

011111-14

9229-T21-1E

# TEXACO CANADA RESOURCES LTD.

CALGARY ALBERTA



GEOPHYSICAL REPORT

NORMAN WELLS, CARCAJOU  
SEISMIC SURVEY, 1983

conducted for

TEXACO CANADA RESOURCES LTD.

by

Western Geophysical Company of Canada Ltd.

COGLA Program No. 9229-T21-1E

Exploration Agreement No. 174

prepared by

M.A. Tivey  
Interpreter

January 23, 1984

GEOPHYSICAL REPORT

NORMAN WELLS, CARCAJOU  
SEISMIC SURVEY, 1983

conducted for

TEXACO CANADA RESOURCES LTD.

by

Western Geophysical Company of Canada Ltd.

COGLA Program No. 9229-T21-1E

Exploration Agreement No. 174

prepared by

M.A. Tivey      January 23, 1984  
Interpreter

Approved by

*R. Bader*

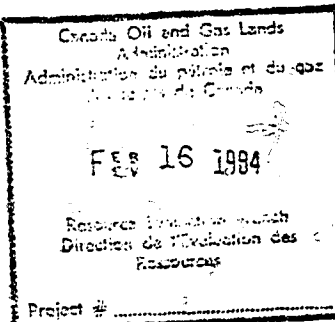


Table of Contents

Introduction

Locality map

Field procedures

Data processing

Interpretation

Summary and Conclusions

Table 1

Table 2

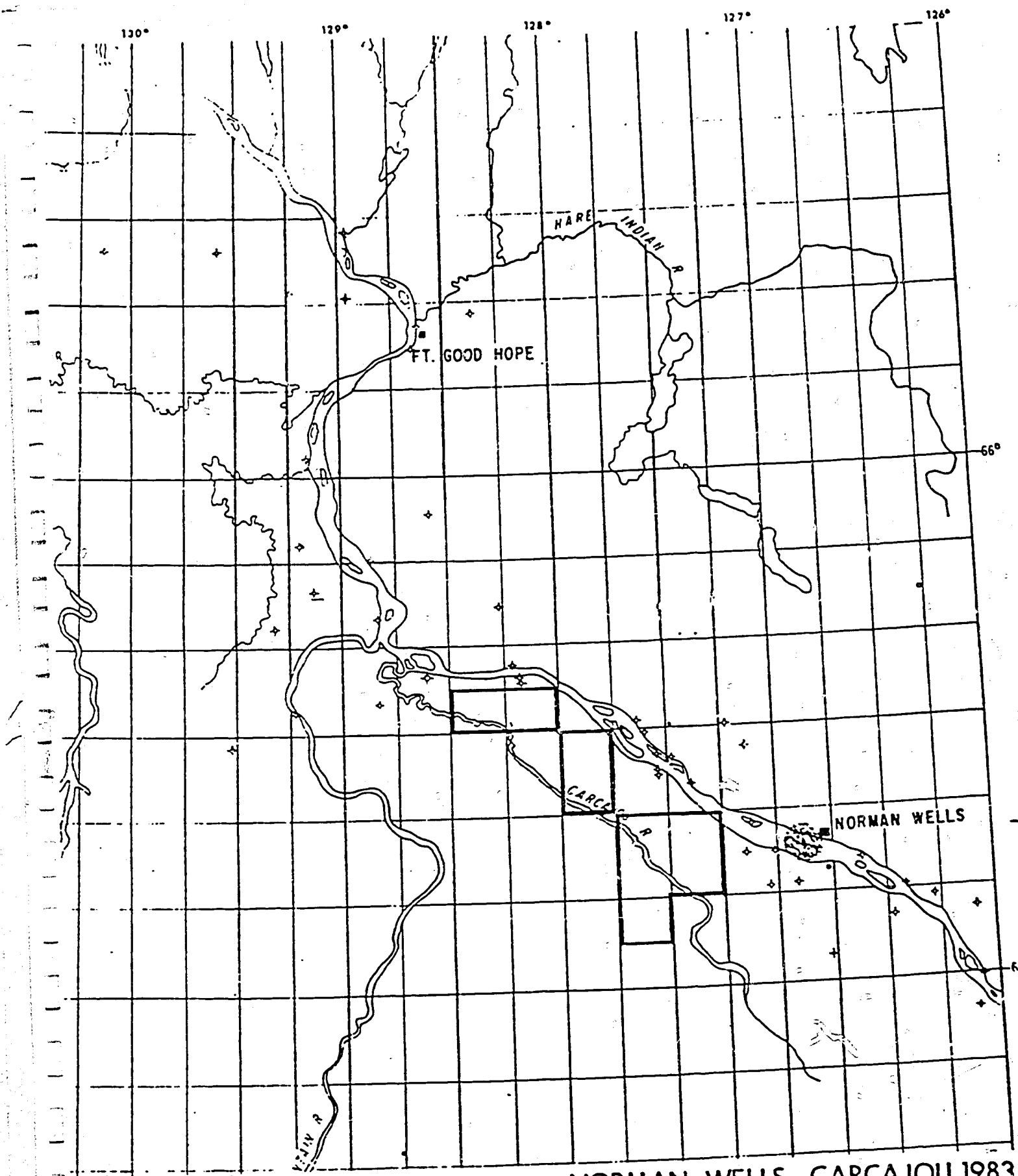
Enclosures

## Introduction

The Norman Wells and Carcajou project areas lie in the Mackenzie Plain physiographic division of the North West Territories. This relatively undeformed region is bounded by two structurally deformed areas; the Franklin Mountains to the North and East and the Mackenzie Mountains to the South and West. The regional geology consists of a Cretaceous clastic sequence directly overlying a predominantly carbonate sequence of Devonian and older age rocks. The main zone of interest and only proven hydrocarbon reservoir in the area is the Devonian Kee Scarp formation (Ramparts formation - G.S.C.). This limestone formation consists of a non-porous, laterally extensive platform member and a partially porous reef member which forms discrete buildups throughout the area. The Norman Wells oilfield is the type example with estimated proven recoverable reserves of 272 MM Bbls oil.

The prime purpose of this survey was first to identify and outline the extent of the Kee Scarp reefs at Norman Wells and Carcajou. Secondly, to fulfill the work commitment on exploration agreement #174 of 100 km of seismic data, and thirdly provide possible future drilling locations.





NORMAN WELLS CARCAJOU 1983  
PROJECT #9229-T21-JE  
EXPLORATION AGREEMENT #174  
NWT CANADA  
SCALE: 1" = 16 MILES

List of enclosures

Map TE 7356 Norman Wells Kee Scarp-Hare Indian Isochron

Map TE 7391 Norman Wells Kee Scarp Time Structure

Map TE 7369 Carcajou Kee Scarp Time Structure

Map TE 7370 Carcajou Kee Scarp-Hume Isochron

Seismic line W83-AP Norman Wells seismic time section

Seismic line W83-AQ Norman Wells seismic time section

Seismic line W83-ND Norman Wells seismic time section

Seismic line W83-NE Norman Wells seismic time section

Seismic line W83-NA Carcajou seismic time section

Seismic line W83-NB Carcajou seismic time section

Seismic line W83-NC Carcajou seismic time section

Seismic line W83-NF Carcajou seismic time section

Seismic line W83-AN Carcajou seismic time section

Summary of local employment and expenditures by Western Geophysical.

### Field Procedures

In March 1983 Western Geophysical under contract to Texaco Canada Resources Ltd. began shooting the Norman Wells and Carcajou seismic programs. A total of 114 kms of 1200% seismic data were shot in the Norman Wells and Carcajou areas, in order to satisfy a work obligation of Exploration Agreement #174.

The recording system consisted of a 96 trace T.I. DSF V instrument utilizing 2 msec sample rate and Mark 30 Hz geophones. Since the zone of interest, the Kee Scarp formation, is much closer to the surface at Carcajou than at Norman Wells a different array and source geometry for each area was used to optimize the seismic data recorded. At Norman Wells a split spread geophone array was used with a 33.5 m group interval, 9 geophones/group and 33.5 m offset. The source consisted of 2 kg of dynamite in a 14 m deep hole at a shotpoint spacing of 134 m. A 12/128 Hz field filter was used with the notch filter "out".

At Carcajou a split spread array was used with a 15 m group interval, 9 geophones/group, and a 45 m offset. 1 kg dynamite was used in each of 2 holes over 30 m at a depth of 13 m with a shotpoint interval of 60 m. The field filter used was an 18/128 Hz with the notch filter "out".

The work was completed by April 18, 1983 and the data sent to Sefel Geophysical Ltd. in Calgary for data processing. Due to the differences in acquisition parameters and noise problems between the Carcajou and Norman Wells areas the 2 sets of data had slightly different processing streams. These processing streams are summarized in the next section.

## Data Processing

Norman Wells 1983

1. DEMULTIPLEX AND BINARY GAIN REMOVAL  
RECORD LENGTH 2.5 SECONDS  
SAMPLE INTERVAL 2 MS
2. CDP GATHERS  
FOLD 1200 PERCENT
3. AUTOMATIC GAIN RECOVERY
4. INSTRUMENT PHASE COMPENSATION
5. SPIKING DECONVOLUTION  
OPERATOR LENGTH 80 MS  
PREWHITENING 1 PERCENT  
WINDOW 200 TO 1600 MS AT 34 M  
750 TO 2150 MS AT 1608 M
6. DATUM AND WEATHERING STATICS  
DATUM 100 M  
REPLACEMENT VELOCITY 3000 M/SEC  
WEATHERING VELOCITY 610 M/SEC
7. SURFACE CONSISTENT RESIDUAL STATICS  
WINDOW 450 TO 1600 MS  
MAX CORRELATION LAG +/- 40 MS
8. VELOCITY ANALYSIS  
CONSTANT VELOCITY STACKS
9. NORMAL MOVEOUT
10. SURFACE CONSISTENT RESIDUAL STATICS  
WINDOW 450 TO 1600 MS  
MAX CORRELATION LAG +/- 20 MS
11. MUTE  
0 MS AT 234 M  
300 MS AT 268. M  
600 MS AT 1005 M  
800 MS AT 1608 M

12. CDP STACK  
1200 PERCENT

13. BANDPASS FILTER  
12/18-90/100 HZ

14. EQUALIZATION

15. MIGRATION  
90 PERCENT ORIGINAL VELOCITIES

16. FILM DISPLAY

CARCAJOU 1983

1. DEMULTIPLEX AND BINARY GAIN REMOVAL  
RECORD LENGTH 2.5 SECONDS  
SAMPLE INTERVAL 2 MS
2. CDP GATHERS  
FOLD 1200 PERCENT
3. AUTOMATIC GAIN RECOVERY
4. DATUM AND WEATHERING STATICS  
DATUM 100 M  
REPLACEMENT VELOCITY 3500 M/SEC  
WEATHERING VELOCITY 610 M/SEC
5. VELOCITY FILTER  
ATTENUATE EVENTS WITH AN APPARENT  
VELOCITY LESS THAN 290 M/SEC
6. INSTRUMENT PHASE COMPENSATION
7. SPIKING DECONVOLUTION  
OPERATOR LENGTH 80 MS  
PREWHITENING 1 PERCENT  
WINDOW 100 TO 1500 MS AT 45 M  
300 TO 1700 MS AT 750 M
8. SURFACE CONSISTENT RESIDUAL STATICS  
WINDOW 300 TO 1300 MS  
MAX CORRELATION LAG +/- 40 MS
9. VELOCITY ANALYSIS  
CONSTANT VELOCITY STACKS
10. NORMAL MOVEOUT
11. SURFACE CONSISTENT RESIDUAL STATICS  
WINDOW 300 TO 700 MS  
MAX CORRELATION LAG +/- 30 MS
12. MUTE  
0 MS AT 135 M  
150 MS AT 150 M  
300 MS AT 750 M

13. CDP STACK  
1200 PERCENT

14. BANDPASS FILTER  
9/15-100/110 HZ

15. EQUALIZATION

16. MIGRATION  
90 PERCENT ORIGINAL VELOCITIES

17. FILM DISPLAY

## Interpretation

### Norman Wells

Four lines were shot in the Norman Wells Project totalling approximately 57 kms; the resulting data quality is excellent. Two wells were used to tie the seismic data in order to identify prominent seismic events. The Imperial Ray #1 well ties line W83-ND at S.P. 1261 from which the Devonian Imperial, Kee Scarp, and Hare Indian formations can be identified (see Table #1). The deeper events were identified using Esso Norman Wells (36 x) B-48 which reached final TD in the Cambrian Saline River formation. Once identified these events were then correlated around the grid of control. The seismic events are generally continuous throughout the mapped area with no major faults or folds and only one major unconformity observable at the Pre-Cambrian basement level.

The Hume event at 0.7 sec at S.P. 105 on line W83-AQ shows the regional dip of the area towards the southwest. The major feature however of these seismic sections and the exploration target is the Kee Scarp formation. All the lines show the build-up of Kee Scarp reef and line ND and AQ in particular show distinct reef flanks with structurally high, thick reef rims and a lower, thinner interior. This build-up of high velocity carbonate induces pull-up deeper down in the sections which is especially apparent at the Hume level. The Kee Scarp reef seen on this seismic data corresponds to the downdip part of the Norman Wells Reef containing the Norman Wells oilfield. Line W83-AP shows the continuation of this reef from the western bank of the Mackenzie River as far as S.P. 1561, a distance of 19 kms.

The Kee Scarp-Hare Indian formation isochron map TE 7356 was made in order to determine the extent and morphology of the Norman Wells reef. The 15 ms contour defines the edge of the reef with 10 ms representing platform thickness of Kee Scarp. The 50 ms contour defines "thicks" which are interpreted as porous reef rim facies. These "thicks" surround a slightly thinner interior lagoonal facies which is commonly not porous. This map thus defines the most favorable areas for possible hydrocarbon bearing porous zones.

The Kee Scarp time structure map TE 7391 shows the regional dip of the Kee Scarp towards the west-southwest, the updip end being the Norman Wells oilfield. The high reef rims identified on seismic and the isochron map appear as excursions of the structural contours from the regional trend. Only the 660 ms contour shows a possible structural anomaly with about 5-10 ms closure, located on the eastern edge of the exploration agreement area.



## Carcajou

Five lines were shot in the Carcajou Project, approximately 57 km. The data quality varies from excellent to poor on a single line, the deterioration in quality is attributed to poor surface conditions such as marshes and small ponds, and in the case of line AN hot sulphur springs.

For the most part however, major seismic events can be readily correlated around the grid of control. Two wells in the project area were used to correlate and identify the major seismic events, Maida Creek F-57 and Maida Creek G-56. Maida Creek F-57 ties line W83-AN at shot point 169; the correlations have been tabulated in Table #2.

The seismic sections show a slightly more complex geological picture than at Norman Wells. The top of the Canol appears to be an unconformity with reflectors dipping to the northwest. The Kee Scarp event itself shows a distinct reef flank to the southeast and several anomalies on top of the reef. These anomalies have been interpreted to be of a stratigraphic nature such as patch reefs, oolite sand shoals, or successive reef margins although there is some possibility of a thrust fault origin. Once again, thick, high velocity Kee Scarp reef results in pull-up on the Hume and underlying events.

Since the Bare Indian pick is very tenuous a Kee Scarp to Hume isochron was chosen to map the extent of the Carcajou Kee Scarp reef. Map TE 7370 shows a northeast-southwest trending reef build-up with the 115 ms contour picked as the reef edge. The map shows a well developed eastern reef flank and a rather less distinct western flank. The reef is bounded to the north by a reverse fault in the Mackenzie River and to the south by the Imperial Hills anticline. Lines W83-NB and W83-NC suggest that the reef may extend further to the west off the exploration agreement area. On the main reef body there are a number of thick reef anomalies possibly reef rim or patch reef features. They vary between 130 and 150 ms thick or about 400-500 ft. thick.

The Kee Scarp time structure map TE 7369 shows a regional southwest dip upon which the reef is superimposed bowing the contours towards the south. The reef flanks show up as a bunching up of the structural contours. There are a number of structural closures but the largest at S.P. 333 on W83-NA corresponds to an isochron "thick". There is 29 ms of closure or about 275 ft. with the closing contour being 325 ms. This map shows that the Maida Creek F-57 well was drilled on structurally the highest point of the reef without much regard for any stratigraphic criteria. The isochron map on the other hand shows that the Maida Creek G-56 was drilled more as a stratigraphic test, however it appears to have missed the most favourable location.

### Summary and Conclusions

In conclusion a number of structural and isochron anomalies in the Norman Wells and Carcajou areas have been identified. The Norman Wells reef appears to be a typical atoll type reef with reef rims and interior lagoon. The Carcajou reef however remains more complex in nature with the paleo-environment and facies not as clearly defined as at Norman Wells.

Additional control is being recommended for both of these areas and it is anticipated this work will be conducted in March and April, 1984

*Additional control  
completed by 84/4/16 under  
program no. 9229-A31-1E*

Table #1

Norman Wells Seismic Correlation

Formation	Imperial Ray #1 top (metres)	W83-ND S.P. 1261 (secs)
Imperial	592	0.350
Kee Scarp	994	0.590
Hare Indian	1133	0.645
Hume	1274 *	0.740
Ronning	1675 *	0.880
Cambrian Saline River	2161 *	1.030
Precambrian	2243 *	1.110

\* estimated depth from jump tie with Norman Wells (36x) B-48

Table #2

Carcajou Seismic Correlation

Formation	Maida Creek F-57 tops (metres)	W83-AN S.P. 169 (secs.)
Imperial	925	0.165
Kee Scarp	1518	0.270
Bare Indian	1930	0.310
Hume	2431	0.390
Ronning	3542	0.505
Cambrian Saline River	4347 *	0.745
Precambrian	4603 *	0.865

\* estimated from interval velocity calculations

9229-T21-1E

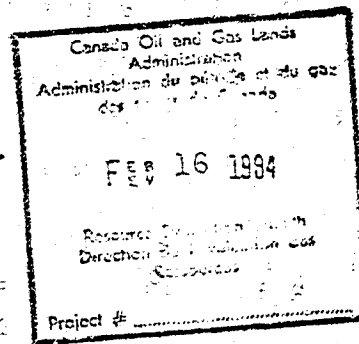
Summary of Local Employment and Expenditures  
Relating to the 1983 Geophysical Survey

by

WESTERN GEOPHYSICAL COMPANY OF CANADA, LTD.

for

TEXACO CANADA RESOURCES LTD.



NORMAN WELLS PROJECT, N.W.T. N82B796

CARCAJOU PROJECT, N.W.T. N82B796

Report by W. G. Quirk

July, 1983

Work Period: March 4, 1983 thru April 18, 1983

WESTERN GEOPHYSICAL COMPANY OF CANADA, LTD.

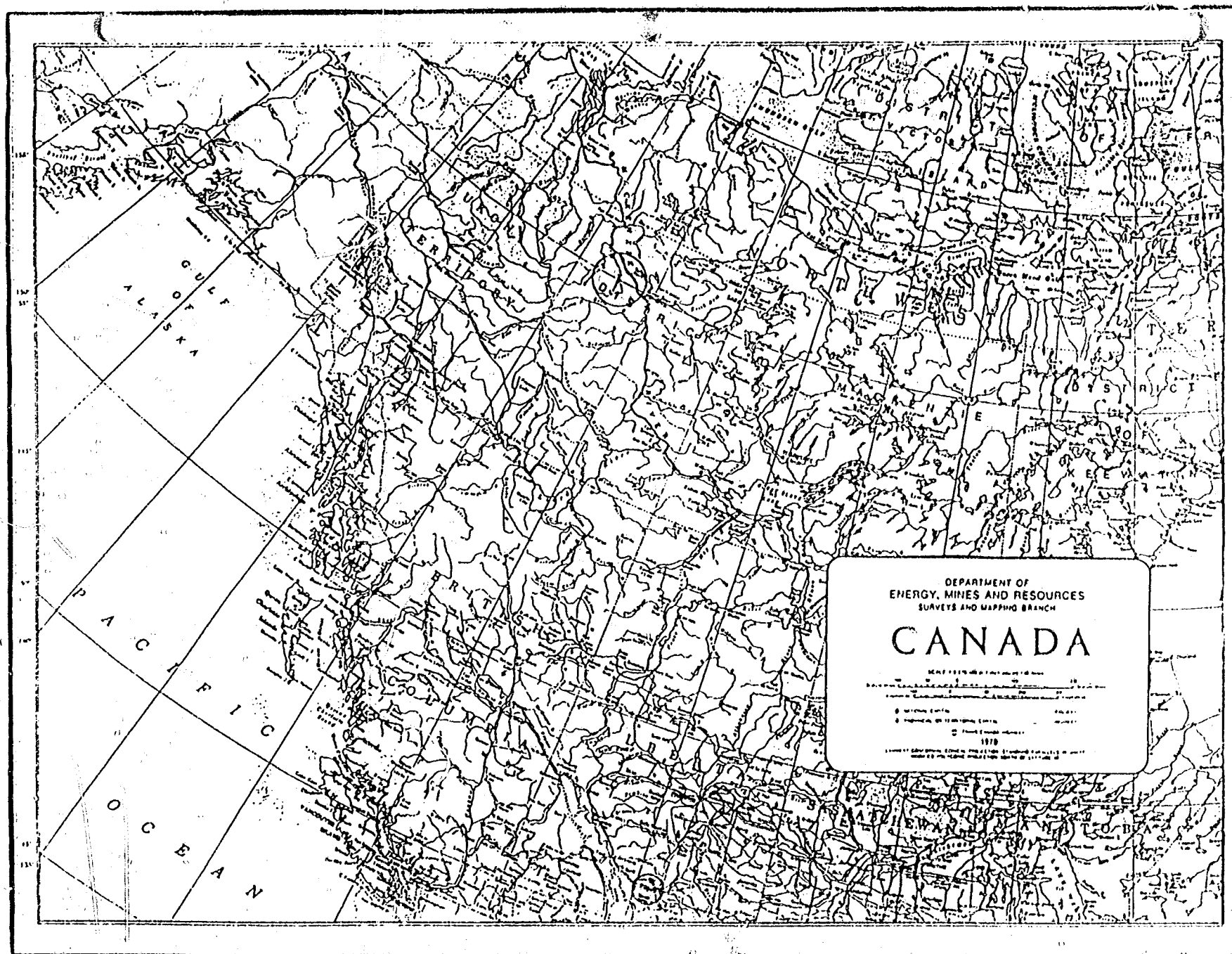
Party 367

Calgary, Alberta

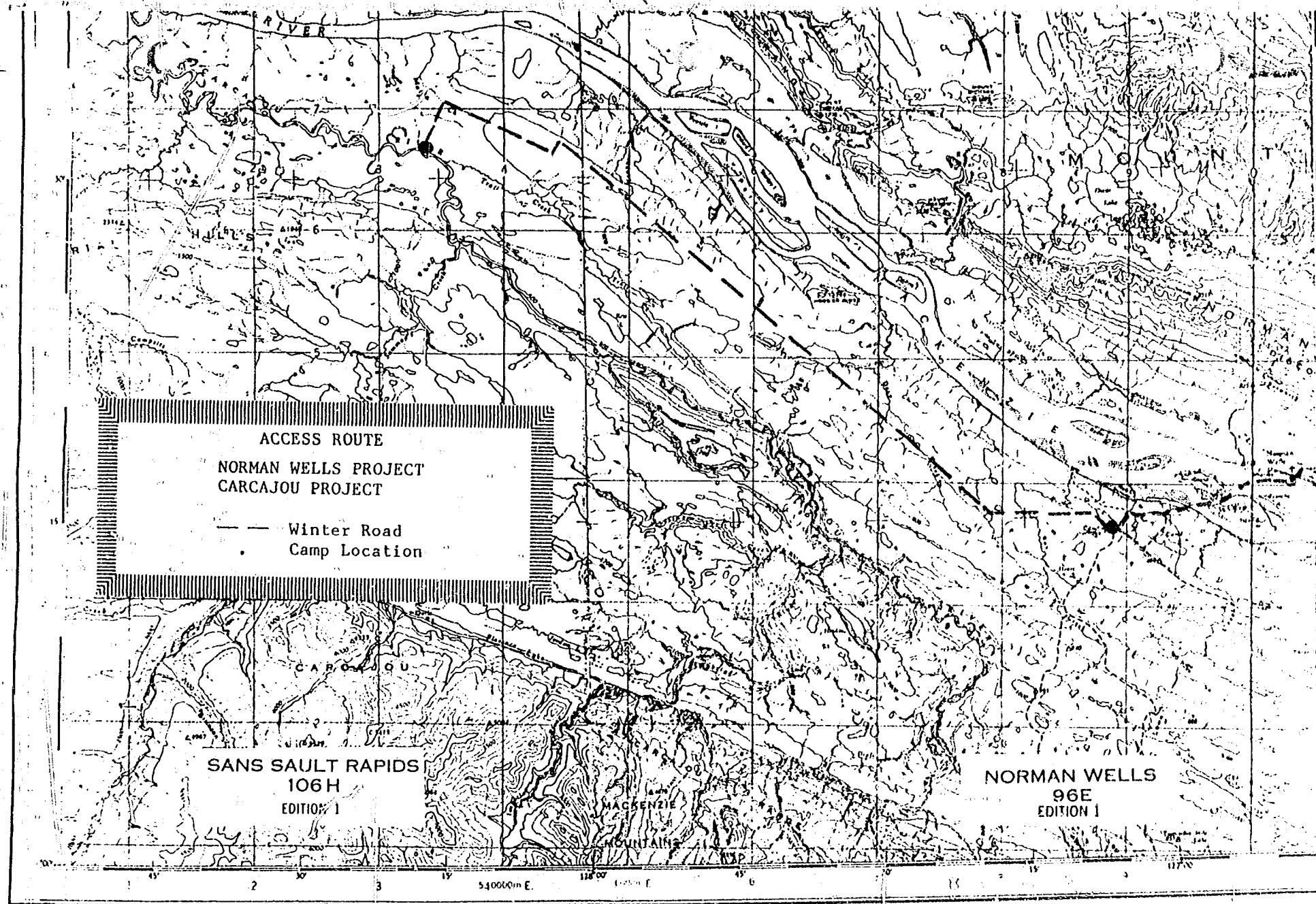
*Western*

# TABLE OF CONTENTS

	<u>PAGE</u>
LOCATION MAP . . . . .	INSIDE FRONT COVER
INTRODUCTION . . . . .	1 thru 4
SUMMARY:	
LOCAL PERSONNEL . . . . .	5
AIR SERVICE . . . . .	6
CONSTRUCTION & TRUCKING CONTRACTORS . . .	6
FUELS AND LUBRICANTS. . . . .	6 & 7
DRILLING SUPPLIES . . . . .	7
LOCAL SUPPLIERS . . . . .	7 & 8
CROWN CORPORATIONS. . . . .	8
CONCLUSION . . . . .	9







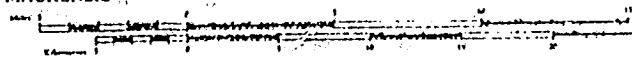
**SANS SAULT RAPIDS**

NORTHWEST TERRITORIES  
DISTRICT OF MACKENZIE

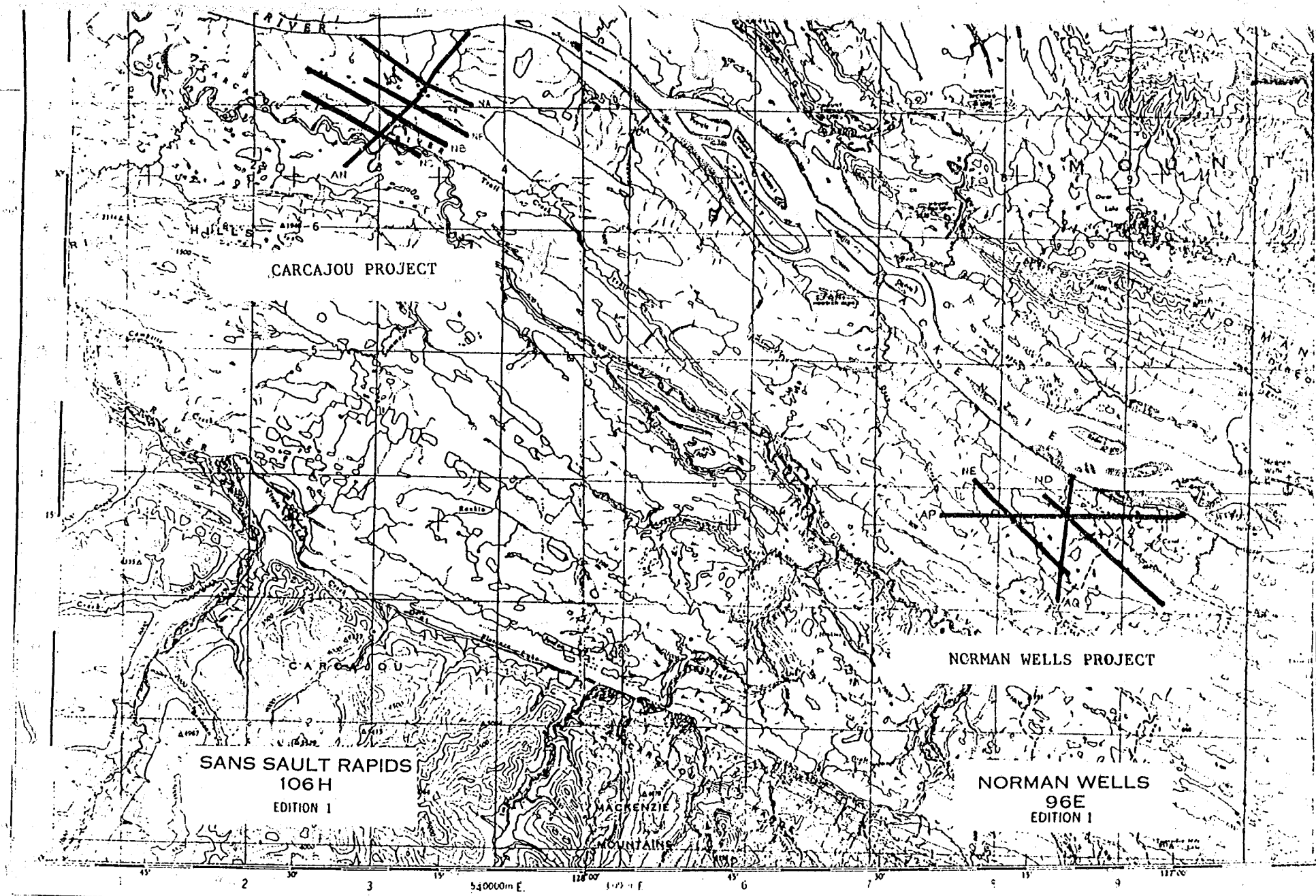
**NORMAN WELLS**

NORTHWEST TERRITORIES  
DISTRICT OF MACKENZIE

Scale 1:250,000 Échelle







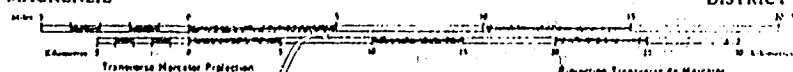
## SANS SAULT RAPIDS

NORTHWEST TERRITORIES  
DISTRICT OF MACKENZIE

## NORMAN WELLS

NORTHWEST TERRITORIES  
DISTRICT OF MACKENZIE

Scale 1:250,000 Échelle



#### INTRODUCTION

The Norman Wells and Carcajou projects are located near the south bank of the Mackenzie River west of the hamlet of Norman Wells, N.W.T. The Norman Wells project's natural boundaries include the Mackenzie River to the north, the Carcajou River to the south, Three Day Lake to the east and Hoosier Ridge to the west. The Carcajou project's natural boundaries include the Mackenzie River to the north, the Imperial Hills to the south, Trapper Creek to the east and the Carcajou River to the west.

The geophysical equipment, ~~dozers, camps and spare parts~~ were mobilized at Norman Wells during the latter part of February, 1983. The total geophysical package, excluding recording instruments and personnel, was stored at Western Geophysical's yard situated near the local quarry.

The geophysical recording system, cables, geophones and survey instruments were shipped from Calgary to Norman Wells via airline containers and truck transport. A winter road from Fort Simpson to Norman Wells allowed semi-trailer traffic to move supplies to and from the area until April 1, 1983.

The access route, from the equipment staging area to the south bank of the Mackenzie River at the start of the Canol Road, traversed Esso Resources' production and construction ice roads on the river. Two meetings between Western and Esso took place during the last half of February, before the access routes were approved by Esso and its contractors.

The Norman Wells expediting operation was mobilized February 17th. In March and April the expediting service consisted of two expeditors, three trucks, telephone, communication radios, and a mobile trailer used for an office and sleeping quarters. Whenever possible crew members in transit stayed in this trailer. Fuels, provisions, explosives and other essential supplies were co-ordinated by the expeditor for the field operation.

Propane, gases and lubricants were barged from Hay River to the Norman Wells expediting operation during the previous summer's transport season.

The "start-up" crew arrived in Norman Wells the first week of March, with the majority of the crew arriving the following week. The first week of March was spent starting the various tracked vehicles, installing the recording system and outfitting the camps with supplies and provisions. The dozers began the opening up of the access route from the termination of Esso's ice road to the old Canol airstrip during the equipment preparation. The existing portion of Line AP was snowploughed at this time.

On March 8 the dozers, drills, survey Nodwells and drill camp with support sleighs moved to the Canol location. The equipment was marshalled on Northern Loran's main ice road and was then moved in mass to the termination of the Esso ice road.

Drilling operations commenced March 9 and were completed March 15, 1983.

The recording equipment and camp was moved March 13 with recording operations commencing the following day. The recording operation was completed at the Norman Wells project March 21.

Dozers, drills and the drill camp began moving to the Carcajou project March 16 and commenced drilling March 18. This group was joined by the recording operation March 27 as recording commenced on Line AN.

The drilling group encountered difficulties maintaining sufficient production levels to sustain a loaded shot point lead over the recording group. The recording group was not hampered severely as equipment and personnel were transferred to another project for a period of ten days, which allowed the shot hole drilling to be completed April 12. Recording operations were completed March 15 and demobilization from the Carcajou project to Western's Norman Wells yard encompassed three days of travel plus dismantling of equipment. April 18, 1983 was the completion date of the Norman Wells area projects.

Native residents of the Northwest Territories employed by Western for the two projects were from Fort Norman, Fort Good Hope, Fort McPherson, and Inuvik. Native residents comprised 25% of field personnel.

The crew fuel consumption per day was approximately 4800 litres of diesel fuel. Fuels and lubricants were purchased

from a bulk station in Norman Wells. Vehicle repair parts, etc. that were available locally were purchased in Norman Wells and Inuvik. Food supplies were purchased from a local supplier in Norman Wells.

A commercial air carrier, P.W.A., was utilized to transport men and parts from Alberta to Norman Wells. The reverse was the rule upon completion of the winter's season. Small fixed wing aircraft were utilized on a casual basis as needed.

A winter road was constructed to allow wheeled access to both project areas. The winter road traffic varied from pick-up trucks to sixteen wheel floats transporting tracked equipment.

Food supplies, explosives, drilling aids, fuels, parts and personnel were transported via aircraft and wheeled vehicles.

Weather conditions during the course of the program tended to assist the conduct of both projects. Snow levels were above normal which helped delay the break-up of the winter trails, and there were no severe storms which minimized the maintenance of the access road.

A SUMMARY OF THE 1983 TEXACO SEISMIC EXPLORATION PROGRAMS'  
ECONOMIC ASSISTANCE TO THE COMMUNITY OF NORMAN WELLS AND  
RESIDENTS OF THE NORTHWEST TERRITORIES

---

LOCAL PERSONNEL

A total of twenty-two residents of the N.W.T. were hired by Western Geophysical for the 1983 season. Job categories were diverse as some residents have acquired job skills with previous years of service with Western. The line crew was comprised of men from Fort Good Hope, Fort Norman, and Fort McPherson working as helpers, and cable truck operators. The shooters and observer were from Fort Norman, Fort Good Hope and Inuvik respectively. An environmental monitor was hired with the consultation of the various hunters and trappers' associations. The expeditor based in Norman Wells hired residents of the community on a casual basis when necessary. During the first week of April many native residents left the recording group of their own accord. The Norman Wells office experienced difficulties finding replacements at this time, and in order to find reliable personnel to finish the project workers had to be flown in from Calgary.

The percentage of northern residents versus employees from Alberta calculated as 25% of the "Western" crew. Thirty-Seven Thousand Six Hundred Dollars were paid to northern residents in wages during the work period in which the seismic crew operated. This figure excludes the monitor's ski-doo income which amounted to One Thousand Two Hundred Dollars.

PETROLEUM INDUSTRY COMMITTEE ON THE EMPLOYMENT OF NORTHERN RESIDENTS SURVEY

NAME (in full)	SOCIAL INSURANCE #	HOME COMMUNITY	JOB CLASSIFICATION	TERMINATED BY EMPLOYER    EMPLOYEE	JOB COMPLETION	GROSS INCOME
ANDREW, LEON	616 508 768	INUVIK	OBSERVER		X	9,047.51
ANDREW, WALTER	635 790 256	FT. NORMAN	RECORDING HELPER		X	2,290.92
BERNARD, PAUL	637 454 869	FT. NORMAN	RECORDING HELPER		X	253.71
CLEMENT, RODERICK	719 929 317	FT. NORMAN	RECORDING HELPER		X	530.51
GRANDJAMBE, JEAN	617 159 223	FT. GOOD HOPE	RECORDING HELPER	X		1,192.78
GRANDJAMBE, JOHN	638 121 830	FT. GOOD HOPE	RECORDING HELPER	X		1,547.92
GRANDJAMBE, RICHARD	625 603 303	FT. GOOD HOPE	RECORDING HELPER	X		1,538.20
HARRIS, HARRY	624 944 534	FT. GOOD HOPE	DRILL HELPER	X		1,538.20
HETCHINELLE, JOHN	614 278 828	FT. NORMAN	SHOOTER'S HELPER		X	2,632.21
HORASSI, ANDREW	615 365 905	FT. NORMAN	RECORDING HELPER		X	1,022.61
HORASSI, JOSEPH	611 675 778	FT. NORMAN	LINE TRUCK DRIVER	X		1,899.05
JACKSON, DENNIS	632 356 994	FT. GOOD HOPE	MONITOR		X	1,534.40
KAKFWI, RODRICK	627 971 672	FT. GOOD HOPE	RECORDING HELPER	X		987.40
KUNNIZZIE, JOHN	613 234 681	FT. MCPHERSON	LINE TRUCK DRIVER	X		2,224.05

PETROLEUM INDUSTRY COMMITTEE ON THE EMPLOYMENT OF NORTHERN RESIDENTS SURVEY

NAME (in full)	SOCIAL INSURANCE #	HOME COMMUNITY	JOB CLASSIFICATION	TERMINATED BY EMPLOYER EMPLOYEE	JOB COMPLETION	GROSS INCOME
MACCAULEY, CHARLIE	631 948 734	FT. NORMAN	RECORDING HELPER		X	253.71
MENAGHO, DAVID	632 181 889	FT. NORMAN	RECORDING HELPER		X	201.21
MENACHO, JOHN	614 117 166	FT. NORMAN	RECORDING HELPER	X		1,583.02
NEYELLE, LEON	614 190 767	FT. NORMAN	RECORDING HELPER		X	532.76
PASCAL, DOUGLAS	631 146 214	FT. MCPHERSON	RECORDING HELPER	X		1,967.10
PETER, JOHNNY	709 025 563	FT. NORMAN	RECORDING HELPER		X	2,087.07
ROBERT, PERRY	629 372 103	FT. MCPHERSON	RECORDING HELPER	X		1,933.35
TOBAC, JIM	634 866 933	FT. GOOD HOPE	RECORDING HELPER	X		813.61
					TOTAL =	\$ 37,614.30



#### AIR SERVICE

Pacific Western Airlines' jet service was utilized to transport personnel and equipment from Alberta to Norman Wells and the return. Approximately Twenty-Nine Thousand Dollars was expended for this service.

Local charter companies were utilized to fly men and supplies from the outlying communities and Norman Wells to the work location. Nahanni Air, Page Flight Services, and Okanagan Helicopters were used on a casual basis. The total expenditure for local charter services was approximately Fifteen Thousand Seven Hundred Dollars.

#### CONSTRUCTION AND TRUCKING CONTRACTORS

The seismic operation took place in an area where no all weather roads existed; however there was a major utilization of local contractors for the construction of ice and winter trails plus the hauling of fuel and supplies.

The firms hired were Borek Construction Ltd., Kenaston Contractors Ltd., and Matco Transportation Ltd. One Hundred and Ninety-Four Thousand Dollars was expended for transportation and construction of roads plus seismic trails.

#### FUELS AND LUBRICANTS

The Imperial Oil bulk station in Norman Wells supplied diesel, gas and oils for crew consumption. Approximately Seventy-Four Thousand Dollars was expended for combustibles. This figure

does not include aviation fuels that were purchased directly by the airline companies.

#### DRILLING SUPPLIES

Walker McDonald Bit Co., and San Juan Tool Co. supplied drill bits for the field operation from their Norman Wells inventories. Costs were Eighty-One Thousand Dollars. Drilling bit representatives kept offices at local hotels.

Approximately Thirty-Five Thousand Dollars was expended for dynamite and blasting caps. The supplies originated from "Explosives Ltd." storage in Norman Wells, with Matco representing them.

#### LOCAL SUPPLIERS

Norwell Developments Ltd. supplied the operation with food and camp supplies from their local warehouse.

Parts and accessories were purchased from various suppliers whenever possible. The local suppliers included Chatham Steel, Canol Welding, Eskimo Inn, Igaloo Welding, Mackenzie Valley Hotel, Mississiquoi Electric Ltd., Riverside Stores, Norman Wells Transportation Ltd., Norman Wells Laundry, Northern Lites Trailer Park, and Spruce Valley Ltd. Casual laborers were used to clean the office and living quarters, plus performed odd jobs when required.

Commissary supplies purchased locally by crew members

along with the taxi rides, hotel rooms and entertainment brought local expenditures up to approximately Forty-Five Thousand Dollars.

CROWN CORPORATIONS

The Northern Canada Power Corporation and the Northern Transportation Company Ltd. received fees for building services and barging. Canadian National Telecommunications received fees for telephone and telex messages over the work period. Some Four Thousand Dollars were expended in the 1983 season.

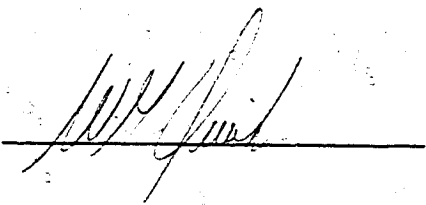
#### CONCLUSION

The economic contribution of the Norman Wells and Carcajou projects to the Northwest Territories was in the neighborhood of Five Hundred and Sixteen Thousand Five Hundred Dollars.

The employment of twenty-two local residents along with supply purchases from small business contributed economically and socially to the welfare of the area.

The foregoing report is respectfully submitted by

WESTERN GEOPHYSICAL COMPANY OF CANADA, LTD.



8 July 1983  
Date

361  
OPS

PROJECT REPORT  
FIELD OPERATIONS APPENDIX

GENERAL:

Project Name Norman Wells 1983 Texaco Project No. \_\_\_\_\_  
 Project Location Lat. 65°05' - 65°15' Long. 126°45' - 127°15'  
 Contractor Western Geophysical Company of Canada, Ltd.  
 Party No. 367 Party Chief (Manager) William Quirk (Carl Holmstrom)  
 Starting Date March 4, 1983 Completion Date March 22, 1983  
 Working Days 19 Days Lost Nil  
 Total kms. of Traverse 57.19 Total No. of SPs 387  
 Access to Project Area QUARRY RD. - NORTHERN-LORAM ICE ROAD - ESSO ICE ROAD - W.G.C. ICE ROAD  
FROM GOOSE ISLAND TO CANOL SITE  
 Terrain Conditions ROLLING - VERY FEW DETOURS - SOME MUSKEG - 3'-4' SNOW.  
 Optimum Working Season -  
 Weather Conditions NORMAL FOR AREA  
 Miscellaneous \_\_\_\_\_

	<u>EQUIPMENT (VEHICLE)</u>	<u>PERSONNEL (NO.)</u>
Recording	1 NODWELL FN110	2
Shooting	1 NODWELL FN60	2
EXPEDIT P.M.	1 NODWELL FN75	2
Personnel	1 NODWELL FN110 CREWCAB	
Surveying	2 NODWELLS FN60	4
Cable	3 NODWELLS FN110	9
Other	1 NODWELL FN110 MECHANIC'S UNIT 1 F250 MECHANIC'S TRUCK	1 3-TON BED TRUCK WITH GIN POLES & WINCH 1 F250 EXPEDITOR'S TRUCK
Camp	1 NODWELL RN110 WATER TRUCK 1 F350 SUPPLY TRUCK	8
	1 ARDCO "K" BUGGY	

RECORDING:

Instruments Texas Instruments DFS-V 96 trace  
 Tape Format SEG.B Sample Rate 2 ms.  
 Recording Filters 12 Hz. with 36 db Slope Record Length 3 sec.  
 Geophones/Type & No. Mark 30 Hz. 9 710 OHM 1K Damping Spacing 3.7 m.  
 Common Depth Coverage 1200% 60%  
 Group Interval 33.5 m. Offset to Near Group Center 33.5 m.  
 S. P. Location 134 m.

Radios (Shooting & Communications) Mobile Telephone Comm., FM Frequ. 152.12, Input/Output  
COMMENTS: RECORD QUALITY Good

DYNAMITE SHOOTING:

Number & Type of Drills & Vehicles 1 - Air/Water Top Drive on Nodwell FN110

1-Air/Water Conv. on FN110 2-Air Conv. on FN110 - 1 Water Truck FN110

Drill Contractors Western Geophysical Company

Type Drilling Bits Used 5 1/8 St., 4 3/4 & 4 1/2 Rock Bits, 4 3/4 & 4 1/2 Walmacs, 3 1/2 - 3 way

Holes per S.P. (Average) 1 Total Meters Drilled 6875

Shothole Pattern Single Average Hole Depth 14 m.

Average Charge Size 2 kg. Type Explosives Dynamite

COMMENTS: Majority of project good air drilling, some sticky wet clay toward Mackenzie River  
drilled with auger stem.

VIBROSEIS:

Number Used & Type \_\_\_\_\_

Sweep Frequency \_\_\_\_\_

Length of Sweep \_\_\_\_\_

No. of Sweeps/VP \_\_\_\_\_

Drag Over \_\_\_\_\_

meters

Offset to Near Group \_\_\_\_\_

Distance Between Vib. \_\_\_\_\_

SURVEYING:

Instruments T16A & T16 Transits - Sokkisha-Red 2 EDM 5 - AGA Geodimeter 14A

B.M. Locations 80 T.004 80 T.003

Other Control Points Trig Stn. Canol A.S.E. P.O.L. 7/CP 22

COMMENTS: \_\_\_\_\_

PERMITTING & DAMAGE CLAIMS: Permit for Parking Camp at the Canol Site was obtained from the  
hamlet of Norman Wells.

Permitting By William Quirk No. Kms. Permitted \_\_\_\_\_

Average Cost \_\_\_\_\_ Per Km. (approx.) \_\_\_\_\_ Per S.P. (approx.) \_\_\_\_\_

Flowing Holes None

Other Damages Camp Site at Canol was not covered by the normal N-82B796 "Diana" Land Use Permit,  
but the N.W.T. local Government Permit L-83-300-01

Special Problems Use of Esso Resources/Northern Loram Ice Road to cross river.

Local Residents/Farmers Hunters and Trappers Assoc. Norman Wells - Contact - Ed Hodgson

Government Agents "Diana" Darcy Proulx under Chief Ranger Ted Rudolph-Norman Wells

Local government Warren Schmitke-Norman Wells under Land Management Officer  
Pat Larocque-Yellowknife.

1. DOZING & LINE CLEANUP:

Contractor(s)	Borek Construction Ltd.		
Equipment	4 D7 Cats	1 F250 Cat Foreman's Truck	
Type Timber/Vegetation	Light spruce, birch and willows		
Percentage of Traverse on Roads			(Approx.)
Percentage of Traverse on Existing Trails	57%		(Approx.)
Percentage of Traverse Requiring New Trails	43%		(Approx.)

OTHER PERTINENT DATA:

A very common occurrence is the flooding of Canol Creek causing a washout across the access from Canol to Norman Wells. Due to this fact an alternate route was snowploughed and dragged. This route follows an old winter road to the south of Canol for approximately five kilometers to an existing access around Canol Lake and back to Norman Wells-Canol Winter Road via existing lines.

Crew mobilized by commercial air carrier P.W.A. along with recording instruments; Cables, Geophones, and other supplies being truck transported over winter roads.



PROJECT REPORT  
FIELD OPERATIONS APPENDIX

GENERAL:

Project Name Carcajou 1983 Texaco Project No. \_\_\_\_\_  
 Project Location Lat. 65°25' - 65°38' Long. 128°00' - 128°35'  
 Contractor Western Geophysical Company of Canada, Ltd.  
 Party No. 367 Party Chief (Manager) William Quirk (Carl Holmstrom)  
 Starting Date March 16, 1983 Completion Date April 18, 1983  
 Working Days 34 Days Lost 0  
 Total kms. of Traverse 56.67 Total No. of SPs 966  
 Access to Project Area Quarry Rd. - Northern-Loram Ice Road - Esso Ice Road -  
W.G.C. Ice Road to Canol Site - Existing Lines to Prospect Area  
 Terrain Conditions Fairly level - a few steep inclines - muskeg - small lakes -  
some dry lake beds - much gravel and sand encountered - 4'-5' of snow.  
 Optimum Working Season \_\_\_\_\_  
 Weather Conditions Normal for the area and season.  
 Miscellaneous \_\_\_\_\_

<u>EQUIPMENT (VEHICLE)</u>		<u>PERSONNEL (NO.)</u>
Recording	1 Nodwell FN110	2
Shooting	1 Nodwell FN60	2
Logging P.M.	1 Nodwell FN75 1 F250 4x4	2
Personnel	1 Nodwell FN110 Crew Cab	
Surveying	2 Nodwell FN60	4
able	3 Nodwell FN110	9
her	1 Nodwell FN110 Mechanic's Truck 1 3-ton Bed Truck, gin poles & winch	5
mp	1 F250 Mechanic's Truck 1 F250 Expeditor's Truck	9
	1 F350 Supply Truck 1 Nodwell FN110 Water Truck	
	1 Ardco "K" Buggy 1 F9000 Fuel Truck	

CORDING:

Instruments Texas Instruments DFS-V 96 Trace  
 Tape Format SEG.B Sample Rate 2 ms.  
 Recording Filters 18 Hz. with 36 db Slope Record Length 3 sec.  
 Phones/Type & No. Mark 30 Hz. 9 710 OHM 1k damp- ing 60% Spacing 1.8 m  
 Common Depth Coverage 1200%  
 Group Interval 15 m Offset to Near Group Center 45 m  
 P. Location 60 m

Ra (Shooting & Communications) Mobile Radio Telephone Comm., FM Freq., 152.12/Input/Output  
COMMENTS: RECORD QUALITY Fair to Good

DYNAMITE SHOOTING:

Number & Type of Drills & Vehicles 1-Air/Water T.D. on FN110 & 1-T.D. on FN110,

2-Air/Water Conv. on FN110's, 3-Air Conv. on FN110's, 1 Water Truck FN110

Drill Contractors Western Geophysical Company, and Double "R" Drilling.

Type Drilling Bits Used 5 1/8 St., 4 3/4-4 1/2 Rock Bits, 4 3/4 & 4 1/2 Walmac, 3 1/2-3 Ways

Holes per S.P. (Average) 1.72 Total Meters Drilled 20306

Shothole Pattern 2 hole Average Hole Depth 12.23 m

Average Charge Size 2 kg. Type Explosives Dynamite

COMMENTS: Drilling was difficult due to sand, gravel and rocks.

VIBROSEIS:

Unit Used & Type

Sweep Frequency

Length of Sweep

No. of Sweeps/VP

Drag Over

meters

Offset to Near Group

Distance Between Vibs.

SURVEYING:

Instruments T16 & T16A Transits - Sokkisha Red 2 E.D.M.s - AGA Geodimeter 14A

M. Locations

Other Control Points Trig. Stns. 78-09-22 & JOU

COMMENTS:

PERMITTING & DAMAGE CLAIMS:

Permitting By No. Kms. Permitted

Average Cost Per Km. (approx.)

Per S.P. (approx.)

owing Holes None

Other Damages

Special Problems

Local Residents/Farmers Hunters and Trappers Assoc., Fort Good Hope, Contact-Barney Masuzumi

Government Agents "Diana" Darcy Proulx under Chief Ranger Ted Rudolph-Norman Wells

Land Use Permit N-82B796

BULDOZING & LINE CLEANUP:

Contractor(s)	Borek Construction Ltd.	
Equipment	5 - D7 Cats	1 - F60 Nodwell Foreman's Unit
Type Timber/Vegetation	Light spruce, birch and willow	
Percentage of Traverse on Roads		(Approx.)
Percentage of Traverse on Existing Trails	32%	(Approx.)
Percentage of Traverse Requiring New Trails	68%	(Approx.)

OTHER PERTINENT DATA:

On Line W83-AN much sand, gravel and rocks were encountered commencing approximately 2 kms. from the Mackenzie River to the end of the line south of the Carcajou River. The same applied to Line W83-NA from the B.O.L. for approximately 3.75 kms. while Lines W83-NF, W83-NB and W83-NC presented the same problem to a much lesser extent - from .25 km. to 1 km. in width.

Transposing the gravel pattern to a prospect map shows an egg shaped bowl approximately 4 kms. in diameter, starting approx. 2 kms. south from the Mackenzie River. This narrows down considerably to show up on the map as an old river bed with the W83-AN line running through the center.

One point that stood out was the record quality of Line W83-NB which was poor while all other lines produced record quality from fair to good.

Dennis Jackson, Fort Good Hope, served as monitor on the project. No reported conflict with hunters, trappers or animals.

