

SHELL OIL COMPANY OF CANADA, LIMITED
STATEMENT OF DEPOSITS
COVERING PERMITS IN THE JEAN MARIE RIVER AREA
NORTHWEST TERRITORIES AS OF SEPTEMBER 26TH, 1961

Status of Deposits

<u>Crown</u> <u>Permits</u>	<u>Shell</u> <u>Res. #</u>	<u>Deposit Period</u>	<u>Acreage</u>	<u>Rate</u>	<u>Amount</u>
890	497	Sept.27/60 Sept.26/61	61920	25¢	15,480.00
891	498	" "	61920	25¢	15,480.00
901	499	" "	62244	25¢	15,561.00

Deposit requirement for 1st year renewal term } Balance is refundable	<u>46,521.00</u>
--	------------------

Balance of Excess expenditures for Master Group #70 as per Department of Northern Affairs & National Resources letter of April 30/61	1,255,158.03
--	--------------

Expenditures for the period Sept. 27/60 to April 30/61	104,483.60
--	------------

LESS: Amount required to reduce Office Administration and Supervision expense to 12.5% in accordance with Department of Northern Affairs and National Resources letter of Feb. 10/1960	<u>14,065.10</u>
---	------------------

Total Allowable Expenditures	90,418.50
------------------------------	-----------

Refundable deposit claimed (See above)	<u>46,521.00</u>
--	------------------

Additional excess expenditures	43,897.50
--------------------------------	-----------

ADD: Allowable expenditures re Tetcho Lake Area submission as of April 30/61	<u>216,384.83</u>
---	-------------------

Balance of excess expenditures on Master Group #70	<u>\$1,515,440.36</u>
--	-----------------------

037-06-04-033

PRICE WATERHOUSE & Co.

444 SEVENTH AVENUE WEST

CALGARY, ALTA.

June 20, 1961

Chief, Resources Division,
Northern Administration Branch,
Department of Northern Affairs and
National Resources,
Ottawa, Ontario.

We have examined the attached statement of exploration expenditures aggregating \$104,483.60 for the period February 1, 1961 to April 30, 1961 incurred by Shell Oil Company of Canada, Limited for exploration work in the Northwest Territories of Canada in respect of areas covered by Petroleum and Natural Gas Permits Nos. 890, 891 and 901. Our examination included such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

Expenditures are included for work of a general exploratory nature carried on outside the permit areas and deemed by the company to be applicable to the permit areas under section 21 of the Canada Oil and Gas Regulations.

In our opinion the expenditures made by the company and shown on the attached statement are applicable (subject to the reference to off-permit expenditures in the preceding paragraph) to the permits in the Northwest Territories of Canada listed above according to the information and explanations given to us and as shown by the books and records of the company.

Price Waterhouse & Co.
Chartered Accountants

SHELL OIL COMPANY OF CANADA, LIMITED

STATEMENT OF EXPLORATION EXPENDITURES
INCURRED IN THE NORTHWEST TERRITORIES OF CANADA
FOR THE PERIOD FEBRUARY 1, 1961 TO APRIL 30, 1961
IN RESPECT OF PETROLEUM AND NATURAL GAS PERMITS
NOS. 890, 891 AND 901

Jean Marie River AreaSeismic

Materials

\$ 4,724.76

Contract work

47,753.37

Transportation

2,305.20

Bulldozing

25,463.89

Surveying

114.78

\$ 80,372.00

Office administration and supervision

Allocated in the proportion that over-
head expenses bear to total direct
exploration and production expendi-
tures on all operations in Western
Canada for the nine years ended
December 31, 1960

24,111.60

Exploration expenditures for the period

\$104,483.60

Submitted with our report to the Chief, Resources Division,
Department of Northern Affairs and National Resources,
Government of Canada, dated June 20, 1961.

Pier Waterhouse & Co.
Chartered Accountants

SHELL OIL COMPANY OF CANADA, LIMITED
STATEMENT OF DEPOSITS
COVERING PERMITS IN THE TETCHO LAKE AREA
NORTHWEST TERRITORIES AS OF APRIL 7TH 1961

Status of Deposits

<u>Crown</u> <u>Permits</u>	<u>Shell</u> <u>Res. #</u>	<u>Deposit Period</u>	<u>Acreage</u>	<u>Rate</u>	<u>Amount</u>
3026	479	Oct. 8th/59	62568	.05	3,128.40
3027	480	"	62244	.05	3,112.20

Deposit requirement for 1st 18 month period 6,240.60

This deposit satisfied by excess expenditures for master group #70 as per department letter dated Nov. 17th, 1960.

3026	479	April 8th/61	62568	.25	15,642.00
3027	480	"	62244	.25	15,561.00

Deposit requirement for 1st years renewal 31,203.00

Above deposit satisfied by excess expenditures for master group #70 as per department letter dated March 21/1961.

Balance of Excess expenditures for Master Group #70 as per Department Nth. Affairs and National Resources letter April 13/1961 1,255,158.03

Expenditures for the period Oct. 9/59 to April 30/61 250,044.69

LESS: Amount required to reduce office administration and Supervision expense to 12.5% in accordance with Department of Northern Affairs and National Resources letter of February 10, 1960.

33,659.86

216,384.83

Total allowable expenditures

Balance of Excess Expenditures 216,384.83

ADD: Allowable expenditures re Jean Marie River Area Submission as of April 30/61 1,471,542.86

43,897.50

Balance of excess expenditures on Master Group #70

\$1,515,440.36

037-06-04-033

PRICE WATERHOUSE & Co.

444 SEVENTH AVENUE WEST

CALGARY, ALTA.

June 20, 1961

Chief, Resources Division,
Northern Administration Branch,
Department of Northern Affairs and
National Resources,
Ottawa, Ontario.

We have examined the attached statement of exploration expenditures aggregating \$250,044.69 for the period January 1, 1961 to April 30, 1961 incurred by Shell Oil Company of Canada, Limited for exploration work in the Northwest Territories of Canada in respect of areas covered by Petroleum and Natural Gas Permits Nos. 3026 and 3027. Our examination included such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

Expenditures are included for work of a general exploratory nature carried on outside the permit areas and deemed by the company to be applicable to the permit areas under section 21 of the Canada Oil and Gas Regulations.

In our opinion the expenditures made by the company and shown on the attached statement are applicable (subject to the reference to off-permit expenditures in the preceding paragraph) to the permits in the Northwest Territories of Canada listed above according to the information and explanations given to us and as shown by the books and records of the company.

Price Waterhouse & Co.

Chartered Accountants

SHELL OIL COMPANY OF CANADA, LIMITED

STATEMENT OF EXPLORATION EXPENDITURES INCURRED
IN THE NORTHWEST TERRITORIES OF CANADA
FOR THE PERIOD JANUARY 1, 1961 TO APRIL 30, 1961
IN RESPECT OF PETROLEUM AND NATURAL GAS PERMITS
NOS. 3026 AND 3027

Tetcho Lake AreaSeismicMaterials

Contract work

Transportation

Bulldozing

Surveying

\$ 12,397.88

115,950.48

14,710.93

48,834.61

440.17

\$192,342.07

Office administration and supervision

Allocated in the proportion that over-
head expenses bear to total direct
exploration and production expenditures
on all operations in Western Canada for
the nine years ended December 31, 1960

57,702.62

Exploration expenditures for the period

\$250,044.69

Submitted with our report to the Chief,
Resources Division, Department of
Northern Affairs and National Resources,
Government of Canada, dated June 20,
1961.

Pric Waterhouse & Co.

Chartered Accountants

COMPREHENSIVE SUMMARY OF WORK DONE
ON TETCHO LAKE AND JEAN MARIE AREA, NORTHWEST TERRITORIES

Permits #3026, 3027, #890, #891 and #901

In compliance with Section 45 of the Canada Oil and Gas Land Regulations the following is reported in respect to the captioned permits which are grouped for exploratory work.

Shell Oil Company of Canada, Limited did approximately three and one half months of seismic exploration on the Tetcho Lake and Jean Marie permits and adjoining area during the winter of 1961. The work was done under contract by General Geophysical Company during the months of January, February, March and April. The camp was moved into the permit area from the Trout Lake block, the tracked vehicles from Mile 60 on the Simpson Trail and the bulldozers from Edmonton. Accessibility to the subject area during the winter is possible via the Simpson Trail from Fort Nelson, B.C. and a previously cut line to the Imperial Island River well. A second access road was cut from the northern part of the area to a point on the Simpson trail approximately four miles south of Cormack Lake. Both the Nelson and the Petitot Rivers were spanned by ice bridges. In addition the area has several lakes that can accomodate ski-equipped aircraft.

Due to an early heavy snowfall in November and exceptionally mild winter there was almost no frost penetration into the muskeg. This factor greatly hampered bulldozing operations and forced us into many inconvenient and costly changes of program. A smaller D-4 caterpillar was brought in for snow ploughing to aid frost penetration into muskeg so that heavier equipment could be moved over the trails. These soft conditions retarded progress generally and to complete the minimum coverage we were obliged to bring in two more tracked drills from Edmonton and one more D-7 caterpillar from Fort Nelson. In addition the program had to be extended into spring break-up. For the last three weeks of the operations aircraft were chartered to fly in supplies and bring out records and personnel as the trails were impassible for vehicles.

Drilling of shot holes was extremely difficult in parts of the program area due to the presence of hard layers of sandstones, gravel and boulders near the surface.

The enclosed maps which form part of this report show the shot point locations and elevations and isotime contours and the "Top Devonian Tetcho" reflector.

Expenditures incurred in the performance of the above outlined exploration program are as follows:

037-06-04-033

Tetcho Lake AreaSeismic

Materials	\$ 12,397.88	Cost of materials used in conducting seismic activity such as drilling bits, bran, mud and explosives.
Contract Work	115,950.48	Payments to contractor for seismic services, drilling and catering services.
Transportation	14,718.93	Cost of transporting personnel, equipment and supplies from headquarters to location of exploration activity and back.
Bulldozing	48,834.61	Payments to contractor for cutting excess trails and cutting and clearing seismic lines.
Surveying	440.17	Cost of additional surveying service required in addition to normal surveying staff supplied by seismic crew.
Office administration and Supervision	57,702.62	Allocation of office administration and supervision expense in proportion that overhead bears to total direct expense.

\$ 250,044.69

Jean Marie AreaSeismic

Materials	4,724.76	Payments made for materials used in conducting seismic exploration, drilling; bits, mud and explosives, etc.
Contract Work	47,763.37	Payments to contractor for services re seismic exploration, drilling and catering service.
Transportation	2,305.20	Cost of transporting personnel, equipment and supplies from headquarters to prospect and back.
Bulldozing	25,463.89	Cost of cutting excess trails and cutting and clearing of seismic lines.

Surveying

\$ 114.78

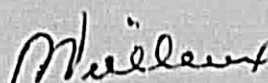
Cost of additional surveying service required in addition to normal surveying supplied by seismic crew.

Office administration and Supervision

24,111.60

Office administration and supervision expense allocated in proportion that overhead bears to total direct expense.

\$ 104,483.60



B. M. Veilleux

Manager,

Northern Division Exploration

June 29, 1961

COMPREHENSIVE SUMMARY OF WORK DONE Date
ON TETCHO LAKE AND JEAN MARIE AREA, NORTHWEST TERRITORIES

Permits #3026, 3027, #890, #891 and #901

In compliance with Section 45 of the Canada Oil and Gas Land Regulations the following is reported in respect to the captioned permits which are grouped for exploratory work.

Shell Oil Company of Canada, Limited did approximately three and one half months of seismic exploration on the Tetcho Lake and Jean Marie permits and adjoining area during the winter of 1961. The work was done under contract by General Geophysical Company during the months of January, February, March and April. The camp was moved into the permit area from the Trout Lake block, the tracked vehicles from Mile 60 on the Simpson Trail and the bulldozers from Edmonton. Accessibility to the subject area during the winter is possible via the Simpson Trail from Fort Nelson, B.C. and a previously cut line to the Imperial Island River well. A second access road was cut from the northern part of the area to a point on the Simpson trail approximately four miles south of Cormack Lake. Both the Nelson and the Petitot Rivers were spanned by ice bridges. In addition the area has several lakes that can accomodate ski-equipped aircraft.

Due to an early heavy snowfall in November and exceptionally mild winter there was almost no frost penetration into the muskeg. This factor greatly hampered bulldozing operations and forced us into many inconvenient and costly changes of program. A smaller D-4 caterpillar was brought in for snow ploughing to aid frost penetration into muskeg so that heavier equipment could be moved over the trails. These soft conditions retarded progress generally and to complete the minimum coverage we were obliged to bring in two more tracked drills from Edmonton and one more D-7 caterpillar from Fort Nelson. In addition the program had to be extended into spring break-up. For the last three weeks of the operations aircraft were chartered to fly in supplies and bring out records and personnel as the trails were impassible for vehicles.

Drilling of shot holes was extremely difficult in parts of the program area due to the presence of hard layers of sandstones, gravel and boulders near the surface.

The enclosed maps which form part of this report show the shot point locations and elevations and isotime contours and the "Top Devonian Tetcho" reflector.

Expenditures incurred in the performance of the above outlined exploration program are as follows:

037-06-04-033

Tetcho Lake AreaSeismic

Materials	\$ 12,397.88	Cost of materials used in conducting seismic activity such as drilling bits, bran, mud and explosives.
Contract Work	115,950.48	Payments to contractor for seismic services, drilling and catering services.
Transportation	14,718.93	Cost of transporting personnel, equipment and supplies from headquarters to location of exploration activity and back.
Bulldozing	48,834.61	Payments to contractor for cutting excess trails and cutting and clearing seismic lines.
Surveying	440.17	Cost of additional surveying service required in addition to normal surveying staff supplied by seismic crew.
Office administration and Supervision	57,702.62	Allocation of office administration and supervision expense in proportion that overhead bears to total direct expense.
	<hr/>	
	<u>\$ 250,044.69</u>	

Jean Marie AreaSeismic

Materials	4,724.76	Payments made for materials used in conducting seismic exploration, drilling bits, mud and explosives, etc.
Contract Work	47,763.37	Payments to contractor for services re seismic exploration, drilling and catering service.
Transportation	2,305.20	Cost of transporting personnel, equipment and supplies from headquarters to prospect and back.
Bulldozing	25,463.89	Cost of cutting excess trails and cutting and clearing of seismic lines.

Surveying

\$ 114.78

Cost of additional surveying service required in addition to normal surveying supplied by seismic crew.

Office administration and
Supervision

24,111.60

Office administration and supervision expense allocated in proportion that overhead bears to total direct expense.

\$ 104,483.60



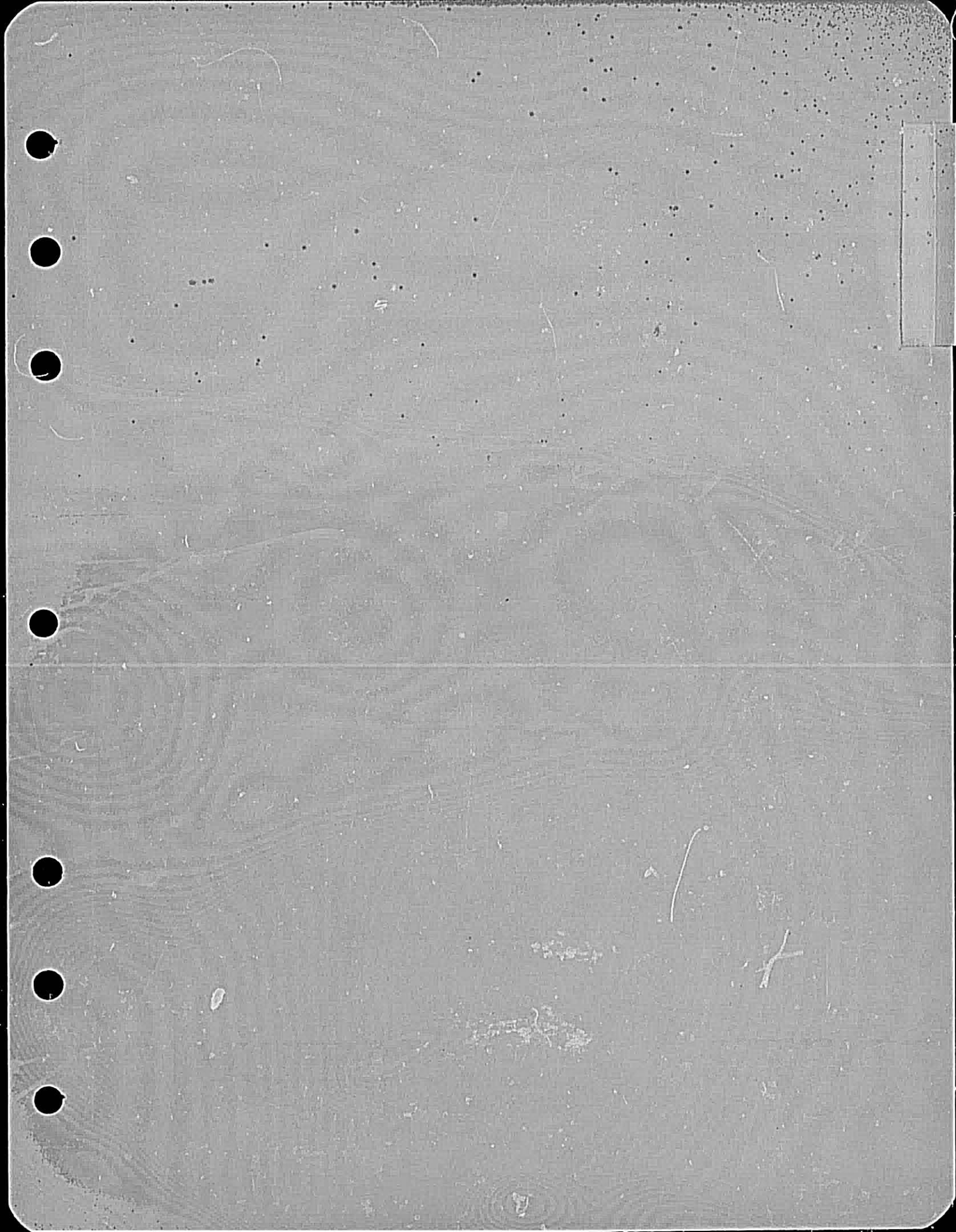
B. M. Veilleux
Manager,
Northern Division Exploration

June 29, 1961

GEOPHYSICAL REPORT
TETCHO LAKE, JEAN MARIE RIVER AND
TROUT LAKE AREAS, NORTHWEST TERRITORIES

by
SHELL OIL COMPANY OF CANADA, LTD.

October, 1961



GEOPHYSICAL REPORT ON

TETCHO LAKE AND JEAN MARIE RIVER AREAS,
NORTHWEST TERRITORIES

Permit Nos. 890, 891, 901, 3026, 3027

October, 1961

by

SHELL OIL COMPANY OF CANADA, LIMITED

C O N T E N T S

	<u>Page</u>
<u>TETCHO LAKE AND JEAN MARIE RIVER AREAS</u>	
INTRODUCTION	1
FIELD CONDITIONS	1
EQUIPMENT	3
DRILLING	4
RECORDING	5
SURVEYING	6
INTERPRETATION	6
<u>TROUT LAKE AREA</u>	
Work done for Shell by General Geophysical .	8
Work done for Shell by Century Geophysical .	14
Aeromagnetic total intensity maps purchased by Shell from Spartan Air Services	18
Trout Lake Area, Geological Surface Mapping . .	19

ENCLOSURES

JEAN MARIE RIVER & TETCHO LAKE AREAS

- Jean Marie River & Tetcho Lake Areas, N.W.T. - Topography
- Jean Marie River & Tetcho Lake Areas, N.W.T. - Top Mississippian
- Jean Marie River & Tetcho Lake Areas, N.W.T. - Devonian Carlson

TROUT LAKE AREA

- Trout Lake Area - Top Mississippian (2 parts)
- Trout Lake Area - Tetcho Line (2 parts)
- Trout Lake Area - Surface Elevation
- Trout Lake Area, N.W.T. - Devonian Carlson
- Trout Lake Area, N.W.T. - Devonian Tetcho
- Aeromagnetic Total Intensity Maps - N.E. B.C. & N.W.T.
Grids - 7, 8 & 9

1

GEOPHYSICAL REPORT ON TETCHO LAKE AREA
AND JEAN MARIE RIVER AREA

Permit Nos. 890, 891, 901, 3026, 3027

In compliance with Section 54 (1) f and (2) b of the Canada Oil and Gas Land Regulations, the following is a summary of the work done by General Geophysical Company for Shell Oil Company of Canada, Limited, in the Tetcho Lake Area and Jean Marie River area, during 1961.

Area and Prospect:

Tetcho Lake Area, Northwest Territories
Jean Marie River Area, Northwest Territories

Location:

Approximately 180 miles north of Fort Nelson, B.C. in the Northwest Territories between Latitude $60^{\circ}15'$ and $61^{\circ}12'$ and Longitude $120^{\circ}39'$ and $121^{\circ}40'$.

Date of Survey:

From January 8, 1961 to April 21, 1961.

Extent of Survey:

Miles of Traverse: 229

Number of Shot Points: 668

Party Chief: A. DeJong - General Geophysical Company

Supervisor: R. Keller, General Geophysical Company

FIELD CONDITIONS:

1. Surface Outcrops:

The entire area is covered with a varying thickness of glacial drift. No surface outcrops were visible.

2. Topography:

Surface elevations vary from 1150 feet above sea level at shot point 2-445 in the north to 1076 feet at shot point 2-137 in the southeast part of the area.

The prospect is located immediately to the east and north of Trout Lake, and east of the Simpson Trail.

The northern half of the area drains into the Mackenzie River via the Trout River and its tributaries. The southern parts are drained by the Island River and its tributaries into Trout Lake.

This is an unpopulated, unsurveyed area, dotted with occasional growths of heavy spruce, but covered largely by muskeg, swamp, and a growth of small spruce and poplar.

3. Accessibility:

The area is accessible over land by the Simpson Trail from Fort Nelson, B.C. and a previously cut line to the Imperial Island River well.

A second access road was cut from the northern part of the area to a point on the Simpson Trail approximately four miles south of Cormack Lake.

During the winter months the Simpson Trail is well maintained, however, during the summer only tracked equipment would be able to move.

Both the Nelson and Petitot Rivers were spanned by ice bridges. During the summer the Nelson River can be crossed by ferry or barge.

In addition to Trout and Tetcho Lakes, there are several smaller lakes that could accomodate ski-or float-equipped planes.

4. Weather:

Temperatures ranged from 50 below to 50 above zero during the period worked, and several heavy snow falls accompanied by drifting were experienced.

In November a three-foot snow fall had covered the area before the muskeg was frozen. Dozers continued to break through the unfrozen muskeg

despite the low temperatures that prevailed during the winter, and unsatisfactory progress was made until a smaller D-4 caterpillar was brought in for snow ploughing in advance of use of the heavier equipment.

EQUIPMENT:

1. Camp

Until the end of March an eight-unit skid camp, moved by the dozers, was used. By the end of March when spring break-up was likely to appear, all the dozers and trucks were moved out. At this time the crew moved into tents and camp moves were made by the muskeg tractors.

2. Vehicles

- 1 Bombardier Muskeg Tractor Recorder
- 1 Bombardier Muskeg Tractor Shooting Unit
- 1 Bombardier Muskeg Tractor Reel Unit
- 2 Bombardier Muskeg Tractor Sewell Auger Drills
- 2 Bombardier Muskeg Tractor Water units
- 2 Bombardier Muskeg Tractor Survey units
- 1 G.M.C. 3/4 ton Pan Truck
- 1 Water truck
- 2 Nodwell units mounted with Mayhew 1000 drills in conjunction with water units
- 4 D-7 Caterpillar dozers
- 1 D-4 Caterpillar dozer

Crew changes were made by a Volkswagon bus or panel truck, and supplies were trucked in from Fort Nelson.

DRILLING:

1. Formation:

The average hole log shows muskeg, clay, sand and gravel. Others show, in addition, shale and layers of hard sandstone. Drilling was hampered by the layers of hard sandstone and also by gravel and boulders near the surface.

2. Hole Depth and Patterns:

At the beginning of the survey it was proposed that a three hole in-line pattern would be drilled to forty feet. Drilling proved to be more difficult than had been anticipated. This necessitated a change to single holes or shallower two and three hole patterns. The Sewell Auger drills were put on double shifts, but were still unable to drill enough holes for the recording crew.

3. Casing:

No casing was used.

4. Drilling Equipment:

Two Sewell Wet Auger drills mounted on Bombardier Muskeg Tractors in conjunction with Muskeg Tractor mounted water units worked throughout the survey. To offset the expected long water hauls a regular truck mounted 800 gallon water unit was used until March 28 when the spring breakⁿ showed signs of starting.

On February 25 a Mayhew 1000 drill and water unit mounted on Nodwell Muskeg tractors commenced work, and on March 18 the second such unit arrived. Both Mayhew drills continued working until the end of March.

Insert finger bits proved satisfactory for all the drilling done by the Sewell Auger drills. The Mayhew drills used finger bits for the easier drilling and rock bits on the hard formations.

RECORDING:

1. Type shooting, Spread - Interval - Spacing etc.

A 24 station split continuous spread with 150 foot station intervals was used. Six seismometers spaced 15 feet apart were centered across the station flag.

Shot points were 1800 feet apart with the first seismometer station 150 feet on either side of the shot point. 100 foot spacing was used between the shot holes of the in-line patterns.

Monitor records and magnetic tapes were simultaneously recorded. A playback for field interpretation was made but the playback procedure was discontinued when the preliminary field interpretation was stopped. A short strip was then played back to check the recording on the tape.

One Way Fast A.G.C. was used for recording and Two Way Slow was used for playbacks.

Normal Gain was used until the early reflections moved into the first breaks. Then it was necessary to go to an instantaneous setting using higher initial suppression.

2. Charges

Ten pounds of Geogel was pre-loaded in all single holes. In the southern part of the area 2-1/2 pounds was pre-loaded in the pattern holes, as the work progressed northwards, 1-1/4 pounds gave good energy return. Finally, in the northern parts the charges was reduced to 5/8 pounds per hole.

3. Experimenting:

Comparisons were made with one, three and five hole patterns, charges from 5/8 to 15 pounds, and hole depth from 10 to 40 feet.

Twelve seismometers per station were tried with single holes without any significant improvement in quality.

4. Type of Instruments:

General Geophysical Company J.M.H. type amplifiers and P type seismometers were used in conjunction with a Geocord magnetic tape recorder using Techno type tapes.

SURVEYING:

It was proposed that a control survey be made across the area to establish bench marks for the seismic work. Midwest Surveys Limited conducted this survey from the 34th base line near shot points 26-1-89 along lines 26-1, 26-2 and 26-9, past the Briggs Tetcho Lake well to shot point 235 on line 26-9.

The regular seismic survey was started from the Imperial Island River well, using the elevation and coordinates given at this point. Satisfactory ties were established with the control survey, the 34th base line and a final tie to the Governmental bench mark #5 on the Simpson Trail. This final tie at bench mark #5 was carried 65 miles from the 34th base line with a Latitude tie of 489 feet north, Longitude 118 feet west and a vertical tie of 8.1 feet.

The seismic survey was made with a Cooke Theodolite. Winding trails in a good portion of the area hampered the surveyors.

INTERPRETATION:

1. Corrections

Uphole plots were of little value because of the shallow hole depth, however, uphole times indicate a near surface velocity of approximately 3000 feet per second.

First arrival plots were made for each profile. These plots indicate an average velocity of 6500 feet per second for V2 and 9000 feet per second for V3 in the southern part of the area. As shallow reflections moved close into the first breaks towards the north, the V3 velocity changed gradually from 9000 feet per second to 12000 feet per second and finally in the northern part to 16,000 feet per second.

Delay times were computed from uphole times.

$$Dt = Tuh - \frac{ds}{V2}$$

where:

Tuh = Measured uphole time

ds = Depth of shot

V2 = Correction velocity, 6500 feet per second.

A correction velocity of 6500 feet per second was used for both weathering and elevation corrections.

Datum was 1500 feet above sea level.

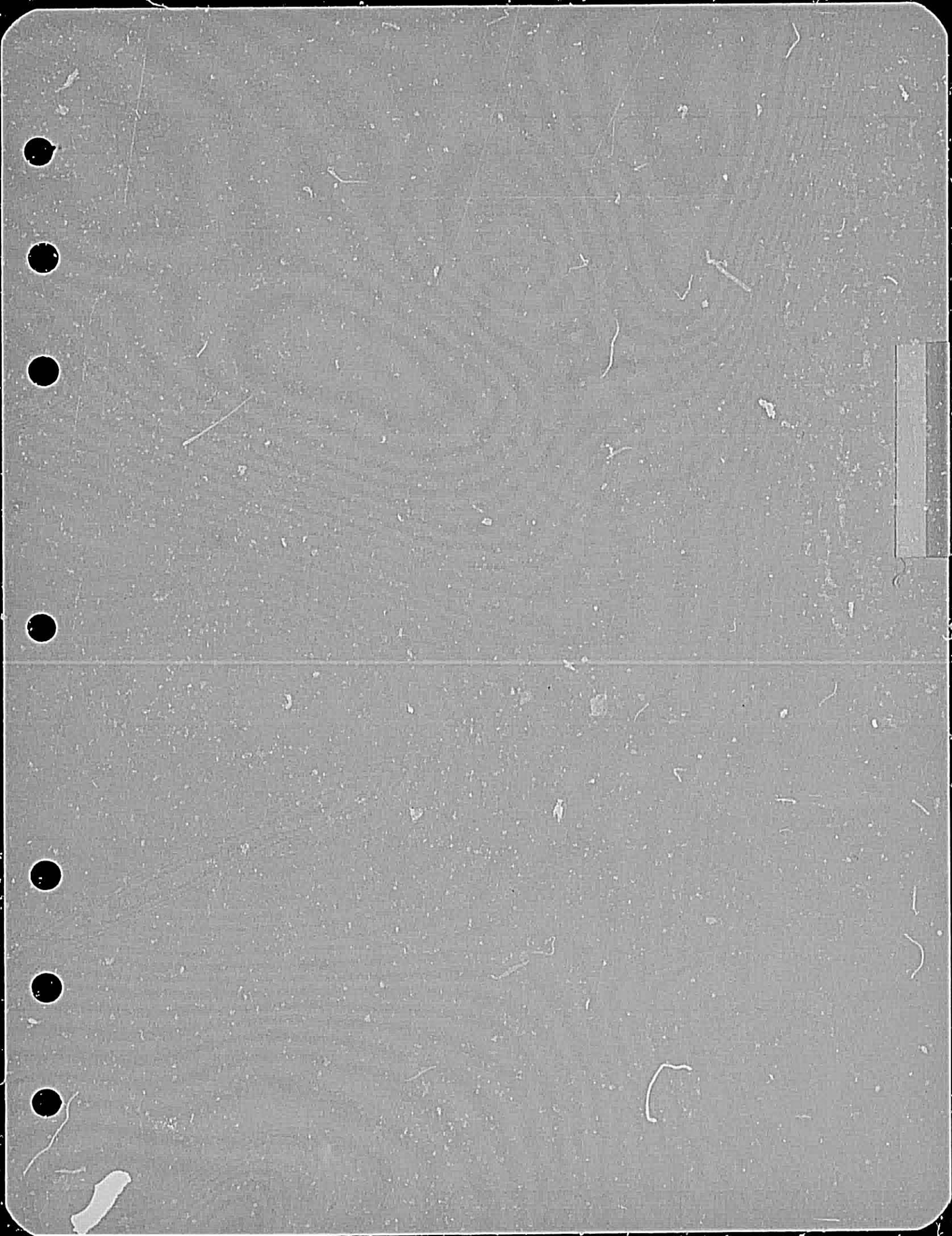
Uphole time, break correction, delay time and elevation correction were added algebraically for the shot point correction. The shot point correction was then combined with the weathering and elevation correction for each trace for a total trace correction.

2. Maps:

Maps on the following horizons were prepared and are submitted with this report:

1. Topography
2. Mississippian
3. Devonian Carlson

A fourth map, Devonian Tetcho, was submitted on June 30, 1961 with our report on the Tetcho Lake and Jean Marie River permits.



TROUT LAKE AREA
NORTHWEST TERRITORIES

October, 1961

SHELL OIL COMPANY OF CANADA, LIMITED

TROUT LAKE AREA

The following reports are submitted in compliance with Section 54(1)f, (2)b, c, of the Canada Oil and Gas Land Regulations.

- work done for Shell by General Geophysical
- work done for Shell by Century Geophysical
- aeromagnetic total intensity maps purchased by Shell from Spartan Air Services.

The following is a summary of the exploration work done by General Geophysical Company for Shell Oil Company of Canada, Limited in the Trout Lake area during, 1960. Permits 2702, 2711, 2712.

LOCATION:

Work was conducted between latitudes 60°00' N and 60°15' N and longitudes 121°05' W and 122°14' W in the Northwest Territories and in British Columbia Grid 94-P-13.

DATES OF SURVEY:

General Geophysical Party #5 operated from January 3rd until April 2nd, 1960 while General Party #204 worked from April 3rd until April 17th, 1960 for the total of 106 working days.

EXTENT OF SURVEY:

Miles of traverse: 327.9

Number of shot points: 1,079

FIELD CONDITIONS:

Surface Outcrops

Surface formations consisted of glacial deposits overlying strata of the Lower Cretaceous age.

Type of Terrain

Elevations ranged from about 1197 feet to 2280 feet above sea level. In the southern part of the prospect streams flow south into the Petitot River, while in the northern part streams flow northwesterly into the Liard River. Light to medium timber growth, interspersed with muskeg stretches, covered the bulk of the prospect.

Available Roads

The Simpson trail traversed the extreme western portion of the prospect and bulldozed trails cleared as part of the program provided access to the remainder.

Weather

Normal weather prevailed throughout the length of the survey with temperatures ranging from a minimum of -40 degrees Fahrenheit to above freezing. No shut down due to cold weather was necessary.

FIELD PROCEDURE:

Drilling

(a) Formations:

Formations encountered during drilling included sandstone, shale, gravel, sand, clay and muskeg.

(b) Hole Depths:

Holes were drilled to depths of 35 feet to 40 feet.

(c) Casing:

No casing or charge anchors were necessary

(d) Drilling Equipment:

Drilling operations commenced with the use of a General Geophysical Company Sewell drill mounted on a muskeg tractor and accompanied by a water tractor; and a conventional Mayhew drill and water truck sub-contracted by Garrity and Baker Drilling, plus an extra water truck supplied by S. Kitchen.

On February 2 a second Sewell drill mounted on a muskeg water tractor was added and an extra muskeg water tractor began working on February 17th.

On April 1st the use of the conventional drill and water trucks was terminated. These units used finger bits and occasional rock bits.

(e) Drilling Problems:

Some difficulties were encountered due to gravel holes and by lack of water.

Recording

(a) Spread Layout:

Seismic surveying was performed using the continuous profile method on a 24 trace recording unit. Shotpoints were located 1800 feet apart and instrument spreads consisted of 24

seismometer groups spaced 150 feet apart with the distance from the shotpoint to the closest station being 75 feet. Either 6 or 12 seismometers at intervals of 15 feet were symmetrically arrayed about each station.

(b) Weathering Spreads:

Normally a shot was taken at every other shotpoint in each direction from the end of the spread.

(c) Influence of Hole Depth:

No great amount of experimentation was carried out but the few deep shots that were taken indicated that the record quality was quite good at depths from 20 feet to 40 feet with no great improvement at deeper shot levels.

(d) Charges up to 10 pounds were used.

(e) Type Amplifier, Filter Setting, etc:

General Geophysical JMH model amplifiers and Electro-Technical Labs seismometers were used. Data were simultaneously recorded on magnetic tape through a General Geophysical Geocord recorder and on a conventional paper record (monitor). Tapes were played back in the field.

Traces number 1 - 24 recorded signals from stations of the instrument array. Trace 25 indicated the shot break, the uphole time, and the time when the front end suppression was released. Trace 26, in most cases, showed an uphole time check, and after the first breaks, a hundred cycle per second signal.

On the monitors a direct current pulse was recorded simultaneously on traces 1 to 24 with the purpose of showing whether there was any lag or lead on any of the traces. A similar pulse

was reproduced in the playback operation from a magnetic scribe on the tape to show whether any of the magnetic heads were out of alignment.

On most profiles a tap test was recorded ahead of the time break on station 12 to check whether the cables had not accidentally been reversed.

Party #204 took over Party #5 instruments, moving them from a conventional truck to a muskeg tractor.

Surveying

Surveying was performed using a transit and spreads were laid out using a chain. Vertical and horizontal control was achieved from a set of bench marks along the British Columbia-Northwest Territories border.

COMPUTATIONS:

Weathering Corrections

Surface to surface refraction breaks were plotted versus distance on rectangular coordinate paper.

The weathering delay time was then computed using the following formula:

$$\text{Weathering delay time} = t_1 + T_{uh} - \frac{t_1 (V_1) + \text{Hole Depth}}{V_c}$$

Where T_2 = Intercept from 9000'/s - 10,000'/s
velocity slope

T_{uh} = Uphole time

was reproduced in the playback operation from a magnetic scribe on the tape to show whether any of the magnetic heads were out of alignment.

On most profiles a tap test was recorded ahead of the time break on station 12 to check whether the cables had not accidentally been reversed.

Party #204 took over Party #5 instruments, moving them from a conventional truck to a muskeg tractor.

Surveying

Surveying was performed using a transit and spreads were laid out using a chain. Vertical and horizontal control was achieved from a set of bench marks along the British Columbia-Northwest Territories border.

COMPUTATIONS:

Weathering Corrections

Surface to surface refraction breaks were plotted versus distance on rectangular coordinate paper.

The weathering delay time was then computed using the following formula:

$$\text{Weathering delay time} = t_l + T_{uh} - \frac{t_l (V_l) + \text{Hole Depth}}{V_c}$$

Where T_2 = Intercept from 9000'/s - 10,000'/s
velocity slope

T_{uh} = Uphole time

$$t_1 = \frac{T_2 - T_{uh}}{2 \cos i} \quad (\text{Vertical time from shot level to highest refractor})$$

V_1 = lowest refraction velocity (about 6000'/s)

V_c = elevation correcting velocity = 9000'/s.

$\cos i$ = cosine of angle whose sine is V_1/V_2 .

In a considerable portion of the area an intermediate velocity (V_1) of about 8000 feet/sec. was used.

MAPS

We enclose with this report the following maps:

- 1) Mississippian
- 2) Devonian Tetcho Lime

Two maps Topography, and Top Devonian were submitted in November, 1960 in conjunction with the report to the government on the Trout Lake area of that date.

The following is a report of the work adjacent to Permits 473, 474 and 475 which was done by Century Geophysical Company, Party 175 for Shell Oil Company of Canada, Limited during January, 1961. Permission to apply the cost of this off permit work to the Trout Lake permits was approved by the Government on January 20, 1961.

GENERAL:

Access to this area was done by bush road from the Simpson Trail. The area is generally flat, being poorly drained into the Petitot River. The major field problem encountered during the project was a result of the weather, when heavy snows prior to freeze-up created a thick insulating blanket and prevented the ground from freezing completely. This particularly affected the progress of the bulldozers.

SURFACE GEOLOGY:

The surface is covered by glacial and alluvial deposits ranging in thickness from 25 feet to 300 feet or more. This is underlain by beds of Cretaceous age.

FIELD OPERATIONS:

Headquarters

Field operations were carried out from a trailer camp.

Surveying

Vertical and horizontal survey control was obtained from:

- British Columbia Triangulation Stations
- Boundary Monuments - British Columbia-Northwest Territories
- Well head locations and elevations.

The survey was run using Wilde T₁ theodolites. All traverses were tied by either closing loops, running back to the take-off point or tying one of the above-mentioned control points. All ties, vertical and horizontal, were within accepted limits.

Drilling

Two Sewell auger drills were used for shothole drilling. In addition a Mayhew 1000 was used where gravel conditions required a heavier drill, particularly near the Petitot River. Normally three hole patterns were drilled to a depth of 50 feet at each shot point location.

Recording

Recording equipment consisted of standard Century instruments supplemented by a magnetic recording unit. Amplifiers were Century Model 501A having an input impedance of 250 ohms. The camera was a Century 24 trace oscillograph. 20 cycle geophones per trace were used. Cables were one-half mile in length with thirteen stations at 220-foot intervals.

The normal spread layout was as follows:

- a) shot point interval 2640 feet
- b) number of holes - 3
- c) geophone station interval - 220 feet

Holes were preloaded using a normal charge size of 5/8 pound per hole.

Bulldozing

Two bulldozers, one D-6 and one D-7, were employed in cutting seismic line. Their progress was continually hampered by the lack of frost in the ground.

COMPUTATIONS

Elevation Correction

All results were corrected to a datum plane of +2000 feet above sea level using a correction velocity of 10,000 feet per second.

Weathering Corrections

The weathering replacement correction was determined in the following manner:

Surface to surface first arrival times were plotted for each shotpoint. Lines were then drawn through the plotted points to measure the observed velocities. The low velocity surface layer, estimated at approximately 2000 feet/sec., was never observed, and it was assumed that all charges were shot below this layer. An intermediate velocity, V_1 , of about 6000 feet/sec. was the initial velocity observed. The top of the high velocity layer, V_2 , was assumed to be the base of the weathered zone. V_2 approximated 10,000 feet/sec., and resulted in an intercept at the shotpoint, t_2 , which was assumed to be approximately equal to the two way time through the weathering. Since, according to these intercepts, the

charge was never located below the base of the weathered zone,
the computation was made as follows: -

$$Wc = -(Tu - \frac{Ds}{Vc}) - K \frac{(t_2 - 2Tu)}{2}$$

where

- Wc = weathering replacement correction
- Tu = uphole time
- Ds = Depth of shot
- Vc = replacement velocity (10,000 feet/sec.)
- t₂ = V₂ intercept

$$K = \sqrt{\frac{V_2 - V_1}{V_2 + V_1}}$$

K was computed separately for each shotpoint and varied from
.4 to .6.

Occasionally there were indications of an additional
velocity of about 8000 feet/sec. occurring between V₁ and V₂,
but only rarely did it appear to be thick enough to assume
validity as a separate velocity zone.

MAPS

Maps submitted with this report include:

- 1) Elevation
- 2) Devonian Carlson
- 3) Devonian Tetcho

TROUT LAKE AREA - AEROMAGNETIC SURVEY

The accompanying aeromagnetic total intensity maps of Permits 474, 475, 476 and the surrounding area were purchased by Shell Oil Company of Canada, Limited from Spartan Air Services Limited, Ottawa. These maps cover the area 60°00' to 60°30' and 120°00' to 123°00', an area of approximately 2.3 million acres.

This work was carried out by Spartan during the spring and fall of 1959. Flight lines were mainly east-west at a mean spacing of 5,280 feet. This mean flight altitude was 4,000 feet.

TROUT LAKE AREA - GEOLOGICAL SURFACE MAPPING

A small amount of geological surface mapping was done in the Trout Lake area in the summer of 1960. Complete results of this work will soon be submitted to you along with maps, as part of our combined Beaver River, Liard River, Trout Lake surface mapping report.

Prepared by Northern Division Geophysical
staff, J. Hamilton, Division Geophysicist,
under the supervision of B.M. Veilleux,
Northern Division Exploration Manager,
Shell Oil Company of Canada, Limited,
October, 1961

ENCLOSURES

JEAN MARIE RIVER & TETCHO LAKE AREAS

Jean Marie River & Tetcho Lake Areas, N.W.T.-Topography
" " " " " " -Top Mississippian
" " " " " " -Devonian Carlson

TROUT LAKE AREA

Trout Lake Area - Top Mississippian (2 parts)
" " " - Tetcho Lime (2 parts)
" " " - Surface Elevation
" " " - Devonian Carlson
" " " - Devonian Tetcho

Aeromagnetic Total Intensity Maps -
N.E. B.C. & N.W.T., Grids 7, 8 & 9

Abstracted for
Geo-Science Data Index

Date _____



37-6-4-19

Shell

FILE-TEX
DOCUMENT EXPANDING
WALLET No. 555V

FULL DEPTH POCKET
FIVE PIECE—OPEN SIDE—COVER FLAP
WITH LOCK GRIP FASTENER—CAN. PAT. NO. 212663

Size	Capacity	1'	2'	3'	4'	5'
4' x 9 1/4'	No.	501V	502V	503V	504V	505V
4 1/2' x 10 1/2'	"	511V	512V	513V	514V	515V
5' x 11 1/4'	"	521V	522V	523V	524V	525V
7' x 10 1/4'	"	531V	532V	533V	534V	535V
9 1/2' x 11 1/4'	"	541V	542V	543V	544V	545V
9 1/2' x 14 1/4'	"	551V	552V	553V	554V	555V
10' x 16'	"	561V	562V	563V	564V	565V

Made in All Sizes

Any Printing Desired

MacMILLAN OFFICE APPLIANCES CO., LIMITED
309 Athlone Ave., Ottawa, Can.

Manufacturers of Office and Library
Filing Supplies—Loose Leaf Devices, etc.

COMPREHENSIVE SUMMARY OF WORK DONE ^{Date}
ON TETCHO LAKE AND JEAN MARIE AREA, NORTHWEST TERRITORIES

Permits #3026, 3027, #890, #891 and #901

In compliance with Section 45 of the Canada Oil and Gas Land Regulations the following is reported in respect to the captioned permits which are grouped for exploratory work.

Shell Oil Company of Canada, Limited did approximately three and one half months of seismic exploration on the Tetcho Lake and Jean Marie permits and adjoining area during the winter of 1961. The work was done under contract by General Geophysical Company during the months of January, February, March and April. The camp was moved into the permit area from the Trout Lake block, the tracked vehicles from Mile 60 on the Simpson Trail and the bulldozers from Edmonton. Accessibility to the subject area during the winter is possible via the Simpson Trail from Fort Nelson, B.C. and a previously cut line to the Imperial Island River well. A second access road was cut from the northern part of the area to a point on the Simpson trail approximately four miles south of Cormack Lake. Both the Nelson and the Petitot Rivers were spanned by ice bridges. In addition the area has several lakes that can accomodate ski-equipped aircraft.

Due to an early heavy snowfall in November and exceptionally mild winter there was almost no frost penetration into the muskeg. This factor greatly hampered bulldozing operations and forced us into many inconvenient and costly changes of program. A smaller D-4 caterpillar was brought in for snow ploughing to aid frost penetration into muskeg so that heavier equipment could be moved over the trails. These soft conditions retarded progress generally and to complete the minimum coverage we were obliged to bring in two more tracked drills from Edmonton and one more D-7 caterpillar from Fort Nelson. In addition the program had to be extended into spring break-up. For the last three weeks of the operations aircraft were chartered to fly in supplies and bring out records and personnel as the trails were impassible for vehicles.

Drilling of shot holes was extremely difficult in parts of the program area due to the presence of hard layers of sandstones, gravel and boulders near the surface.

The enclosed maps which form part of this report show the shot point locations and elevations and isotime contours and the "Top Devonian Tetcho" reflector.

Expenditures incurred in the performance of the above outlined exploration program are as follows:

Tetcho Lake AreaSeismic

Materials	\$ 12,397.88	Cost of materials used in conducting seismic activity such as drilling bits, bran, mud and explosives.
Contract Work	115,950.48	Payments to contractor for seismic services, drilling and catering services.
Transportation	14,718.93	Cost of transporting personnel, equipment and supplies from headquarters to location of exploration activity and back.
Bulldozing	48,834.61	Payments to contractor for cutting excess trails and cutting and clearing seismic lines.
Surveying	440.17	Cost of additional surveying service required in addition to normal surveying staff supplied by seismic crew.
Office administration and Supervision	57,702.62	Allocation of office administration and supervision expense in proportion that overhead bears to total direct expense.
	<hr/>	
	<u>\$ 250,044.69</u>	

Jean Marie AreaSeismic

Materials	4,724.76	Payments made for materials used in conducting seismic exploration, drilling bits, mud and explosives, etc.
Contract Work	47,763.37	Payments to contractor for services re seismic exploration, drilling and catering service.
Transportation	2,305.20	Cost of transporting personnel, equipment and supplies from headquarters to prospect and back.
Bulldozing	25,463.89	Cost of cutting excess trails and cutting and clearing of seismic lines.

Surveying

\$ 114,78

Cost of additional surveying service
required in addition to normal survey-
ing supplied by seismic crew.

Office administration and
Supervision

24,111.60

Office administration and supervision
expense allocated in proportion that
overhead bears to total direct expense.

\$ 104,483.60

B. M. Veilleux

B. M. Veilleux
Manager,
Northern Division Exploration

June 29, 1961

SHELL OIL COMPANY OF CANADA, LIMITED
STATEMENT OF DEPOSITS
COVERING PERMITS IN THE TETCHO LAKE AREA
NORTHWEST TERRITORIES AS OF APRIL 7TH 1961

Status of Deposits

<u>Crown Permits</u>	<u>Shell Res. #</u>	<u>Deposit Period</u>	<u>Acreage</u>	<u>Rate</u>	<u>Amount</u>
3026	479	Oct. 8th/59	62568	.05	3,128.40
3027	480	April 7/61	62244	.05	3,112.20
Deposit requirement for 1st 18 month period					<u>6,240.60</u>
This deposit satisfied by excess expenditures for master group #70 as per department letter dated Nov. 17th, 1960.					
3026	479	April 8th/61	62568	.25	15,642.00
3027	480	April 7/62	62244	.25	15,561.00
Deposit requirement for 1st years renewal					<u>31,203.00</u>
Above deposit satisfied by excess expenditures for master group #70 as per department letter dated March 21/1961.					
Balance of Excess expenditures for Master Group #70 as per Department Nth. Affairs and National Resources letter April 13/1961					1,255,158.03
Expenditures for the period Oct. 9/59 to April 30/61			250,044.69		
LESS: Amount required to reduce office administration and Supervision expense to 12.5% in accordance with Department of Northern Affairs and National Resources letter of February 10, 1960.					<u>33,659.86</u>
					216,384.83
Total allowable expenditures					<u>216,384.83</u>
Balance of Excess Expenditures					<u>1,471,542.86</u>
ADD: Allowable expenditures re Jean Marie River Area Submission as of April 30/61					<u>43,897.50</u>
Balance of excess expenditures on Master Group #70					<u>\$1,515,440.36</u>

PRICE WATERHOUSE & Co.

444 SEVENTH AVENUE WEST

CALGARY, ALTA.

June 20, 1961

Chief, Resources Division,
Northern Administration Branch,
Department of Northern Affairs and
National Resources,
Ottawa, Ontario.

We have examined the attached statement of exploration expenditures aggregating \$250,044.69 for the period January 1, 1961 to April 30, 1961 incurred by Shell Oil Company of Canada, Limited for exploration work in the Northwest Territories of Canada in respect of areas covered by Petroleum and Natural Gas Permits Nos. 3026 and 3027. Our examination included such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

Expenditures are included for work of a general exploratory nature carried on outside the permit areas and deemed by the company to be applicable to the permit areas under section 21 of the Canada Oil and Gas Regulations.

In our opinion the expenditures made by the company and shown on the attached statement are applicable (subject to the reference to off-permit expenditures in the preceding paragraph) to the permits in the Northwest Territories of Canada listed above according to the information and explanations given to us and as shown by the books and records of the company.

Price Waterhouse & Co.

Chartered Accountants

SHELL OIL COMPANY OF CANADA, LIMITED

STATEMENT OF EXPLORATION EXPENDITURES INCURRED
IN THE NORTHWEST TERRITORIES OF CANADA
FOR THE PERIOD JANUARY 1, 1961 TO APRIL 30, 1961
IN RESPECT OF PETROLEUM AND NATURAL GAS PERMITS
NOS. 3026 AND 3027

Tetcho Lake AreaSeismic

Materials	\$ 12,397.88	
Contract work	115,950.48	
Transportation	14,718.93	
Bulldozing	48,834.61	
Surveying	440.17	
	<u>440.17</u>	\$192,342.07

Office administration and supervision

Allocated in the proportion that overhead expenses bear to total direct exploration and production expenditures on all operations in Western Canada for the nine years ended December 31, 1960

57,702.62

Exploration expenditures for the period

\$250,044.69

Submitted with our report to the Chief,
Resources Division, Department of
Northern Affairs and National Resources,
Government of Canada, dated June 20,
1961.

Pric Waterhouse & Co.
Chartered Accountants

SHELL OIL COMPANY OF CANADA, LIMITED
STATEMENT OF DEPOSITS
COVERING PERMITS IN THE JEAN MARIE RIVER AREA
NORTHWEST TERRITORIES AS OF SEPTEMBER 26TH, 1961

Status of Deposits

<u>Crown</u> <u>Permits</u>	<u>Shell</u> <u>Res. #</u>	<u>Deposit Period</u>	<u>Acreage</u>	<u>Rate</u>	<u>Amount</u>
890	497	Sept.27/60 Sept.26/61	61920	25¢	15,480.00
891	498	" "	61920	25¢	15,480.00
901	499	" "	62244	25¢	15,561.00
Deposit requirement for 1st year renewal term)					<u>46,521.00</u>
Balance is refundable)					
Balance of Excess expenditures for Master Group #70 as per Department of Northern Affairs & National Resources letter of April 30/61					1,255,158.03
Expenditures for the period Sept. 27/60 to April 30/61					104,483.60
LESS: Amount required to reduce Office Administration and Supervision expense to 12.5% in accordance with Department of Northern Affairs and National Resources letter of Feb. 10/1960					<u>14,065.10</u>
Total Allowable Expenditures					90,418.50
Refundable deposit claimed (See above)					<u>46,521.00</u>
Additional excess expenditures					43,897.50
ADD: Allowable expenditures re Tetcho Lake Area submission as of April 30/61					<u>216,384.83</u>
Balance of excess expenditures on Master Group #70					<u>\$1,515,440.36</u>

PRICE WATERHOUSE & Co.

44 SEVENTH AVENUE WEST

CALGARY, ALTA.

June 20, 1961

Chief, Resources Division,
Northern Administration Branch,
Department of Northern Affairs and
National Resources,
Ottawa, Ontario.

We have examined the attached statement of exploration expenditures aggregating \$104,483.60 for the period February 1, 1961 to April 30, 1961 incurred by Shell Oil Company of Canada, Limited for exploration work in the Northwest Territories of Canada in respect of areas covered by Petroleum and Natural Gas Permits Nos. 890, 891 and 901. Our examination included such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

Expenditures are included for work of a general exploratory nature carried on outside the permit areas and deemed by the company to be applicable to the permit areas under section 21 of the Canada Oil and Gas Regulations.

In our opinion the expenditures made by the company and shown on the attached statement are applicable (subject to the reference to off-permit expenditures in the preceding paragraph) to the permits in the Northwest Territories of Canada listed above according to the information and explanations given to us and as shown by the books and records of the company.

Price Waterhouse & Co.
Chartered Accountants

SHELL OIL COMPANY OF CANADA, LIMITED

STATEMENT OF EXPLORATION EXPENDITURES
INCURRED IN THE NORTHWEST TERRITORIES OF CANADA
FOR THE PERIOD FEBRUARY 1, 1961 TO APRIL 30, 1961
IN RESPECT OF PETROLEUM AND NATURAL GAS PERMITS
NOS. 890, 891 AND 901

Jean Marie River AreaSeismicMaterials

Contract work

Transportation

Bulldozing

Surveying

\$ 4,724.76

47,763.37

2,305.20

25,463.89

114.78

\$ 80,372.00

Office administration and supervision

Allocated in the proportion that overhead expenses bear to total direct exploration and production expenditures on all operations in Western Canada for the nine years ended December 31, 1960

24,111.60

Exploration expenditures for the period

\$104,483.60

Submitted with our report to the Chief, Resources Division,
 Department of Northern Affairs and National Resources,
 Government of Canada, dated June 20, 1961.

Pier Waterhouse & Co.

Chartered Accountants

COMPREHENSIVE SUMMARY OF WORK DONE
ON TETCHO LAKE AND JEAN MARIE AREA, NORTHWEST TERRITORIES

Permits #3026, 3027, #890, #891 and #901

In compliance with Section 45 of the Canada Oil and Gas Land Regulations the following is reported in respect to the captioned permits which are grouped for exploratory work.

Shell Oil Company of Canada, Limited did approximately three and one half months of seismic exploration on the Tetcho Lake and Jean Marie permits and adjoining area during the winter of 1961. The work was done under contract by General Geophysical Company during the months of January, February, March and April. The camp was moved into the permit area from the Trout Lake block, the tracked vehicles from Mile 60 on the Simpson Trail and the bulldozers from Edmonton. Accessibility to the subject area during the winter is possible via the Simpson Trail from Fort Nelson, B.C. and a previously cut line to the Imperial Island River well. A second access road was cut from the northern part of the area to a point on the Simpson trail approximately four miles south of Cormack Lake. Both the Nelson and the Petitot Rivers were spanned by ice bridges. In addition the area has several lakes that can accomodate ski-equipped aircraft.

Due to an early heavy snowfall in November and exceptionally mild winter there was almost no frost penetration into the muskeg. This factor greatly hampered bulldozing operations and forced us into many inconvenient and costly changes of program. A smaller D-4 caterpillar was brought in for snow ploughing to aid frost penetration into muskeg so that heavier equipment could be moved over the trails. These soft conditions retarded progress generally and to complete the minimum coverage we were obliged to bring in two more tracked drills from Edmonton and one more D-7 caterpillar from Fort Nelson. In addition the program had to be extended into spring break-up. For the last three weeks of the operations aircraft were chartered to fly in supplies and bring out records and personnel as the trails were impassible for vehicles.

Drilling of shot holes was extremely difficult in parts of the program area due to the presence of hard layers of sandstones, gravel and boulders near the surface.

The enclosed maps which form part of this report show the shot point locations and elevations and isotime contours and the "Top Devonian Tetcho" reflector.

Expenditures incurred in the performance of the above outlined exploration program are as follows:

Tetcho Lake AreaSeismic

Materials	\$ 12,397.88	Cost of materials used in conducting seismic activity such as drilling bits, bran, mud and explosives.
Contract Work	115,950.48	Payments to contractor for seismic services, drilling and catering services.
Transportation	14,718.93	Cost of transporting personnel, equipment and supplies from headquarters to location of exploration activity and back.
Bulldozing	48,834.61	Payments to contractor for cutting excess trails and cutting and clearing seismic lines.
Surveying	440.17	Cost of additional surveying service required in addition to normal surveying staff supplied by seismic crew.
Office administration and Supervision	57,702.62	Allocation of office administration and supervision expense in proportion that overhead bears to total direct expense.

\$ 250,044.69

Jean Marie AreaSeismic

Materials	4,724.76	Payments made for materials used in conducting seismic exploration, drilling bits, mud and explosives, etc.
Contract Work	47,763.37	Payments to contractor for services re seismic exploration, drilling and catering service.
Transportation	2,305.20	Cost of transporting personnel, equipment and supplies from headquarters to prospect and back.
Bulldozing	25,463.89	Cost of cutting excess trails and cutting and clearing of seismic lines.

Surveying

\$ 114.78

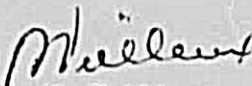
Cost of additional surveying service required in addition to normal surveying supplied by seismic crew.

Office administration and
Supervision

24,111.60

Office administration and supervision expense allocated in proportion that overhead bears to total direct expense.

\$ 104,483.60



B. M. Veilleux
Manager,

Northern Division Exploration

June 29, 1961