

**Non Exclusive Reflection Seismic Survey
9229-W27-1P**

**FINAL REPORT
for
MACKENZIE BASIN
Northwest Territories**

location
**Latitude : 64° 45' to 65° 20'
Longitude : 125° 45' to 127° 05'**

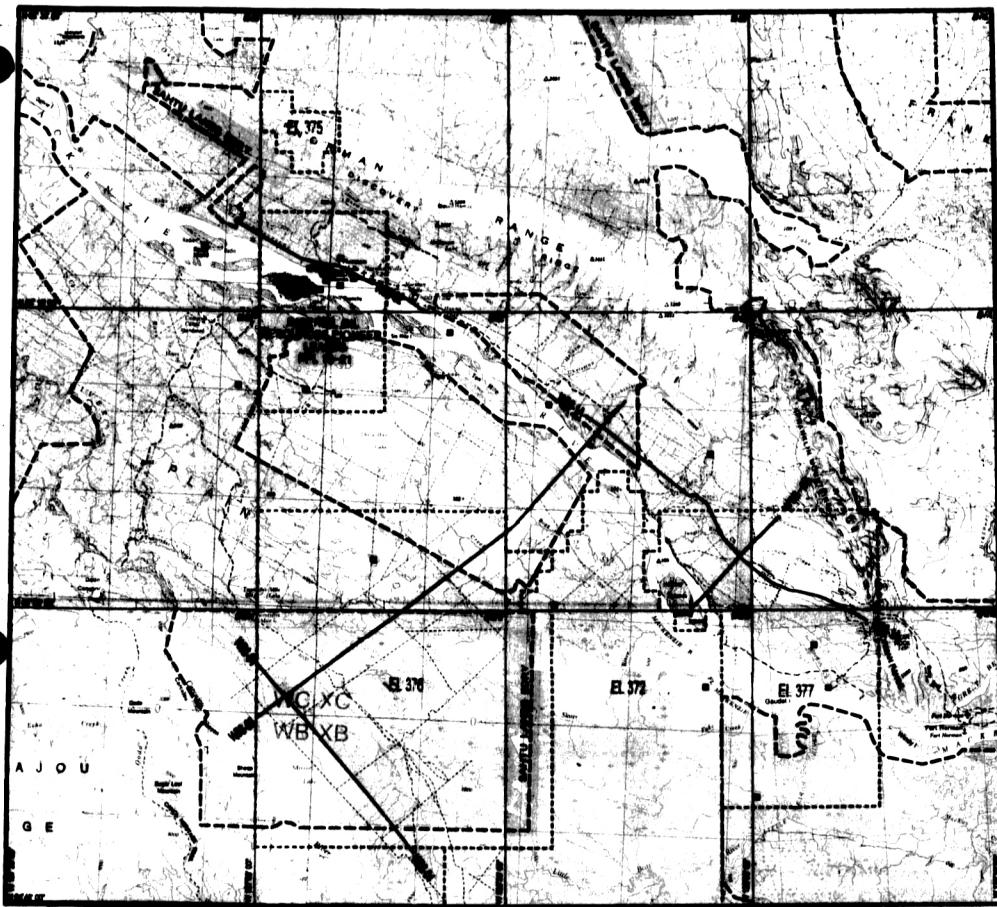
dates
March 1 - April 7, 1996

contractor
Western Geophysical

operator
Western Atlas International Inc.

report by
R.O. Brown
Aguila Exploration Consultants Ltd.

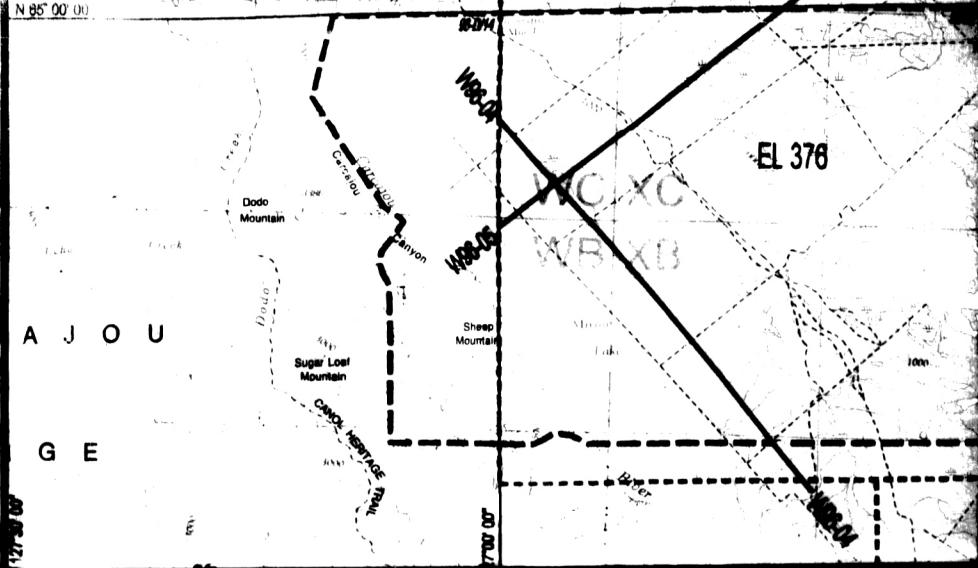
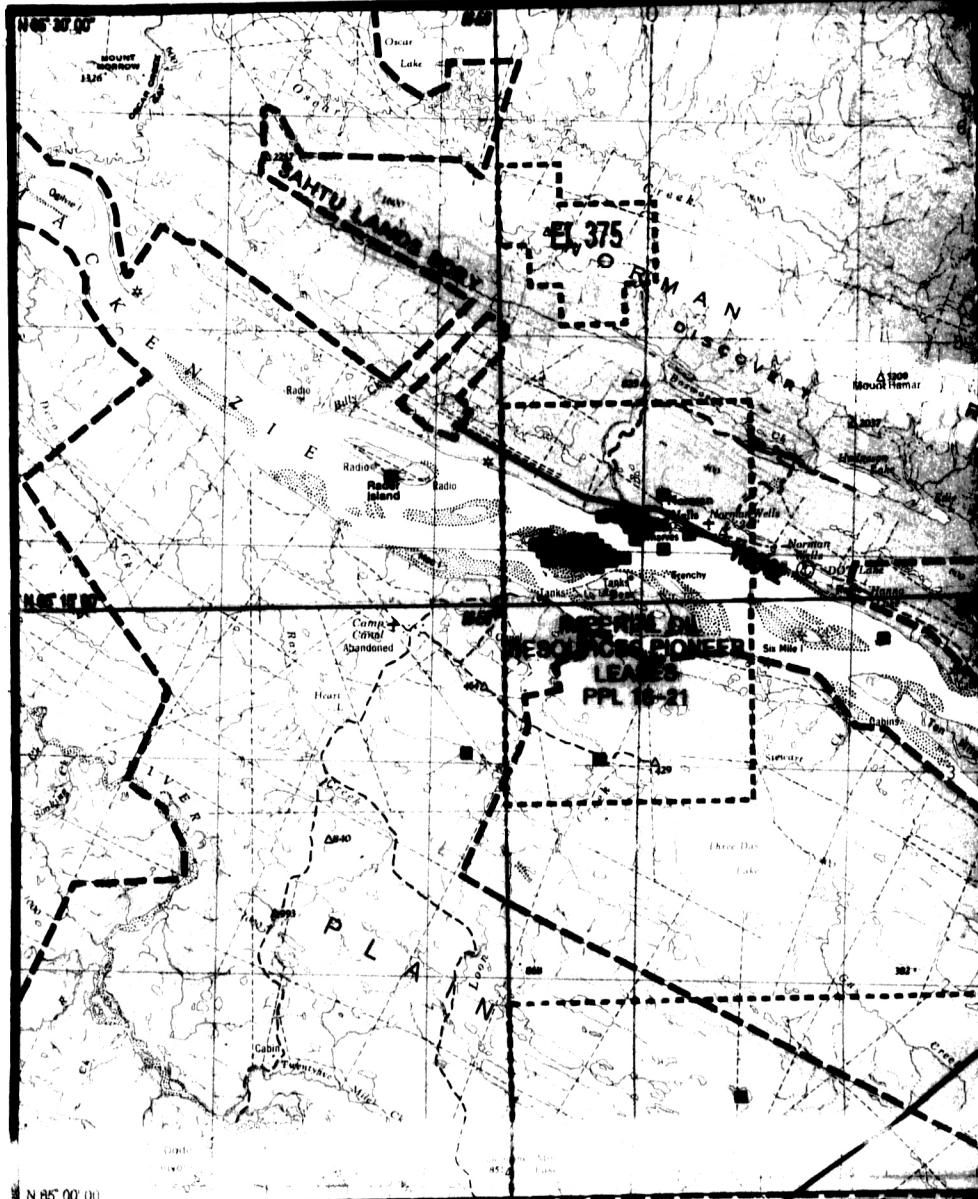
November 8, 1996

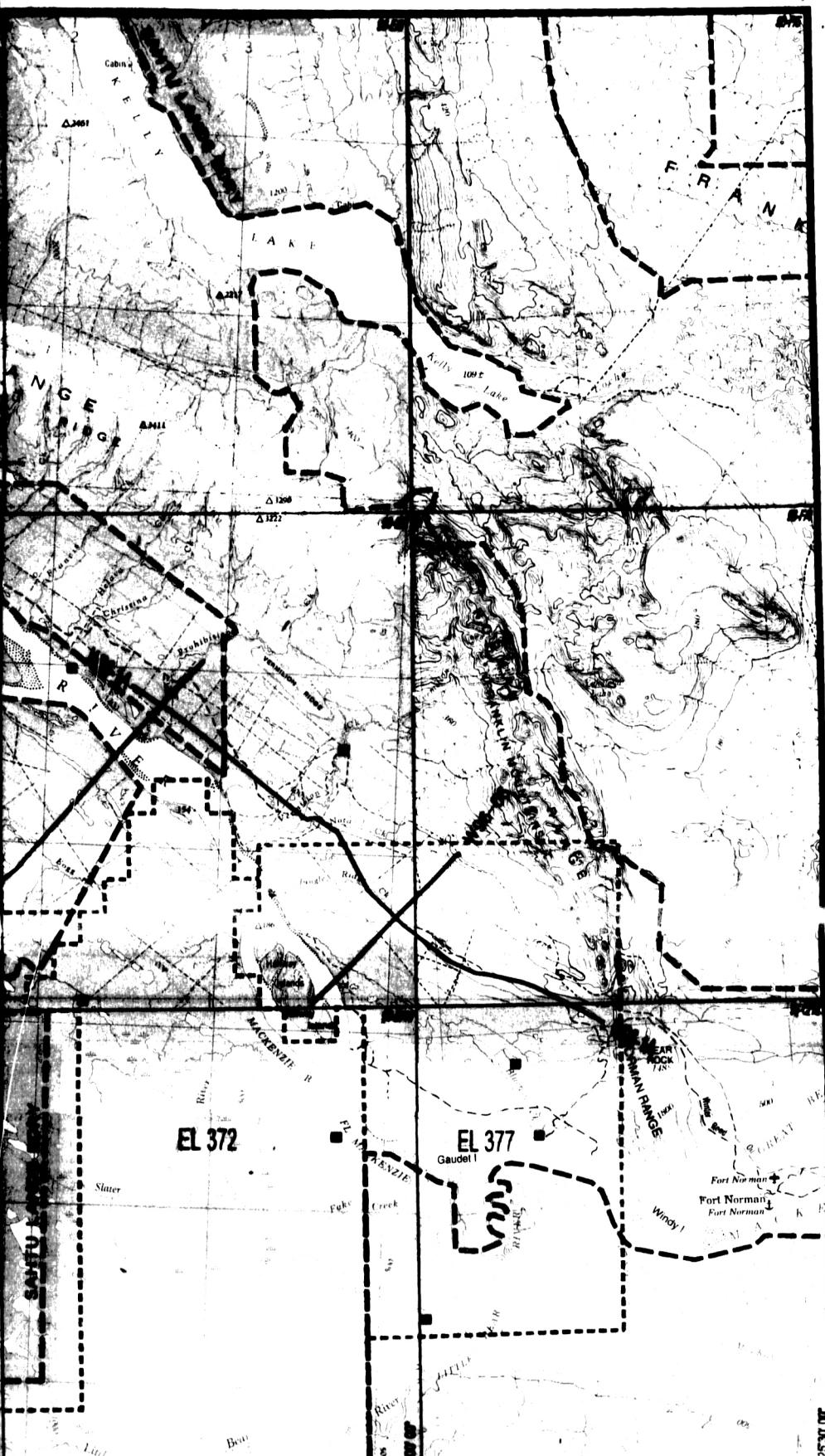


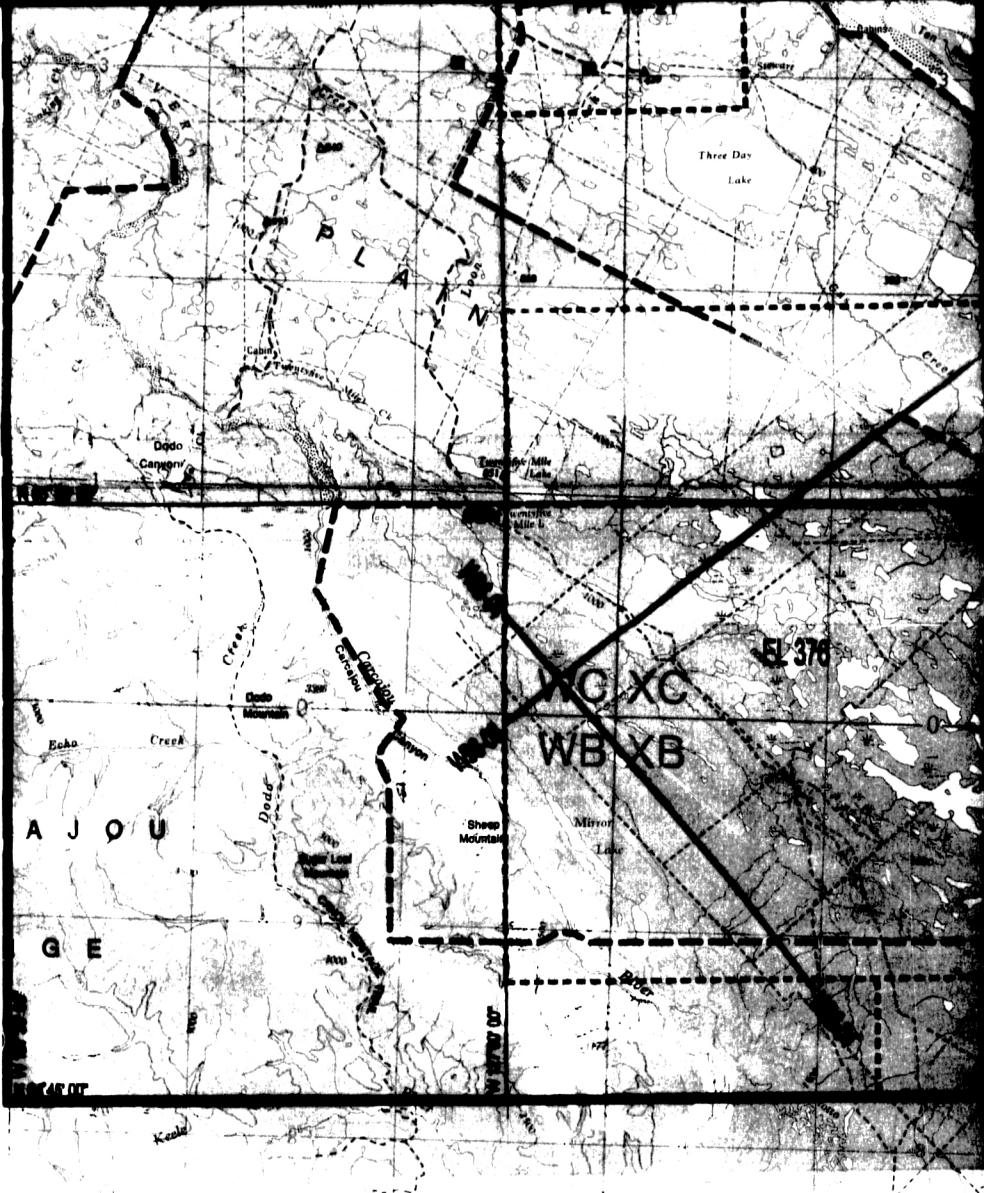
WESTERN ATLAS MACKENZIE BASIN INTERNATIONAL PROGRAM					
FINAL PLAN					
LINE	DESCRIPTION	LINE	DESCRIPTION	LINE	DESCRIPTION
WMS-01A	31.3 kms	2.0 kms	0.8 kms	1.0 kms	24.0 kms
WMS-02	14.3 kms				14.3 kms
WMS-04		2.0 kms		1.0 kms	23.0 kms
WMS-05	1.0 kms	44.3 kms		1.0 kms	45.7 kms
WMS-06				1.0 kms	11.0 kms
TOTAL	47.4 kms	81.1 kms	0.8 kms	1.0 kms	202.2 kms

HARBINGER EXPLORATION 2000 A.D. 40 Acre S.W. Section 10 100' x 100' Grid

922-100-101-101







WESTERN ATLAS MACKENZIE BASIN
INTERNATIONAL PROGRAM

FINAL PLAN

LINE	EXISTING	NEW CUT	NEW CUT AND CUT	EXISTING ACRES	TOTAL
W96-01A	31.2 kms.	2.0 kms.	0.8 kms.	kms.	34.0 kms.
W96-02	14.3 kms.	kms.	kms.	kms.	14.3 kms.
W96-04	kms.	23.0 kms.	kms.	kms.	23.0 kms.
W96-05	1.9 kms.	44.3 kms.	kms.	kms.	46.2 kms.
W96-06	kms.	11.8 kms.	kms.	kms.	11.8 kms.
TOTAL	47.4 kms.	81.1 kms.	0.8 kms.	kms.	129.3 kms.

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INTRODUCTION

The Mackenzie Basin project is located in the Norman Wells area of the Northwest Territories. The project's natural boundaries include the Norman Range to the north and east (Franklin Mountains), the Carcass River to the south, and Twentyfive Mile Lake to the west.

The program was conducted on both sides of the Mackenzie River, with two lines (W96-05 and W96-06) crossing the Mackenzie River. The center of the program is approximately 25 km. south east of Norman Wells

The Mackenzie Basin program was conducted in the spring of 1996 by Western Geophysical working on behalf of Western Atlas International Inc.. The work period was from March 1 to April 7, 1996. There were normally 60 people involved in all phases of the operation.

The project was under the supervision of Mr. Darrel Elliott of Western Geophysical and the field operations were coordinated by Party Managers Lud Letal and Leon Andrew.

Lines W96-02, W96-03, and W96-11 were not recorded. Line W96-01 (the winter road) was not recorded as proposed, instead it was recorded in two separate parts and labeled as two lines. The first section ran between north of Radar Island and the east side of Norman Wells and was labeled W96-02. The portion which ran between west of the intersection with line 5 and the west edge of the Norman Range was labeled W96-1A.

The program was originally conducted as a non-exclusive survey. However, portions of the program have since been sold and are now proprietary data. Lines W96-08, W96-09, W96-10, W96-12, and W96-13, were sold and are no longer part of the non exclusive survey. Requests for Letters of Authorization and Final Plans will be submitted by Imperial Oil Resources Limited and Stampeder Exploration Ltd. for these lines.

WEATHER AND TERRAIN

Temperatures ranged from -43 to +5 Celsius through out the course of operations. There were occasional snowstorms during the survey which resulted in poor visibility and the lines drifting back in.

Elevations on the program varied from 169 m. above sea level on line W9602 (the winter road), to 935m. on the south end of line W9605 near Mirror Lake at the base of Sheep Mountain.

The project area is located in the Mackenzie River valley plain. Surface conditions consisted mainly of lightly timbered, slightly rolling terrain. The majority of the timber encountered was light pine, spruce and willows. Severe erosion gullies were encountered on some creek banks.

Lines W96-1A and W96-02 were shot on the winter road. Permission was obtained from the Department of Transport prior to working on the winter road. Traffic controls were used while working on the winter road.

Line W96-05 and W96-06 crossed the Mackenzie River. The river was profiled for ice thickness prior to use by the crew.

LOGISTICS AND SUMMARY

Western had been working for another client in the area prior to commencing operations on the Mackenzie Basin program. Initially, recording equipment and survey instruments were flown up from Calgary to Norman Wells. As Western Geophysical maintains a shop facility and base in Norman Wells, all equipment was mobilised out of Norman Wells. Expediting for the field operations was based in Western's yard in Norman Wells. Personnel, fuel, food, aircraft, and other essential supplies were coordinated by the expeditors for the field operations.

Land use supervision was handled by the Northwest Territories. The permit was issued by the Inuvik Office of Indian and Northern Affairs. Prior to the permit being issued, meetings were held in Fort Norman and Norman Wells with Western Geophysical and local interest groups of the area. These meetings resulted in the conditions being drafted into the Land Use Permit (number N96B514).

The expediting service purchased fuels, foods, and other essential supplies for the field operation. Crew members in transit stayed in the yard/office facilities in Norman Wells.

A local helicopter was used to for transporting supplies and personnel when operationally necessary.

Key personnel were obtained from Calgary, Edmonton, Saskatoon, and Yellowknife. Residents of the Northwest Territories made up 65% of the crew compliment. Time off periods were on a self determined basis, subject to availability of replacement personnel.

The field crew was setup in 2 separate sleigh camps : cat camp and recording camp. Daily fuel consumption averaged 4000 liters of diesel and 50 liters of gasoline. Fuel and lubricants were purchased in bulk from a supplier in Norman Wells.

Upon completion of operations all equipment was walked back to Western's base in Norman Wells. Crew members were transported to their homes via commercial and chartered aircraft. The recording and survey equipment was flown to Calgary.

LINE CLEARING OPERATIONS

The program consisted of both existing and new cut lines. Lines W961A and W9602 were located on the winter road and represented approximately one third of the program. The remainder of the program was new cut.

Lines were cleared by Borek Construction. Dozing operations were coordinated by Mr. Rocky Arnt. The new cut lines were cut to a 8 m. width. The slash was windrowed to one side then slashed by local slashers.

Six D 7 dozer units and a loader were used cut and clear line, to move camps, and to do the line clean up.

Dozers were equipped with "mushroom shoes" on the dozer blades to elevate the blade. This procedure left ten centimeters of snow cover on the tundra.

Creek crossings were constructed of snow fills. These were removed after completion of operations in the area.

SURVEYING OPERATIONS

Mr. Frans Brouwer was the chief surveyor on the program.

Shotpoint and geophone group locations were derived using a surveyor's steel chain. Pin flags were used to mark the geophone and shotpoint locations.

Chaining notes were kept for each line and were forwarded to Western with the data shipments.

2 Nikon E.D.M survey instruments were used for horizontal and vertical control. New cut lines were derived from topographic features and sun shots. Station elevations were computed by E.D.M. and horizontal latitudes and departures.

A Trimble SST G.P.S. unit was used for additional control. Control points are noted on the Shot Point plot.

All survey work was performed in the metric system.

RECORDING OPERATIONS

Instruments	LRS VISION -1000
Number of Traces	360
Geophone Type	LRS - 1011
Geophone Frequency	14 Hz.
Geophone Array	9 geophones over 15 m. (1.88 m. spacing)
Sample Rate	2 milliseconds
Record Length	4 seconds
High Cut Filter	206 Hz.
Low Cut Filter	Out
Receiver Interval	15 m.
Source Interval	60 m.
Fold	4500%
Spread	
Source	LRS 311 buggy vibrator (33,000 lb.)
Number of Vibrators	3
Source Array	drag over 15 m. centered on flag
Number of Sweeps	4 sweeps (W96-06 with 6 sweeps)
Length of Sweep	6 sec.
Sweep Array	8 Hz. - 96 Hz. nonlinear

The cable lay out was a 2745 - 60 - X - 60 - 2745 balanced spread, with source points located on the group flags. Group 1 was always to the north or east.

Record quality ranged from poor to good through out the survey.

All flagging, lath, and survey markers were removed by the recording crew upon completion of operations in an area.

DATES OF OPERATIONS

Surveyors and line clearing commenced :	March 1, 1996
Recording crew mobilised :	March 3, 1996
Recording commenced :	March 4, 1996
Recording ceased :	March 11 1996
Recording recommenced :	March 20, 1996
Recording ceased :	March 22, 1996
Recording recommenced :	March 25, 1996
Recording operations completed :	April 6, 1996
Recording crew demobilised :	April 7, 1996

PRODUCTION SUMMARY

Total Kilometers Surveyed :	129.375
Number of Shots :	2160
Number of Stations :	8630
Number of Recording Days :	19
Kilometers per Recording day :	6.81 km/day
Days Mobilised / Demobilised :	3
Days Lost Due to Equipment Failure	0
Down Time per day :	no instrument/equipment down time noted

PERSONNEL

Recording

- 1 - Observer
- 1 - Assistant Observer
- 4 - Line Drivers
- 10 - Line Crew Helpers
- 1 - Cable Repair Technician

Surveying

- 1 - Cat Push
- 2 - Surveyors
- 3 - Helpers

Catering

- 2 - Cooks
- 2 - Assistant Cooks
- 3 - Camp Attendants

Expediting

- 2 - Expeditors
- 2 - Fuel Drivers

Source

- 1 - Vibrator Technician
- 4 - Vibrator Operators
- 2 - Night Men

Support

- 2 - Party Managers
- 1 - Clerk
- 3 - Mechanics
- 2 - Mechanic Helpers
- 1 - Medic

Line Clearing

- 7 - Dozer Operators
- 1 - Foreman
- 1 - Supply Driver
- 1 - Monitor

Total of 60 personnel

EQUIPMENT

Camp :

2 - Kitchens	Sleigh Mounted 10 x 40
2 - Utility/Storage	Sleigh Mounted 10 x 40
4 - Generator/Shop	Sleigh Mounted 10 x 40
2 - Office/Sleeper	Sleigh Mounted 10 x 40
5 - Sleepers	Sleigh Mounted 10 x 40
6 - Fuel Sloops	Sleigh Mounted 3000 gallon each
1 - Medic	Sleigh Mounted 10 x 40
1 - Grocery	Sleigh Mounted 10 x 40
1 - Garbage	Sleigh Mounted 10 x 40

Recording & Survey :

1 - Recorder	Track Unit FN - 110
5 - Line Units	Track Unit FN - 110
2 - Shop Units	Track Unit FN - 110
2 - Party Manager Units	Track Unit FN - 110
3 - Survey Units	Track Unit FN - 110
2 - Water Unit	Track Unit FN - 110
4 - Vibrators	LRS Buggy
4 - Snow Machines	Elan

Line Clearing :

6 - Dozers	Caterpillar D7
1 - Loader	Caterpillar 977
1 - Foreman Unit	Delta II
1 - Fuel Supply Unity	Delta III

DATA PROCESSING

1.	Format Conversion	
	Process Sample Rate	2 ms.
	Process Record Length	4 sec.
2.	Pre-Processing	
	Geometry	
	Geometric Divergence	
	Field Static Computation	
	Datum Elevation	200 m.
	Replacement Velocity	2500 m. / sec.
3.	Offset Consistent Amplitude Recovery	
4.	Refraction Statics	
	V1	2500 m. / sec.
5.	Deconvolution	
	Type	Surface Consistent Minimum Phase
	Predictive Distance	2 ms.
	Operator Length	160 ms.
	Stop Autocorrection Windows	3000 ms.
	Number of Windows	1
	Prewhitenning	.01%
6.	Spectral Whitening	Whitened from 10 - 95 Hz.
7.	Velocity Analysis	Velan®
8.	Automatic Statics	Miser® (Surface Consistent)
9.	Velocity Analysis	Velan®
10.	Automatic Statics	Miser® (Surface Consistent)
11.	Velocity Analysis	Velan®
12.	CDP Trim Statics	
	Stack Fold	4500%
	Model	3 CDPs
	Shift	+/- 12 ms.

13. Dip Moveout 60 m. - 2700 m.
(120 m. increments)

14. Stack

15. Finite Difference Migration

16. Spectral Whitening Whitened from 10 - 95 Hz.

17. Radial Predictive Filter

18. Time Variant Filter

Time Zone sec.	Low Cut Hz. dB/Oct	High Cut Hz. dB/Oct
0.0 - 1.0	16 18	96 72
- 2.0	14 18	80 72
- 3.0	12 18	60 72

19. Gain Time Variant Trace Equalization

20. 2 to 1 Sum Smoothing

CONTRACTORS

PRINCIPLE CONTRACTOR

Western Geophysical

SUB-CONTRACTORS

Borek Construction

Buffalo Air

Canadian Helicopters

Continental Helicopters

Norwel Developments

Sahlu Construction

Willow Lake Slashing

Whiponic