS	1.70
"	1206	101 -	166	101 -	166	66	1.650	0.18									0.18
"		-		-													24
06-22	1206	167 -	382	167 -	382	216	5.400	0.57									0.57
"		-		-					1.17								1.17
"	1150	314 -	34	314 -	34	281	7.025	0.73									0.73
"		-		-					1.12								1.12
"	1205	101 -	381	101 -	381	281	7.025	0.75									0.75
"		-		-					1.28								1.28
"	1149	314 -	33	314 -	33	282	7.050	0.75									0.75
"		-		-					1.28								1.28
"	1204	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.13								1.13
"	1148	314 -	33	314 -	33	282	7.050	0.75									0.75
"		-		-					1.18								1.18
"	1203	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.17								1.17
"	1147	314 -	33	314 -	33	282	7.050	0.73									0.73

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.	LST S.P.	CHARGED 1ST S.P.	LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
06-22																	
"									1.15								1.15
"	1202	101	382	101	382	282	7.050	0.75									0.75
"									1.20								1.20
"	1146	314	33	314	33	282	7.050	0.77									0.77
"									1.13								1.13
"	1201	101	382	101	382	282	7.050	0.75									0.75
"									1.13								1.13
"	1145	314	33	314	33	282	7.050	0.75									0.75
"									1.13								1.13
"	1200	101	382	101	382	282	7.050	0.79									0.79
"									0.36								0.36
																	24
06-23																	
"									1.23								1.23
"	1144	314	33	314	33	282	7.050	0.75									0.75
"									1.45								1.45
"	1199	101	381	101	381	281	7.025	0.75									0.75
"									1.12								1.12
"	1143	314	33	314	33	282	7.050	0.75									0.75
"									1.25								1.25
"													0.47				0.47
"	1198	101	382	101	382	282	7.050	0.75									0.75
"									1.13								1.13
"	1142	314	33	314	33	282	7.050	0.78									0.78
"									1.35								1.35
"	1197	101	381	101	381	281	7.025	0.73									0.73
"									1.27								1.27
"	1141	314	34	314	34	281	7.025	0.73									0.73
"									1.08								1.08
"	1196	101	381	101	381	281	7.025	0.72									0.72
"									1.37								1.37
"	1140	314	33	314	33	282	7.050	0.77									0.77
"									1.18								1.18
"	1195	101	381	101	381	281	7.025	0.77									0.77
"									1.15								1.15
"	1139	314	33	314	33	282	7.050	0.78									0.78
"									1.34								1.34
"	1194	101	215	101	215	115	2.875	0.33									0.33
																	24

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

		ACQUIRED		CHARGED													
DATE	LINE	1ST S.P.	LST S.P.	1ST S.P.	LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
06-24	1194	216 -	381	216 -	381	166	4.150	0.45									0.45
"		-		-					1.28								1.28
"	1138	314 -	33	314 -	33	282	7.050	0.80									0.80
"		-		-					1.13								1.13
"	1193	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.20								1.20
"	1137	314 -	33	314 -	33	282	7.050	0.75									0.75
"		-		-					1.28								1.28
"	1192	101 -	381	101 -	381	281	7.025	0.73									0.73
"		-		-					1.13								1.13
"	1136	314 -	33	314 -	33	282	7.050	0.77									0.77
"		-		-					1.23								1.23
"		-		-												1.68 CMS	1.68
"	1191	101 -	909	-													---
"	1191a	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.16								1.16
"	1135	314 -	228	-												1.90 CMS	1.90
"	1135a	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.18								1.18
"	1190	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.12								1.12
"	1189	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.20								1.20
"	1134	314 -	33	314 -	33	282	7.050	0.77									0.77
"		-		-					0.51								0.51
"		-		-													24
06-25		-		-					0.58								0.58
"	1188	101 -	381	101 -	381	281	7.025	0.77									0.77
"		-		-					1.07								1.07
"	1133	314 -	34	314 -	34	281	7.025	0.77									0.77
"		-		-												5.65 STR	5.65
"	1187	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.17								1.17
"	1132	314 -	33	314 -	33	282	7.050	0.75									0.75
"		-		-					1.17								1.17
"		-		-									0.49				0.49
"	1186	101 -	381	101 -	381	281	7.025	0.73									0.73
"		-		-					1.25								1.25
"	1131	314 -	33	314 -	33	282	7.050	0.75									0.75
"		-		-					1.12								1.12

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

		ACQUIRED		CHARGED													
DATE	LINE	1ST S.P.	LST S.P.	1ST S.P.	LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
06-25	1185	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.12								1.12
"	1130	314 -	33	314 -	33	282	7.050	0.75									0.75
"		-		-					1.20								1.20
"	1184	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.15								1.15
"	1129	314 -	33	314 -	33	282	7.050	0.77									0.77
"		-		-					0.51								0.51
"		-		-													24
06-26		-		-					0.57								0.57
"	1183	101 -	381	101 -	381	281	7.025	0.82									0.82
"		-		-					1.17								1.17
"	1128	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.10								1.10
"	1182	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.12								1.12
"	1127	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.20								1.20
"	1181	101 -	217	-												1.98 CMS	1.98
"	1126	314 -	33	-												4.60 CMS	4.60
"	1181A	101 -	154	-													---
"	1181B	101 -	381	101 -	381	281	7.025	0.75									0.75
"		-		-					1.25								1.25
"	1126A	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.18								1.18
"		-		-												1.87 NAV	1.87
"	1125	314 -	33	314 -	33	282	7.050	0.77									0.77
"		-		-					1.08								1.08
"	1180	101 -	279	-													---
"	1180A	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-									0.85				0.85
"		-		-													24
06-27		-		-								2.50					2.50
"		-		-						14.00							14.00
"		-		-							7.50						7.50
"		-		-													24

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

		ACQUIRED		CHARGED													
DATE	LINE	1ST S.P.	LST S.P.	1ST S.P.	LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
06-28		-		-							16.25						16.25
″		-		-						7.75							7.75
″		-		-													24
06-29		-		-						4.00							4.00
″		-		-								6.50					6.50
″		-		-									2.20				2.20
″		-		-						1.30							1.30
″		-		-												1.45 CMS	1.45
″	1179	101 -	382	101 -	382	282	7.050	0.75									0.75
″		-		-					1.10								1.10
″	1124	314 -	33	314 -	33	282	7.050	0.75									0.75
″		-		-					1.12								1.12
″		-		-												4.83 CMS	4.83
″																	24
06-30		-		-					0.75								0.75
″	1178	101 -	382	101 -	382	282	7.050	0.78									0.78
″		-		-					1.17								1.17
″	1123	314 -	33	314 -	33	282	7.050	0.77									0.77
″		-		-					1.18								1.18
″	1177	101 -	382	-										2.25			2.25
″	1122	314 -	33	314 -	33	282	7.050	0.75									0.75
″		-		-					1.28								1.28
″	1177a	101 -	381	101 -	381	281	7.025	0.75									0.75
″		-		-					1.23								1.23
″	1121	314 -	33	314 -	33	282	7.050	0.77									0.77
″		-		-					1.25								1.25
″	1176	101 -	381	101 -	381	281	7.025	0.75									0.75
″		-		-					1.25								1.25
″	1120	314 -	33	314 -	33	282	7.050	0.77									0.77
″		-		-					1.17								1.17
″	1175	101 -	381	101 -	381	281	7.025	0.73									0.73
″		-		-					1.12								1.12
″	1119	314 -	33	314 -	33	282	7.050	0.73									0.73
″		-		-					1.20								1.20
″	1174	101 -	382	101 -	382	282	7.050	0.78									0.78
″		-		-					1.15								1.15
″	1118	314 -	33	314 -	33	282	7.050	0.75									0.75
″		-		-					0.67								0.67
″																	24

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

		ACQUIRED		CHARGED													
DATE	LINE	1ST S.P.	LST S.P.	1ST S.P.	LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
07-01									0.57								0.57
"	1173	101 -	382	101 -	382	282	7.050	0.77									0.77
"									1.12								1.12
"	1117	314 -	33	314 -	33	282	7.050	0.73									0.73
"									1.17								1.17
"	1172	101 -	381	101 -	381	281	7.025	0.73									0.73
"									1.32								1.32
"	1116	314 -	33	314 -	33	282	7.050	0.73									0.73
"									1.08								1.08
"	1171	101 -	381	101 -	381	281	7.025	0.72									0.72
"									1.15								1.15
"	1115	314 -	33	314 -	33	282	7.050	0.73									0.73
"									1.45								1.45
"	1170	101 -	382	101 -	382	282	7.050	0.75									0.75
"									1.15								1.15
"	1114	314 -	33	314 -	33	282	7.050	0.74									0.74
"									1.12								1.12
"	1169	101 -	382	101 -	382	282	7.050	0.77									0.77
"									1.12								1.12
"	1113	314 -	34	314 -	34	281	7.025	0.73									0.73
"									1.15								1.15
"	1168	101 -	381	101 -	381	281	7.025	0.77									0.77
"	1112	314 -	205	-					1.18								1.18
"																2.00 CMS	2.00
"													0.25				0.25
																	24
07-02																	
"	1167	101 -	326	-									0.37			-	0.37
"	1112A	314 -	274	-												3.13 CMS	3.13
"																2.07 TIT	2.07
"	1112B	314 -	33	314 -	33	282	7.050	0.73									0.73
"									1.12								1.12
"	1167A	101 -	382	101 -	382	282	7.050	0.75									0.75
"									1.12								1.12
"	1111	314 -	34	314 -	34	281	7.025	0.73									0.73
"									1.27								1.27
"	1166	101 -	382	101 -	382	282	7.050	0.75									0.75
"									1.20								1.20
"	1110	314 -	33	314 -	33	282	7.050	0.78									0.78
"									1.18								1.18
"	1165	101 -	382	101 -	382	282	7.050	0.77									0.77
"									1.08								1.08

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.	ACQUIRED LST S.P.	CHARGED 1ST S.P.	CHARGED LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
07-02	1109	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.13								1.13
"	1164	101 -	381	101 -	381	281	7.025	0.73									0.73
"		-		-					1.12								1.12
"	1108	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.20								1.20
"	1163	101 -	382	101 -	382	282	7.050	0.78									0.78
"		-		-					0.53								0.53
"		-		-													24
07-03		-		-					0.55								0.55
"	1107	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.13								1.13
"	1162	101 -	381	101 -	381	281	7.025	0.77									0.77
"		-		-					1.07								1.07
"	1106	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.12								1.12
"		-		-												3.75 CMS	3.75
"	1161B	101 -	381	101 -	381	281	7.025	0.78									0.78
"		-		-					1.12								1.12
"	1105	314 -	33	314 -	33	282	7.050	0.75									0.75
"		-		-					1.13								1.13
"	1160	101 -	381	101 -	381	281	7.025	0.75									0.75
"		-		-					1.20								1.20
"	1104	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.18								1.18
"	1159	101 -	382	101 -	382	282	7.050	0.73									0.73
"		-		-					1.20								1.20
"		-		-												1.50 CMS	1.50
"	1103A	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.08								1.08
"	1158	101 -	381	101 -	381	281	7.025	0.77									0.77
"		-		-					0.50								0.50
"		-		-													24
07-04		-		-					0.17								0.17
"	1102	314 -	33	314 -	33	282	7.050	1.42									1.42
"		-		-					1.13								1.13
"	1157	101 -	382	101 -	382	282	7.050	0.75									0.75
"		-		-					1.20								1.20
"	1101	314 -	33	314 -	33	282	7.050	0.73									0.73
"		-		-					1.15								1.15

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.	LST S.P.	CHARGED 1ST S.P.	LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
07-04	F1176	101 -	382	101 -	382	282	7.050	0.72									0.72
"									1.03								1.03
"	F1132	314 -	33	314 -	33	282	7.050	0.73									0.73
"									1.17								1.17
"	F1209	101 -	381	101 -	381	281	7.025	0.73									0.73
"									1.17								1.17
"	F1154	314 -	33	314 -	33	282	7.050	0.73									0.73
"									1.08								1.08
"	F1206	101 -	382	101 -	382	282	7.050	0.77									0.77
"									1.15								1.15
"	F1147	314 -	33	314 -	33	282	7.050	0.75									0.75
"									1.15								1.15
"	F1202	101 -	381	101 -	381	281	7.025	0.77									0.77
"									1.30								1.30
"	F1139	314 -	33	314 -	33	282	7.050	0.75									0.75
"									1.07								1.07
"	F1200	101 -	382	101 -	382	282	7.050	0.73									0.73
"									1.20								1.20
"	F1144	314 -	145	314 -	145	170	4.250	0.45									0.45
																	24
07-05	F1144	144 -	33	144 -	33	112	2.800	0.28									0.28
"									1.21								1.21
"	F1198	101 -	382	101 -	382	282	7.050	0.75									0.75
"									1.21								1.21
"	F1121	314 -	33	314 -	33	282	7.050	0.73									0.73
"									1.13								1.13
"	F1187	101 -	382	101 -	382	282	7.050	0.77									0.77
"									1.08								1.08
"	F1117	314 -	33	314 -	33	282	7.050	0.75									0.75
"									1.13								1.13
"	F1181	101 -	382	101 -	382	282	7.050	0.73									0.73
"									1.18								1.18
"	F1106	314 -	33	314 -	33	282	7.050	0.77									0.77
"									1.18								1.18
"	F1173	101 -	381	101 -	381	281	7.025	0.75									0.75
"									1.25								1.25
"																3.52 CMS	3.52
"	F1126	314 -	33	314 -	33	282	7.050	0.75									0.75
"									1.15								1.15
"	F1190	101 -	383	101 -	383	283	7.075	0.75									0.75
"									1.28								1.28

TIME AND PRODUCTION STATISTICS

NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

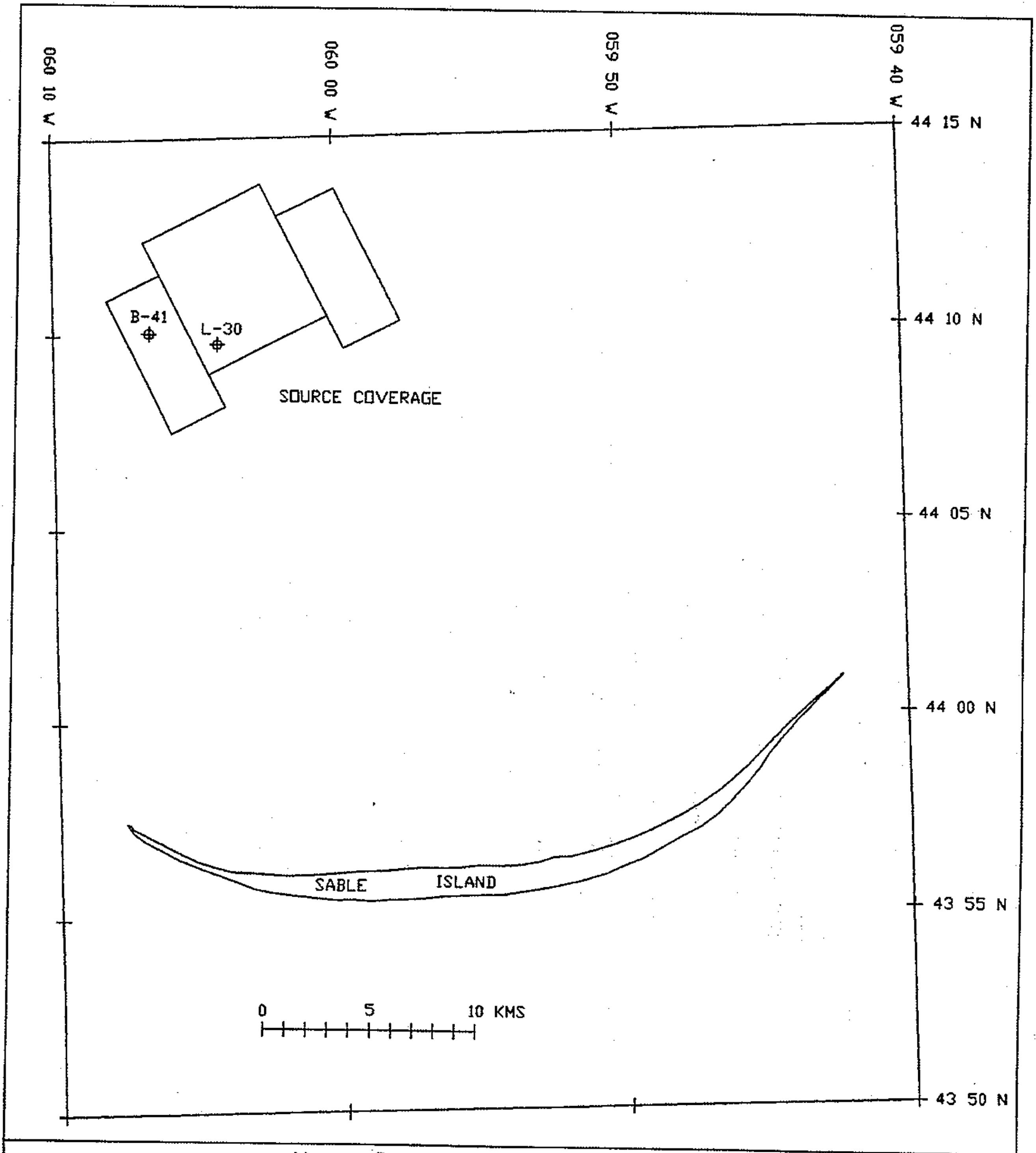
		ACQUIRED		CHARGED													
DATE	LINE	1ST S.P.	LST S.P.	1ST S.P.	LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
07-05	F1142	314 -	33	314 -	33	282	7.050	0.77									0.77
"									0.88								0.88
"																	24
07-06									0.23								0.23
"	F1179	101 -	381	101 -	381	281	7.025	0.75									0.75
"									1.15								1.15
"	F1120	314 -	33	314 -	33	282	7.050	0.75									0.75
"									1.20								1.20
"	F1169	101 -	382	101 -	382	282	7.050	0.75									0.75
"									1.12								1.12
"	F1109	314 -	33	314 -	33	282	7.050	0.77									0.77
"									1.23								1.23
"	F1164	101 -	382	101 -	382	282	7.050	0.75									0.75
"									1.40								1.40
"																3.57 CMS	3.57
"	F1290	314 -	33	314 -	33	282	7.050	0.74									0.74
"									1.17								1.17
"	F1222	101 -	382	101 -	382	282	7.050	0.76									0.76
"									1.23								1.23
"	F1292	314 -	32	314 -	32	283	7.075	0.74									0.74
"									1.12								1.12
"	F1226	101 -	382	101 -	382	282	7.050	0.73									0.73
"									1.13								1.13
"	F1297	314 -	33	314 -	33	282	7.050	0.73									0.73
"									1.23								1.23
"	F1231	101 -	382	101 -	382	282	7.050	0.73									0.73
"									0.02								0.02
																	24
07-07									1.17								1.17
"	F1299	314 -	215													3.02 CMS	3.02
"	F1300	314 -	32	314 -	32	283	7.075	0.73									0.73
"									1.32								1.32
"	F1230	101 -	383	101 -	383	283	7.075	0.75									0.75
"									1.63								1.63
"	F1309	314 -	33	314 -	33	282	7.050	0.70									0.70
"									1.25								1.25
"	F1236	101 -	382	101 -	382	282	7.050	0.75									0.75
"									1.25								1.25
"	F1301	314 -	33	314 -	33	282	7.050	0.75									0.75
"									1.22								1.22

TIME AND PRODUCTION STATISTICS

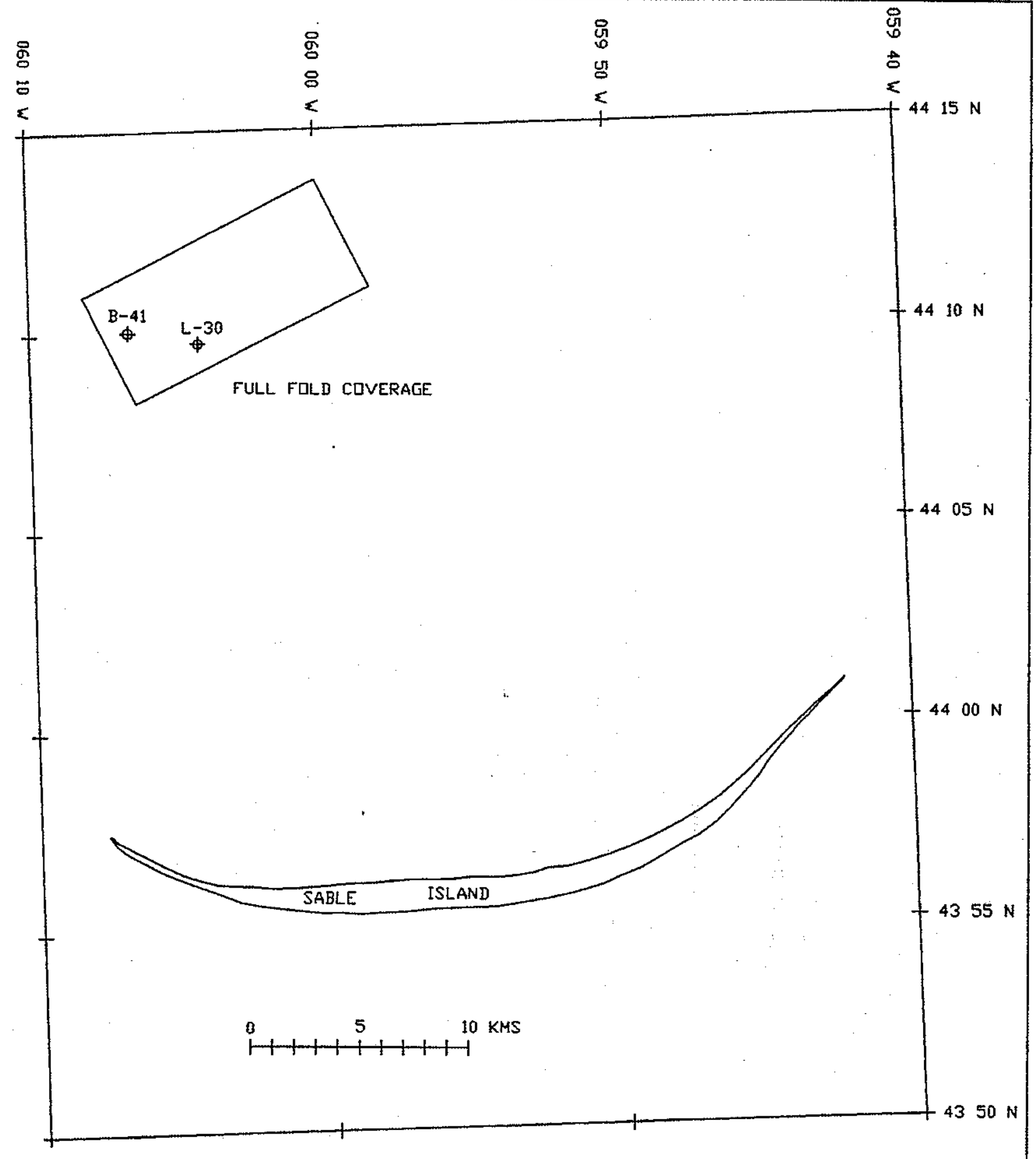
NOVA SCOTIA RESOURCES LIMITED
PENOBSCOT 3-D, SABLE ISLAND

M/V EDWARD O. VETTER
JUNE 1, 1991 THROUGH JULY 8, 1991

DATE	LINE	ACQUIRED 1ST S.P.	ACQUIRED LST S.P.	CHARGED 1ST S.P.	CHARGED LST S.P.	TOTAL S.P.'S	SEISMIC KM	RECORD TIME	LINE CHANGE	TRAVEL TIME	SUPPLY TIME	STRMR HNDL	GUN HNDL	WEATHER TIME	ICE DELAY	OTHER DT	HOURS
07-07	F1243	101 -	381	101 -	381	281	7.025	0.73									
″		-		-													0.73
″	F1307	314 -	32	314 -	32	283	7.075	0.73	1.18								1.18
″		-		-													0.73
″		-		-					1.25								1.25
″	F1247	101 -	149	-									0.90				0.90
″	F1246	101 -	382	101 -	382	282	7.050	0.72								2.22 CMS	2.22
″		-		-													0.72
″	F1340	314 -	180	314 -	180	135	3.375	0.37	1.36								1.36
″		-		-													0.37
																	24
07-08	F1340	179 -	33	179 -	33	147	3.675	0.39									
″		-		-													0.39
″	F1258	101 -	382	101 -	382	282	7.050	0.73	1.18								1.18
″		-		-													0.73
″	F1313	314 -	33	314 -	33	282	7.050	0.72	1.20								1.20
″		-		-													0.72
″	F1260	101 -	383	101 -	383	283	7.075	0.73	1.13								1.13
″		-		-													0.73
″		-		-					2.67								2.67
″	F1263	101 -	382	101 -	382	282	7.050	0.75								2.25 INS	2.25
″		-		-													0.75
″	F1264	101 -	231	-									1.00				1.00
″		-		-												2.25 CMS	2.25
″		-		-									0.50				0.50
″		-		-								1.50					1.50
″		-		-						1.83							1.83
″		-		-							1.67						1.67
″		-		-												3.50 OTH	3.50
																	24
TOTALS						80283	1696.850	213.98	343.48	41.88	45.92	20.33	17.34	25.05		204.02	912.00



Nova Scotia Resources Limited
Penobscot 3D
Surveyed by:
Halliburton Geophysical Services
June 3rd to July 8th, 1991



Nova Scotia Resources Limited
Penobscot 3D
Surveyed by:
Halliburton Geophysical Services
June 3rd to July 8th, 1991

HGS CANADA LTD. wishes to take this opportunity to thank **NOVA SCOTIA RESOURCES (VENTURES) LIMITED** for its cooperation in conducting this survey.

Respectfully submitted,

HGS CANADA LTD.

Gary A. Bartlett

Gary A. Bartlett
Marine Data Acquisition Manager

APPENDIX 1
VESSEL SPECIFICATIONS
M/V EDWARD O. VETTER

I VESSEL

Owner	HGS Canada Ltd.
Flag	Canadian
Built	1973 Ferguson's Shipyard Pictou, Nova Scotia
Country of Registry	Canada
Registration Number	329550
Classification	Lloyd's 100 A1, Dot Ice VII, CSI 1X
Home Port	Pictou, Nova Scotia
Tonnage - Gross	Gross 997.18 tons
Dimensions	a. Length185 ft. b. Beam39 ft. c. Draught, Medium 13.5 ft.
Engines	2 - EWSL 16 MGR 2000 HP each
Speed	6.9 m/s (13.5 knots)
Generators	2 Cat D343 250 KW 1 Cat D330 112 KW
Radios	SSB - Marconi & Kelvin Hughes VHF CMS DN42
Endurance	35 days
Berth Facilities	30 Bunks
Call Sign	VC 8857
Radar	2 - Decca 914
Fathometer	Simrad M2R
Navigation	Transit & Trisponder

II EQUIPMENT SPECIFICATIONS

Source

Type	PNUCON/Sleeve Hybrid Array
Capacity	3616 cu. in. Active, 852 cu. in. Spare
Number of Guns	57 Active, 7 Spare
Performance	105 BARMS P-P, 0 - 128 Hz
Number of Strings	Inners - 2 x 19.225 m Outers - 2 x 17.286 m
Depth	7.0 m +/- 1 m

Compressors

Type	2 LMF 1200 CFM 1 LMF 1040 CFM 2 Sullair Model 300
Capacity	3440 CFM

Streamer

Type	TITAN 1000
Number of Channels	480
Group Length	6.25, 12.5 or 25 m
Max. Length	4800 m Single, 3000 m Dual
Hydrophones	HGS Dish Phone Acceleration Cancelling
Number of Hydrophones	32 per 12.5 m Group Length
Group Sensitivity	53.4 volts/bar, +/- 1.2 dB
Data Transmission	Fiber-Optic Channel from Streamer Electronic Modules
Number of Streamer Electronic Modules	40 max
Sample	1 msec
Recording Filters	
Low Cut	0/6, 8/18, 8/12, 18/12 Hz
High Cut	256/72 Fixed
Amplifiers	I.F.P. Binary Gain, 0-84 dB
System Dynamic Range	114 dB (Lo Pre-Amp Gain)
Pre-Amp Gain	-6 +6 dB
A/D Convertor	14 Bit + Sign Dynamic Range78 dB
Auxilary Sensors	40 max
Compasses	Digicourse max 20
Depth Sensors	20 max
Trace Summings	1,2,3 or 4

III RECORD INSTRUMENTS

Data Acquisition Unit	FCS III
Number of Channels	480 Seismic
Auxilary Channels	24
Resample	2 or 4 msec
Filters	64, 90, 128, 180, 256 Hz (72/oct.)
Format	SEG D, 6250 BPI

IV CONTROL SYSTEM

Type	CMS IV
Navigation	12 RPS Control
Streamer Tracking	HGS On Board Binning
Binning System	HGS Real Time Binning
Source Controller	TIGER II
Resolution	0.1 msec
Standard Deviation	0.6 msec
Data Logging	Automatic Recording

APPENDIX 2
CREW DESCRIPTION

SHORE-BASED PERSONNEL

1	Operations Supervisor
1	Vessel Administrator
1	Field Service

ON-BOARD SEISMIC PERSONNEL

1	Party Manager
1	Technical Support
2	CMS Operators
4	Titan Operators
2	Quality Assurance
4	Source Mechanics

VESSEL

1	Ship's Captain
1	Mate
1	Chief Engineer
1	2nd Engineer
1	3rd Engineer
3	Seamen
2	Cooks
1	Messman

CLIENT PERSONNEL

1	NSRL Client
2	Nortech Navigation

APPENDIX 3
VESSEL PERSONNEL

Vessel Administrator	Ted Cooper
Party Manager	Weldon Oxner
Technical Support	Blake Knoll
Field Service	Mike Landua
CMS Operators	Guy Northcott
	Gary Michael
	Paul Twa
	John Nicol
Titan Operators	Robert Dawson
	Walter Moro
	Dan Jackson
	Jamie Gandier
	John Fitzgerald
	Mark Bermudez
	Darcy Bolduc
Quality Assurance	Brian Nurse
	Mark Novosad
	Walter Moro
Source Mechanics	David White
	David Dacey
	Ed Gaulton
	Tony Clarke
	Chris Jordan
	Dan Manabat
	Garry Herritt
Nortech Navigation	Norbert Hirth
	Tony Butyn
NSRL Client	Milan Kalabis
Captain	John Gill
Mate	Blaise MacNeill
	Wayne West
Chief Engineer	Dave Bowridge
	Gordan Reid
2nd Engineer	Dave Porter
3rd Engineer	Dave White
	Dan Parent
Seamen	Roger Perry
	Brad Rowsell
	Lyola O'Driscoll
	Noel Burke-Gaffney
Cooks	Cyril Cynard
	Gerry Wood
	Bruce Noseworthy
Messman	Mike Escaravage

APPENDIX 4
RECORDING INSTRUMENT DETAILS

System	DFOS 480 (TITAN)
Tape Format	SEG D, GCR
Packing Density	6250 bpi
Tape Speed	125 ips
Number of Seismic Channels	240
Number of Q.C. Channels	2
Gain Control	I.F.P.
Sample Rate	2 msec
Record Length	6 sec
Gain Constant	Low = 12 dB
Total System Dynamic Range	>10 dB
Final Gain	84 dB
Filters	High Cut - 128 Hz at 72 dB/octave Low Cut - 8 Hz at 18 dB/octave
System Polarity	Increase in pressure on hydrophone produces a negative number on the tape and a down break on the camera.

APPENDIX 4A
CMS DESCRIPTIONS

The Configurable Marine System (CMS) provides for navigation, line control, and data logging. The system is comprised of three main sub-systems: 990 Nav, 990 OBB/STS, and 990 QC. These sub-systems are linked to a 980B minicomputer, which is the central information processor for the entire system.

The 990 Nav acquires data from the various radio positioning systems (Syledis and Argo), and MX1107 satellite navigation receiver, and gyrocompass readings to compute a geodetic position. The operator controls the vessel's navigation from a keyboard, and can define the system in use. The operator can also keep track of various statistical information on the various radio systems such as variances and standard deviations to help determine the quality of the navigation.

The 990 OBB/STS was the first generation of on-board binning to be used. It acquires information from heading sensors (compasses) located on the streamer to compute trace reflection point (CDP) locations. It then uses this information to compute a graphical representation of trace density (coverage) for a particular seismic line. The system also keeps track of contributions from adjacent lines. With the advent of the Real-Time Binning (RTB) system, the OBB only performs the acquisition of the heading and depth sensor information, and is thus referred to as the Streamer Tracking System (STS). Along with the streamer tracking function, the STS also monitors the performance of the TIGER II airgun controller. It records the firing times and various delays generated by the TIGER, and provides for a quick reinitialization of the TIGER parameters. At the end of each line, statistical information on the performance of each gun is printed, providing the operator and client with a hard copy of the performance data of the gun array for each line.

The 990 QC provides operator interface to the 980B minicomputer. It is through this terminal that the operator performs line control and data logging. The QC also prints a copy of the Automatic Data Logging (ADL) records, which are also recorded on the navigation tape.

Once the operator has initiated the line control sequence, the 980 receives the vessels new position from the 990 Nav every second. It computes the distance and bearing to the next required position (the start of the lead-in, the beginning of the seismic line, or the next shotpoint). Between lines, the CMS will print the distance and bearing of the next chosen position on the track plotter to aid in steering the vessel. During the lead-in or on-line, the 980 computes the distance travelled and determines if the vessel has moved the required distance to the next shotpoint. It then either decrements the counter if in lead-in mode, or initiates the recording sequence if on-line. Once a shot has been taken, the 980 records the time, vessel (antenna) position, raw navigation data, raw streamer positioning data, TITAN record information, and TIGER status onto the navigation tape and restarts the sequence until the vessel has travelled beyond the end of the seismic line.

APPENDIX 4B
RECORDING SYSTEM DESCRIPTION

The TITAN 1000 Marine Data Acquisition System consists of four major sub-systems:

1. DFOS - Digital Fibre Optic Streamer
2. SCS - Streamer Control System
3. FCS - Field Computer System
4. RAWPS - Read After Write Plotter System

A general overview is described below in the context of seismic data flow through these systems.

The DFOS sub-system is comprised of the in-water and back-deck components: Streamer Electronics Modules (SEMs), Repeaters, Live Sections and Passive Cables (Armoured Tow Cable, Reel Interconnect Cable and Deck Cable). The live sections carry 1500 Hz, 240 Volt power to the SEMs which receive analog data from the hydrophone groups. Trace mixing and signal routing is done by Program Plugs in the Live sections. The SEMs provide signal conditioning for 12 hydrophone channels in the form of Line Filtering at 570 Hz to remove 1500 Hz power line pick-up, pre-amplification at +6 dB or -6 dB (high or low gain), operator selectable Low Cut Filtering (256 Hz cut-off at 1 ms sampling or 128 Hz cut-off at 2 ms), Time Division Multiplexing, Automatic Gain Ranging (Instantaneous Floating Point), and Analog-to-Digital Conversion (15 bit-plus-sign, successive approximation type). Total system dynamic range, RMS signal to RMS noise exceeds 100 dB. Digital data transmission along the streamer is performed on two fibre optic lines, A and B, with the data from the aft traces of a particular SEM being re-synchronized and re-timed on Fibre B and the SEMs data being appended to data on Fibre A.

Fibre optic data is received in the doghouse at the Streamer Control System via an Auxiliary Data Module which provides onboard input of up to 28 auxiliary channels of data. The main components of the SCS are the Digitizer Module Interface (DMI), Signal Processing Units (SPUs) and Streamer Power system. The DMI interfaces directly with the digital streamer, receiving seismic data and status information and controlling communication and data flow between these units and the recording system. The DMI decodes streamer data from it's serial Manchester phase-encoded format and reports status, configuration and errors. The seismic data is then passed on in correct channel sequence to input bus (IBUS) A or B. The IBUS is an Ethernet link which forwards the raw data to the SPU and where it undergoes digital anti-alias filtering and DC offset removal as well as any trace summing that may be required. The processed data is then buffered, synchronized, and transmitted back to the DMI on the output bus (OBUS) where it may be displayed on a camera, single trace profiler and an oscilloscope. The DMI uses a Motorola VME 68000 computer and peripheral boards and the VERSAdos operating system. The main tasks of the software are to provide operator control, monitoring, and testing of the streamer and the SCS system.

The seismic data is then passed to the FCS which controls and monitors the total seismic data acquisition system in real time and demultiplexes and reformats the data into the desired tape format. Data is transmitted from the SCS to the FCS amplifier controller via Ethernet. The serial input data is double buffered and then sent on in four 8-bit bytes to the SEG D data boards. These data boards format the data and generate a relative mass memory address. From here, the Mass Memory Manager sends the data as it is received, one scan at a time in 32-bit data words through error correction control into the individual mass memory array boards in the Zitel Mass Memory chassis. The Zitel is configured into two 8 megabyte blocks. Data from all channels for one record is written into half the mass memory while the previous record is being read from the other half of the mass memory.

At the centre of the FCS if the Gould SEL 32/2705 32-bit minicomputer utilizing a true 32-bit processor designed around 4-bit slices technology. The SEL 32-2705 also contains a high speed data bus capable of 26 megabytes per second, address space for 1000 channels, 1 megabyte of program memory and a 340 megabyte disk for the operating system.

The 32-bit data words are passed to the Memory Bus Controller in the Gould chassis which places the data onto the SELbus, the system controller for the FCS. The data passes to the high speed tape controller where the Regional Processor Unit (RPU) splits the 32-bit words into two half words and the device interface (DI) splits it again into four 8-bit bytes before transmitting it to the STC 1935 tape formatter. The formatter sends 8-bits write data to the appropriate STC 1950 tape drive and receives 8-bit read-after-write data. The read-after-write data is sent to the Read-After-Write Monitor for display of two operator selectable channels and also to the Digital Data Checker for parity and header checks.

The FCS software is divided into two parts: the Gould computer operating system and the seismic application software. The Gould uses a comprehensive disk-based, multi-programming operating system called the Gould Mapped Programming Executive (MPX-32). The modules in this package include the resident operating system, device and interrupt handlers, a terminal servicing manager (TSM), a System Generator (SYSGEN), and utilities. The seismic application software consists of the data gathering system and the quality control system. The data gathering system allows for parameter entry of line-to-line and prospect variables and for real time acquisition (RTAS) which controls data recording.

APPENDIX 4C
REAL TIME BINNING DESCRIPTION

Since the survey conducted under this contract is three dimensional, HGS's Real Time Binning (RTB) system was used. The main objective of the RTB system is to evaluate subsurface fold coverage in real time.

The reflection point for each receiver group is calculated in real time (ie. every shotpoint) as the vessel moves up the survey line. To keep track of where each receiver group's reflection point is located, a small unit of subsurface area is created and is called a bin. Each bin is centered on a survey line and usually it's length along the line is equal to the length of each receiver group. The width of a bin is generally determined by the spacing of the grid of survey lines. However, a technique known as overlapping bins is also used where the width of a bin is greater than the line spacing. As the vessel moves up the survey line, the bin content is continuously updated giving a real time indication of the subsurface fold coverage. Further to this, the length of the streamer is divided into segments known as near, mid and far receiver groups. Client provided specifications determine the percentage of these segments necessary to achieve full fold coverage.

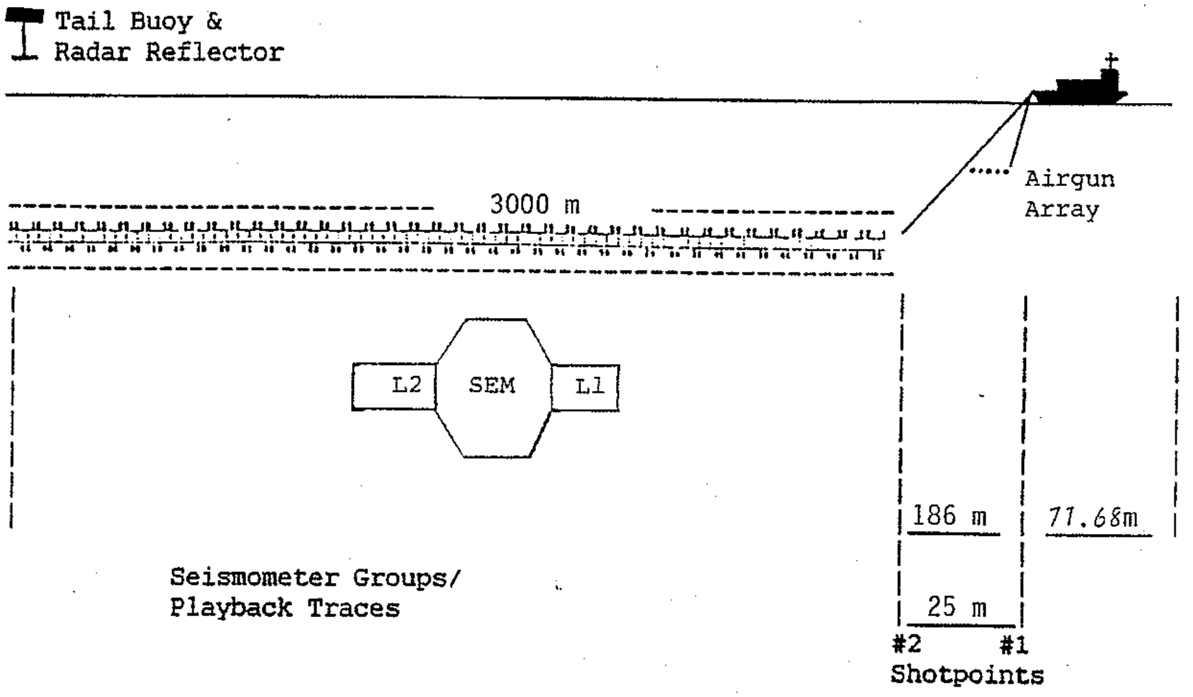
The RTB system is based around a 33 MHz, 386 microprocessor based microcomputer equipped with a math co-processing unit. Data for the RTB system is received from the CMS via the eXternal Quality Control (XQC) link. Data passed on this link include the shotpoint, latitude and longitude of the SP, time, vessel velocity and offline position, and the compass heading data. Two VGA colour displays are available to the operator to give useful information both online and offline. One of the displays is text based and shows the data needed to evaluate the subsurface coverage including the bird compass readings, gyro, and the reflection points of each of the three segments of the streamer. The other display is a graphic one which shows the survey line being shot (known as the prime line), the lines adjacent to the prime line and a visual representation of the fold coverage in the immediate area. Also on this display is information regarding vessel offline distance, the near receiver group reflection point relative to the prime line and the course made good. This second graphic display also appears on the bridge as an aid to steering down the prime line.

APPENDIX 5
STREAMER DETAILS
(DIGITAL MULTIPLEX)

Length	3000 m
Length of Centre Near Group 240 to 1	2977.5 m
Number of Groups	240
Group Interval	12.5 m
Hydrophone Interval	0.4 m
Number of Hydrophones per Group	32
Hydrophone Type	D-2B Dish Type
Live Section Length	74.5 m
Stretch Section Length	2 @ 50 m 1 @ 100 m
SEM Module Length	0.50 m
Repeater Module Length	0.33 m
Stretch Sections in Use	3 Front, 2 Tail
Streamer Skin Type	P.U.
Numbering Convention	Near Group is #240
Streamer Sensitivity	53.4 uV/uBar

APPENDIX 6

STREAMER DIAGRAM



FS	A1	FS	A2	FS SOS	L40	S20	L39	L38	S19	L37	L36	S18	L35
					L34	S17	L33	L32	S16	L31	L30	S15	L29
					L28	S14	L27	L26	S13	L25	L24	S12	L23
					L22	S11	L21	L20	S10	L19	L18	S9	L17
					L16	S8	L15	L14	S7	L13	L12	S6	L11
					L10	S5	L9	L8	S4	L7	L6	S3	L5
					L4	S2	L3	L2	S1	L1	TS		ROPE

FS – FRONT-END STRETCH
L – LIVE SECTION
TS – TAIL STRETCH

S – SEM
A – REPEATER
SOS – COMPASS SECTION

APPENDIX 7
SOURCE DETAILS

Type	PNUCON/Sleeve Hybrid Array
Total Array Volume (active)	59.25 L (3616 cu in)
Total Volume of Spares	13.96 L (852 cu in)
Operating Pressure	13.1 - 13.8 MPa (1900 - 2000 psi)
Operating Depth	7 m +/- 1
Timing Controller	TIGER II
Firing Delay	51.2 msec
Distance, Stern to centre of array	46.20 m
Array Spread from Outer to Outer	32 m
Array String Length	
Inners	19.225 m
Outers	17.286 m
Compressor Types	1 LMF compressor rated at 490.78 L/s at 13.8 MPa. This is driven by a V-12 Deutz engine direct on the two stage screw end which supplies 2.1 MPa to the reciprocal end which is a two stage piston with a final discharge pressure of 13.8 MPa. 1 LMF compressor rated at 566.28 L/s at 13.8 MPa. This is driven by V-12 Deutz engine direct on the screw end which supplies 1.4 MPa to the reciprocal end which is a three state piston with a final discharge pressure of 13.8 MPa. 1 LMF booster compressor rated at 566.28 L/s at 13.8 MPa. This is driven by a 3406B CAT engine. Low pressure air (2.1 MPa) is supplied by two Sullair 300 screw stand alone compressors driven by individual 3406B cat engines. 2 Sullair 300 compressors driven by 3406 CAT engines.

APPENDIX 8
AIRGUN ARRAY
3000 m STREAMER

AIRGUN CAPACITY:

```
(Litres)            |[1.311] [1.311] [1.311] [1.311]   [.655] [.655]   [.655] [.328]   [.655]   [.655]   [.328]
STBD OUTER ELEMENT  |----A-----A------A------S--------A-----A-------A-----A------A---------A-------A---
                                               <2.63m>      <2.63m>       <1.86m> <1.86m> <1.58m> <1.58m>
PORT OUTER ELEMENT  |----A-----A------A------S--------A-----A-------A-----A------A---------A-------A---

(Con't.)
(Litres)            |[.328]   [.164]   [.164]
STBD OUTER ELEMENT  |--A-------A-------A--
                       <1.24m> <1.24m>
PORT OUTER ELEMENT  |--A-------A-------A--


(Litres)            |[3.343] [3.343] [3.343] [3.343] [3.343] [3.343]   [.655] [.655] [.655]   [.655] [.655] [.655]
STBD INNER ELEMENT  |---A------A------A------A-----A------S--------A------A-----A--------A-----A----S--
                                                          <1.75m>           <2.48m>                 <2.48m>
PORT INNER ELEMENT  |---A------A------A------A-----S------S--------A------A-----A--------A-----A----S--

(Con't.)
(Litres)            |[.655] [.655]   [.655]    [.328] [.164]   [.328]
STBD INNER ELEMENT  |--A------A------A--------A------A------A---
                            <2.32m> <2.01m>          <2.32m>
PORT INNER ELEMENT  |--A------A------A--------A------A------A---
```

A = Active AirgunS = Spare Airgun

AIRGUN ARRAY COMPOSITION

Active Guns:	9 X 3.343 L	**Spare Guns:**	3 x 3.343 L	Inners - 19.23 m
	6 x 1.311 L		2 X 1.311 L	Outers - 17.29 m
	26 X .655 L		2 X .655 L	
	10 X .328 L			
	6 X .164 L			
Total Active Guns:	59.25 L	**Total Spare Guns:**	13.96 L	

NOTES:

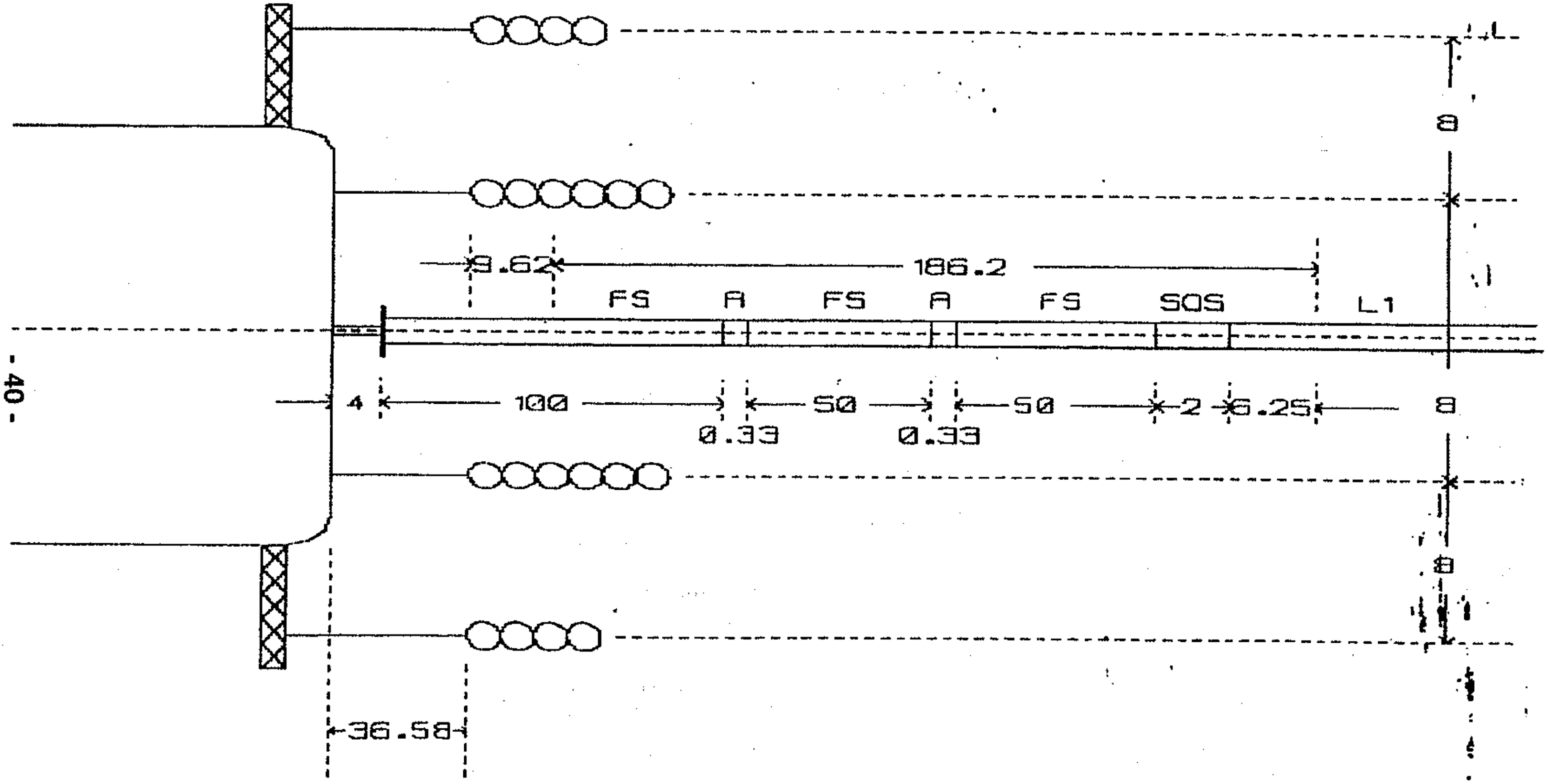
1. This airgun array is comprised of 4 elements.

2. Pnu-Con/Sleeve Hybrid Array Airguns.

3. The array contained 64 airguns; however, the working array consisted of 57 guns, allowing 7 guns to be used as spares as required.

APPENDIX 8A

Source/Streamer Geometry – m/v E.O. Vetter



FS – Front Stretch

A – Repeater

SOS – Compass Section

L1 – 1st Live Section

NOTE : diagram is not to scale, all distances in metres

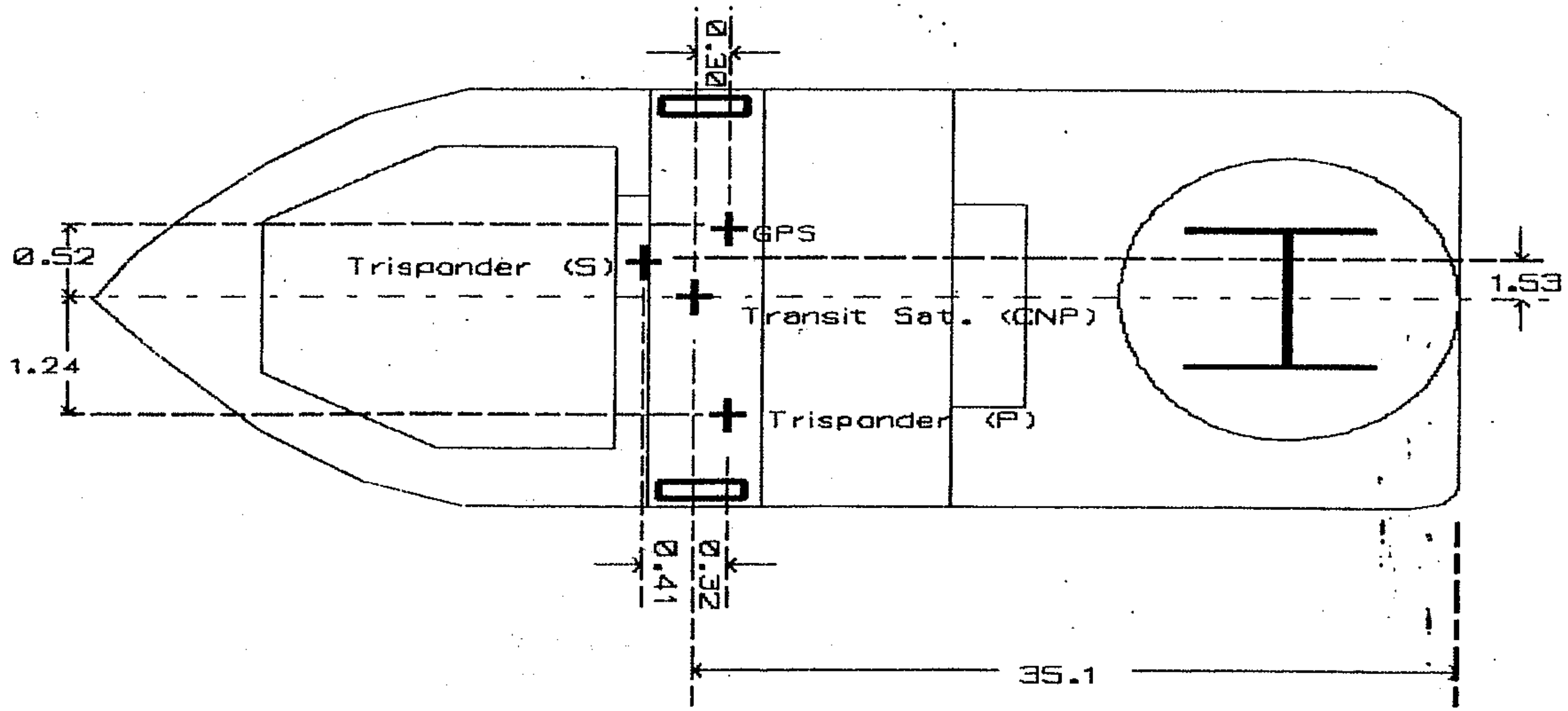
APPENDIX 9
BASE STATION COORDINATES

STATION NAME	LATITUDE	LONGITUDE	ELEVATION
TRI1	43 56 06.14 N	59 59 15.66 W	25.0 m
TRI2	43 55 59.52 N	59 51 06.58 W	22.0 m
TRI3	43 57 28.04 N	60 07 39.18 W	20.8 m
TRI4	43 57 35.63 N	59 47 28.96 W	34.0 m

Datum:	NAD 27
Spheriod:	Clarke 1866
Projection:	UTM
Central Meridian:	063 degrees W

APPENDIX 9A

Antenna Diagram – m/v E.O. Vetter



Trisponder (P) – 1.24 m , 255 deg from CNP
Trisponder (S) – 1.58 m , 75 deg from CNP
GPS – 0.6 m , 120 deg from CNP

Note – Diagram is not to scale, all distances in metres.

APPENDIX 2

WESTERN GEOPHYSICAL PROCESSING REPORT

SEISMIC PROCESSING REPORT
OF THE
PENOBSCOT 3D SURVEY 1991

FOR

NOVA SCOTIA RESOURCES LIMITED

BY

WESTERN GEOPHYSICAL, A DIVISION OF
WESTERN ATLAS INTERNATIONAL INC.

July 1991 through December 1991

Project # 4473

TABLE OF CONTENTS

INTRODUCTION

The processing of marine seismic data from the **Penobscot** 3D was performed by Western Geophysical, A Division of Western Atlas International Inc. for Nova Scotia Resources Limited. This report states the processing parameters, relevant acquisition information pertaining to the data processing, the personnel involved in the project, and a statement of the final products are also included.

ACQUISITION PARAMETERS

ACQUISITION DATES: June 3 to July 8, 1991

BY: H.G.S. Canada Ltd.

VESSEL: E.O. Vetter

SOURCE:

Type	PNU-CON/Sleeve
Volume	3616 cu. in
Pressure	2000 p.s.i.
Depth	7 m
Shotpoint Interval	25 m
Nominal Line Spacing	50 m
Firing Delay	51.2 ms

INSTRUMENT:

Record format	SEG-D Demultiplexed
Recording system	Titan 1000
Record length	6 s
Sample rate	2 ms
Filter	8 hz/ 18 db-128 hz/72 db

CABLE:

Streamer	DFOS 480
Hydrophones in group	32
Number of groups per çable	240
Centre of source to Center of near group	186 m
Near to Far Group	2987.5 m
Group Interval	12.5 m
Cable depth	9 m

NAVIGATION:

Trisponder

TAPES RECEIVED:

Raw Seismic: June 17, 1991
Processed Navigation: August 6, 9, 12 (replaced on September 3, 1991).

------------------PRIMARY LINES------------------

LINE	1ST SP	LST SP	#SP	#KM
P911101	314	33	282	7.050
P911102	314	33	282	7.050
P911103A	314	33	282	7.050
P911104	314	33	282	7.050
P911105	314	33	282	7.050
P911106	314	33	282	7.050
P911107	314	33	282	7.050
P911108	314	33	282	7.050
P911109	314	33	282	7.050
P911110	314	33	282	7.050
P911111	314	34	281	7.025
P911112B	314	33	282	7.050
P911113	314	34	281	7.025
P911114	314	33	282	7.050
P911115	314	33	282	7.050
P911116	314	33	282	7.050
P911117	314	33	282	7.050
P911118	314	33	282	7.050
P911119	314	33	282	7.050
P911120	314	33	282	7.050
P911121	314	33	282	7.050
P911122	314	33	282	7.050
P911123	314	33	282	7.050
P911124	314	33	282	7.050
P911125	314	33	282	7.050
P911126	314	33	282	7.050
P911127	314	33	282	7.050
P911128	314	33	282	7.050
P911129	314	33	282	7.050
P911130	314	33	282	7.050
P911131	314	33	282	7.050
P911132	314	33	282	7.050
P911133	314	34	281	7.025
P911134	314	33	282	7.050
P911135A	314	33	282	7.050
P911136	314	33	282	7.050
P911137	314	33	282	7.050
P911138	314	33	282	7.050
P911139	314	33	282	7.050
P911140	314	33	282	7.050
P911141	314	34	281	7.025
P911142	314	33	282	7.050
P911143	314	33	282	7.050
P911144	314	33	282	7.050
P911145	314	33	282	7.050
P911146	314	33	282	7.050
P911147	314	33	282	7.050
P911148	314	33	282	7.050
P911149	314	33	282	7.050
P911150	314	33	282	7.050
P911151	314	33	282	7.050
P911152	314	33	282	7.050
P911153	314	33	282	7.050
P911154	314	33	282	7.050
P911155B	314	33	282	7.050
P911156	314	33	282	7.050
P911157	101	382	282	7.050
P911158	101	381	281	7.025
P911159	101	382	282	7.050
P911160	101	381	281	7.025
P911161B	101	381	281	7.025
P911162	101	381	281	7.025
P911163	101	382	282	7.050

-------------------PRIMARY LINES (con't)-----------

LINE	1ST SP	LST SP	#SP	#KM
P911164	101	381	281	6.975
P911165	101	382	282	7.050
P911166	101	382	282	7.050
P911167A	101	382	282	7.050
P911168	101	381	281	7.025
P911169	101	382	282	7.050
P911170	101	382	282	7.050
P911171	101	381	281	7.025
P911172	101	381	281	7.025
P911173	101	382	282	6.925
P911174	101	382	282	7.050
P911175	101	381	281	7.025
P911176	101	381	281	7.025
P911177A	101	381	281	7.025
P911178	101	382	282	7.050
P911179	101	382	282	7.050
P911180A	101	382	282	7.050
P911181B	101	381	281	7.025
P911182	101	382	282	7.050
P911183	101	381	281	7.025
P911184	101	382	282	7.050
P911185	101	382	282	7.050
P911186	101	381	281	7.025
P911187	101	382	282	7.050
P911188	101	381	281	7.025
P911189	101	382	282	7.050
P911190	101	382	282	7.050
P911191A	101	382	282	7.050
P911192	101	381	281	7.025
P911193	101	382	282	7.050
P911194	101	381	281	7.025
P911195	101	381	281	7.025
P911196	101	381	281	7.025
P911197	101	381	281	7.025
P911198	101	382	282	7.050
P911199	101	381	281	7.025
P911200	101	382	282	7.050
P911201	101	382	282	7.050
P911202	101	382	282	7.050
P911203	101	382	282	7.050
P911204	101	382	282	7.050
P911205	101	381	281	7.025
P911206	101	382	282	7.050
P911207	101	382	282	7.050
P911208	101	382	282	7.050
P911209	101	382	282	7.050
P911210	101	382	282	7.050
P911211B	101	382	282	7.050
P911212	101	382	282	7.050
P911213	101	382	282	7.050
P911214	101	382	282	7.050
P911215	101	382	282	7.050
P911216	101	381	281	7.025
P911217	101	381	281	7.025
P911218	101	382	282	7.050
P911219	101	381	281	7.025
P911220	101	381	282	7.050
P911221A	101	381	281	7.025
P911222A	101	381	281	7.025
P911223	101	382	282	7.050
P911224	101	382	282	7.050
P911225	101	382	282	7.050
P911226	101	382	282	7.050
P911227	101	381	281	7.025

--------------------PRIMARY LINES (con't)-----------

LINE	1ST SP	LST SP	#SP	#KM
P911228	101	382	282	7.050
P911229	101	382	282	7.050
P911230	101	382	282	7.050
P911231E	101	382	282	7.050
P911232	101	382	282	7.050
P911233	101	382	282	7.050
P911234	101	382	282	7.050
P911235	101	382	282	7.050
P911236	101	382	282	7.050
P911237	101	382	282	7.050
P911238	101	382	282	7.050
P911239	101	382	282	7.050
P911240	101	382	282	7.050
P911241	101	382	282	7.050
P911242	101	382	282	7.050
P911243	101	382	282	7.050
P911244	101	382	282	7.050
P911245	101	382	282	7.050
P911246	101	382	282	7.050
P911247	101	382	282	7.050
P911248	101	381	281	7.025
P911249	101	381	281	7.025
P911250A	101	382	282	7.050
P911251	101	382	282	7.050
P911252	101	381	281	7.025
P911253	101	382	282	7.050
P911254A	101	382	282	7.050
P911255	101	382	282	7.050
P911256	101	382	282	7.050
P911257	101	382	282	7.050
P911258	101	382	282	7.050
P911259	101	382	282	7.050
P911260	101	382	282	7.050
P911261B	101	382	282	7.050
P911262	101	382	282	7.050
P911263	101	382	282	7.050
P911264	101	382	282	7.050
P911265	101	382	282	7.050
P911266	101	382	282	7.050
P911267	101	382	282	7.050
P911268	101	382	282	7.050
P911269	101	382	282	7.050
P911270	101	381	281	7.025
P911271	101	382	282	7.050
P911272	101	382	282	7.050
P911273	101	382	282	7.050
P911274	101	382	282	7.050
P911275	101	382	282	7.050
P911276	101	382	282	7.050
P911277	101	382	282	7.050
P911278	101	382	282	7.050
P911279	101	382	282	7.050
P911280	101	382	282	7.050
P911281	101	382	282	7.050
P911282	314	33	282	7.050
P911283	314	33	282	7.050
P911284	314	33	282	7.050
P911285	314	33	282	7.050
P911286	314	33	282	7.050
P911287	314	33	282	7.050
P911288	314	33	282	7.050
P911289	314	33	282	7.050
P911290	314	33	282	7.050
P911291	314	33	282	7.050
P911292B	314	33	282	7.050

-------------------PRIMARY LINES (con't)-----------

LINE	1ST SP	LST SP	#SP	#KM
P911293	314	33	282	7.050
P911294	314	33	282	7.050
P911295	314	33	282	7.050
P911296	314	33	282	7.050
P911297	314	33	282	7.050
P911298	314	33	282	7.050
P911299	314	33	282	7.050
P911300A	314	33	282	7.050
P911301	314	33	282	7.050
P911302A	314	33	282	7.050
P911303	314	33	282	7.050
P911304	314	33	282	7.050
P911305B	314	33	282	7.050
P911306	314	33	282	7.050
P911307	314	33	282	7.050
P911308A	314	33	282	7.050
P911309	314	32	283	7.075
P911310	314	33	282	7.050
P911311	314	33	282	7.050
P911312	314	33	282	7.050
P911313	314	33	282	7.050
P911314	314	33	282	7.050
P911315	314	33	282	7.050
P911316	314	34	281	7.025
P911317	314	33	282	7.050
P911318	314	33	282	7.050
P911319	314	33	282	7.050
P911320	314	33	282	7.050
P911321	314	33	282	7.050
P911322	314	33	282	7.050
P911323	314	33	282	7.050
P911324	314	33	282	7.050
P911325	314	33	282	7.050
P911326	314	33	282	7.050
P911327	314	33	282	7.050
P911328	314	33	282	7.050
P911329A	314	33	282	7.050
P911330	314	33	282	6.400
P911331A	314	33	282	7.050
P911332	314	33	282	7.050
P911333	314	33	282	7.050
P911334	314	33	282	7.050
P911335A	314	33	282	7.050
P911336	313	33	282	7.050
P911337B	314	34	281	6.450
P911338A	314	33	282	7.050
P911339	314	33	282	7.050
P911340	341	60	282	7.050
P911341	314	33	282	7.050
		PRIMARY:	67925 SP	1696.725

****

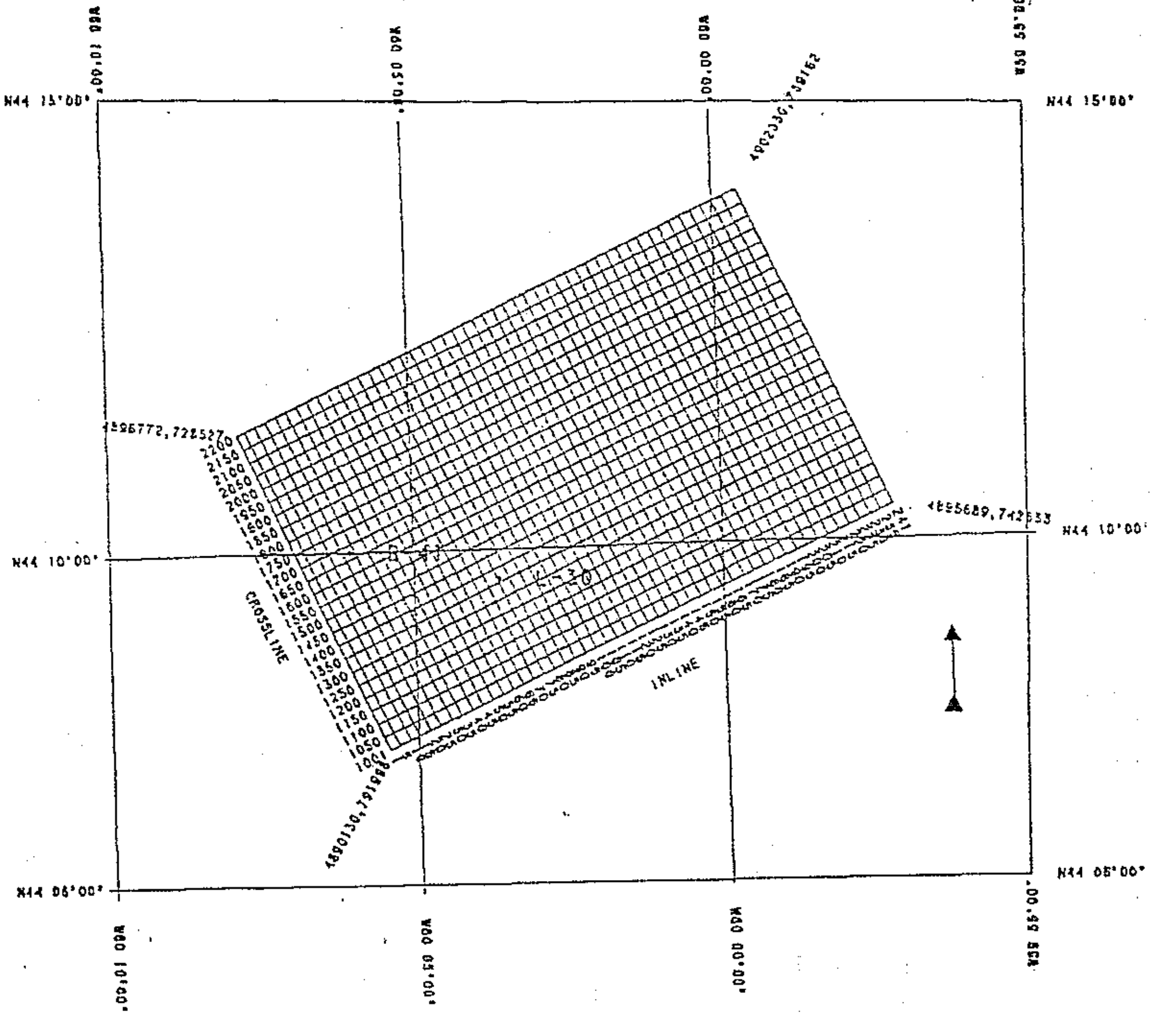
INFILL LINES

LINE	1ST SP	LST SP	#SP	#KM
P91F1106	314	33	282	7.050
P91F1109	314	33	282	7.050
P91F1117	314	33	282	7.050
P91F1120	314	33	282	7.050
P91F1121	314	33	282	7.050
P91F1126	314	33	282	7.050
P91F1132	314	33	282	7.050
P91F1139	314	33	282	7.050
P91F1142	314	33	282	6.850
P91F1144	314	33	282	7.050
P91F1147	314	33	282	7.050
P91F1154	314	33	282	7.050
P91F1164	101	382	282	7.050
P91F1169	101	382	282	7.050
P91F1173	101	381	281	7.025
P91F1176	101	381	281	7.025
P91F1179	101	381	281	7.025
P91F1181	101	382	282	7.050
P91F1187	101	382	282	7.050
P91F1190	101	383	283	7.075
P91F1198	101	382	282	7.050
P91F1200	101	382	282	7.050
P91F1202	101	381	281	7.025
P91F1206	101	382	282	7.050
P91F1209	101	381	281	7.025
P91F1222	101	382	282	7.050
P91F1226	101	382	282	7.050
P91F1230	101	383	283	7.075
P91F1231	101	382	282	7.050
P91F1236	101	382	282	7.050
P91F1243	101	381	281	7.025
P91F1246	101	382	282	7.050
P91F1258	101	382	282	7.050
P91F1260	101	383	283	7.075
P91F1263	101	382	282	7.050
P91F1290	314	33	282	7.050
P91F1292	314	32	283	7.075
P91F1297	314	33	282	7.050
P91F1300	314	32	283	7.075
P91F1301	314	33	282	7.050
P91F1307	314	32	283	7.075
P91F1309	314	33	282	7.050
P91F1313	314	33	282	7.050
P91F1340	314	33	282	7.050

INFILL: 12408 SP 310.000 KM

TOTAL: 80333 SP 2006.725 KM

FINAL 3-D GRID SCHEMATIC



DIMENSIONS:

Inline length is 7493.75 m at an azimuth of 332.4°
Crossline length is 12000.00 m at an azimuth of 62.4°
Cell size is 6.25 m (inline) by 50.00 m (crossline)

Corners	Inline	Crossline	Northing	Easting	y	x
P1	1	1001	44°07'46"N	60°06'00"W	4890130.78	731998.45
P2	1	2200	44°11'25"N	60°08'26"W	4896772.05	728527.16
P3	241	1001	44°10'34"N	59°57'53"W	4895689.47	742633.34
P4	241	2200	44°14'13"N	60°00'19"W	4902330.74	739162.05

(Note: UTM coordinates are based on the Clarke 1866 spheroid with central meridian -63°).

PROCESSING FLOW CHART

Western Geophys

FORMAT CONVERSION
SUBSAMPLE
2-D GEOMETRY
GEOMETRIC SPREADING COMPENSATION
DECONVOLUTION
TRACE BALANCE
SEISMIC/NAVIGATION MERGE
3-D CELL SORT
LAYER REPLACEMENT STATICS
REFLECTION STATICS
VELOCITY ANALYSIS
3-D DMO STACK
DECONVOLUTION
TIME VARIANT FILTER
INLINE MIGRATION
CROSSLINE SORT
CROSSLINE MIGRATION
BANDPASS FILTER
INLINE SORT
REFLECTION STRENGTH GAIN
ROOT MEAN SQUARED GAIN
DATUMING TO SEALEVEL

SEISMIC PROCESSING DESCRIPTION

(1) FORMAT CONVERSION/SUBSAMPLE/EDIT:

The field tapes received in demultiplexed SEG-D format consisted of 240 channels. The data was format converted to Western's internal Code 4 format then subsampled to 4 ms using a minimum phase anti-alias filter. A 52 ms time shift pulled the data up to compensate for the gun firing delay. For quality control the near trace and every 60th shot record were displayed.

(2) GEOMETRIC SPREADING COMPENSATION:

Using the geometry and zero-offset velocity function given in Table 1, the amplitude loss due to geometric spreading was restored using the following formula:

$$G(T) = \frac{V^2 T}{V^2_{(water)}}$$

T(ms)	V(m/s)
200	1500 (water)
560	1670
900	1865
1100	2025
1580	2345
1980	2605
2300	2815
2820	3120
6200	4500

TABLE 1

(3) PREDICTIVE DECONVOLUTION:

Wiener-Levinson predictive deconvolution was applied to the data using the following parameters:

i) The design was performed on an average from all traces within the shot on 3 overlapping windows in time. The start and stop times were governed by hyperbolic moveout with the curve parameters from the following chart:

	Start t_o (ms)	V(m/s)	Stop t_o (ms)	V(m/s)
Window 1	180	1223	2500	1700
Window 2	1800	1695	4000	3800
Window 3	3500	3500	6000	9999

ii) Minimum Prediction Distance .... 4 ms
Maximum Prediction Distance .... 340 ms
Percentage White Noise 1%

iii) The output RMS amplitude level of each window was restored to its input value after the application of deconvolution.

(4) TRACE BALANCE:

The RMS amplitude of each trace was scaled to a fixed value of 2000 based on the input RMS values from the following window:

	Near Trace	Far Trace
Start Time(ms)	240	2600
Stop Time (ms)	6000	6000

(5) SEISMIC/NAVIGATION MERGE:

Navigation information, processed by H.G.S. Canada Ltd., was received in UKOOA P1-84 format which included Clarke 1866 UTM coordinates for every source and receiver position together with a unique field shot identifier based on the time of the shot. Likewise, upon conversion of the seismic data from SEG-D to our internal format, the same field shot identifier was constructed from timing information in the field tapes.

By matching the field shot identifiers in the navigation data to those of the seismic data, the correct geometry was copied into the trace headers of the seismic data.

(6) 3-D CELL SORT:

The shot gathers updated with 3-D geometry were sorted according to midpoint location into 3-D cell gathers in preparation for statics treatment and stacking. A grid which encompassed the midpoints, with cell dimensions of 6.25 m (inline) and 50.00 m (crossline) and parallel to the average effective azimuth of the sail-lines (332.4 DEG or 152.4 DEG), was tested to give optimum coverage in the stacking process.

(7) LAYER REPLACEMENT STATICS:

To remove the effect of the variable depth of the low velocity water layer, brute statics were first calculated based on the formula:

$$S_b = \frac{WD}{V_r} - \frac{WD}{V_w}$$

WHERE:

S_b = BRUTE STATIC
WD = WATER DEPTH (m)
V_r = 1900 M/S
V_w = 1500 M/S

Water depths were supplied to us on UK00A format tapes for every source point, but measured at the antenna. To place these at the source point, we adjusted the x and y coordinates by 81.7 m in the bearing direction. This produced a field of water depths covering the survey which, with additional water depth information supplied by the client for the perimeter, was interpolated and contoured for quality control.

For each data trace, the water depth field was searched at both the xy-coordinate of the shot and the receiver, and separate brute statics calculated as above. To make them surface consistent, the mean static was calculated for each CDF (cell) gather and was apportioned to a datum static for that gather and residual source and receiver statics. These statics would later be residualized by a reflection statics routine and the result applied at the time of NMO correction during velocity analysis and stacking.

(8) REFLECTION STATICS:

Residual reflection statics were calculated based on a surface consistent analysis of static deviation picks on CDF (cell) ordered data.

First, the static deviations were calculated as the difference between the trace being picked and a model trace constructed from two sources of data surrounding the gather being picked: dip-steered averages within a windowed 3-D volume of both stacked data and upgraded NMO-corrected data already static-shifted within the program. The model building window was limited to between 800 ms and 3700 ms, with stacked traces within a radius of 150 m contributing to the construction of the model trace.

The resulting reflection pick times were then decomposed into surface-consistent source and detector statics, subsurface-consistent structural times and residual normal moveout using the Gauss-Seidel iterative algorithm.

(9) VELOCITY ANALYSIS:

Velocity analysis was performed in a 2-D fashion on select inline data forming a grid of approximately 1000 metres square. Eleven contiguous deconvolved gathers were common offset summed to provide the input. A crosscorrelation based technique was used to create the velocity analysis (VELAN*) by searching for coherency along hyperbolic trajectories. The velocity spectra were interpreted and velocities output digitally from Western's EXPEDITOR workstation.

(10) 3-D DMO STACK:

All of the following operations were performed in this single major processing step:

i) 3-D FLEXI-CELL BINNING

Flexi-cell binning was invoked to provide data for only those offset ranges which contained no representation.

The shooting geometry of 240 receivers spaced at 12.5 m with shotpoint spacing at 25 m provided a nominal 60-fold coverage in the 2-D common midpoint domain. This translated to a partitioning of the source to receiver distances into 60 offset ranges, all of which should be represented in each static grid cell with the dimensions 6.25 m (inline) by 50 m (crossline).

For any offset not represented in a cell, the cell was expanded in the crossline direction by a factor of 2.0 creating overlapping 6.25 m by 100 m 'Flexi-Cells'. This expanded cell was then searched to provide 'borrowed' traces for any missing offsets. In the event of more than one candidate trace to be borrowed, that with the nearest perpendicular distance to the cell's centre was chosen.

Where irregular shooting geometry produced more that one representative offset in the original 'static' cell, 'redundant offset weighting' inverted the duplication factor and applied it as a scalar weight for that offset prior to stacking.

ii) NMO CORRECTION AND TRACE MUTING

The data was NMO-corrected using the 3-D geometry and the velocity field obtained from Step 9. After NMO-correction the data was muted on the basis of offset as follows:

Offset (m)	First Live Sample (ms)
380	4
394	300
3174	2800

iii) DMO CORRECTION AND STACK:

The DMO correction was achieved by applying 'Kirchhoff like' migration operators to the prestack traces. The velocity independent impulse response of these operators formed an ellipse passing through the sample point and the trace source and receiver coordinates. The amplitudes along these curves were added into running averages being maintained for the cells the DMO operator passed through. This can be viewed as a transformation from common midpoint to common reflection point, resulting in a true zero-offset stacked section. A 51 trace aperture and 70 degree maximum dip were imposed on the DMO operators.

(11) DECONVOLUTION AFTER STACK:

Minimum phase predictive deconvolution was applied using the Wiener Levinson algorithm. The operator was designed from the amplitude spectrum of a 51 trace running average. The design parameters and windowing for autocorrelation determination were as follows:

Operator Length	300 ms
Prediction Distance	4 ms
Number of Channels	51
Percent of White Noise	0.1%

Autocorrelation Windowing

WINDOW	START TIME (ms)	STOP TIME (ms)
1	80	1418
2	749	2087
3	1418	2756
4	2087	3424
5	2756	4093
6	3424	4762
7	4093	5431
8	4762	6100

(12) TIME VARYING FILTER:

The following zero phase bandpass filters were applied to the data at the times given. For intermediate times the output trace consists of a linear combination of the filtered result with the earlier and later filters.

Time (ms)	Roll Off (db/oct)	Freq at - 3 db (Hz)	Freq at - 3 db (Hz)	Roll Off (db/oct)
300	18	14	80	96
1200	18	14	70	96
2700	18	14	60	78
3300	18	14	50	64
3900	18	12	40	56
4500	18	10	30	42
6100	18	10	25	36

(13) INLINE MIGRATION:

The residualized stacking velocity field obtained in step (9) was smoothed using the Radian Corporations' CPS Software. The '6 concentric circles' method was used to provide the smoothing operator iterated 2 times on a 1000 m square grid. These smoothed stacking velocities were scaled to 110% from 0 - 1500 ms and 100% from 3000 - 6100 ms. Between 1500 and 3000 ms the scaling was linearly interpolated from 110% to 100%.

The velocities were input to a 2-D poststack time migration in the inline direction using the Kirchhoff algorithm. The migration operators were set to image a maximum geologic dip of 45 degrees. This was further constrained by the condition that 75 Hz was not allowed to spatially alias. The aperture width was held constant after a time of 3100 ms. To reduce edge effects, 90 low-fold traces were removed from the ends of each inline, then further tapered over 150 live traces.

(14) CROSSLINE SORT:

To facilitate the second pass of 2D migration in the crossline orientation, the volume was sorted into crossline profiles.

(15) CROSSLINE MIGRATION:

A 2D poststack time migration was performed in the crossline direction using the Kirchhoff algorithm as in Step (13).

(16) BANDPASS FILTER:

A 10 Hz zero phase bandpass filter, with 18 db/octave roll-off, was applied to the data.

(17) INLINE SORT:

The data volume was sorted back into inline profiles to provide the required ordering for the final product.

(18) REFLECTION STRENGTH GAIN:

This statistical gain was based on the local amplitude envelope (magnitude of reflection strength vector) as follows:

$$D_i = \frac{[\, S \times A_i \,]}{[\, C_i + (S\text{-}1)\, A \,]} \times R$$

Where:
A_i = input amplitude
D_i = output amplitude
C_i = amplitude envelope (running average over 200 ms window)
S = standout factor (2)
A = mean absolute value of trace
R = desired output RMS amplitude

(19) RMS AMPLITUDE GAIN:

RMS values from non-overlapping windows beginning with length 128 ms and doubling to a maximum of 1024 ms were obtained. A scalar was determined for each window to adjust the RMS amplitude to a constant 2000. These scalars were applied at window centres with all other values determined by linear interpolation.

(20) DATUMING TO SEALEVEL:

The data was pushed down 12 ms to compensate for the average towing depth (converted to travel time) of the source and streamer.

FINAL PRESENTATIONS

DISPLAYS

- One film and one print of the scaled migrated stacks for every 5th inline (36.3 tr/in, 5 in/s) and every 50th crossline (24 tr/in, 5 in/s), as well as inline 24, inline 77 and two reconstructed (directional) lines.
- One mylar and five additional prints of the scaled migrated stacks for every 10th inline and every 100th crossline.
- Two mylar and three prints of the final grid map at a scale of 1:20,000.

TAPES

- SEG-Y tapes containing scaled migrated stacks (every second trace), the raw stacks and scaled stacks.
- Two UK00A format tapes containing bin locations.
- Velocity reels containing stacking velocities (as picked from velocity scans) and scaled and smoothed migration velocities.

STAFFING OF PROJECT:

All of the seismic processing was performed in Western Geophysical's Calgary Processing Centre.

PERSONNEL:

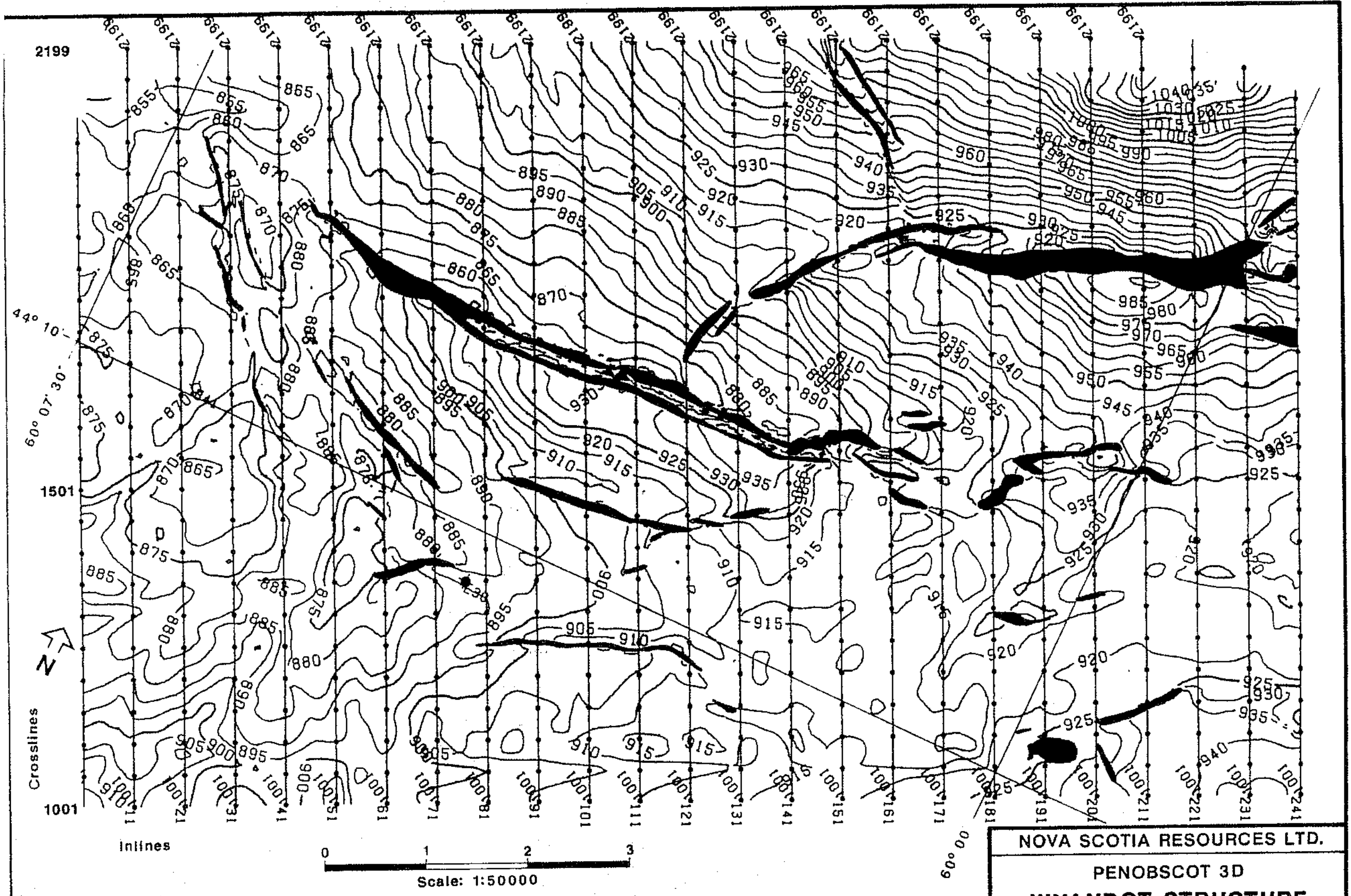
Nova Scotia Resources Limited:
Technical Representative - Mr. Don Crane

Western Atlas International Inc.:
Seismic Processing Supervisor - L. Wayne Smith
Seismic Processing Geophysicist - Brendalee Bowman
Seismic Processing Technician - Lynn Burroughs
Seismic Processing Technician - Sat Aujla
Seismic Processing Technician - John Lewald

This report prepared by Wayne Smith and Brendalee Bowman, January 1992.

APPENDIX 3

1:50,000 MAPS

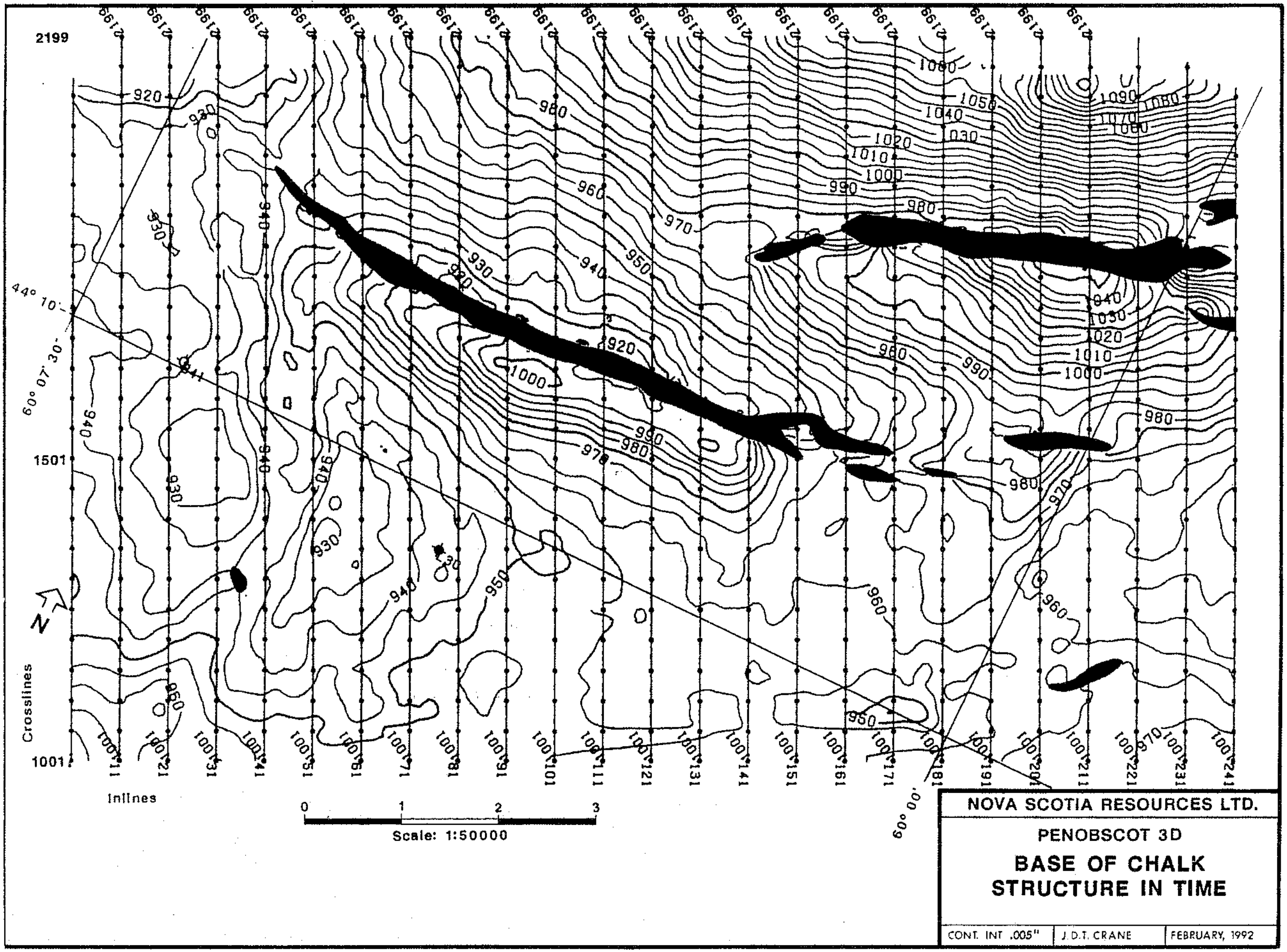


NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

WYANDOT STRUCTURE IN TIME

CONT. INT. .005" | J.D.T. CRANE | FEBRUARY, 1992

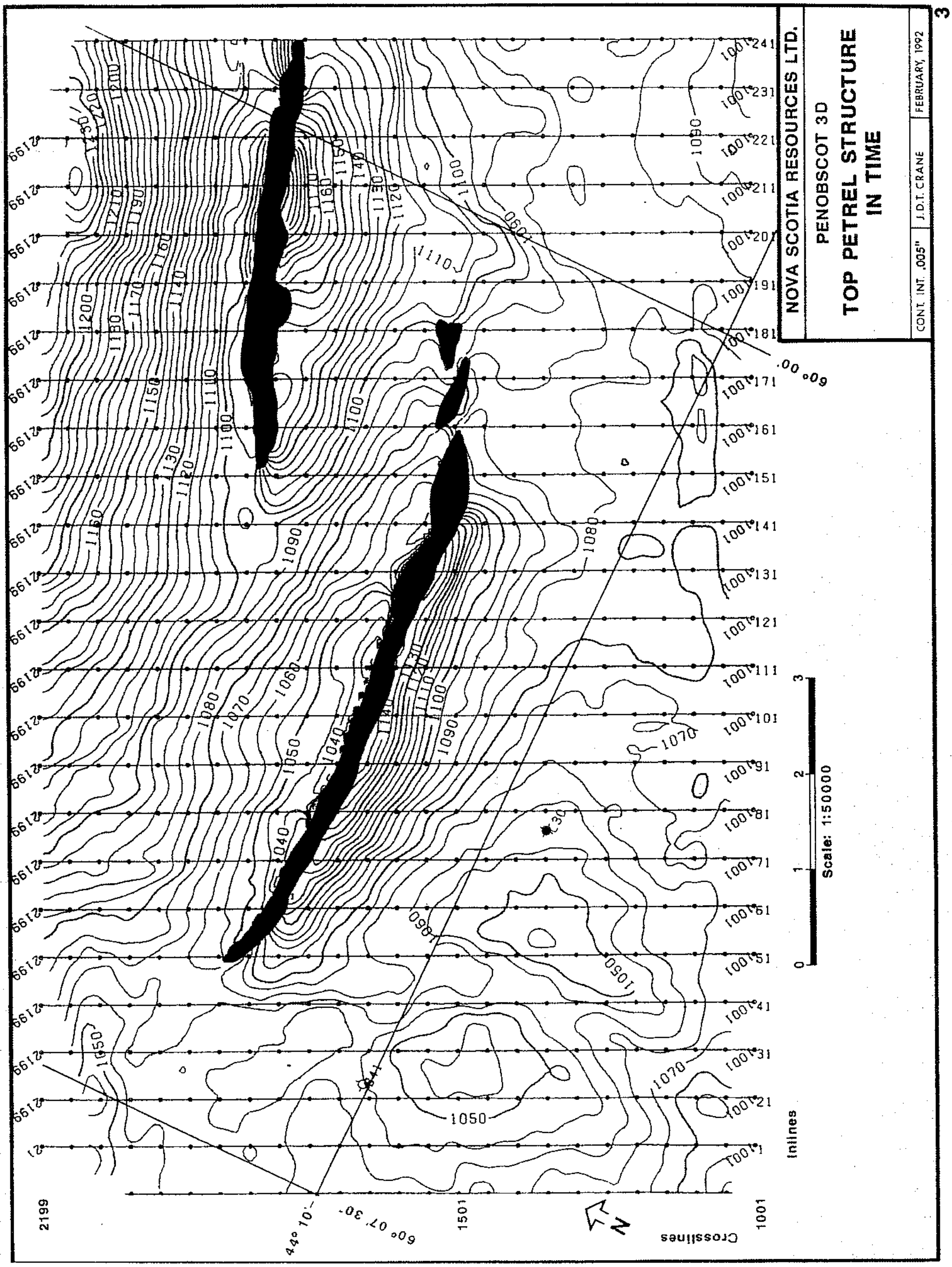


NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

BASE OF CHALK STRUCTURE IN TIME

CONT. INT .005" | J.D.T. CRANE | FEBRUARY, 1992



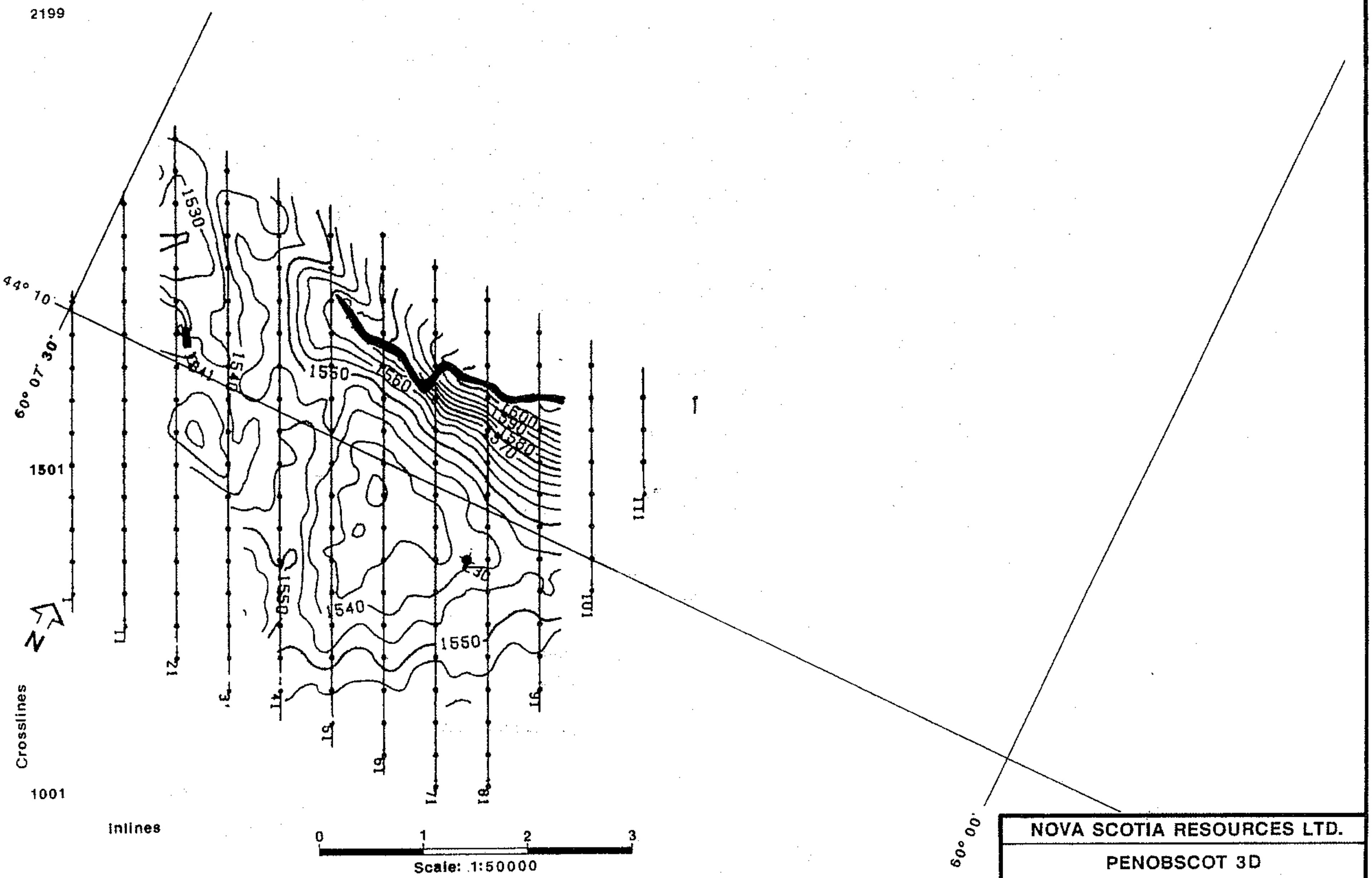
NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

TOP PETREL STRUCTURE IN TIME

CONT. INT. .005" | J.D.T. CRANE | FEBRUARY, 1992

3



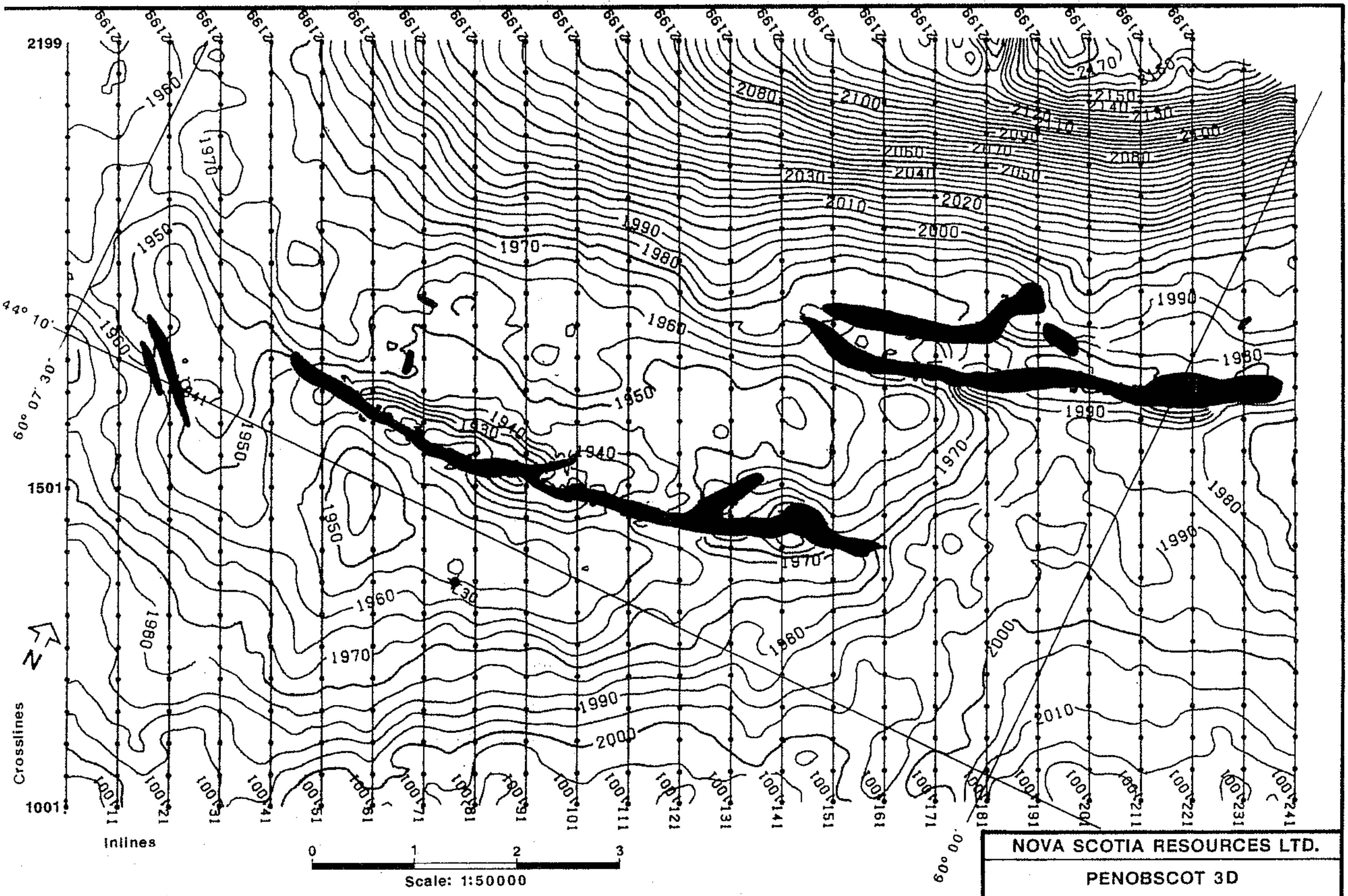
NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

MID. LOGAN CANYON STRUCTURE IN TIME

CONT. INT. .005"	J.D.T. CRANE	FEBRUARY, 1992

4

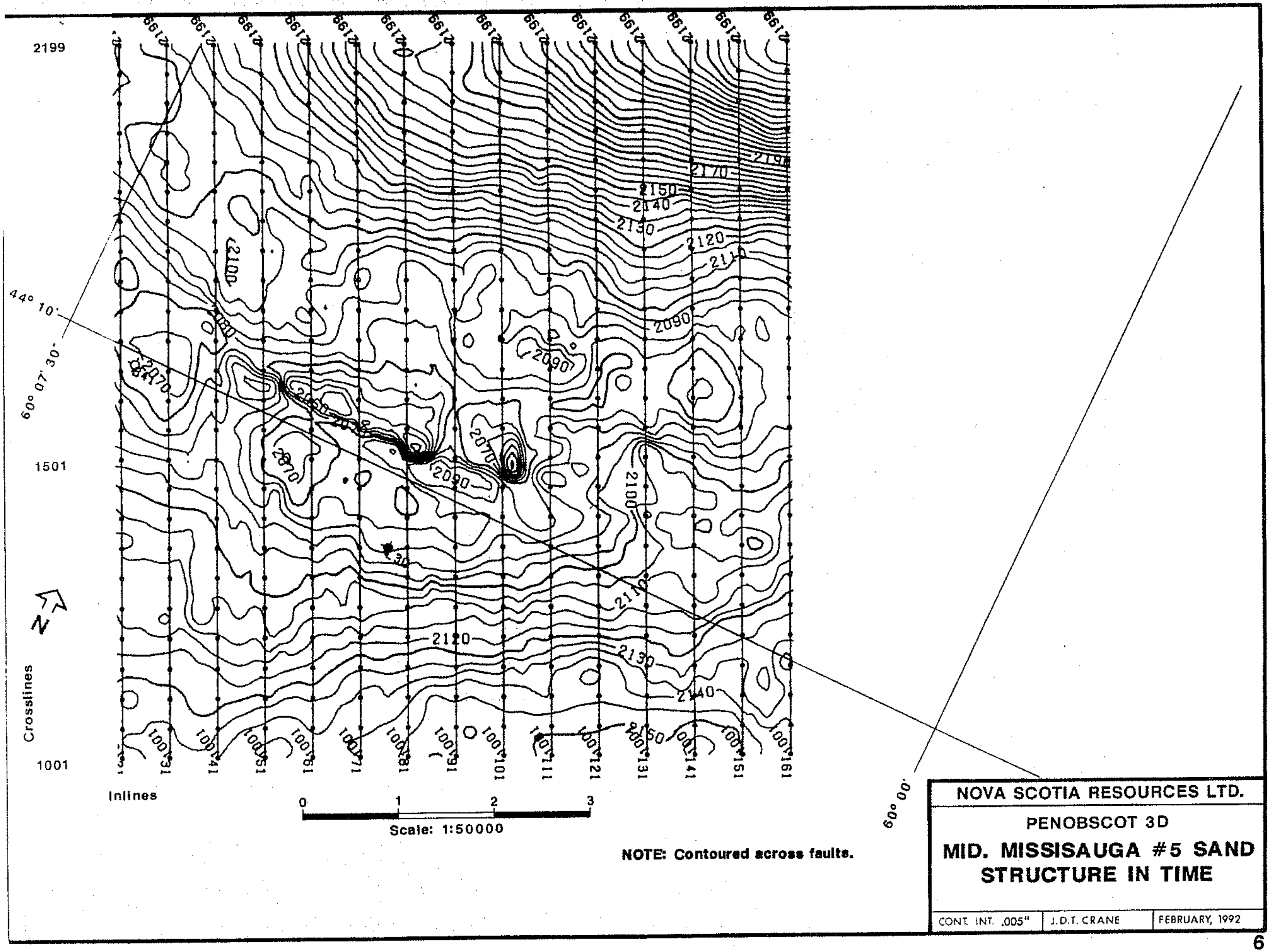


NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

'O' MARKER STRUCTURE IN TIME

CONT. INT .005"	J.D.T. CRANE	FEBRUARY, 1992



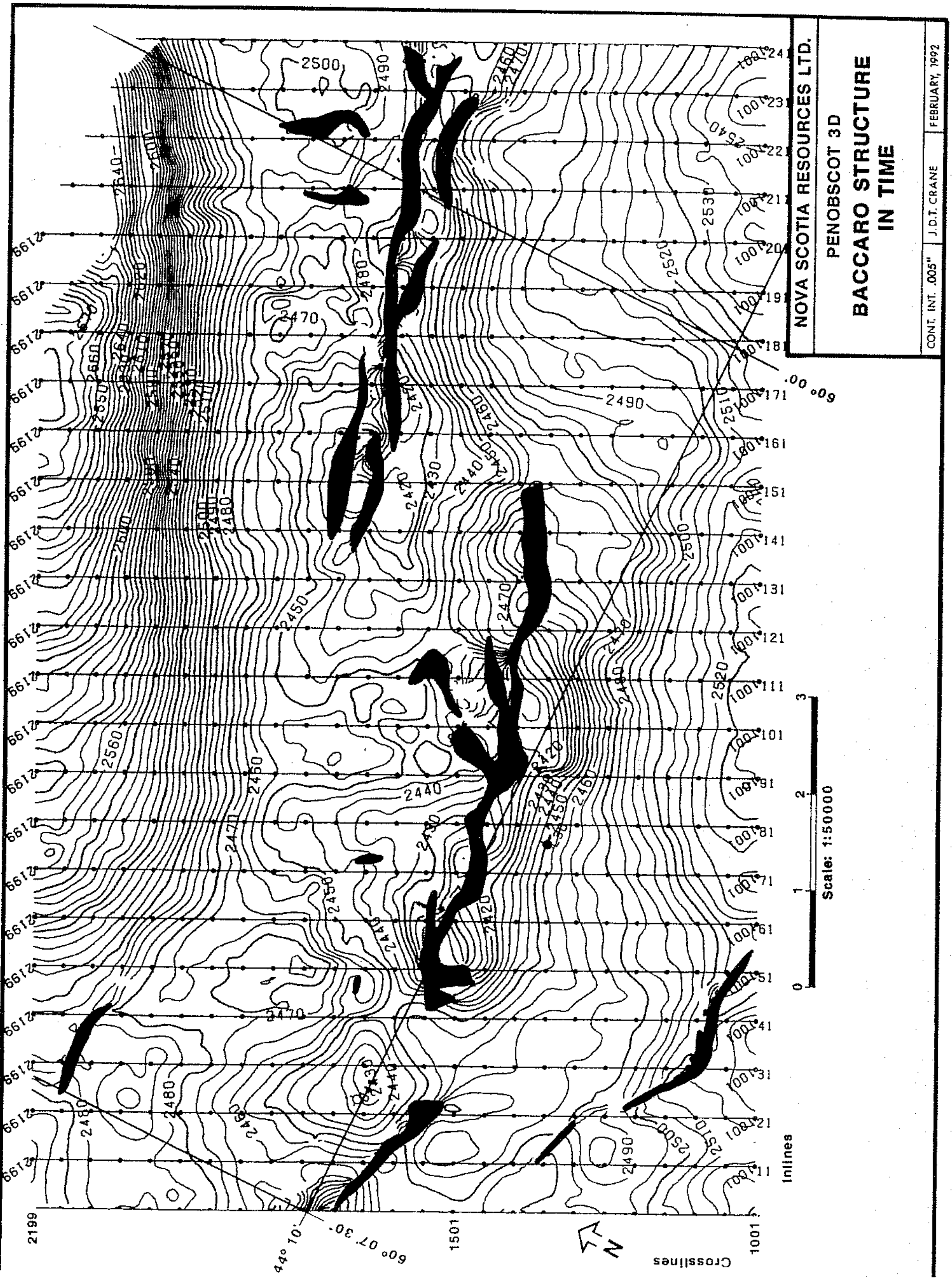
NOTE: Contoured across faults.

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

MID. MISSISAUGA #5 SAND STRUCTURE IN TIME

CONT. INT. .005"	J.D.T. CRANE	FEBRUARY, 1992

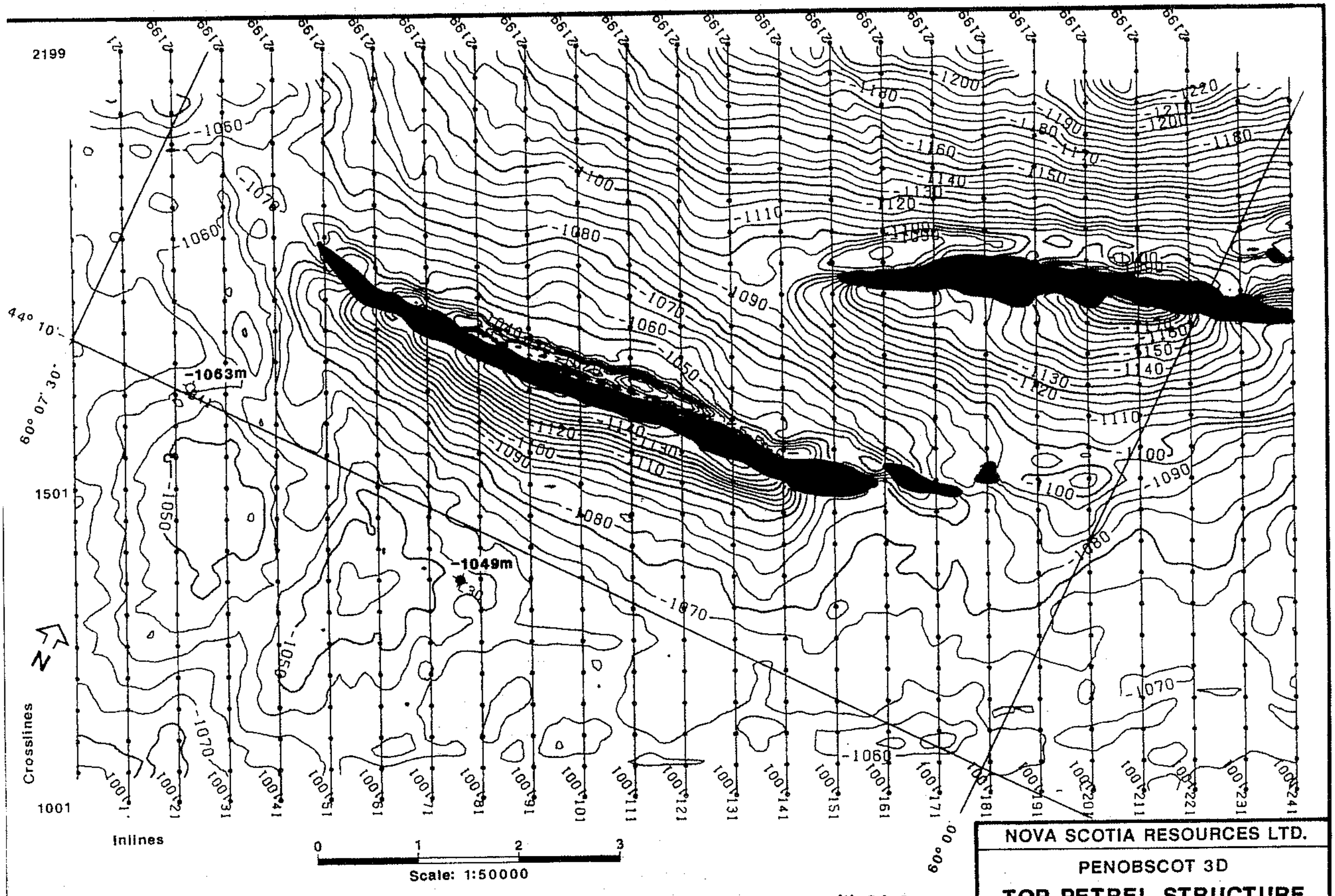


NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

BACCARO STRUCTURE IN TIME

CONT. INT. .005" | J.D.T. CRANE | FEBRUARY, 1992



NOTE: See 1:20000 map with C.I. 2m.

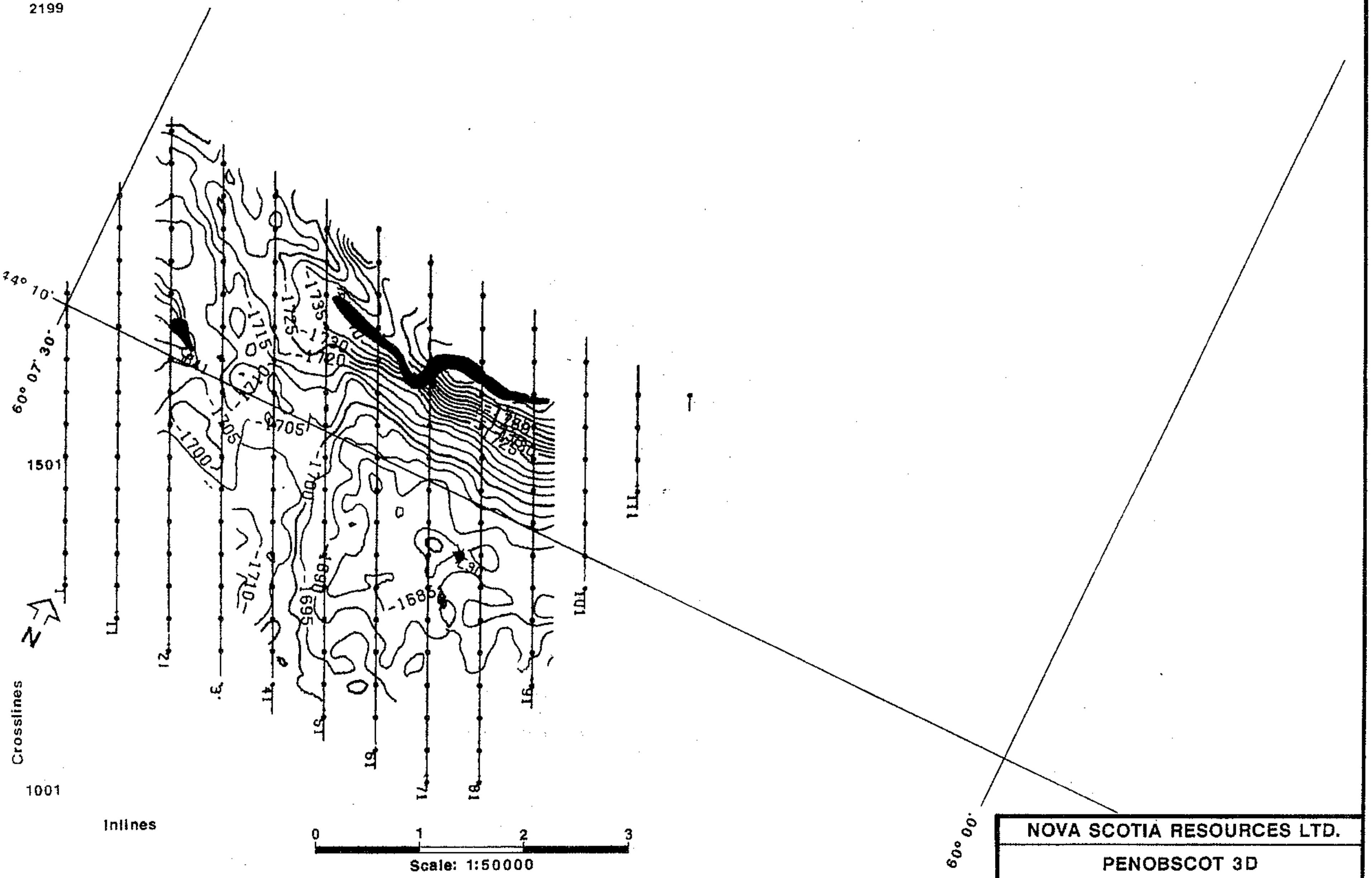
NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

TOP PETREL STRUCTURE IN DEPTH

CONT. INT. .5m	J.D.T. CRANE	FEBRUARY, 1992

8

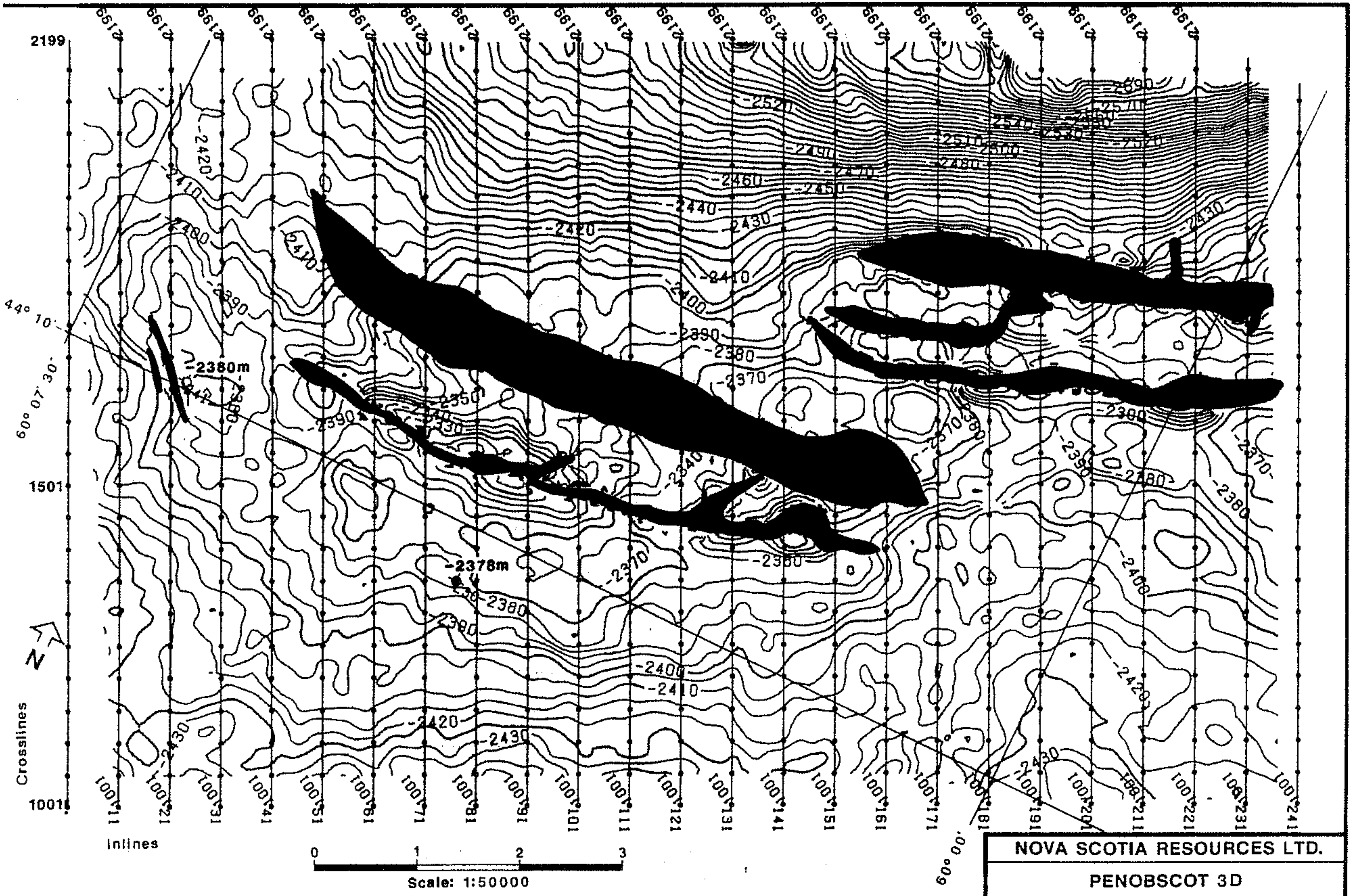


NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

MID. LOGAN CANYON STRUCTURE IN DEPTH

CONT. INT. 5 m | J.D.T. CRANE | FEBRUARY, 1992



NOTE: Wyandot to Petrel fault zone shown.

NOVA SCOTIA RESOURCES LTD.

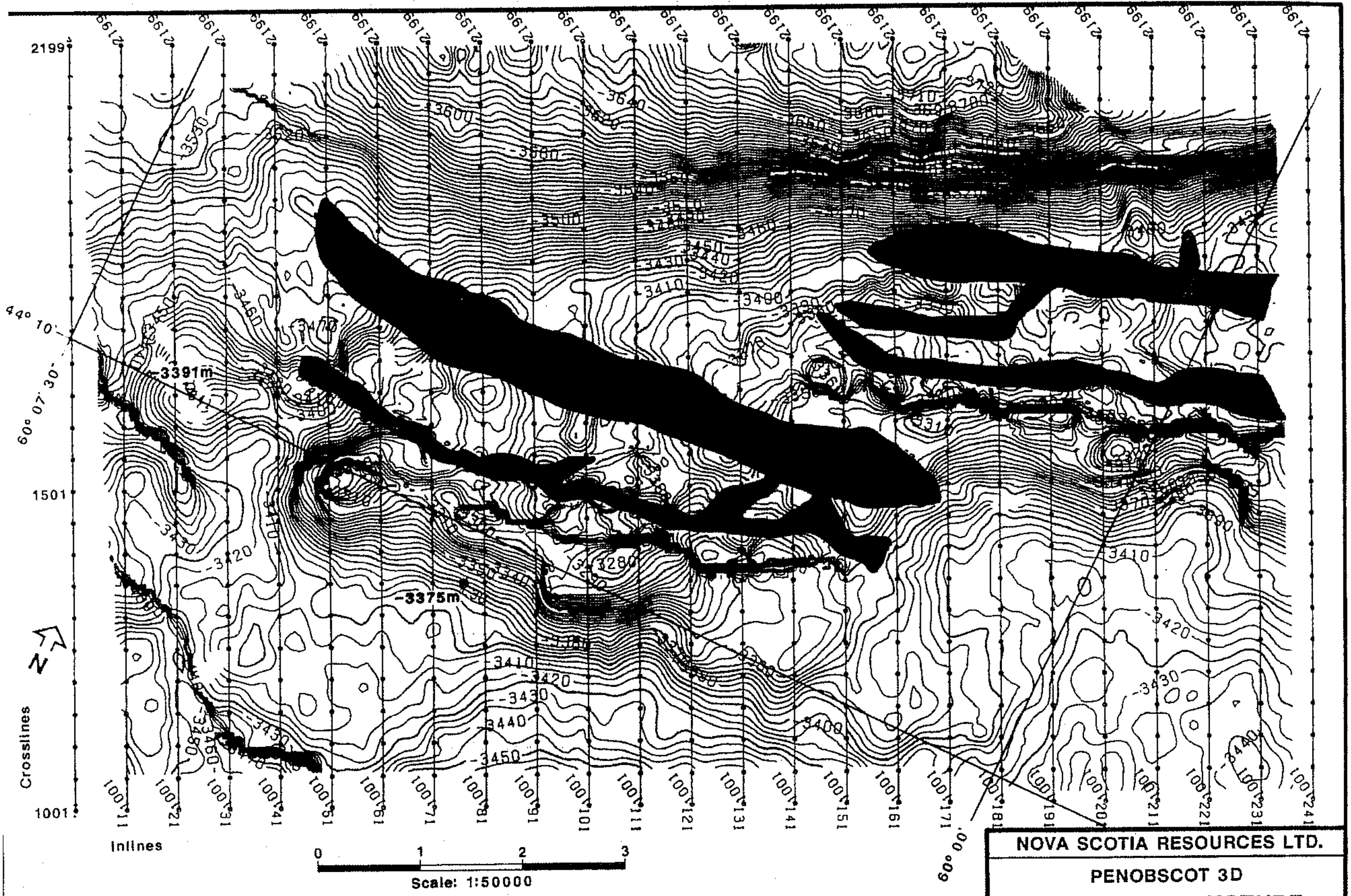
PENOBSCOT 3D

'O' MARKER STRUCTURE IN DEPTH

B

CONT. INT. 5m	J.D.T. CRANE	FEBRUARY, 1992

10-1



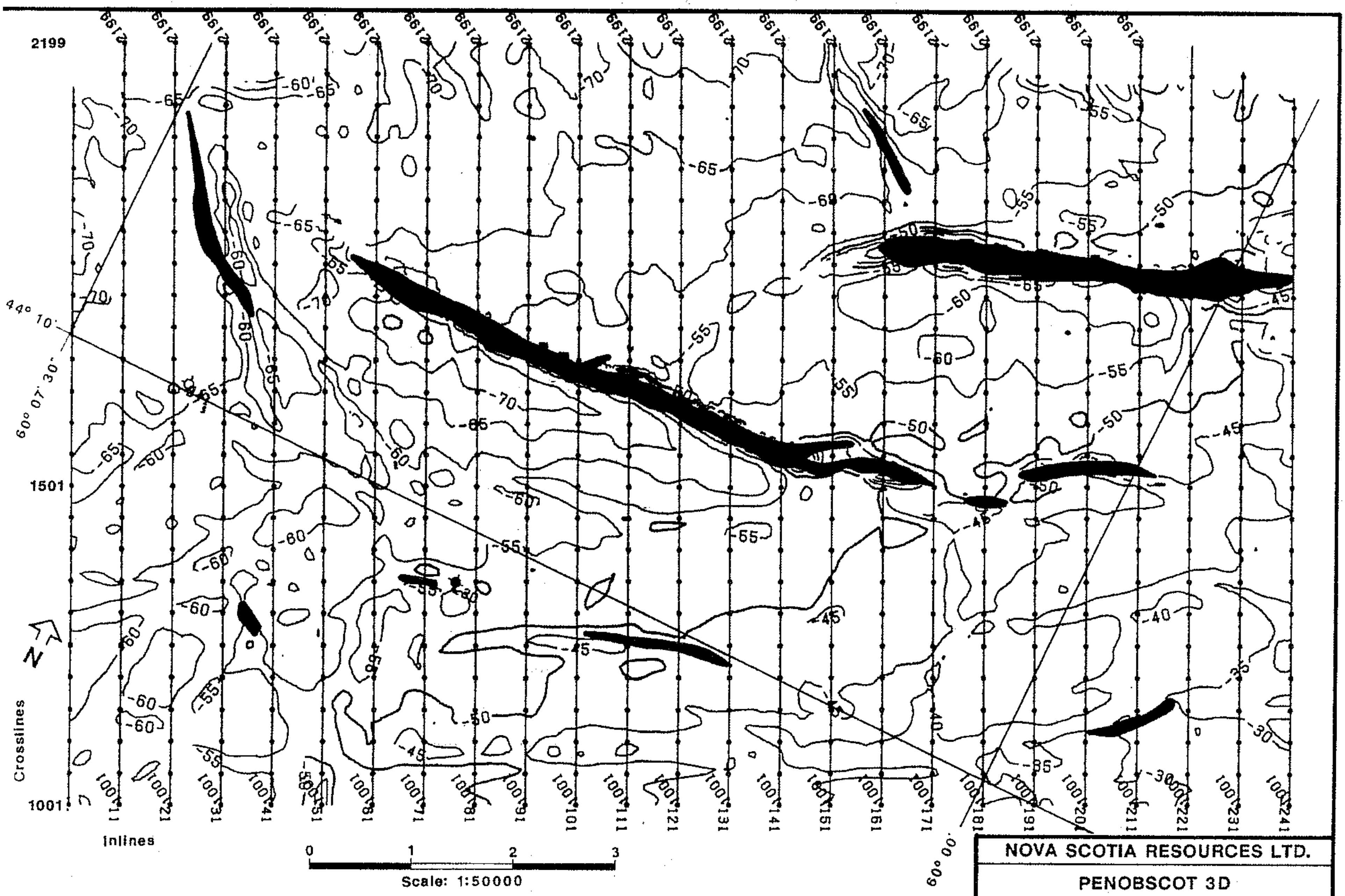
NOTE: Contoured across Baccaro faults.
Wyandot to 'O' fault zones shown.
See 1:20000 scale structure map.

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

BACCARO STRUCTURE IN DEPTH

CONT. INT. 5m	J.D.T. CRANE	FEBRUARY, 1992

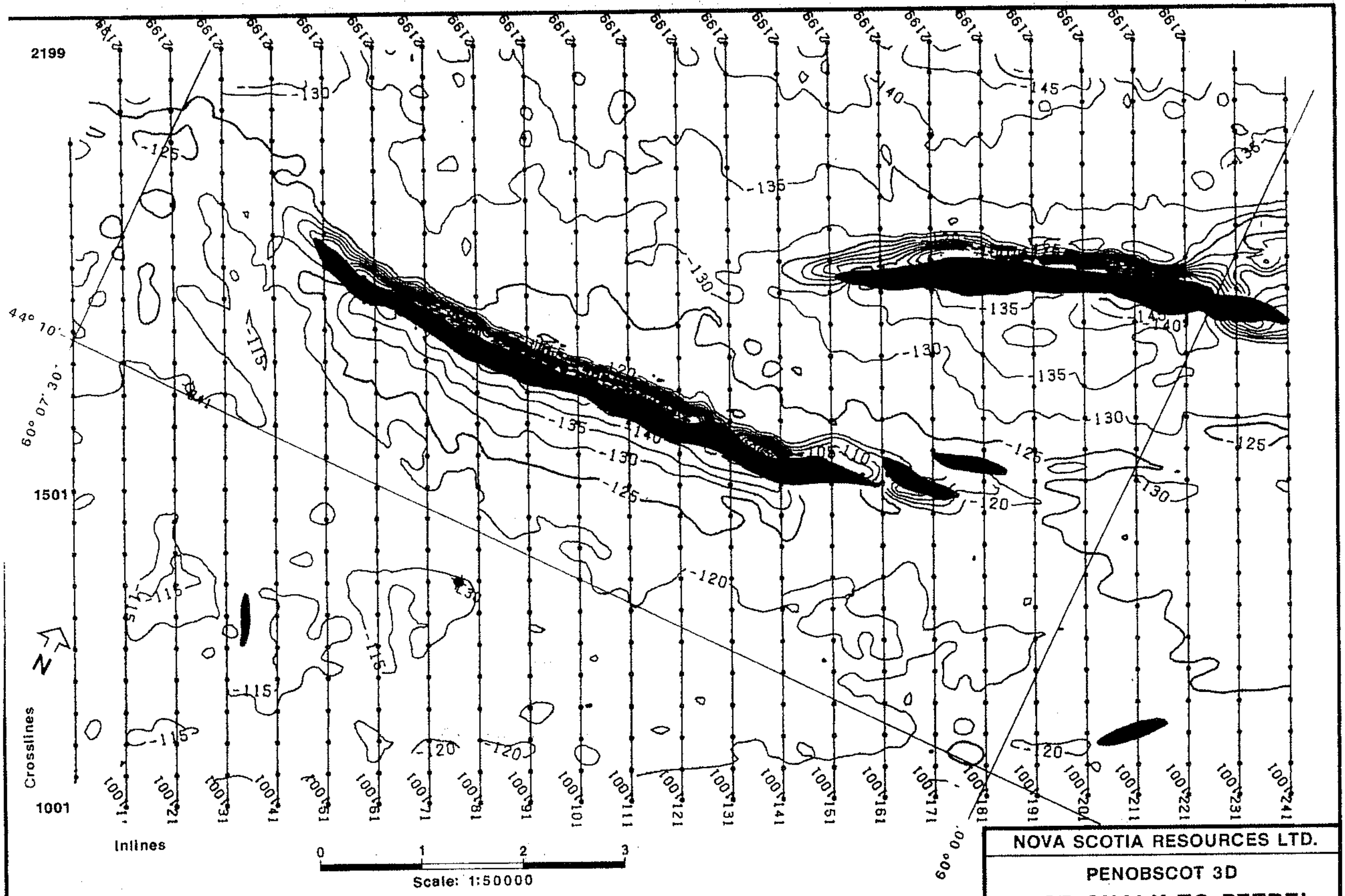


NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

WYANDOT TO BASE CHALK ISOCHRON

CONT. INT. .005"	J.D.T. CRANE	FEBRUARY, 1992



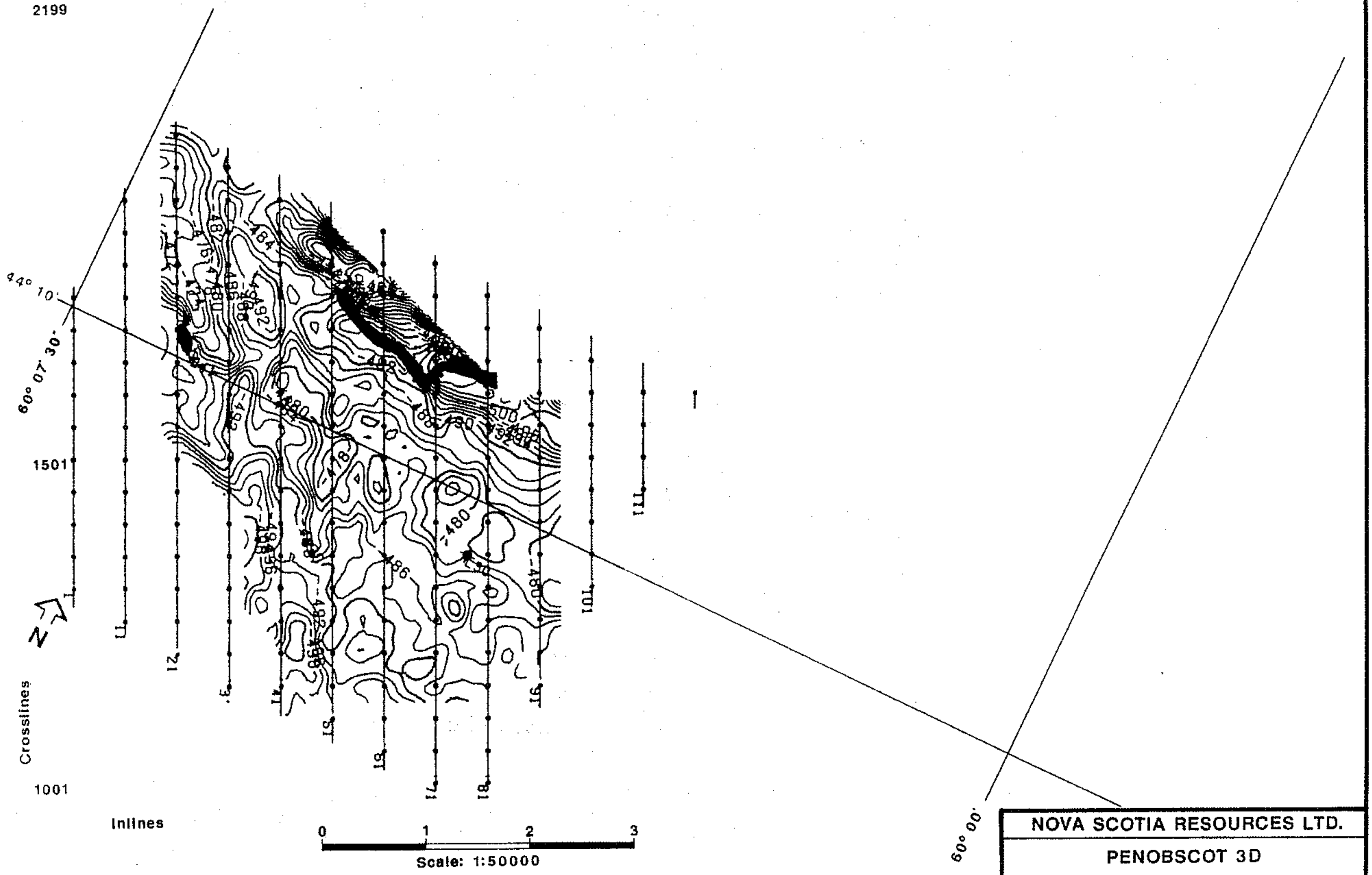
NOTE: Base Chalk contoured across fault
Petrel faults shown

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

BASE CHALK TO PETREL ISOCHRON

CONT. INT. .005" | J.D.T. CRANE | FEBRUARY, 1992

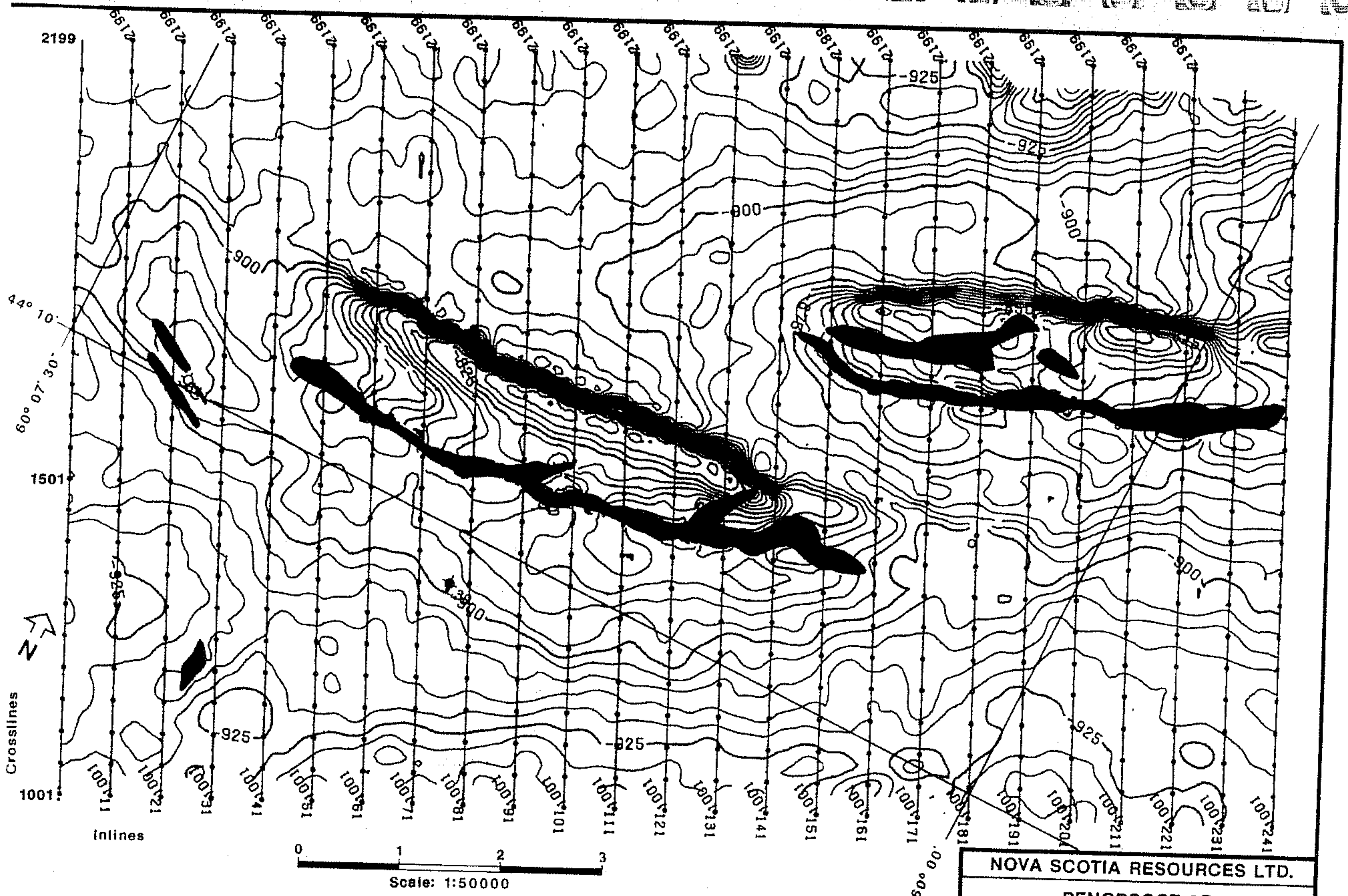


NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

PETREL TO MID. LOGAN CANYON ISOCHRON

CONT. INT. .005"	J.D.T. CRANE	FEBRUARY, 1992



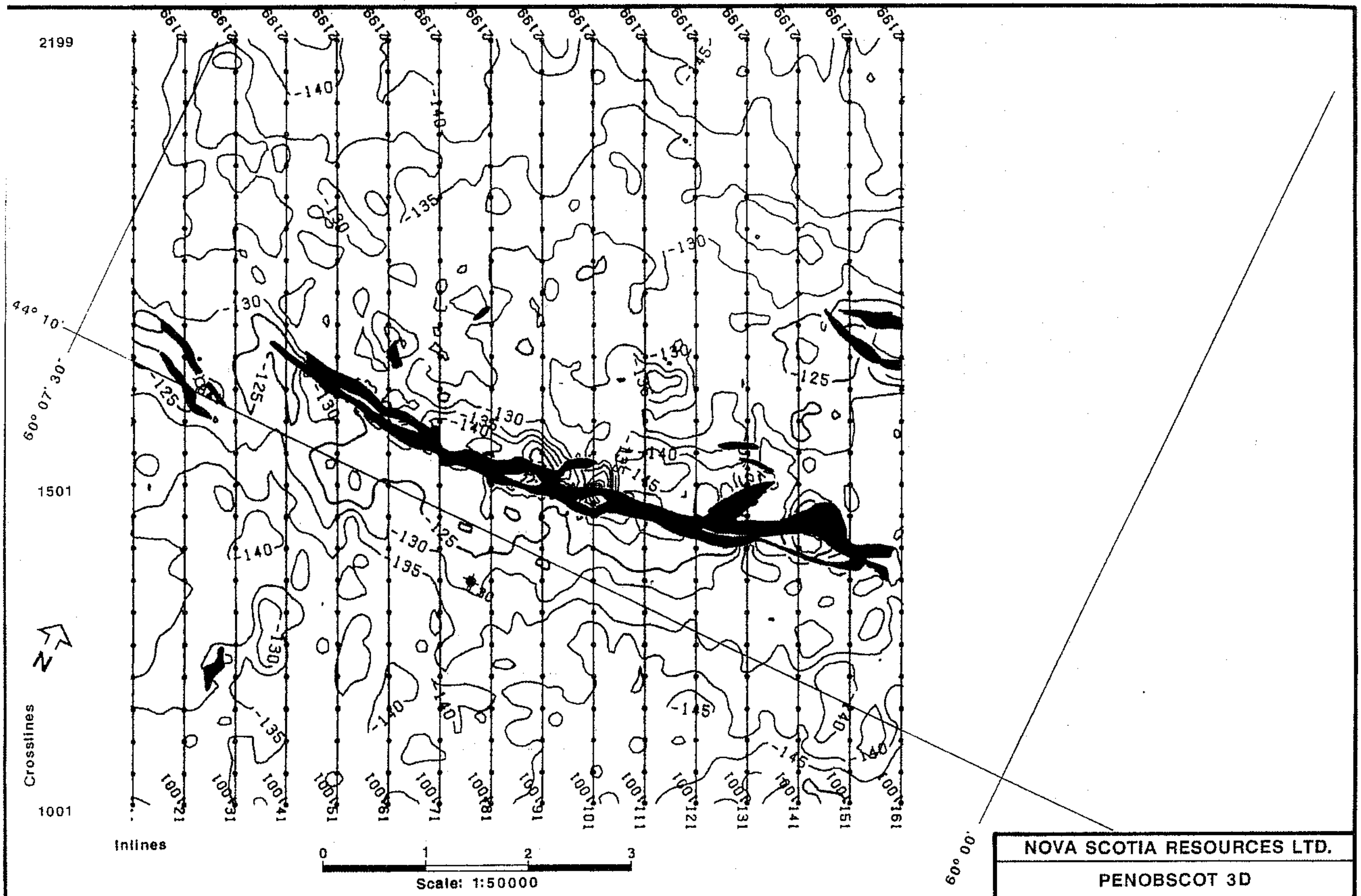
NOTE: Petrel contoured across faults.
'O' Marker faults shown.

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

PETREL TO 'O' MARKER ISOCHRON

CONT. INT. .005"	J.D.T. CRANE	FEBRUARY, 1992



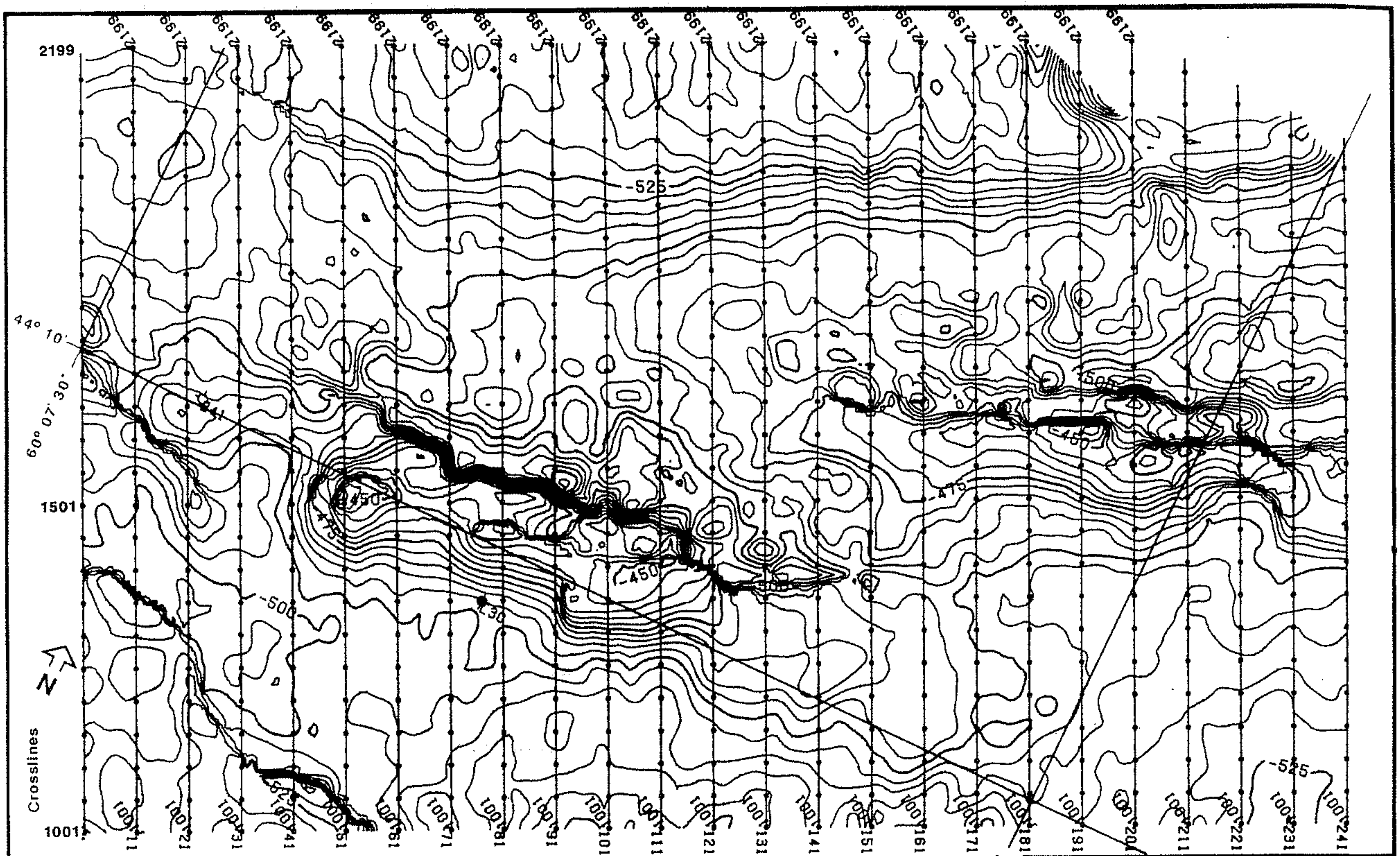
NOTE: Both 'O' Marker and #5 Sand faults shown.

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

'O' MARKER TO #5 SAND ISOCHRON

CONT. INT. .005"	J.D.T. CRANE	FEBRUARY, 1992



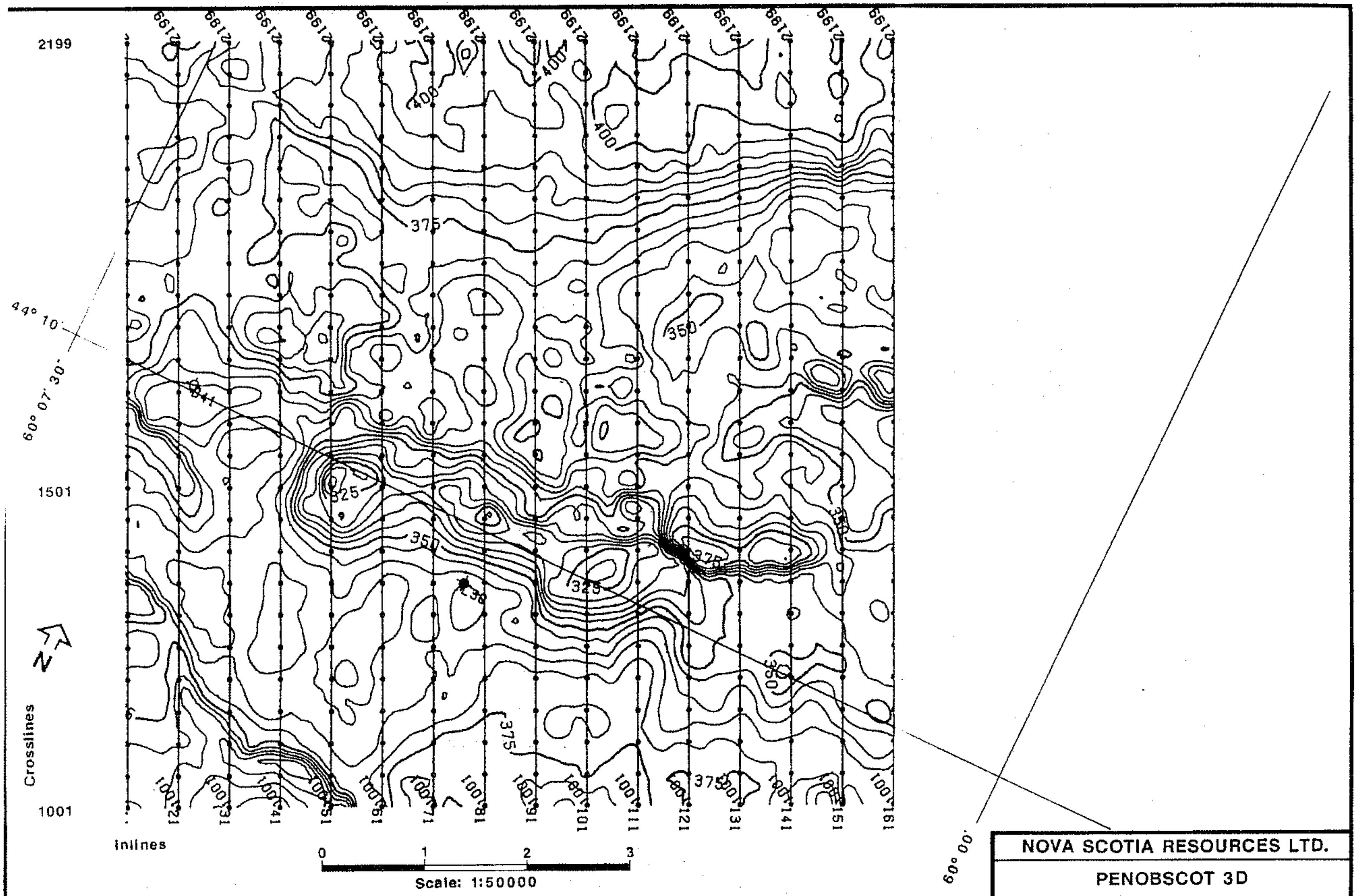
NOTE: Contoured across faults

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

'O' MARKER TO BACCARO ISOCHRON

CONT. INT. .005"	J.D.T. CRANE	FEBRUARY, 1992



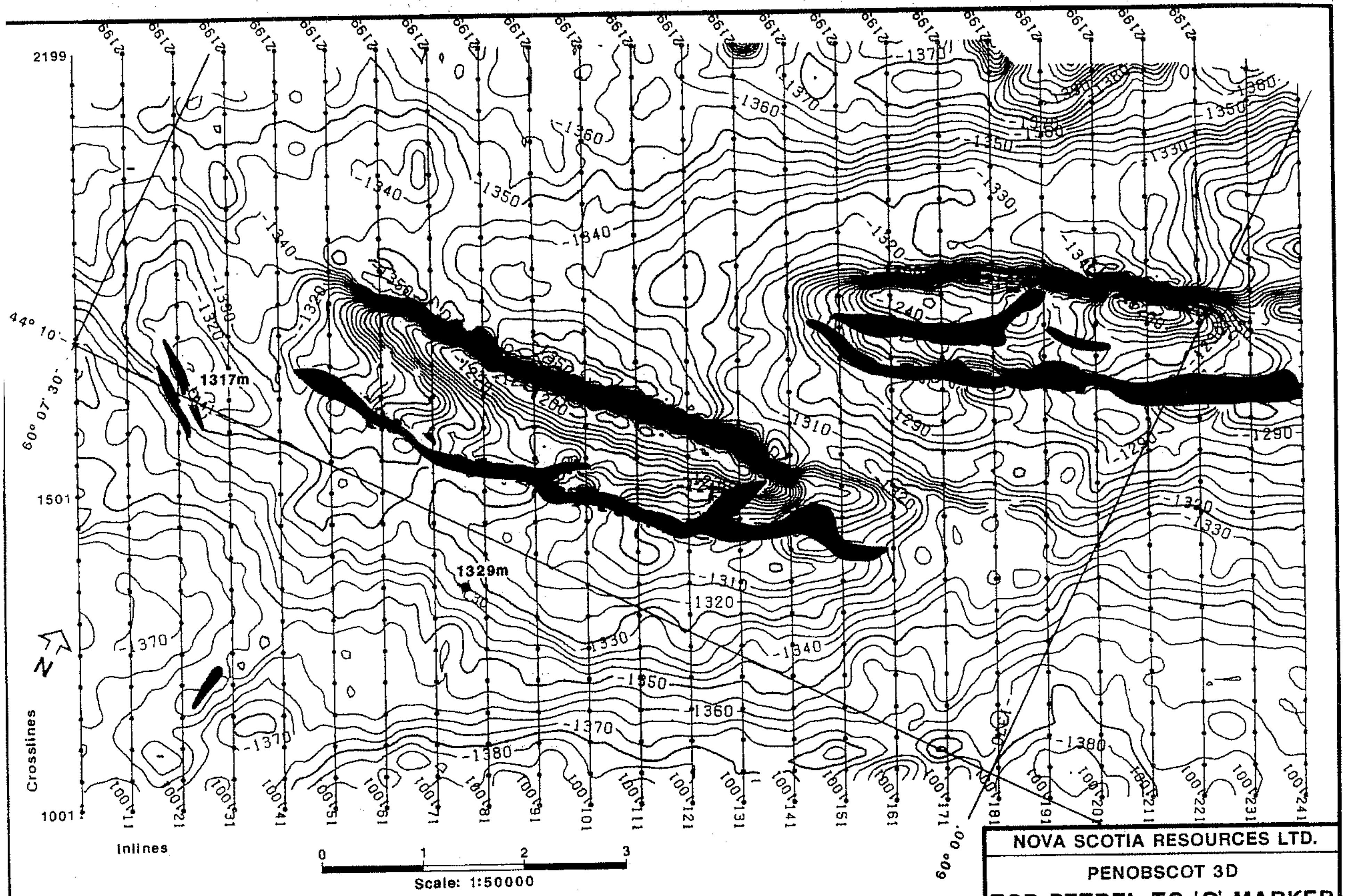
NOTE: Contoured across faults.

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

#5 SAND TO BACCARO ISOCHRON

CONT. INT. .005"	J.D.T. CRANE	FEBRUARY, 1992



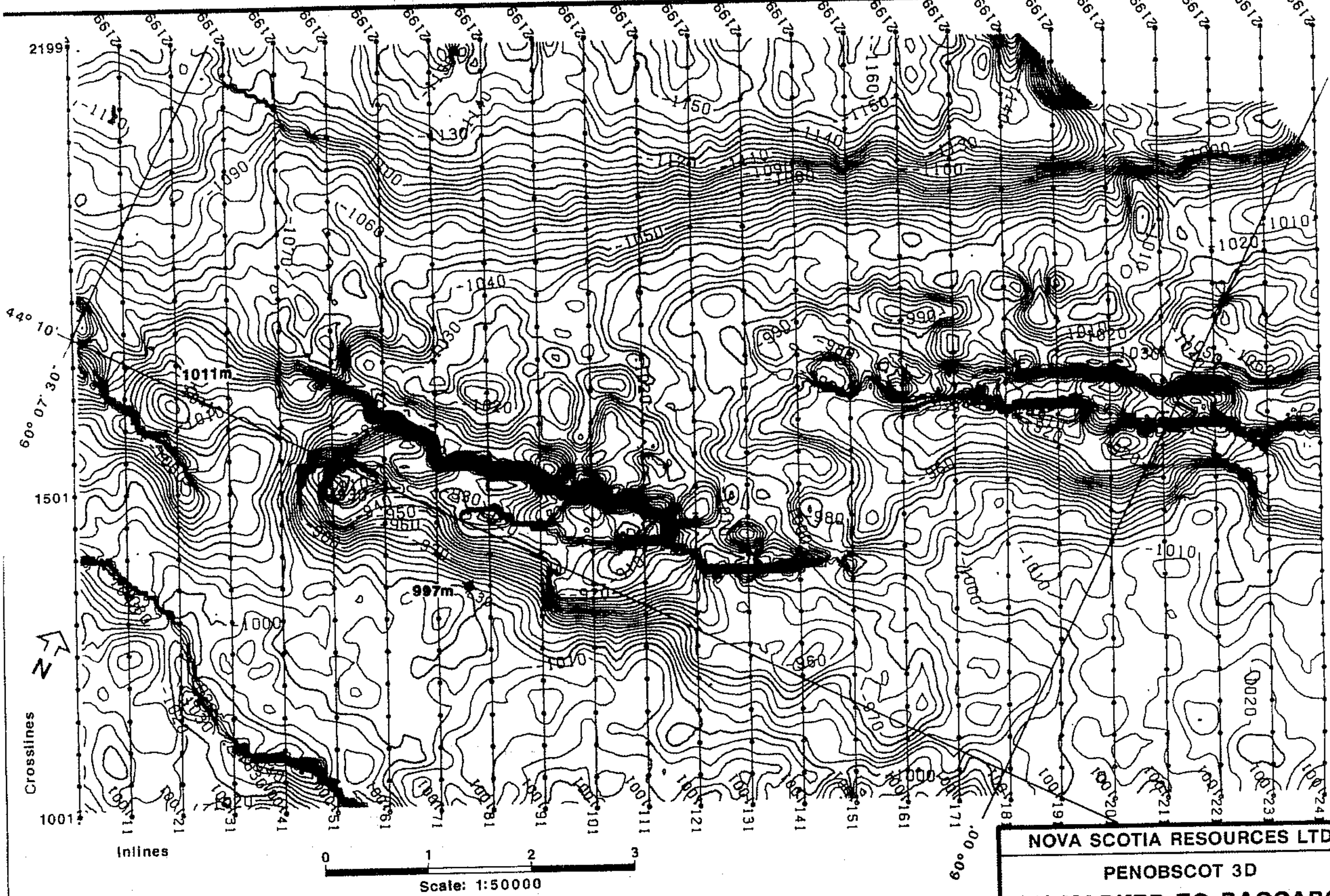
NOTE: Contoured across Petrel faults.
'O' Marker faults shown.

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

TOP PETREL TO 'O' MARKER ISOPACH

CONT. INT. 5 m	J.D.T. CRANE	FEBRUARY, 1992



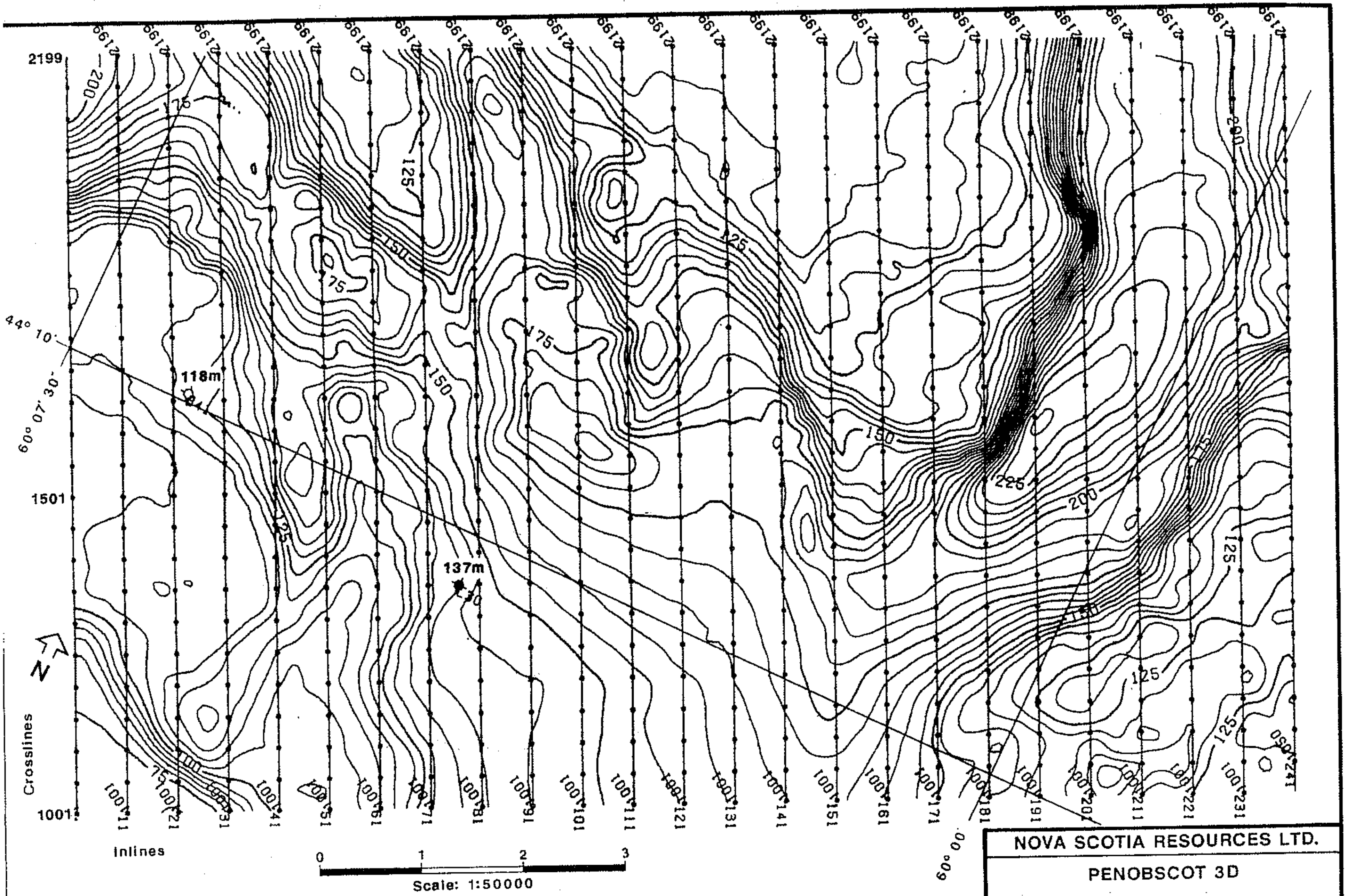
NOTE: Contoured across all faults.

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

'O' MARKER TO BACCARO ISOPACH

CONT. INT. 5m | J.D.T. CRANE | FEBRUARY, 1992

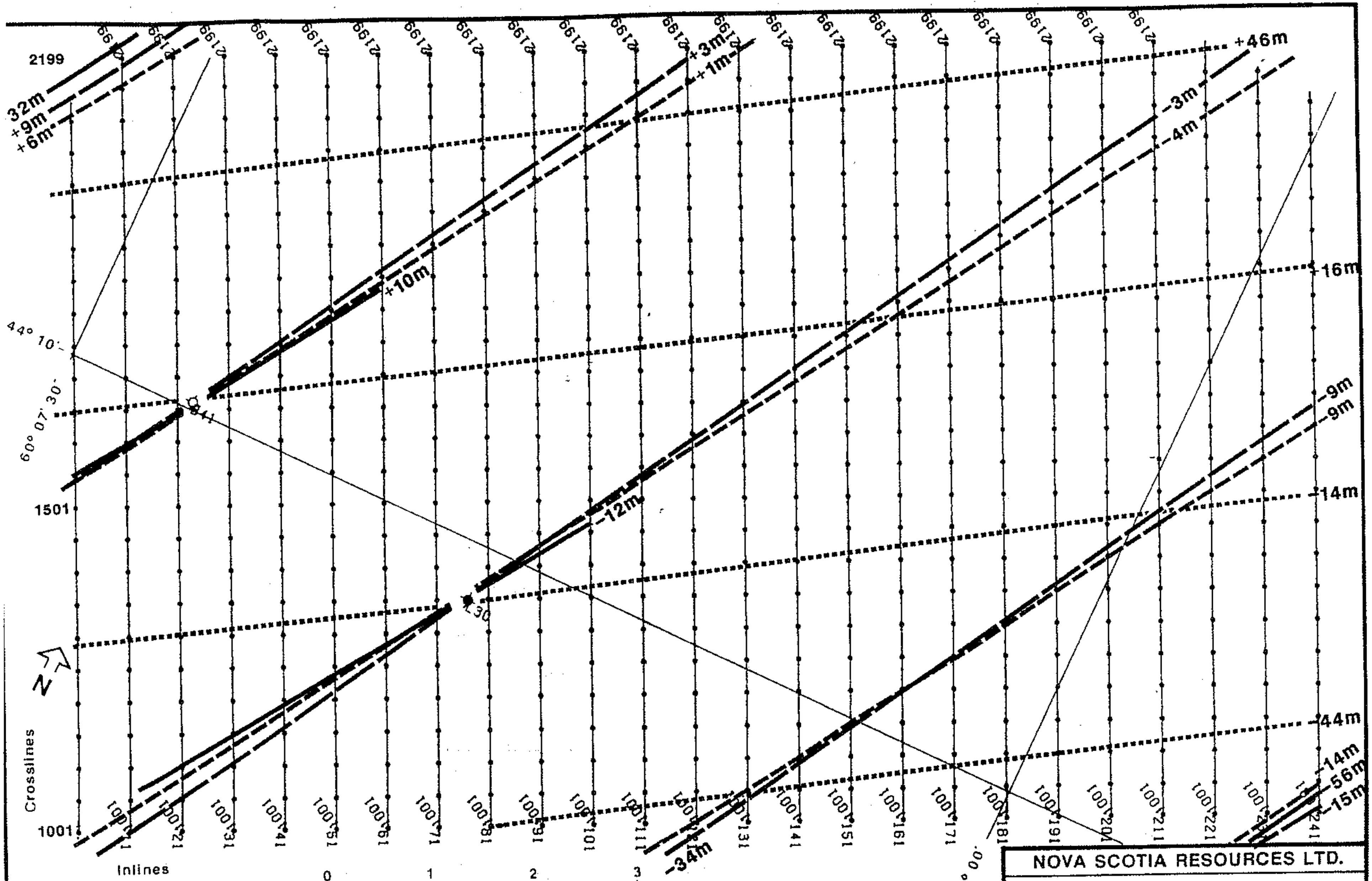


NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

BATHYMETRY IN METRES

CONT. INT. 5 m	J.D.T. CRANE	FEBRUARY, 1992



ADJUSTMENTS TO DEPTH MAPS

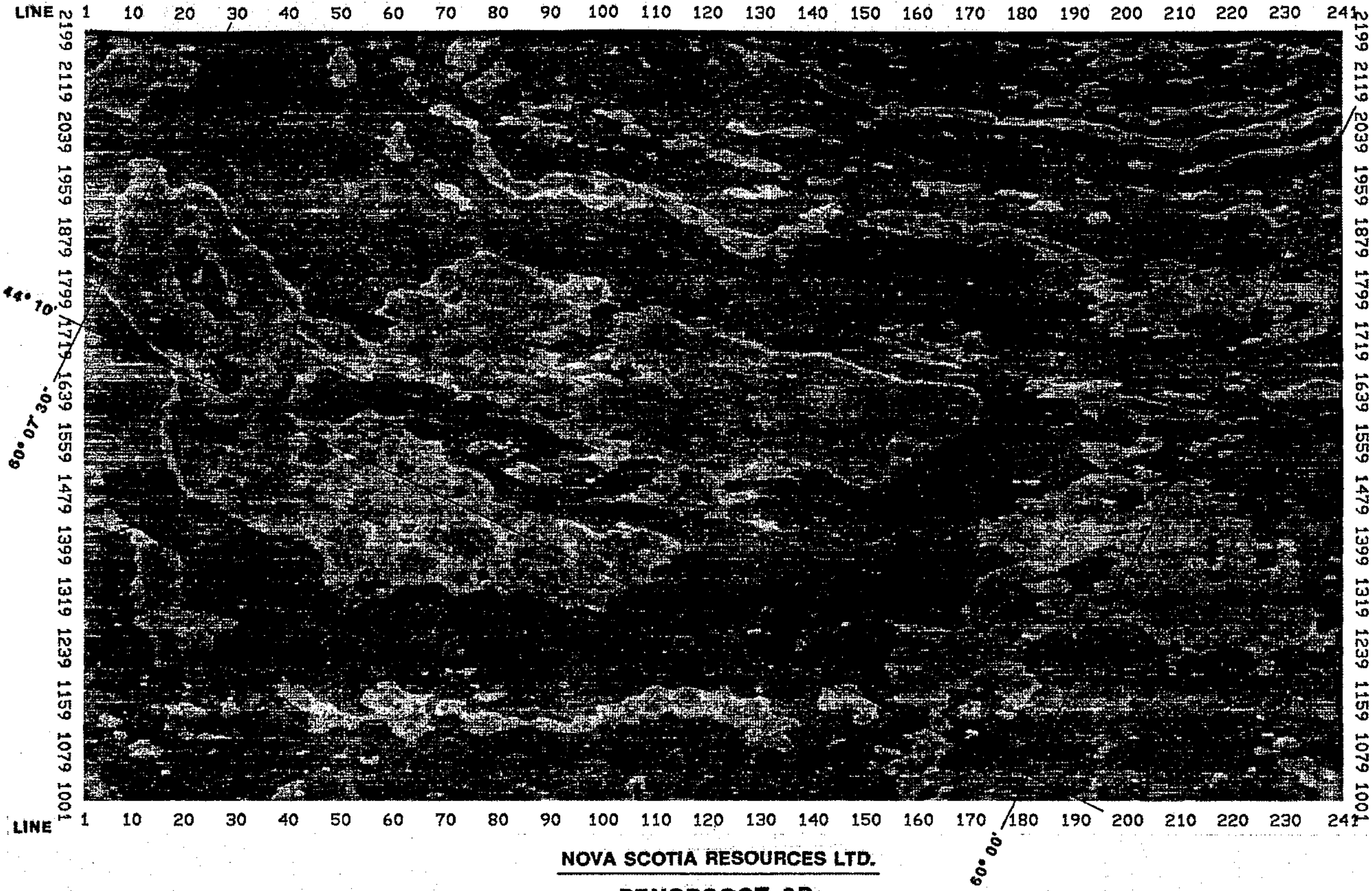
Petrel	— — — — —	From sea level
Mid. Logan Sand	———	From sea level
'O' Marker	— - — - —	From sea level
Baccaro	·········	From corrected 'O'

NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

DEPTH ADJUSTMENTS

CONT. INT.	J.D.T. CRANE	FEBRUARY, 1992



NOVA SCOTIA RESOURCES LTD.

PENOBSCOT 3D

TIME SLICE 1.960 SEC.
(NEAR 'O' MARKER)

J.D.T. CRANE FEBRUARY, 1992