ADDENDUM TO

REFLECTION SEISMOGRAPH SURVEY

OF THE

LIARD RIVER AREA N.W.T.

FOR

MURPHY OIL COMPANY LTD.

FEBRUARY ~~MARCH~~ 1962

GENERAL GEOPHYSICAL COMPANY

PARTY 26

CLIENT:

MURPHY OIL COMPANY LTD.

AREA AND PROSPECT:

LIARD RIVER AREA
NORTHWEST TERRITORIES
PERMIT NUMBERS 1034, 1035, 1045, 1046, 3172.

LOCATION:

APPROXIMATELY 190 MILES NORTH OF
FORT NELSON, B.C.
IN THE NORTHWEST TERRITORIES
BETWEEN LATITUDE 60° 45' AND 61° 05'
AND LONGITUDE 122° 00' AND 122° 45'

DATE OF SURVEY:

FROM FEBRUARY 5, 1962 TO APRIL 1, 1962

EXTENT OF SURVEY:

MILES OF TRAVERSE:	156
NUMBER OF REFLECTION PROFILES	625
NUMBER OF WEATHERING SHOTS	578

FIELD CONDITIONS:

The 1962 program is closely connected with the surveys conducted during 1959 to 1961. The lines surveyed during the 1962 period are within the boundaries of the former survey, except for the lines within permit number 3172, which borders the northern edge of permit number 1034.

Topography:

Rough topography is apparent in the northern part of the prospect, where the Blackstone River crosses the area in a northwesterly direction.

Weather:

Temperatures were normal for the time of the year. A thick blanket of snow covered the area, in some places preventing the muskeg from freezing. Heavy snowfalls with drifting were experienced.

Equipment:

Dozing:

The dozing of the seismic lines was carried out by J. Richardson Construction of Bowden, Alberta.
D-7 Caterpillars and TD-14 International dozers were used on the job.
A D-7 Caterpillar of Pembina Construction was also temporarily employed.

Camp:

A camp mounted on skids was used. Camp moves were carried out with the aid of the dozers.

Vehicles:

Vehicles employed on the job were:

1 Bombardier Muskeg Tractor Recorder

1 Bombardier Muskeg Tractor Reel Unit

1 Bombardier Muskeg Tractor Shooting Unit

2 Bombardier Muskeg Tractor Sewell Auger Drills

2 Conventional Wheel Watertrucks

1 3/4 ton Panel Truck

1 1/2 ton Survey Pick Up

1 Fuel Sleigh

Supplies were trucked in from Fort Nelson.

No crew changes were made during the time of the survey.

DRILLING:

The same drilling procedures as used during the earlier surveys were followed. Identical formations were encountered. Several holes in the northern part of the area showed sand and gravel.

RECORDING:

To tie the 1962 survey to the surveys conducted in former years, the same recording procedures were followed.

Monitor records and magnetic tapes were simultaneously recorded in the S-1-25-180 filter setting. No magnetic tapes were used on the weathering shots. Mixed field playbacks made were not used for interpretation.

General Geophysical Company J.M. amplifiers and "P" type seismometers were used in conjunction with a Geocord Magnetic Tape Recorder, using Techno type tapes.

SURVEYING:

The topographical survey was carried out with a Wild T-2 Theodolite. Horizontal and vertical survey was tied to existing lines, loop closures were calculated and ties proved to be within the usual limits.
Misties of approximately 10 feet were found by tying into line 26-15, which made it necessary to raise the elevations on this line by ten feet. Adjusted elevations, together with elevations obtained during this years survey were put on a topographical map.

OFFICE PROCEDURE:

Weathering Corrections:

The same rectilinear subshot method for computation of delay times was used as in the 1959 to 1961 surveys. Datum, as formerly established at 1500 feet above sea level, was used and elevations corrected to this datum using a correcting velocity of 10 000 feet per second.

Geopac Sections:

Specimen tapes for each shotpoint were processed through General Geophysical Company's Geopac into flattened Isotime Record Sections.
As the Third Lime (Island River) reflection seemed continous, this horizon was chosen as a flattener for the eastern portion of the area. To the west, where a possible shaling-out of this horizon occurs, the flattening of this reflection became impractical. Therefore, the reflection from the Top of Devonian and the possible Hay River Lime reflection were used for further flattening purposes. The Delta t was removed and the respective horizon flattened to a heavy timing line in all instances.
The first playback filter chosen for the processing of the Geopac sections was the S-1-25-75 filter, later this filter was changed to a flat response amplifier.

When the record quality deteriorated in the western part of the area, more filtering than the flat amplifier was needed, and the remainder of the sections were run in the 13-75 filter setting. As this filter has a 180 degree Phase shift the polarity was reversed on these sections to make them correspond to the other sections made. All playback filters are indicated on the Geopac sections.

The flattening horizon corrected for elevation and weatherings on the monitor records, was point plotted at the base of the record sections for structural values. The isotimes taken from the Geopac sections were then added to these values for the structural values of additional horizons mapped.

An instrument correction of plus .006 seconds was applied to the current work to make it fit the former surveys.

The colour code used on the Geopac Sections is as follows:

Orange ..... Top of Devonian
Yellow ..... Possible Hay River Lime
Blue ..... Third Lime (Island River)
Green ..... Second leg of Third Lime
Red ..... Slave Point
Brown ..... Pre Devonian

Geopac sections were also made of several lines of the 1959 - 1960 surveys.

RESULTS:

Purpose of survey:

The purpose of this survey was a continuation of the reconnaissance survey conducted during 1959 to 1961 with special emphasis on the Slave Point horizon and possible reef build ups, also to conduct a more detailed survey in any part of the area showing promising features.

General Quality of Records:

Record quality in the eastern part of the area may be considered as fair to good with the exception of some points in the north, where the topography is rough and sand and gravel reached the surface.

In the western part of the area record quality may generally be considered as poor.

Reflections observed:

The reflection coming from the Top of Devonian shows fair continuity and character. In the northern part of the area this reflection is absent due to the near surface occurrence of the horizon.

The Third Lime (Island River) reflection has good character and continuity in the eastern and northern part of the area. In the western part, where a possible shaling-out of this horizon occurs, the reflection is absent.

The Slave Point reflection is of generally good character and continuity over the entire area.

In addition to the three main reflections mentioned above, the Hay River Lime or Second Lime reflection was observed and used as a guide where the Third Lime reflection was of poor quality.

The reflection from the Pre Devonian section was of variable character. This reflection was used as a guide for the Slave Point horizon in places where reef build-up seemed likely.

Horizons mapped:

Structural maps in two-way time were made of the following horizons:

Possible Top of Devonian

Third Lime (Island River)

Slave Point

In addition isotime maps in two-way time were constructed for the intervals:

Top of Devonian to Third Lime (Island River)

Third Lime (Island River) to Slave Point

All values of the 1959 to 1961 surveys were incorporated in all new maps made.

In view of the greater dips displayed and the smallness of some of the features, it seemed advisable to construct the Slave Point structural map and the isotime map Third Lime to Slave Point with a scale of two inches to one mile. All other maps were made in the one inch to one mile scale.

INTERPRETATION:

General:

No significant changes from the 1959-1961 surveys were noted on the upper horizons.

A tentative small fault, mapped on the weathering plots and indicated on all maps by low points, but not clearly seen on the records, was placed on all maps between lines 26-A and 26-B south of line 26-15.

Structural Map, Top of Devonian,

Isotime Map, Top of Devonian to Third Lime (Island River)

A line of demarcation of rate of dip from shotpoint 26-A-45 to the intersection of lines 26-7 and 26-EE indicates an erosional surface towards the northwest. Immediately south of this line a Thick area exists, and erratic thinning towards the southeast is shown.

The horizon could not be mapped within permit number 3172, as the reflection became too shallow to be recorded.

Structural Map, Third Lime (Island River)

All tentative faults mapped in the earlier survey were eliminated and the horizon mapped as straight dip.

An anticlinal nose is indicated immediately west of line 26-F with a southward plunge and small lateral extent. This anomaly does not exist above or below the Third Lime, but is restricted to this horizon.

The area of no reflection as shown on the 1959-1960 survey located within permit number 1046, has been mapped on the basis of phantom values established by linear contouring across this area.

Structural Map; Slave Point:

The faults shown on the previous work in permit number 1034 and 1035 were eliminated; in the western part of the area all previous mapped faults are still evident. All faults have a general northwest-southeast strike, except for the fault located between lines 26-I and 26-J which strikes almost due north-south. Throw is indicated Down to the south on the faults near shotpoints 26-10-104, 26-EE-30 and 26-I-39. All other faults have a throw which is Down to the north.

An upthrown block between two faults in the southwest corner of the prospect shows evidence of an anticline with a closure of approximately .050 seconds, which appears to close against this fault on the upthrown side.

Reinterpretation based on isotime sections made of the 1959-1960 survey indicated more vertical relief and a somewhat larger extent of the anticline on which Murphy E.O.C. Arrowhead River # 1 was drilled.

The 1962 survey indicated evidence of two anomalies, one approximately centered on shotpoint 26-BB-28, the other located between lines 26-10 and 26-11 and lines 26-D and 26-C.

Isotime Map; Third Lime (Island River) to Slave Point:

All faults shown on this map coincide with the faults displayed on the Slave Point horizon. All anomalies described above are confirmed by this map.

A Thick shown immediately west of line 26-F confirms the anticline featured on the Third Lime horizon.

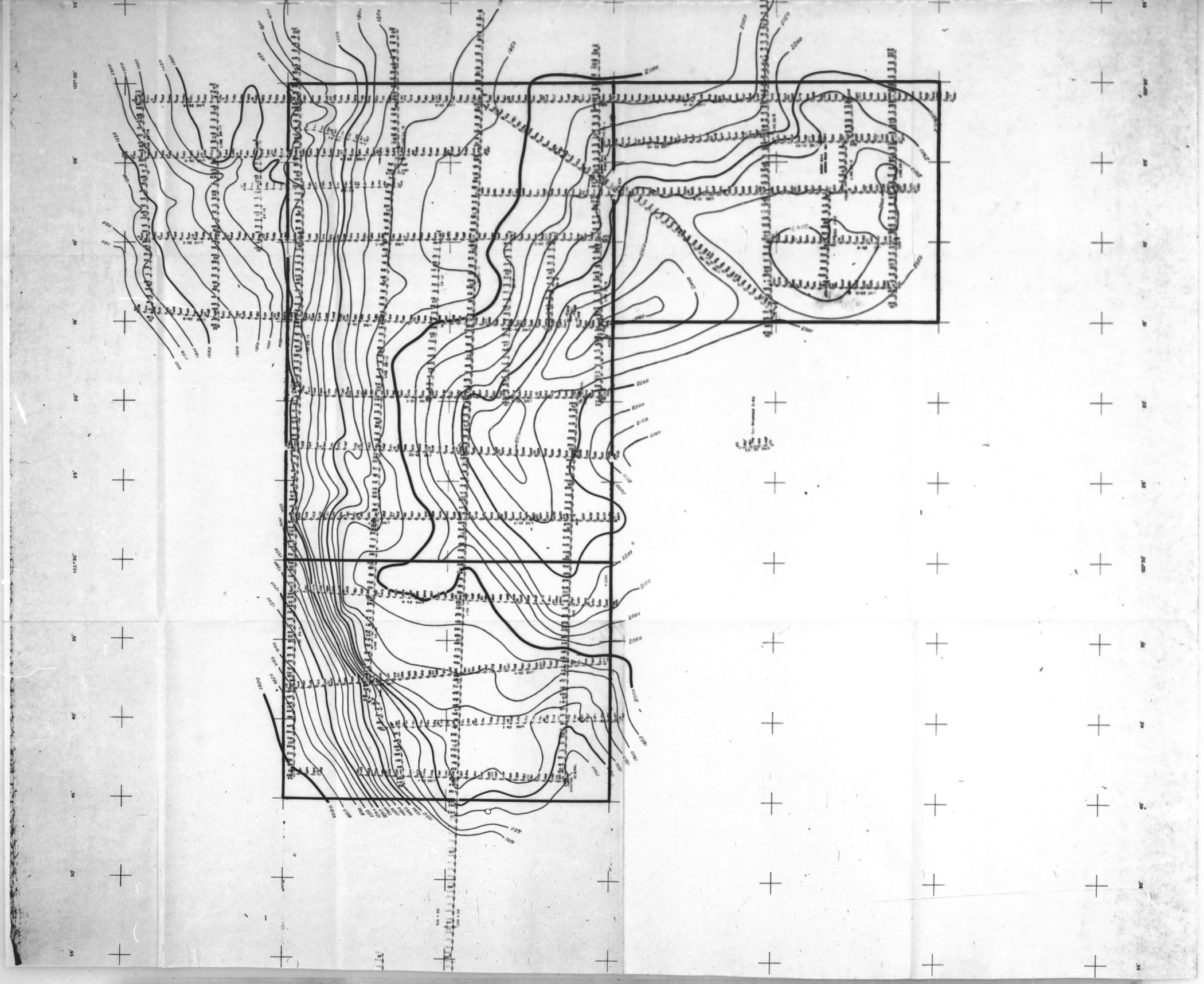
The area of no reflection shown on the former survey was mapped by phantom values derived by subtraction of the contoured values of the Third Lime from the values of the Slave Point horizon.

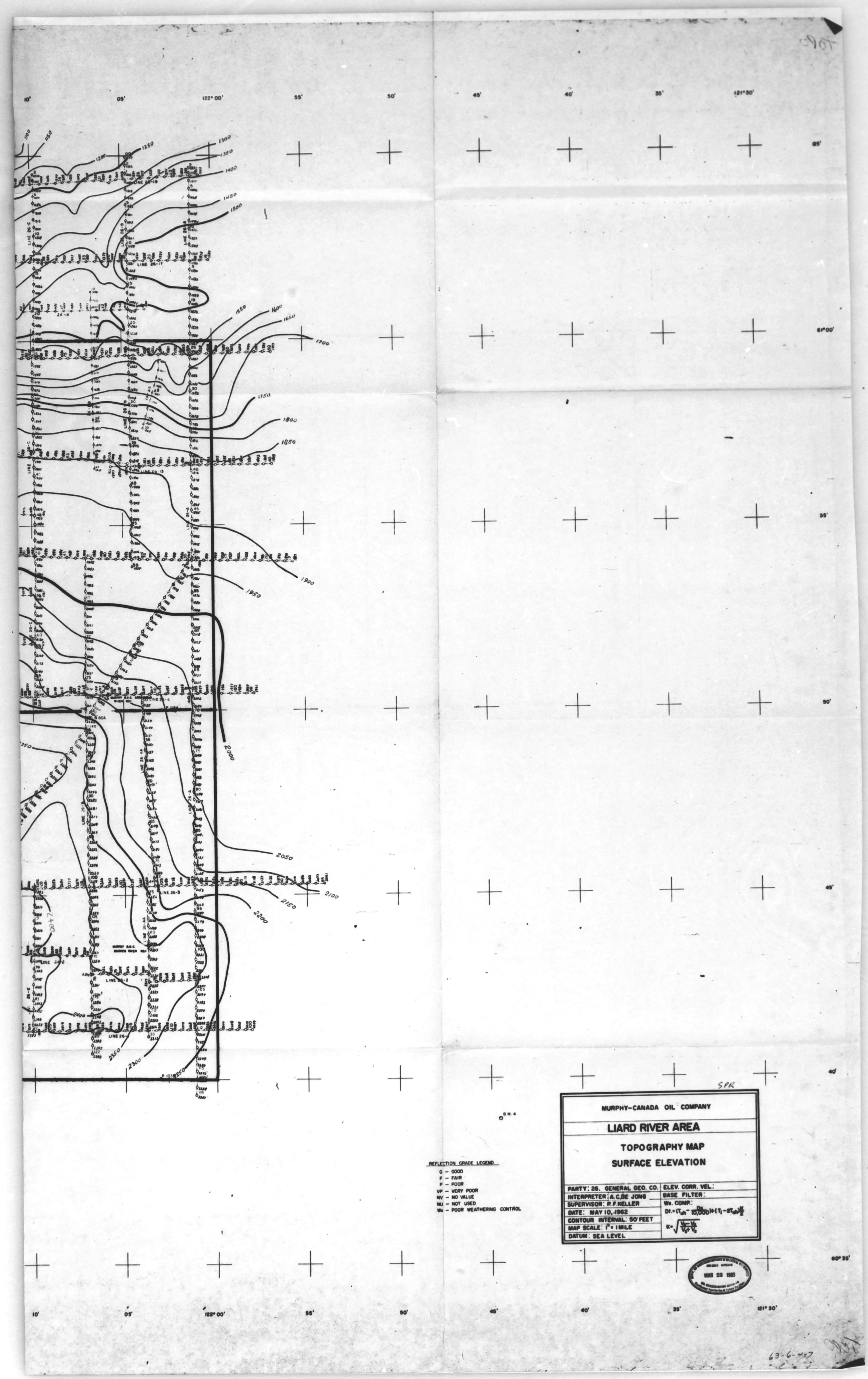
CONCLUSION:

The 1962 survey indicated the existence of reef build up south of Line 26-15 between lines 26-A and 26-C, between lines 26-C and 26-D within permit number 1034 and 1045, and in the southwest corner of the prospect within permit number 1046 as shown on the isotime map of Third Lime to Slave Point.

Party Chief
A.C. de Jong

Supervisor
R.F. Keller




MURPHY-CANADA OIL COMPANY
LIARD RIVER AREA
TOPOGRAPHY MAP
SURFACE ELEVATION
PARTY: 26. GENERAL GEO. CO.
INTERPRETER: A.C.DE JONG
SUPERVISOR: R.F.KELLER
DATE: MAY 10, 1962
CONTOUR INTERVAL: 50 FEET
MAP SCALE: 1" = 1 MILE
DATUM: SEA LEVEL
ELEV. CORR. VEL.:
BASE FILTER:
Wx. COMP.:
REFLECTION GRADE LEGEND
G - GOOD
F - FAIR
P - POOR
VP - VERY POOR
NV - NO VALUE
NU - NOT USED
Wx - POOR WEATHERING CONTROL
B.M. 4
MAR 22 1963
10'
05'
122° 00'
55'
50'
45'
40'
35'
121° 30'
61° 00'
60° 35'
1250
1300
1350
1400
1450
1500
1550
1600
1650
1700
1750
1800
1850
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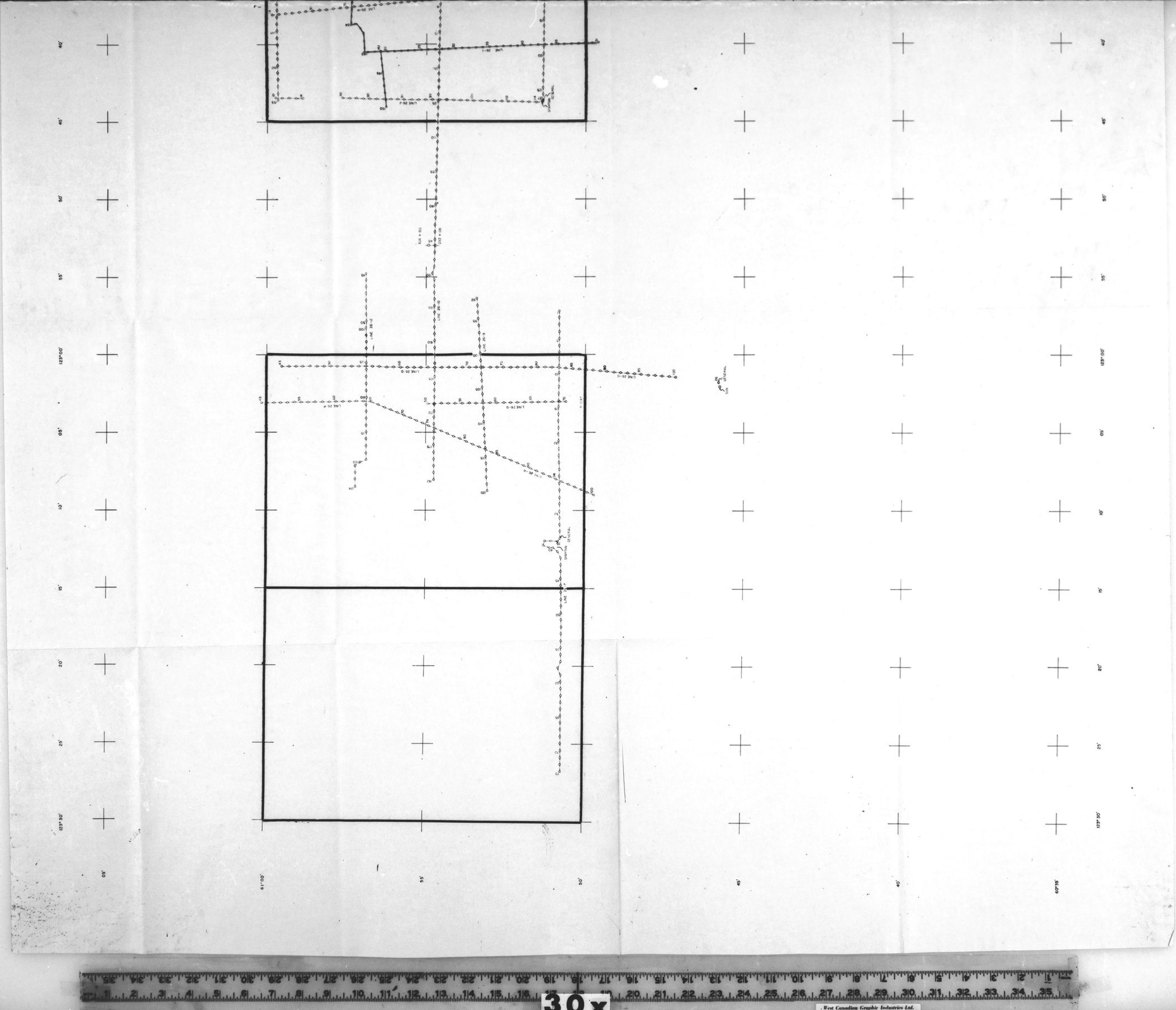

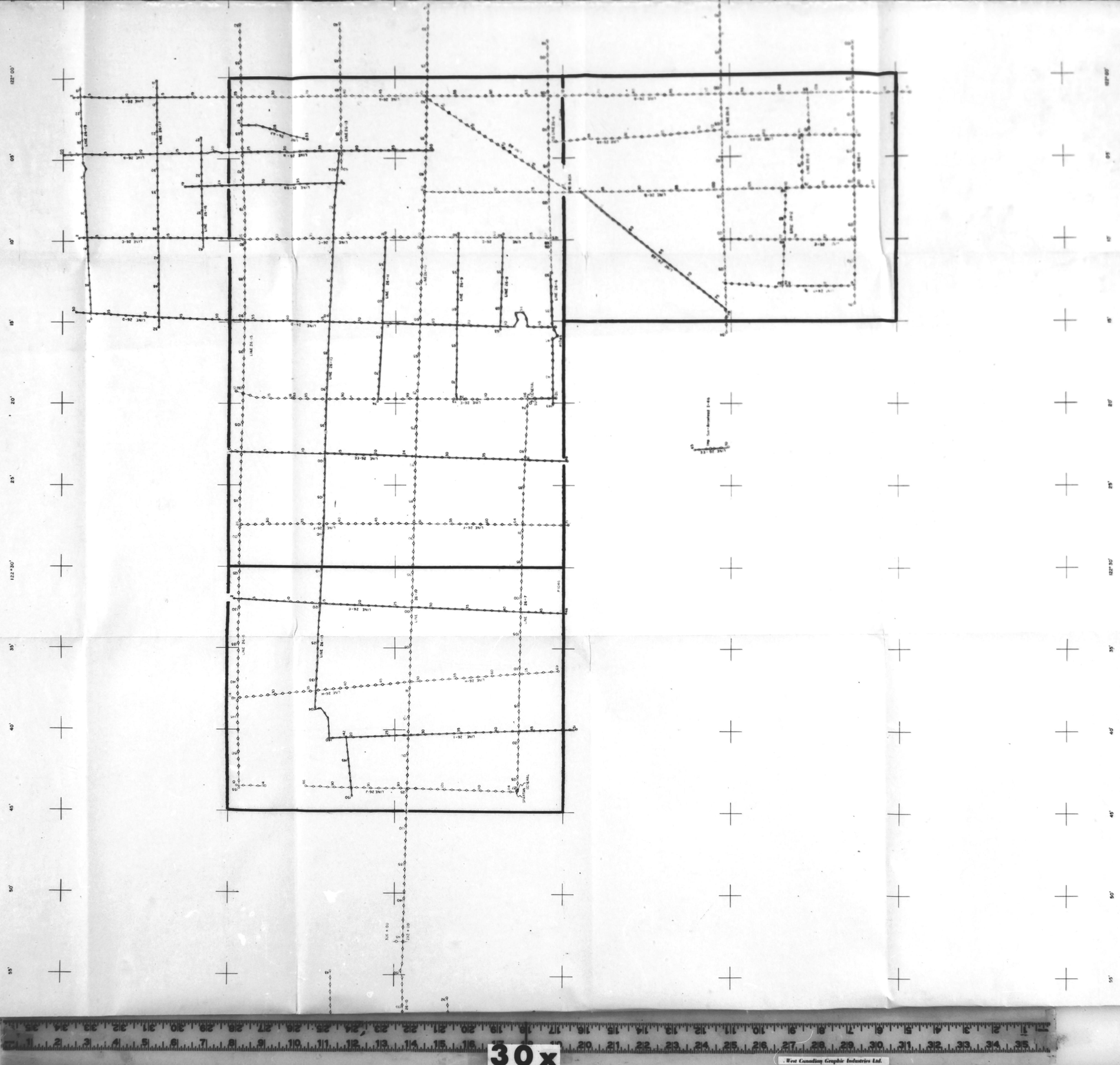

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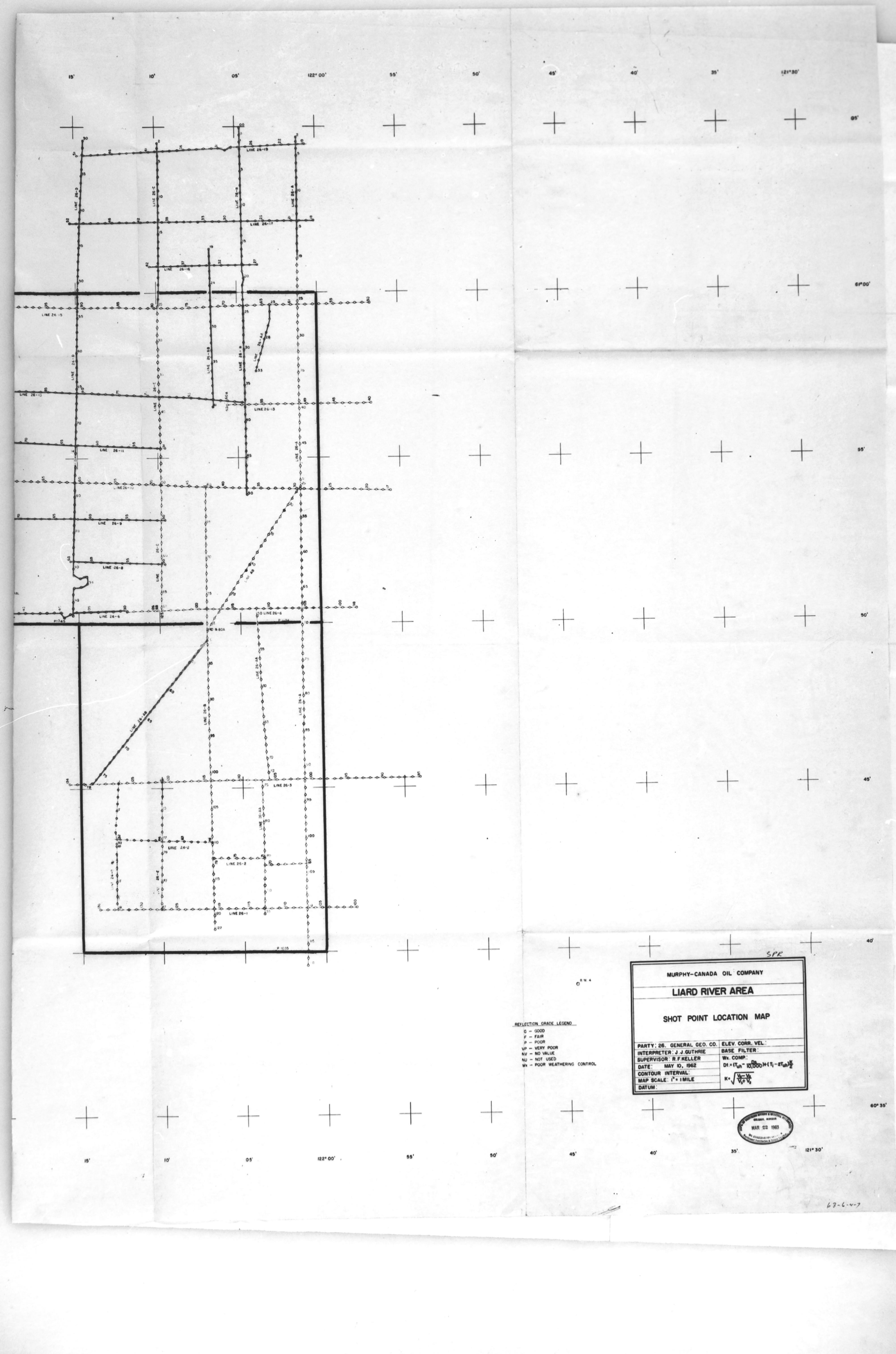
West Canadian Graphic Industries Ltd.



MURPHY-CANADA OIL COMPANY
LIARD RIVER AREA
SHOT POINT LOCATION MAP
PARTY: 26. GENERAL GEO. CO.
INTERPRETER: J.J.GUTHRIE
SUPERVISOR: R.F.KELLER
DATE: MAY 10, 1962
CONTOUR INTERVAL:
MAP SCALE: 1" = 1 MILE
DATUM:
ELEV. CORR. VEL.:
BASE FILTER:
Wx. COMP.:
REFLECTION GRADE LEGEND
G - GOOD
F - FAIR
P - POOR
VP - VERY POOR
NV - NO VALUE
NU - NOT USED
Wx - POOR WEATHERING CONTROL
B.M. 4
SPR
MAR 22 1963
15'
10'
05'
122° 00'
55'
50'
45'
40'
35'
121° 30'
61° 00'
60° 35'
63-6-4-7