

SEISMOGRAPH MAP
SURFACE ELEVATIONS
Contour Interval _____
Datum: Plane SEA LEVEL Velocity _____

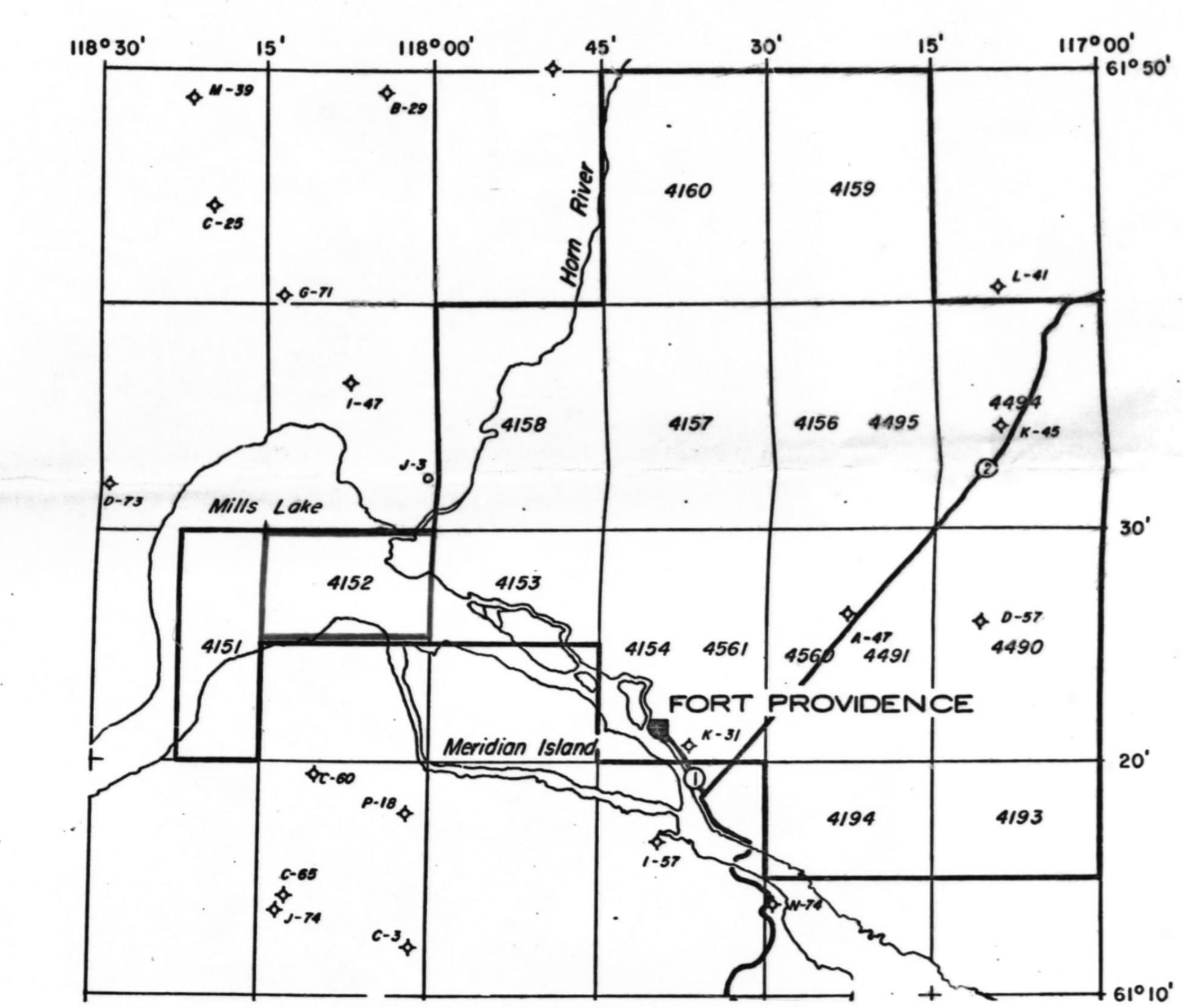
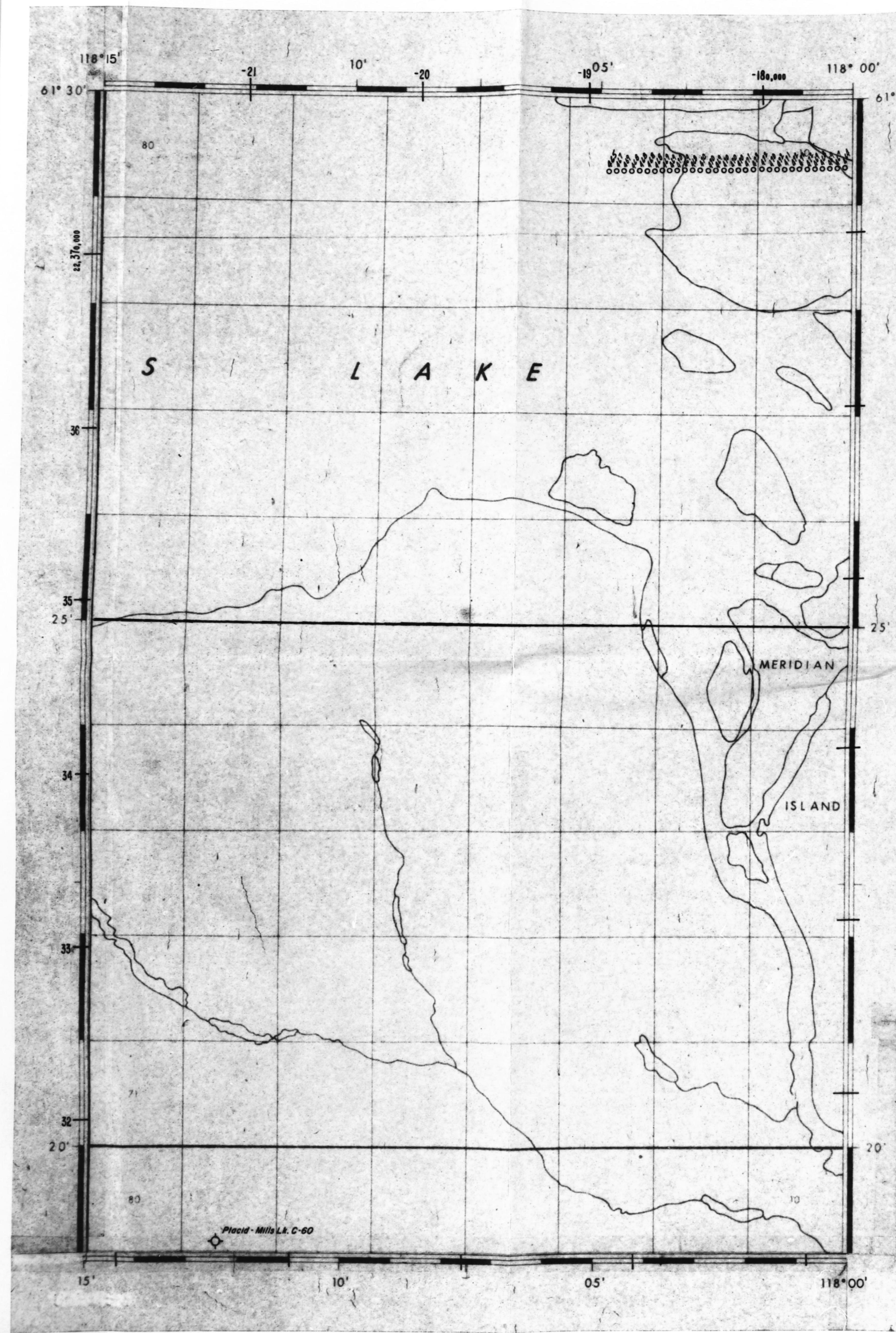
FALAISE LAKE 85 F - 13/12

SCALE 1: 50,000
1.25 inches to 1 mile approximately
Miles 1 2 3 4
Feet 5000 0 5000 10000 15000 20000

Seismic Revised
Values Revised
Contours Revised
Wells Revised

Gp 85F-13/12 4 V

2 of 2
PROPRIETARY



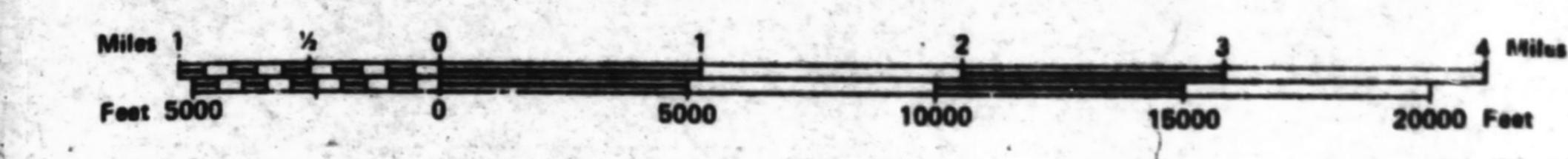
FORT PROVIDENCE AREA
IMPERIAL OIL ENTERPRISES LTD.

SCALE: 1:500,000

SURFACE ELEVATIONS
MILLS LAKE 85 E - 8/1

SCALE 1: 50,000

1.26 inches to 1 mile approximately



IMPERIAL OIL ENTERPRISES LTD.
Producing Department - Western Region
Report on Reflection Seismic Programs
Fort Providence N.W.T. Area

By: O. Friesen
November 16, 1970

Department Project Nos.: 7-6-4-69-1
7-6-4-69-10

7-6-4-90

IMPERIAL OIL ENTERPRISES LTD.
Producing Department - Western Region

Reflection Seismic Program

Ft. Providence Area

Permits: 4151, 4152, 4153, 4154, 4156, 4157,
4158, 4159, 4160, 4193, 4194, 4490, 4491, 4494,
4495, 4560, 4561

STAGE I: Ray Geophysical Co. Party 13
from January 31 to March 19, 1969

IOE P.W.O. No: A0001-23

Department Code No: 7-6-4-69-1

STAGE II: Teledyne Exploration Ltd. Party 16
from January 9 to February 17, 1970

IOE P.W.O. No: A080133

Department Code No: 7-6-4-69-10

Teledyne Exploration Ltd. Party 18
from January 7 to April 12, 1970

IOE P.W.O. No: A080133

Department Code No: 7-6-4-69-10

by

O. Friesen

Southern Exploration District
Edmonton, Alta

Date: November 16, 1970

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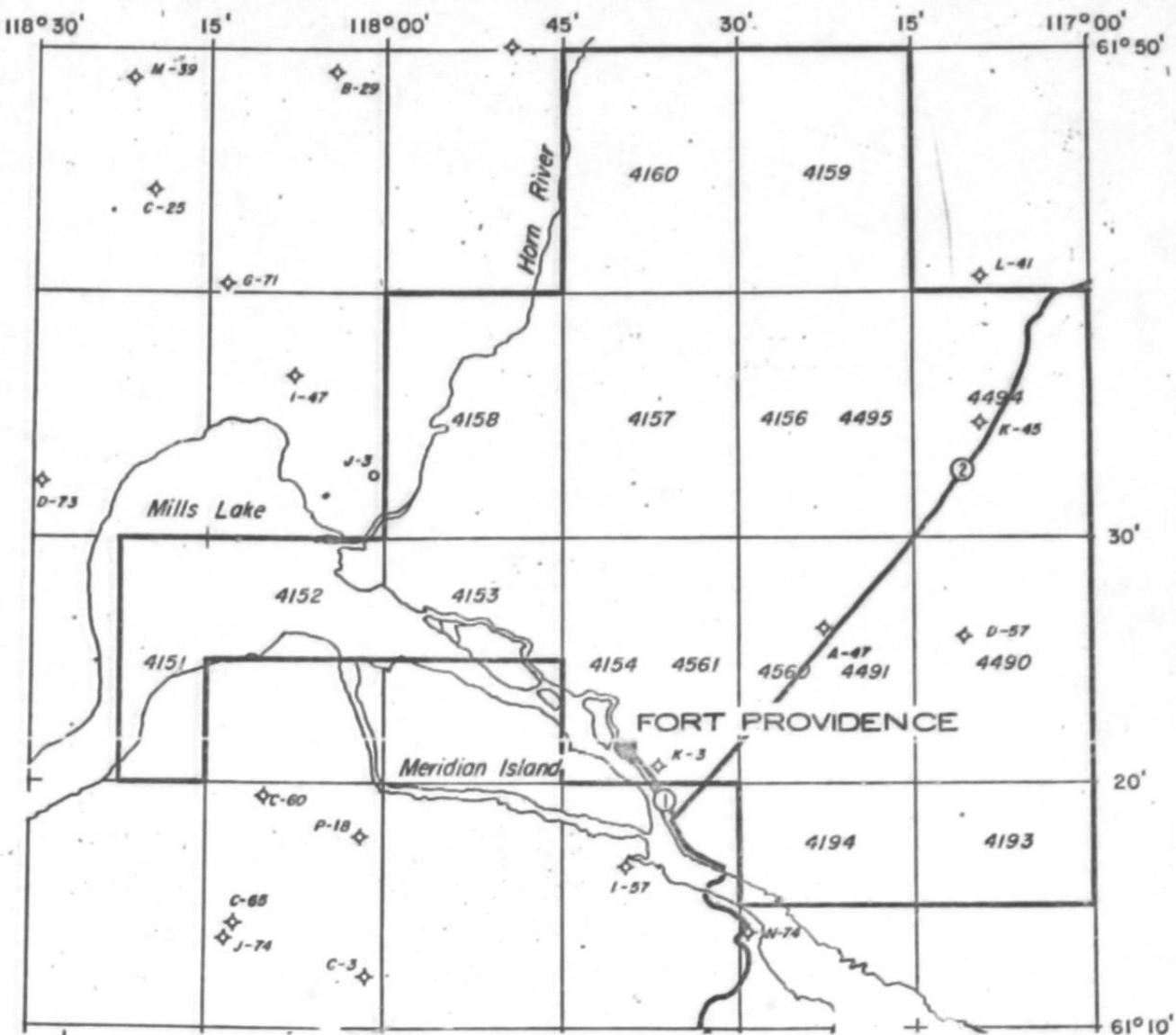
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Enclosures:	(in attached pocket)
1. Shot Point Locations and Elevations map	
2. Middle Devonian Carbonate Structure map	

Introduction

This is a report on seismograph operations conducted by Ray Geophysical Co., Party 13 on behalf of Imperial Oil Enterprises Ltd. in the Fort Providence area from January 31, 1969 to March 19, 1969.

Also included in this report is the seismograph operations of Teledyne Exploration Ltd. Party 16 from January 7 to February 17, 1970, and Teledyne Party 18 from January 7, 1970 to April 12, 1970.

While in the Fort Providence area, the Teledyne Parties 16 and 18 did some "off-permit" shooting as well, which is not included in this report but which was done within the dates shown above.



FORT PROVIDENCE AREA

IMPERIAL OIL ENTERPRISES LTD.

SCALE: 1:500,000

Statistical Data

Stage I - Ray Geophysical Co. Party 13

Dates - The move into the Fort Providence area from Fort Simpson was completed on January 30, 1969 and recording commenced on January 31 and was completed with the vehicles released on March 19, 1969.

Production - 148 miles, 1,755 shot points, average daily production 3.1 miles, 48 working days. No down-days.

Equipment - Recorder, shooting truck, reel truck, 2 survey trucks, 5 shot hole drilling rigs, 2 water trucks, 2 bulldozers. The Imperial Oil aircraft Aztec was used for supervisory and scouting work. Most of the supplies were purchased locally or brought in by charter service provided by Keir Transport and Mercury Flights.

The recording instruments were Imperial Oil digital PFS 2-10 system with binary gain amplifiers. All vehicles were mounted on wheels.

Personnel - Party Manager, Operator and Assistant, Shooter and Assistant, two surveyors, two rodmen, four geophysical helpers, five drillers, five drill helpers, water truck driver, four dozer operators, cook, cook's helper and one camp attendant.

Surveying - Horizontal angles were measured to + or - 20 seconds with a Wilde T-16 theodolite. Horizontal and vertical control was based on the baseline survey and previous seismic surveys. The survey crew was made up of two surveyors and two rodmen.

Conditions - Weather conditions for the region were typical with temperatures ranging from 0° to -50°. Some difficult drilling was encountered west of the Great Slave highway, however this did not hamper production.

Field Procedures

A 300% C.D.P. method of shooting was used with single holes at each shot point. The spread length was 1320' split. The shot hole spacing was 440 feet, station distance 110 feet and geophone coverage was 8 geophones over 110 feet. Charge sizes varied from 2½ to 5 pounds of "Geogel." Average hole depth was 40 feet.

Data Processing

All of the seismograms were corrected to a datum of +1500' A.S.L. using a datum velocity of 10,000'/sec. Weathering corrections were applied where the base of shot did not penetrate the weathering layer.

The data was played back digitally with 3-fold stacked sections produced on variable density film. The data during processing was all filtered to remove the interfering events such as noise and ground roll. Multiple energy on the sections didn't appear to be a problem so that deconvolution was not necessary.

Results and Interpretation

The results and interpretation of Party 13's shooting are incorporated with the results of the Teledyne Parties 16 and 18 in the final portion of this report.

Statistical Data

Stage II - Teledyne Exploration Ltd. Party 16

Dates - The move to the Fort Providence area was completed January 7, 1970. Recording commenced on January 9 and was completed with the equipment being released on February 17, 1970.

Production - 95 miles, 1120 shot points, average daily production was 4.3 miles. The crew was in the area for 33 days, however some of this time was spent on "off-permit" shooting. They had seven down-days due to instrument problems in the recorder.

Equipment - Recorder, 2 shooting trucks, 2 cable trucks, 2 survey trucks, 1 party manager vehicle, 2 water trucks, 6 shot hole drills, 3 bulldozers (2 - 7E's and 1 - 6C), 1 personnel carrier. The IOE Aztec aircraft was used for supervisory trips.

Supplies were brought in by truck. Twenty-four trace digital recording equipment was used (S.D.S. 10-10).

Personnel - Party manager, operator and assistant, shooter and assistant, 2 surveyors, 2 rodmen, 5 line helpers, 8 drillers, 8 drill helpers, 2 water truck drivers, 6 dozer operators, 1 dozer foreman, dozer camp cook, seismic camp cook, cook's helper and camp attendant.

Surveying - Horizontal angles measured to + or - 20 seconds with a Wilde T-16 Theodolite. Horizontal control based on baseline survey. Vertical control based on baseline and previous seismic control.

Field Procedures

A 300% C.D.P. of shooting was used. Single holes were used, spaced 440 feet apart, stations spaced 110 feet apart with 8 geophones over 110 feet. Charge sizes varied from 2½ to 20 pounds of "Geogel" per hole. The average hole depth was 40 feet. Drilling was from fair to good.

Data Processing

All of the seismograms were corrected to a datum of +1500' A.S.L. using a datum velocity of 10,000'/sec. Weathering corrections were applied where the base of shot did not reach the base of the weathered layer.

The data was played back digitally with 3-fold stacked sections produced on variable density film. All the data was filtered with selective filters used to remove low frequency interference energy. The data was not deconvolved since multiple interference did not appear to be a problem. The processing was done in Imperial Oil's Process Centre.

Results and Interpretation

The results and interpretation of Party 16's shooting are incorporated with that of Party 13's and Party 18's in the final portion of this report.

Statistical Data

Stage II - Teledyne Exploration Ltd. Party 18.

Dates - The move to the Fort Providence area was completed January 6, 1970. Recording began January 7, and was completed April 12, 1970. The vehicles were released on April 13, 1970.

Production - 386 miles, 4600 shot points, average daily production was 5.1 miles. The crew spent 75 shooting days on these permits. However, some "off-permit" was done in the area as well that is not included in this report. Two days of shooting were lost due to instrument failure in the recorder. The crew was also on time-off for 5 days in February.

Equipment - Recorder, 2 shooting trucks, 2 cable trucks, 2 survey trucks, one party manager pick-up truck, one water truck, 8 shot hole drills, one personnel carrier and 3 bulldozers (2 - 7E's, 1 - 6C). IOE Aircraft Aztec was used for supervisory trips.

Digital recording equipment (S.D.S. 10-10) was used. Supplies were brought in by truck.

Personnel - Party manager, operator and assistant, shooter and assistant, 2 surveyors, 2 rodmen, 5 helpers, 8 drillers, 8 drill helpers, 2 water truck drivers, 6 dozer operators, 1 dozer foreman, dozer camp cook, seismic camp cook, cook's helper and camp attendant.

Surveying - Horizontal angles measured + or - 20 seconds with a Wilde T-16 theodolite. Horizontal control based on baseline and previous seismic control.

Conditions - Weather was typical with temperatures ranging from 0° to -50°. Terrain was level but rough surface for travelling.

Field Procedures

A 300% C.D.P. method of shooting was used. Single holes were used, spaced 440 feet apart, stations were 110 feet apart with 8 geophones over 110 feet. The charge size varied from 2½ to 10 pounds of "Geogel" with most holes shot with 10 pounds. The average hole depth was 40 feet. The drilling was from fair to good.

Data Processing

All of the seismograms were corrected to a datum of +1500' A.S.L. using a datum velocity of 10,000'/sec. Weathering corrections were applied where the base of shot did not reach the base of the weathered layer.

The data was played back digitally with 3-fold stacked sections produced on variable density film. All the data was filtered with selective filters used to remove low frequency interference energy. The data was not deconvolved since multiple interference was not a problem. The processing was done in Imperial Oil's Process Centre.

Results and Interpretation

The quality of the seismograms obtained by the three crews were comparable and considered to be good to fair for this particular area. The only consistent reflection which could be carried was the Middle Devonian carbonate. A time structure map was constructed on this reflection. Because of the thin isopach between the Middle Devonian carbonate and the basement, a basement reflection could not

be carried. A shallow reflector somewhere above the Middle Devonian carbonate was sporadic and impossible to carry in those areas where the carbonate was very shallow. It was then not possible to construct any isochron maps. The interpretation of the Fort Providence area was made from this one structure map and the seismic cross sections. The seismic coverage in the area was tied into a velocity survey at the well IOE Providence A-47-61°30'-117°15' on the Yellowknife Highway.

Two major anomalies and one smaller anomaly were observed from the seismic coverage.

A discussion of these anomalies is as follows:

- 1) The first major anomaly, the Deep Bay Barrier Complex, is evident in the east-half of Permit 4193. The word barrier is used to infer that the Deep Bay anomaly is part of the Arrowhead Barrier which separates the Horn River shale basin in the north from the Muskeg evaporite basin of Northern Alberta. The name Arrowhead represents continuous carbonate from the top of the Middle Devonian Carbonate down to the Chinchaga and is equivalent to Keg River, Sulphur Point and Slave Point in time. The thickness of this total carbonate on the Deep Bay anomaly is approximately 800 feet; whereas, the thickness of the carbonate within the basin itself is 200 feet or less. The seismic coverage on the Deep Bay anomaly indicates a raised rim along the edge of the barrier. This raised rim we interpret as being a prospective feature for the trapping of hydrocarbons, considering that the regional dip in the area is towards the southwest.

2) The second major anomaly that was interpreted from the seismic coverage is a NE-SW trending fault with the downthrown side towards the northwest with a vertical displacement of approximately 200 feet. This fault can be observed on the maps running through Permits 4154, 4561, 4560, 4495 and 4494 from a point near the town of Fort Providence northeast to a point about a mile beyond the abandoned well 10E Providence K-45-61⁰40'-117⁰00'. It appears that structural closures may be occurring along the upthrown side of this fault. It is felt that the entire upthrown side of this fault could be prospective for the trapping of hydrocarbons if a cross fault or a roll-over were to occur in the north-easterly direction. The K-45 well is not a definitive test of this concept since it only penetrated a few feet of the Middle Devonian carbonate.

3) The third anomaly interpreted from the seismic control is felt to be a pinnacle reef of Middle Devonian age out in the Horn River Shale Basin in the northeast portion of Permit 4157. The relief on this pinnacle has been calculated from the seismic time map to be in the order of approximately 100 feet.

Several other minor relief anomalies were covered with detailed seismic but were then interpreted as being too low in relief to be economically prospective.

Several shallow events were observed on the seismic cross sections, particularly near the MacKenzie River. These shallow events appeared as in-filled troughs and have been interpreted as

Pleistocene channels infilled with sands and gravels and other low velocity material. The channels are not considered prospective, and are possibly old tributaries of the MacKenzie River.

Summary and Conclusions

It can be concluded at this time that there are three prospective anomalies in Imperial Oil's permit acreage in Fort Providence. Whether the economics of these prospects would warrant drilling at this time is questionable.

Please Note:

A report covering work done by Accurate Exploration Ltd., Party 47C in the Fort Providence area in 1967 was submitted by Mr. O. Friesen to the Department of Indian Affairs and Northern Development on March 21, 1968. See Department Code Number 7-6-4-66-11.

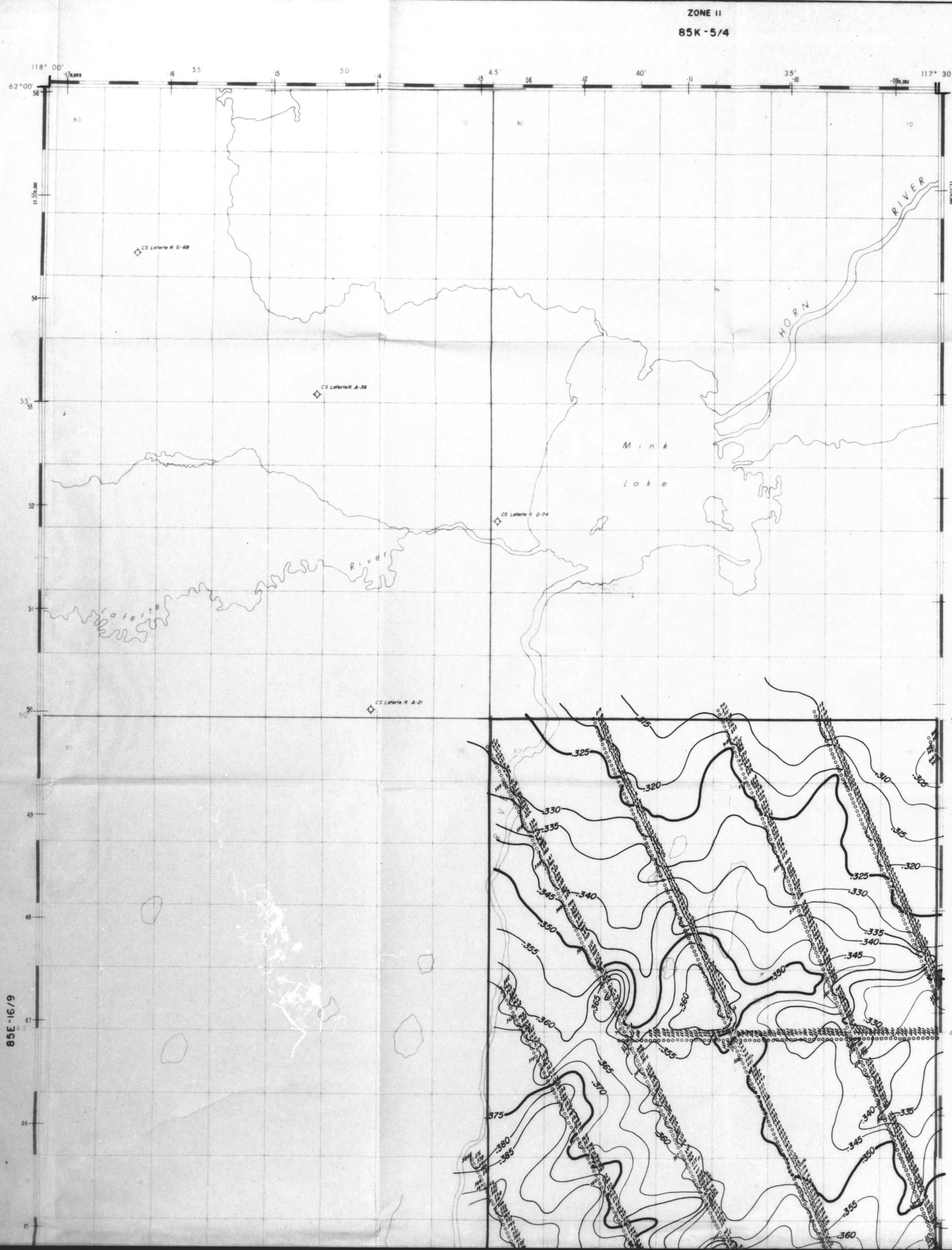
It has been found through the new surveying that the shot point locations on those accompanying maps for Party 47C were in error. These locations have since been re-positioned in their proper co-ordinates and appear in the correct location on the maps accompanying this present report.

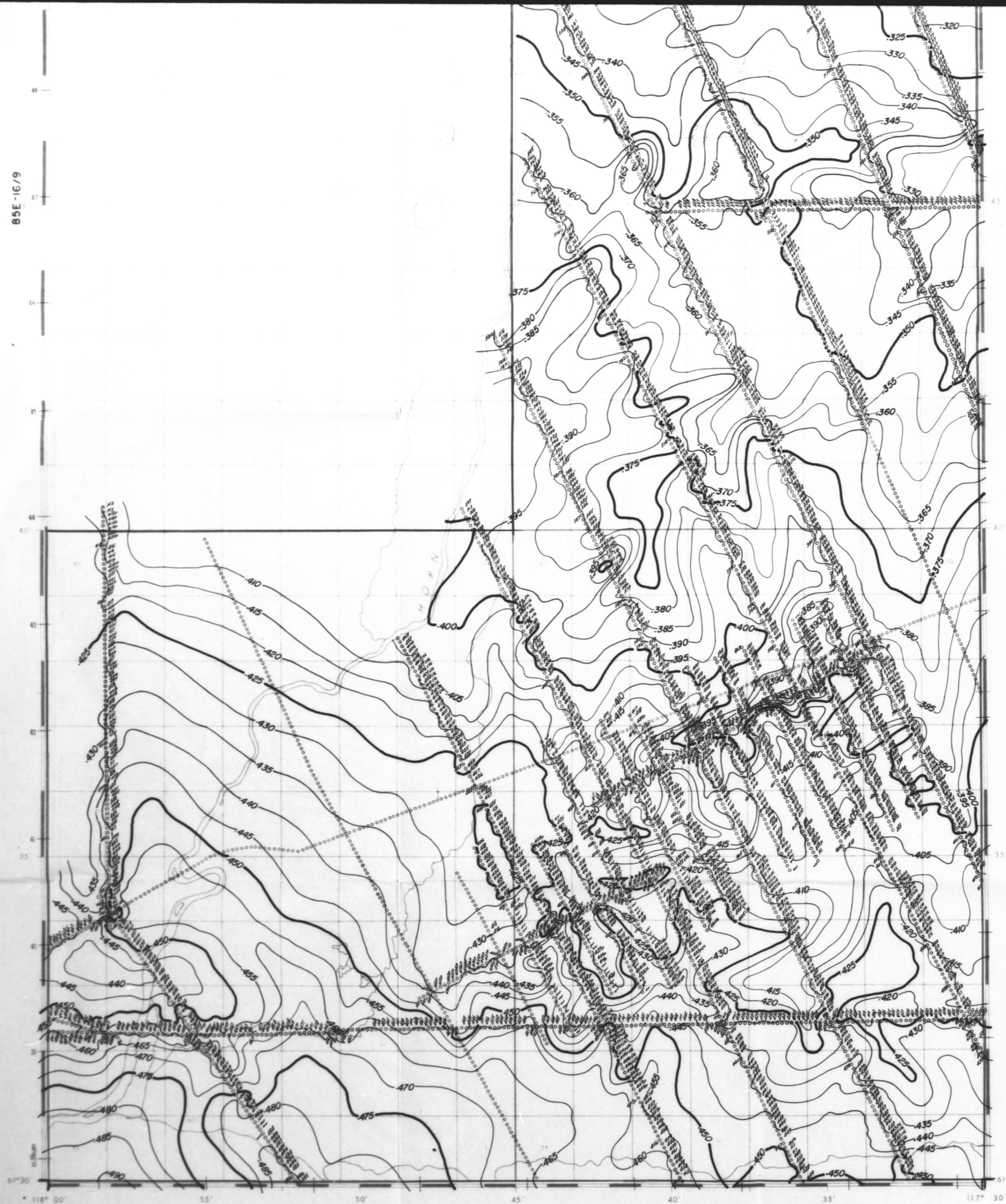


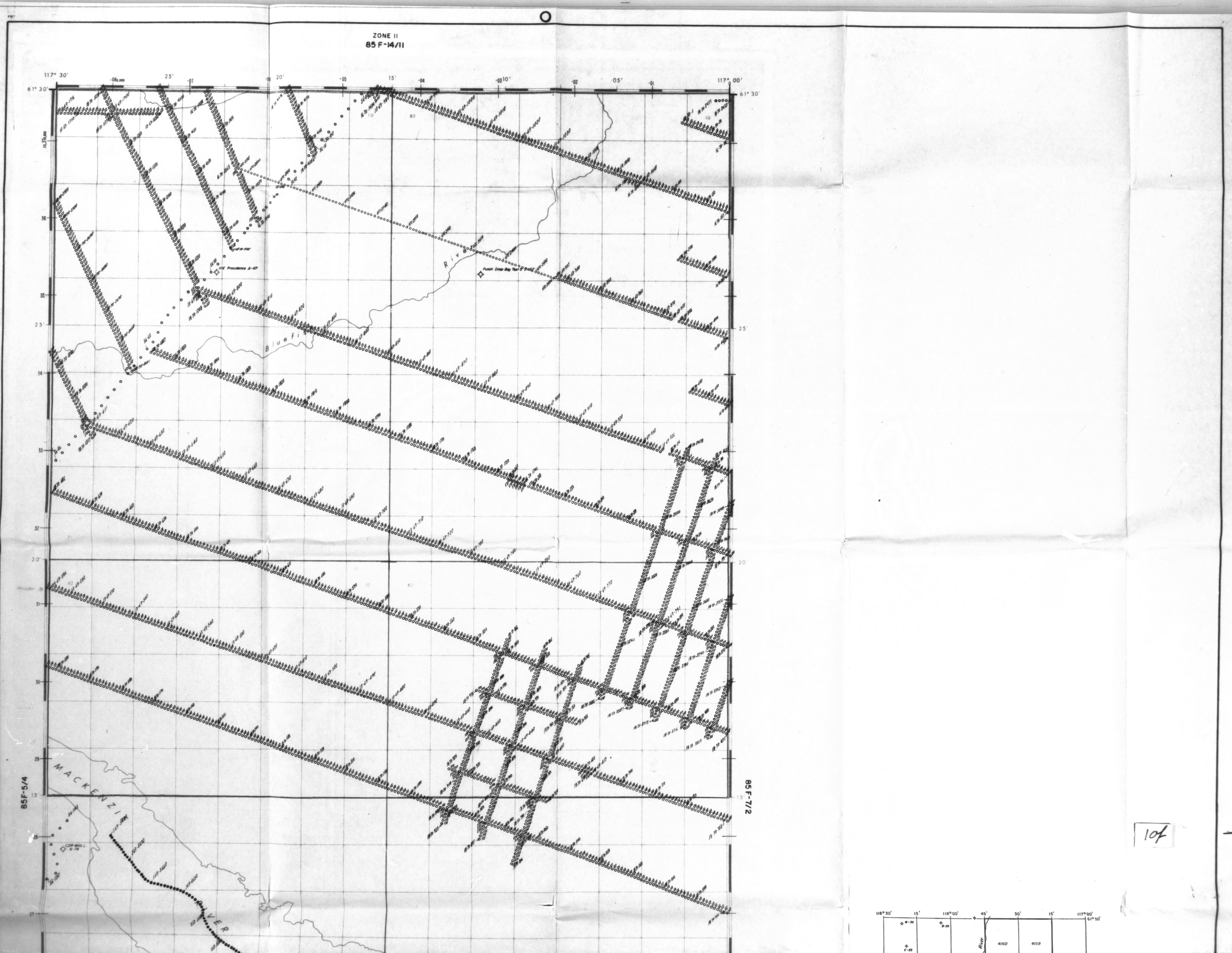
O. Friesen
Southern Exploration District Manager
Imperial Oil Enterprises Ltd.
Edmonton, Alberta



ZONE II
85K-5/4

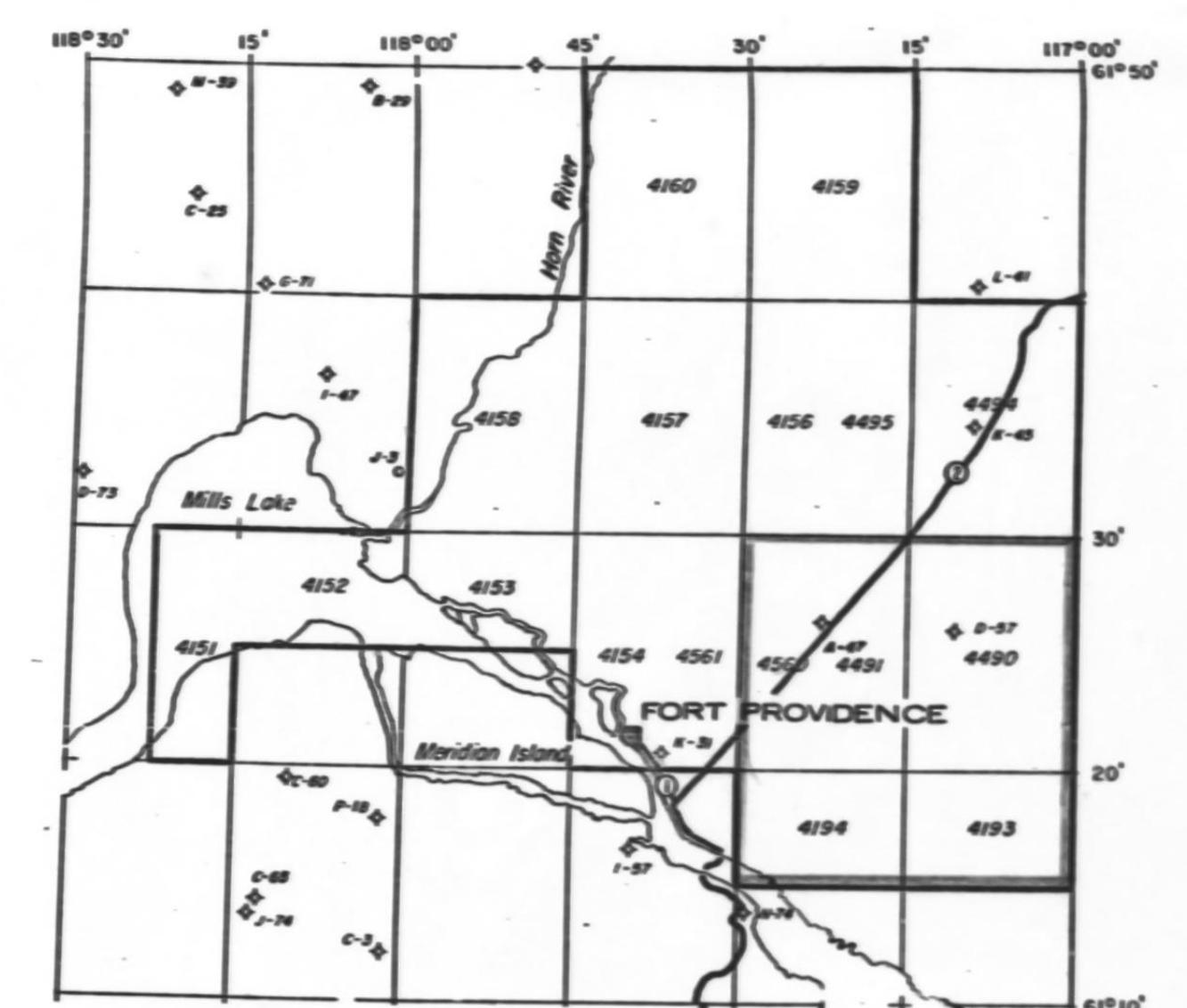
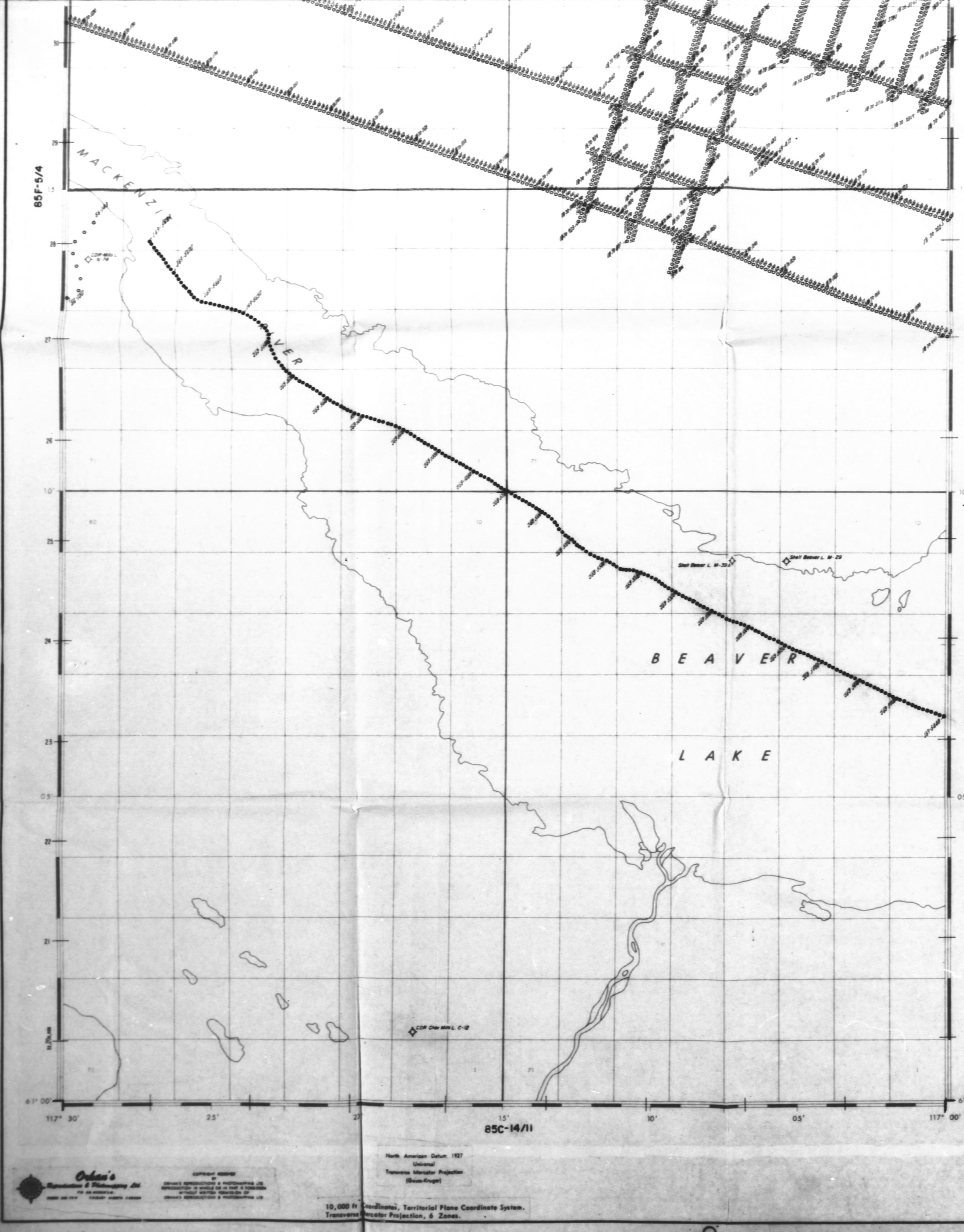




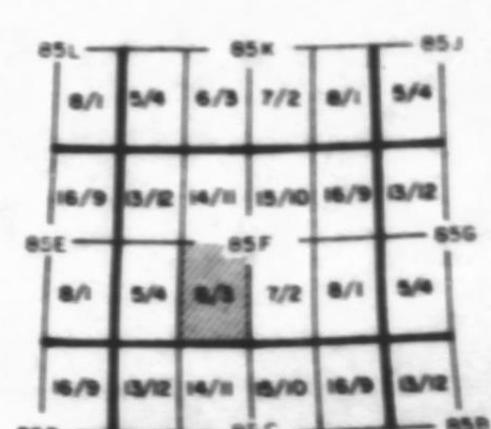


118° 30' 15' 118° 00' 45' 30' 15' 117° 00' 61° 30'

♦ M-39 ♦ 2-29 ♦ 2-28 ♦ River 4/60 4/59



INDEX TO MAP SHEETS



SEISMOGRAPH MAP

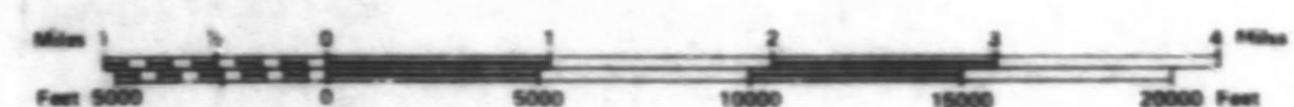
SURFACE ELEVATIONS

Contour Interval _____
Datum: Plane Sea Level Velocity

FALAISE LAKE 85 F - 6/3

SCALE 1:50,000

1:25 inches to 1 mile approximately

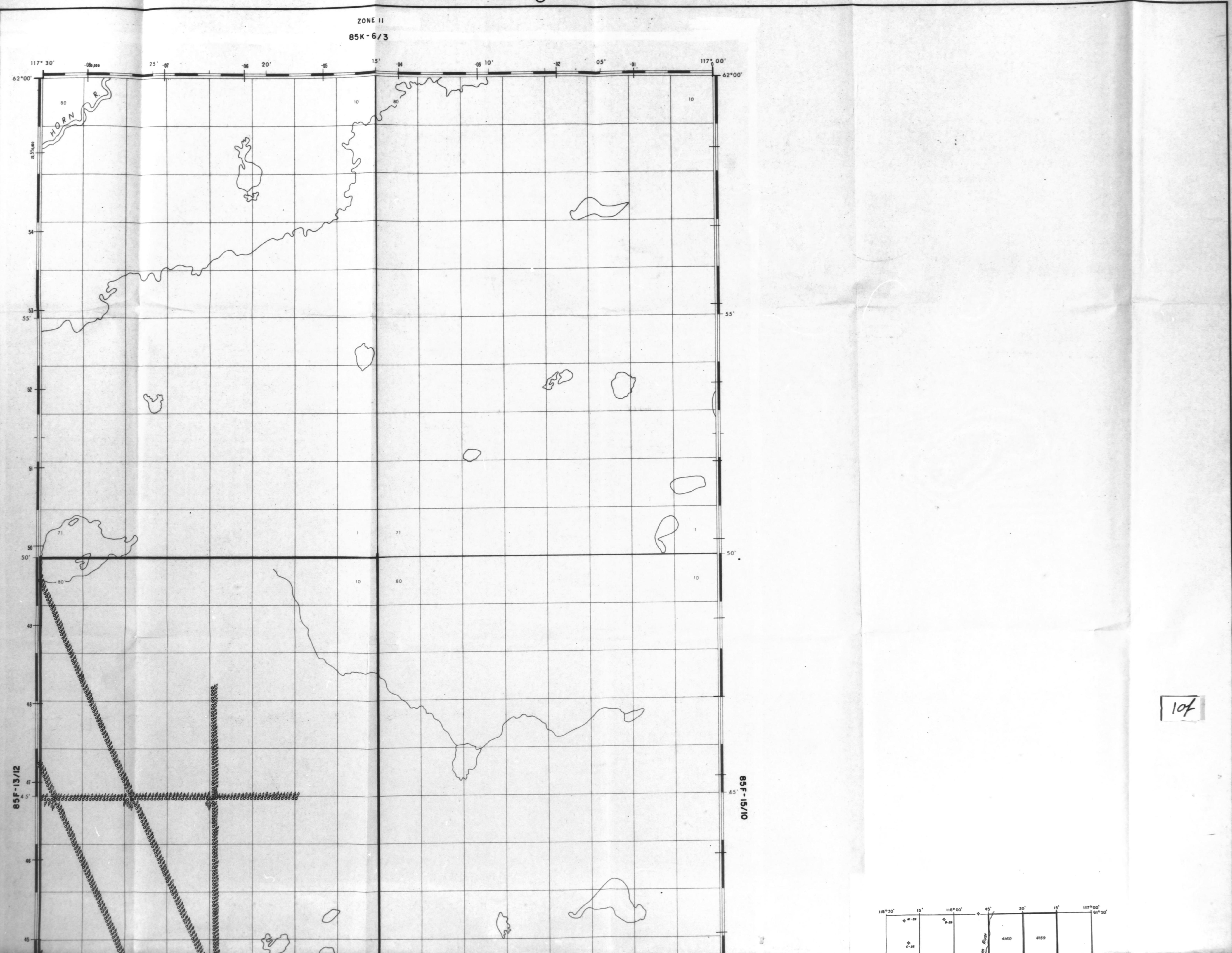


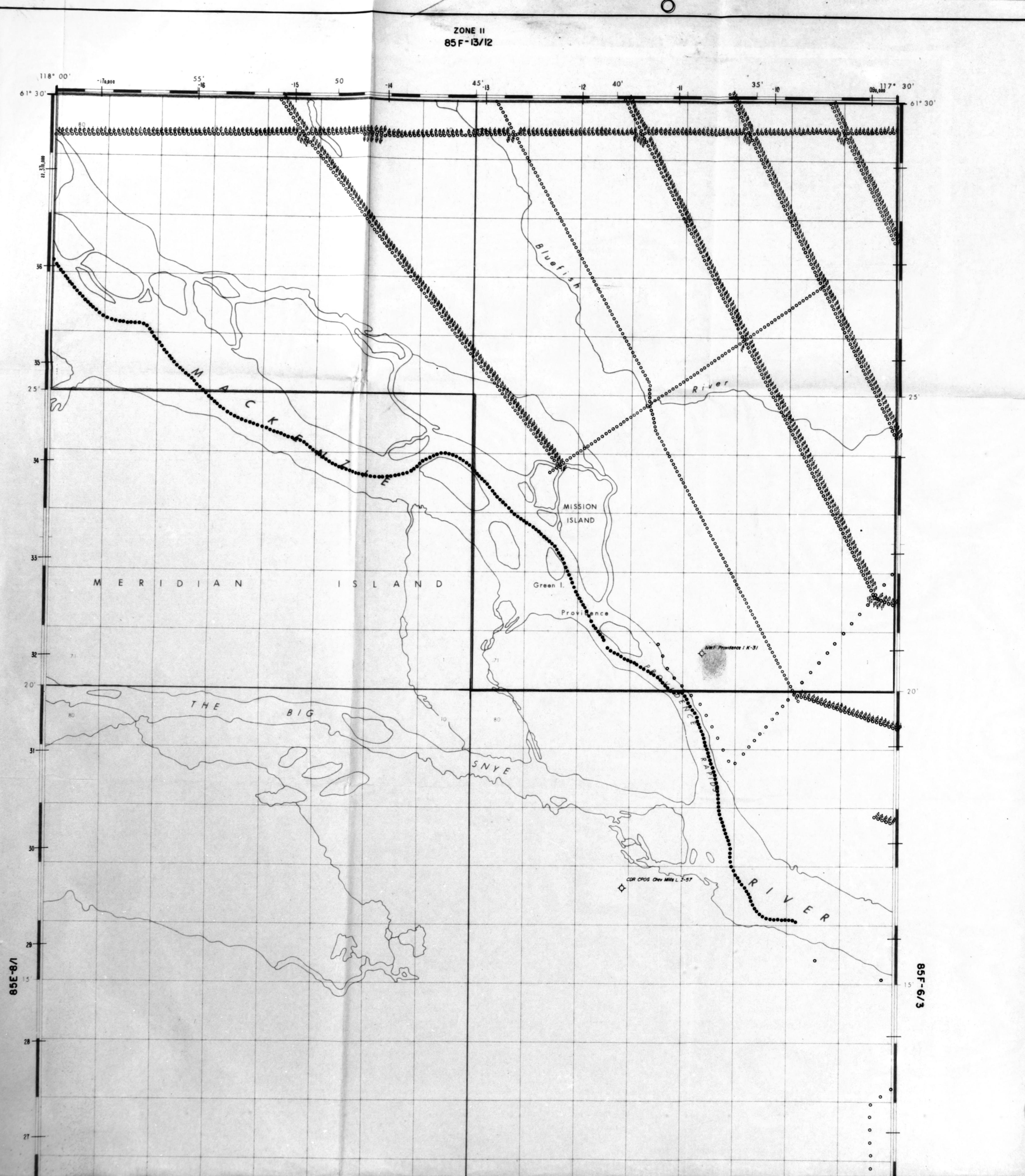
Seismic Revised _____
Value Revised _____
Contour Revised _____
Wells Revised _____

Gp 85F-6/3 4 V N

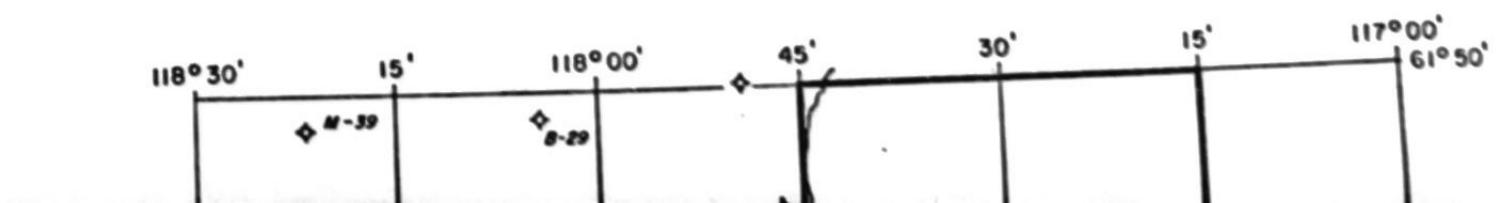
PROPRIETARY

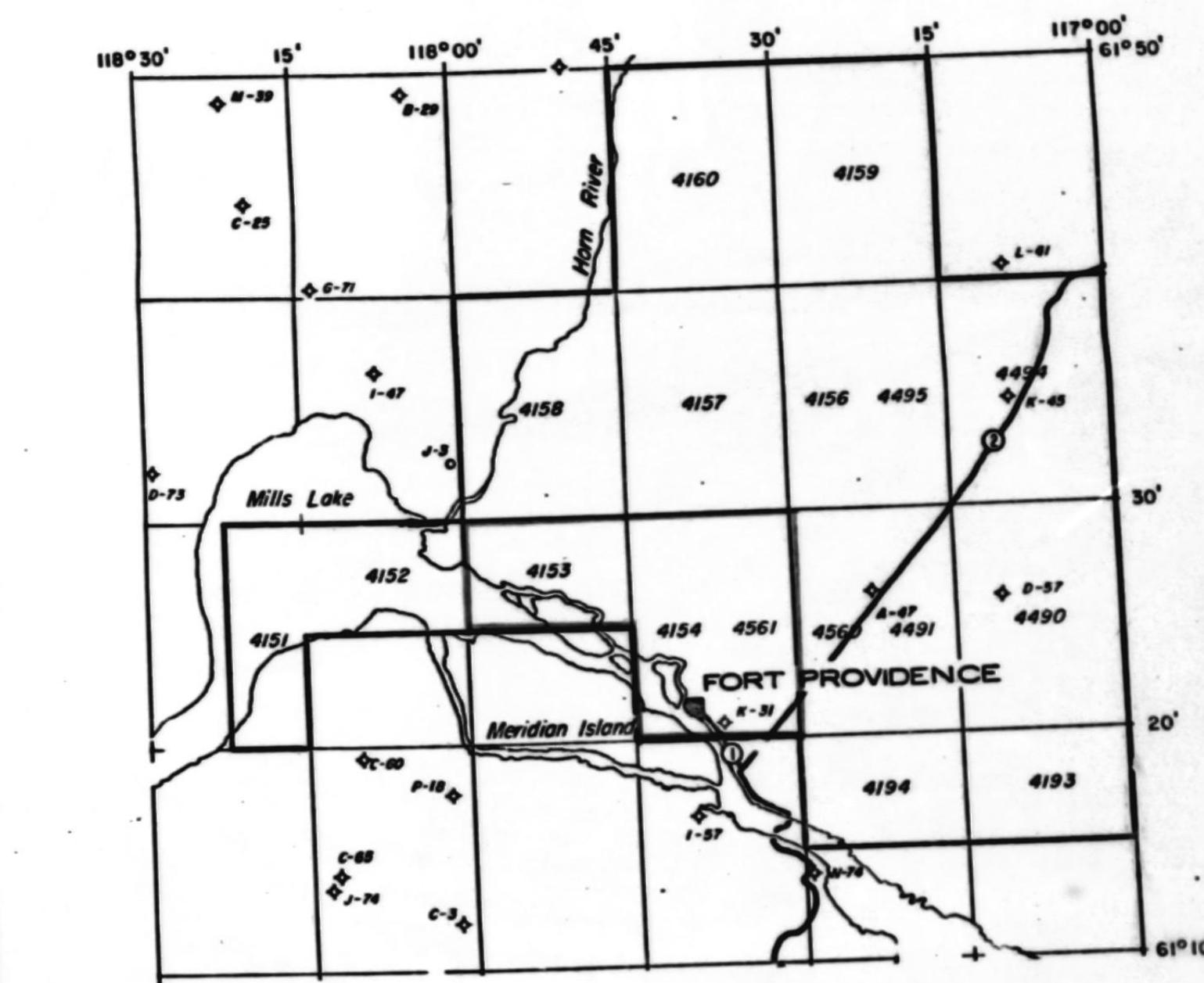
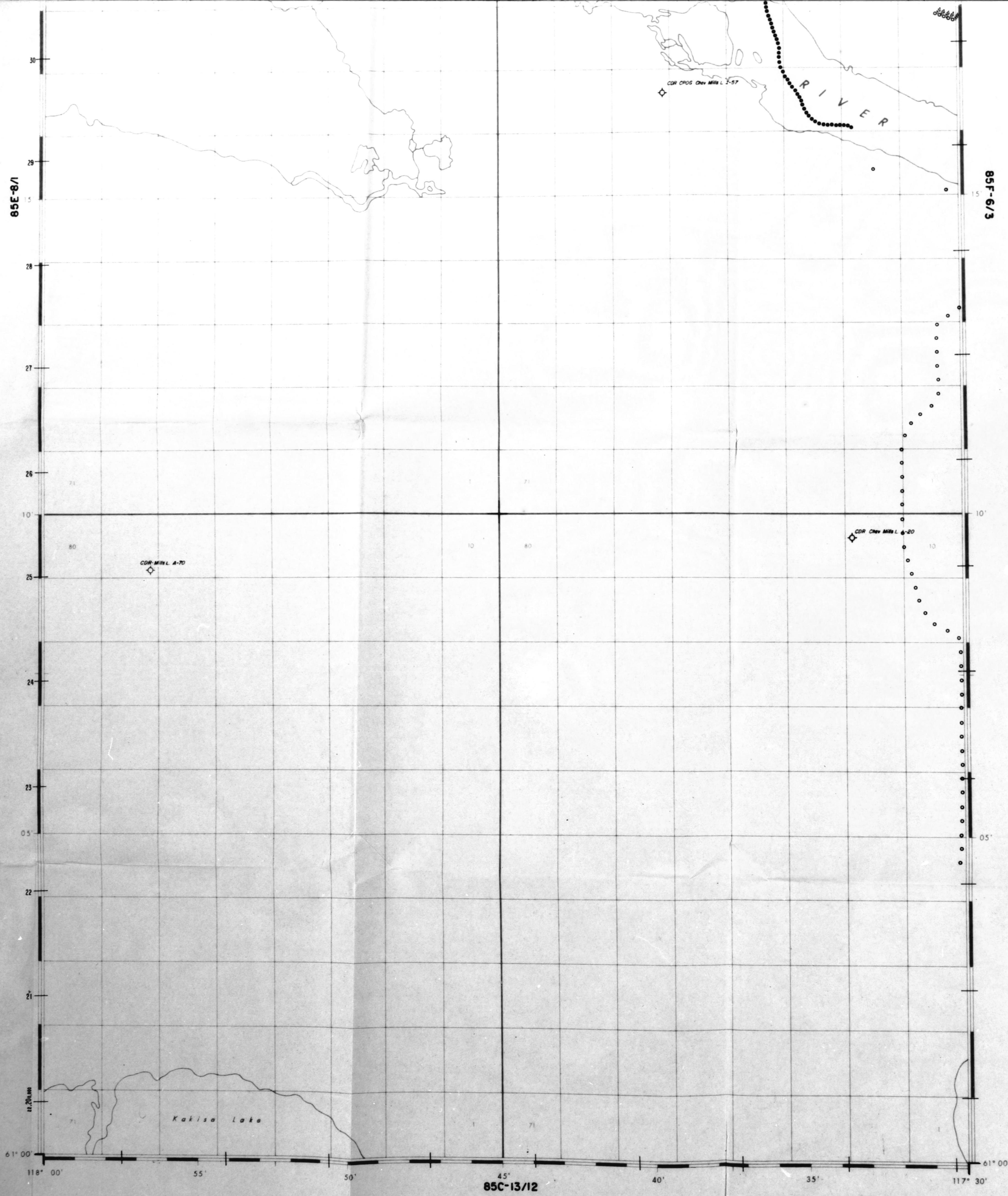
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10f





FORT PROVIDENCE AREA
IMPERIAL OIL ENTERPRISES LTD.

SCALE: 1:500,000

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85L	85K	85J
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85F	85E	85D
85C	85B	85A
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SEISMOGRAPH MAP

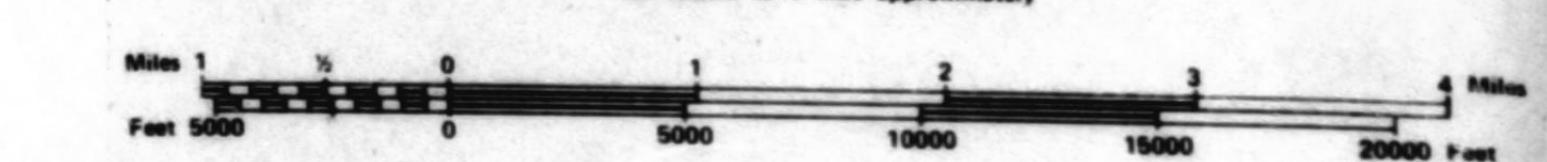
SURFACE ELEVATIONS

Contour Interval
Datum:Plane SEA LEVEL Velocity

FALAISE LAKE 85 F - 5 / 4

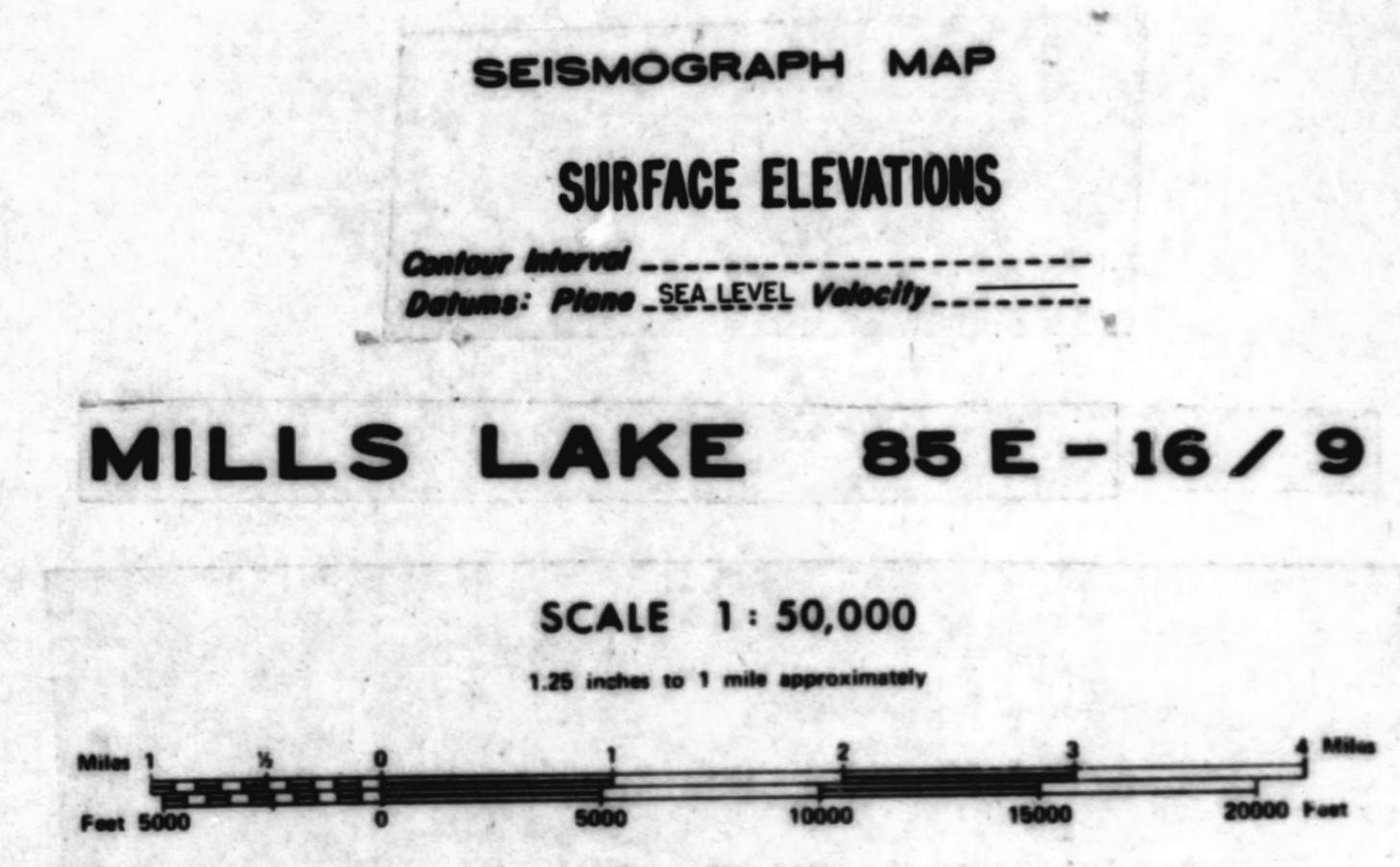
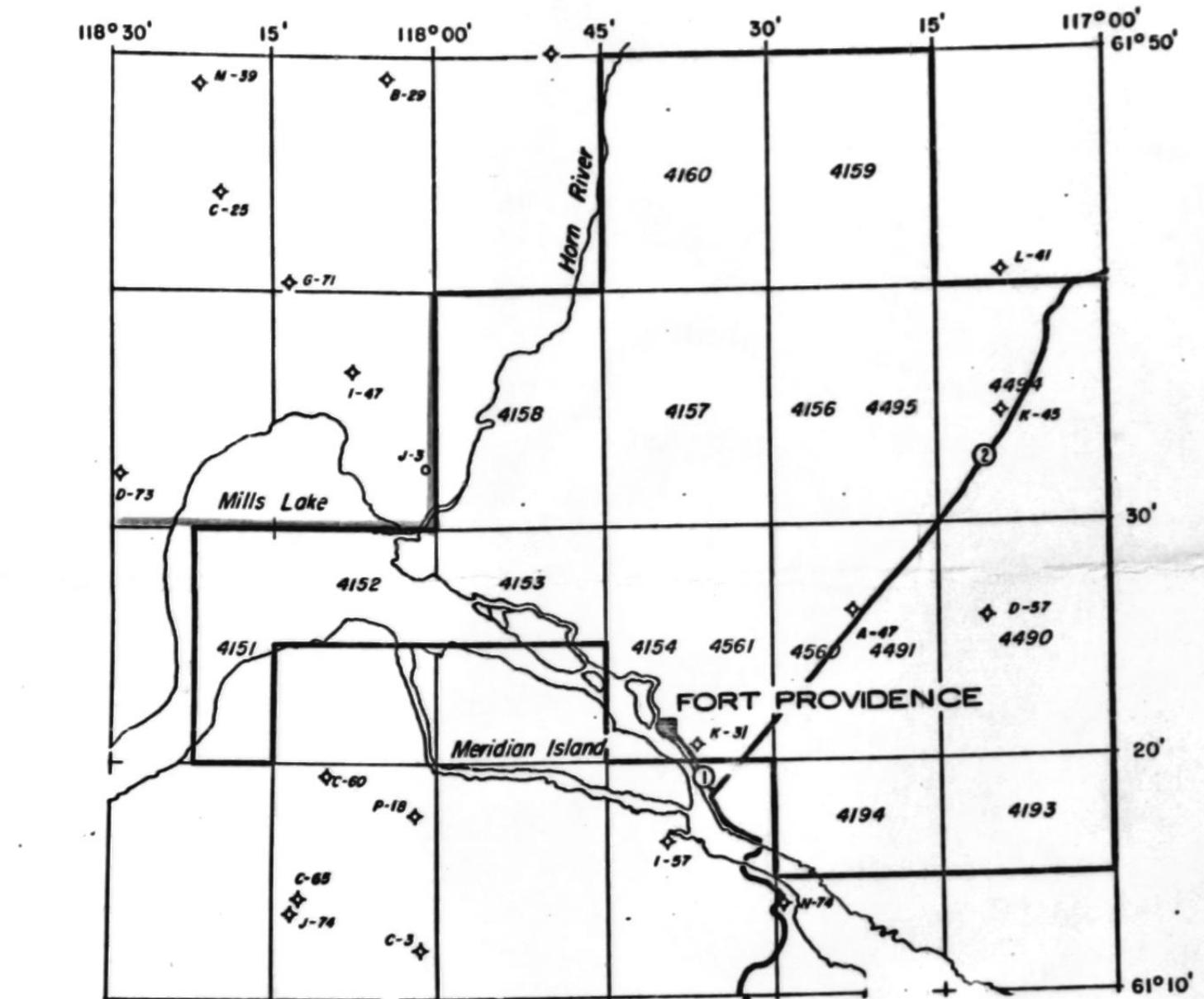
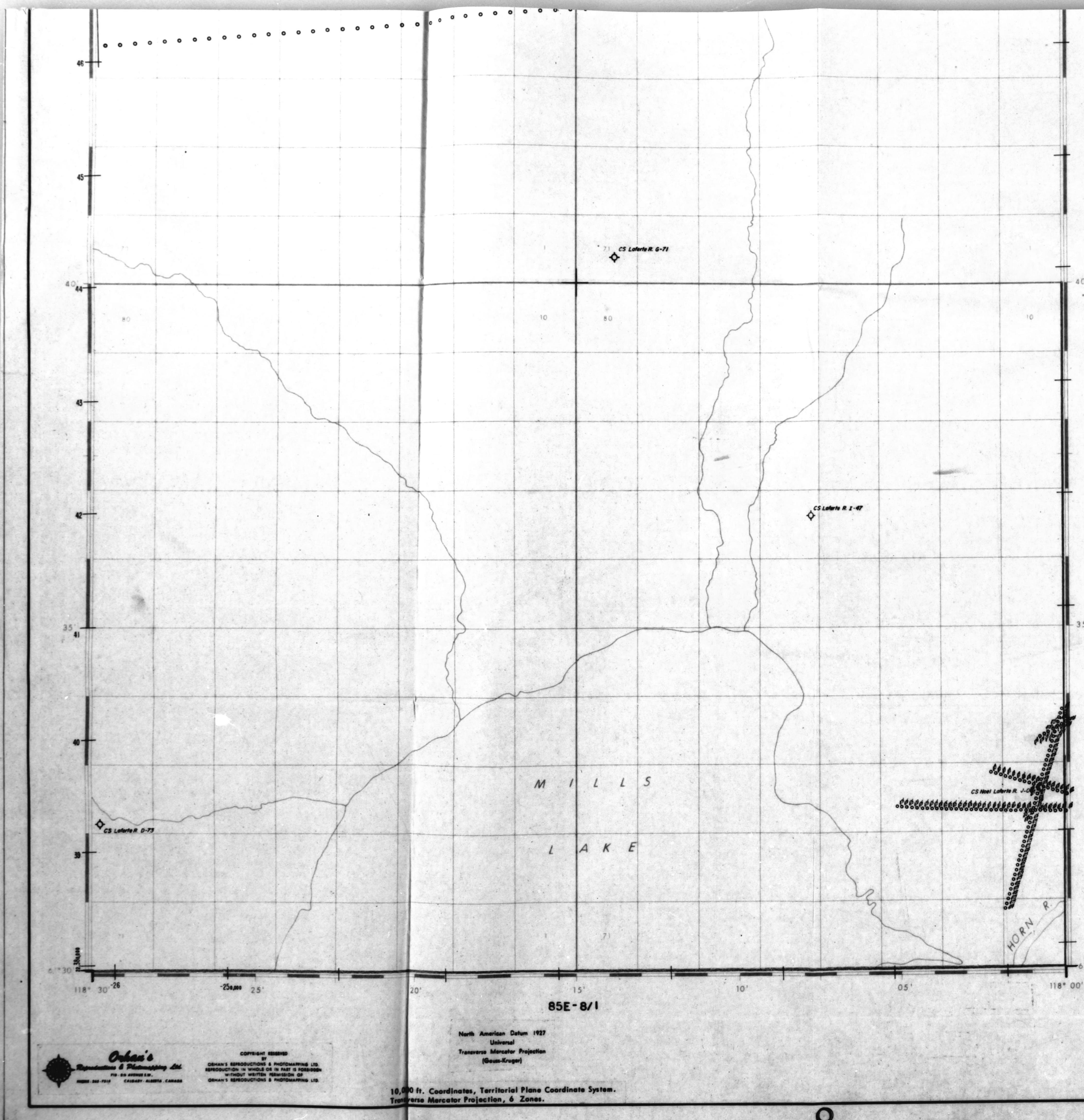
SCALE 1: 50,000

1.25 inches to 1 mile approximately



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PROPRIETARY

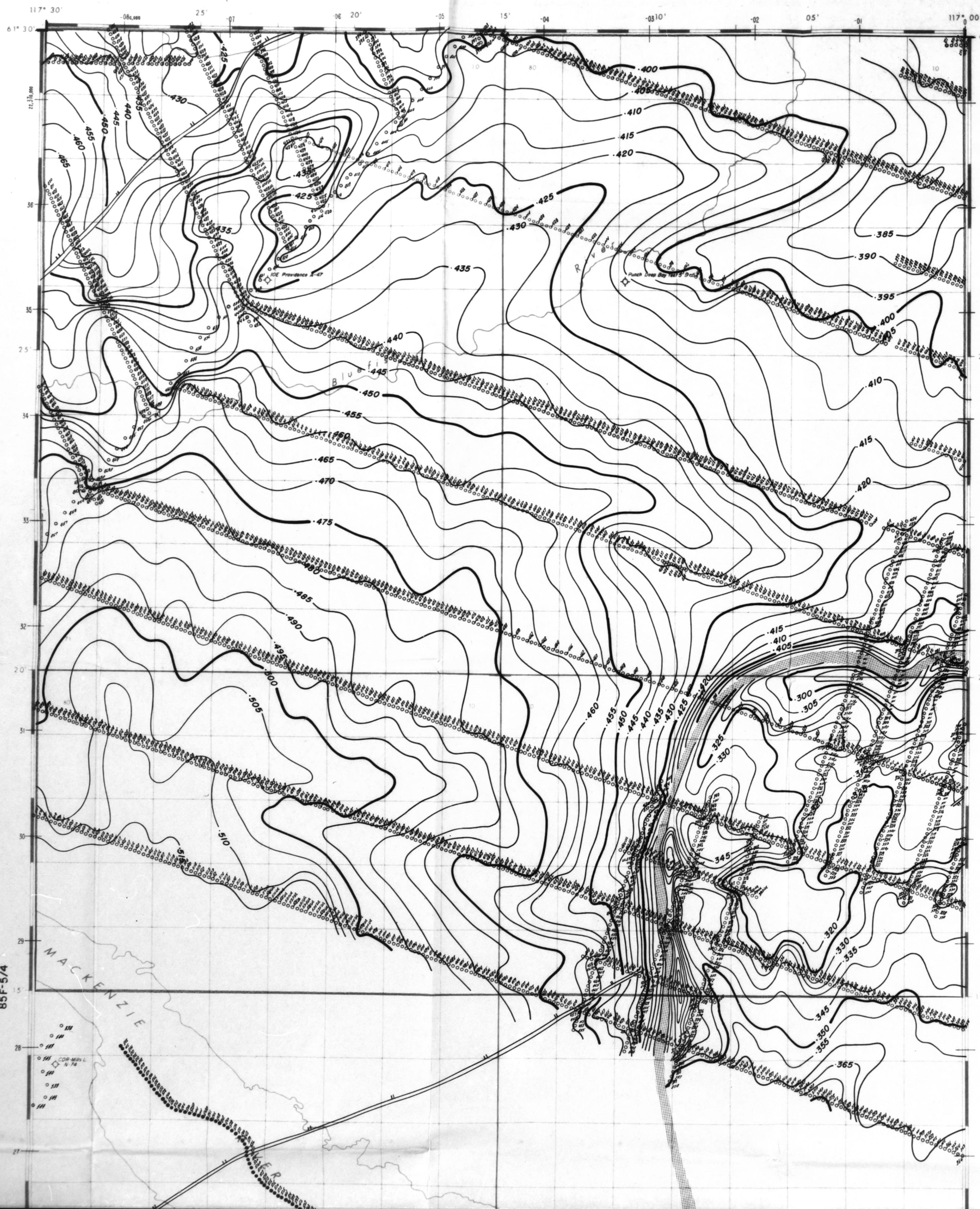


Seismic Revised
Values Revised
Contours Revised
Wells Revised

Gp 85E-16/9 3 V

PROPRIETARY

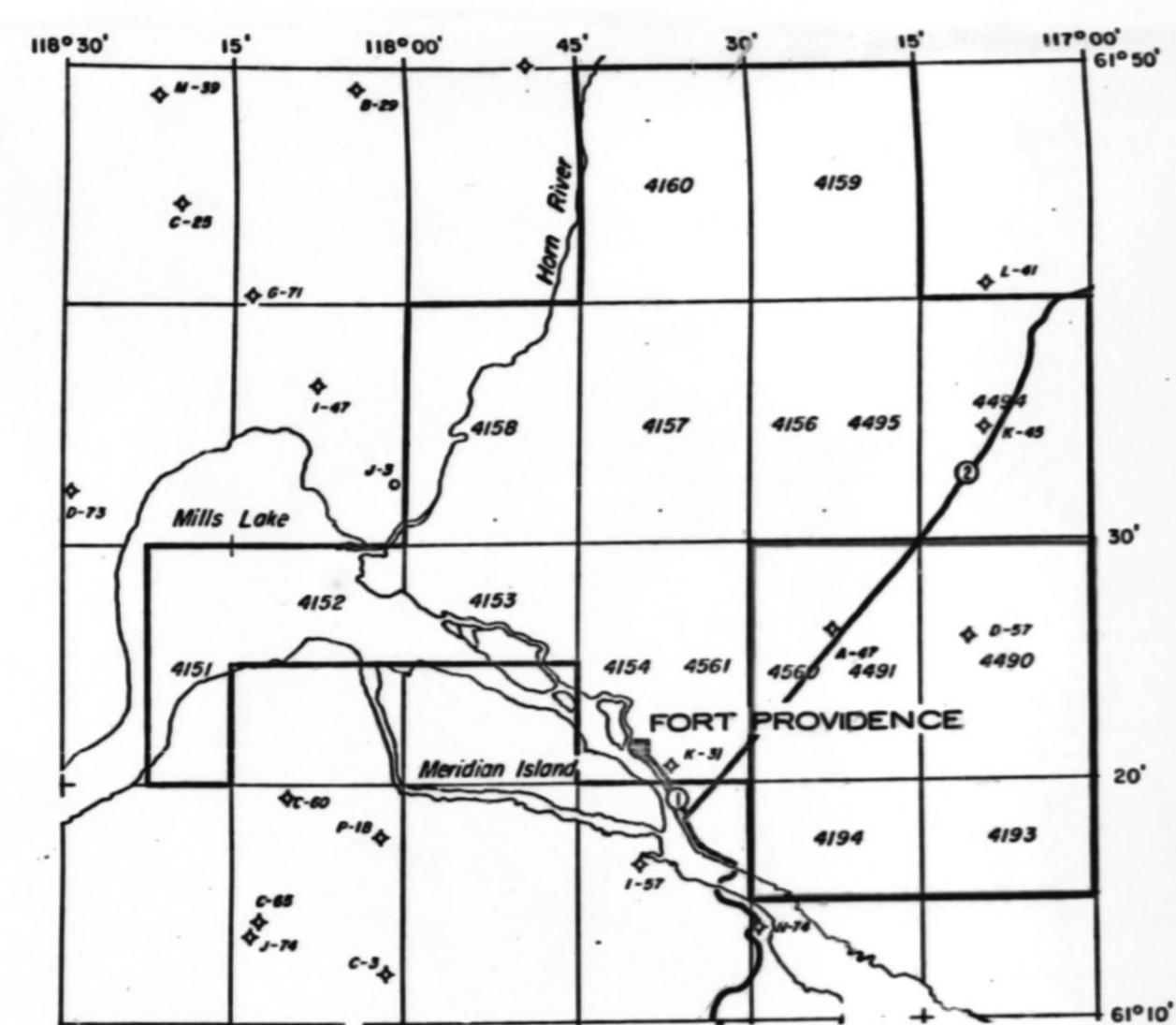
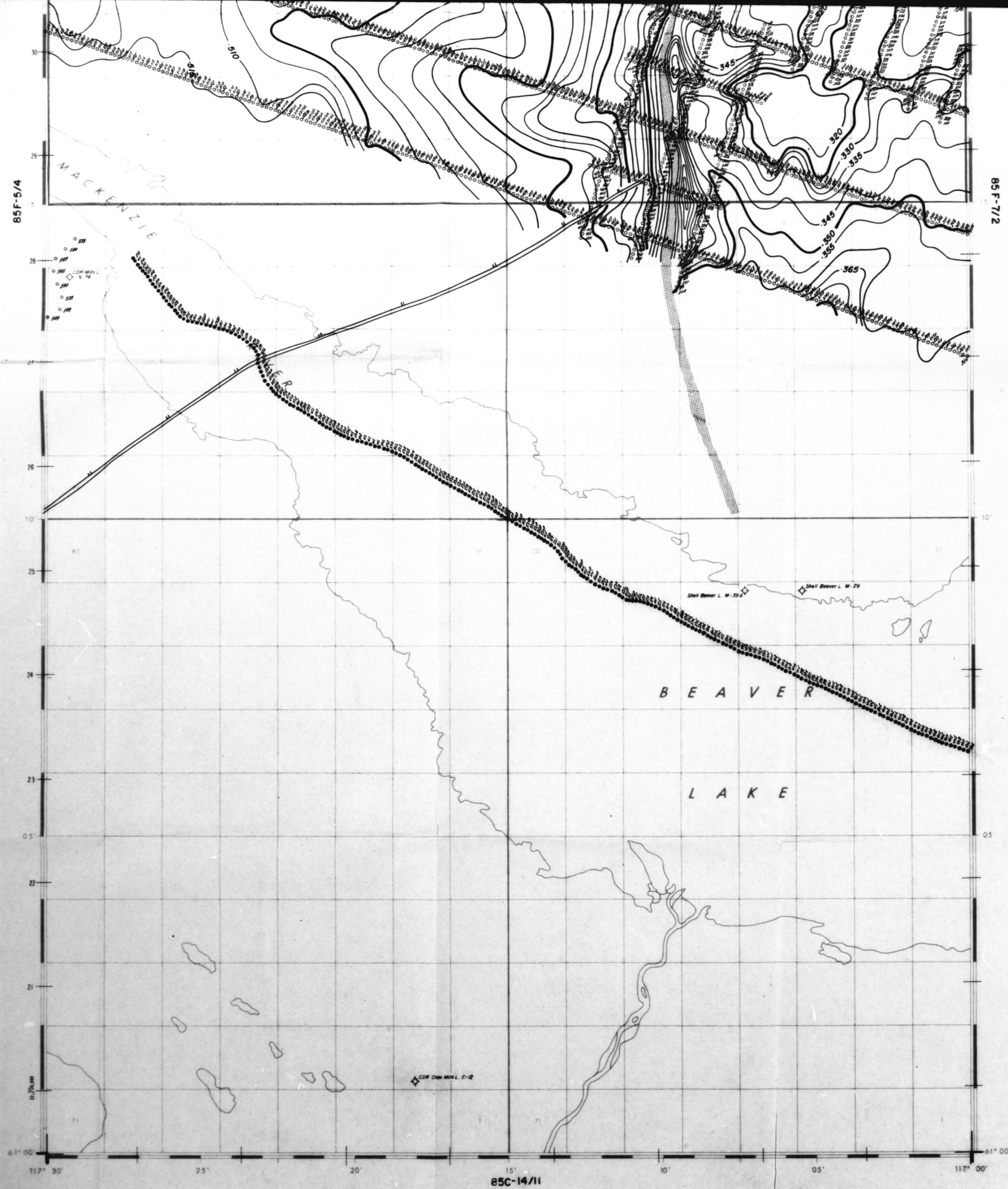
ZONE
85 F-14



104

85F-5/4

18



FORT PROVIDENCE AREA IMPERIAL OIL ENTERPRISES LTD.

SCALE: 1:500,000

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8/1	5/4	6/3	7/2	8/1	5/4
16/9	13/12	14/11	15/10	16/9	13/12
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8/1	5/4	6/3	7/2	8/1	5/4
16/9	13/12	14/11	15/10	16/9	13/12
85D	85C			85B	

NOTE: LVL - THICK LVL, CORRECTIONS NOT ADEQUATE.

**SEISMOGRAPH MAP
STRUCTURE
MIDDLE DEVONIAN CARBONATE**

Contour Interval .. 925 msl. -----
Datums: Plane .. 1500' Velocity .. 10,000 f/s

FALAISE LAKE 85 F - 6/3

SCALE 1: 50,000

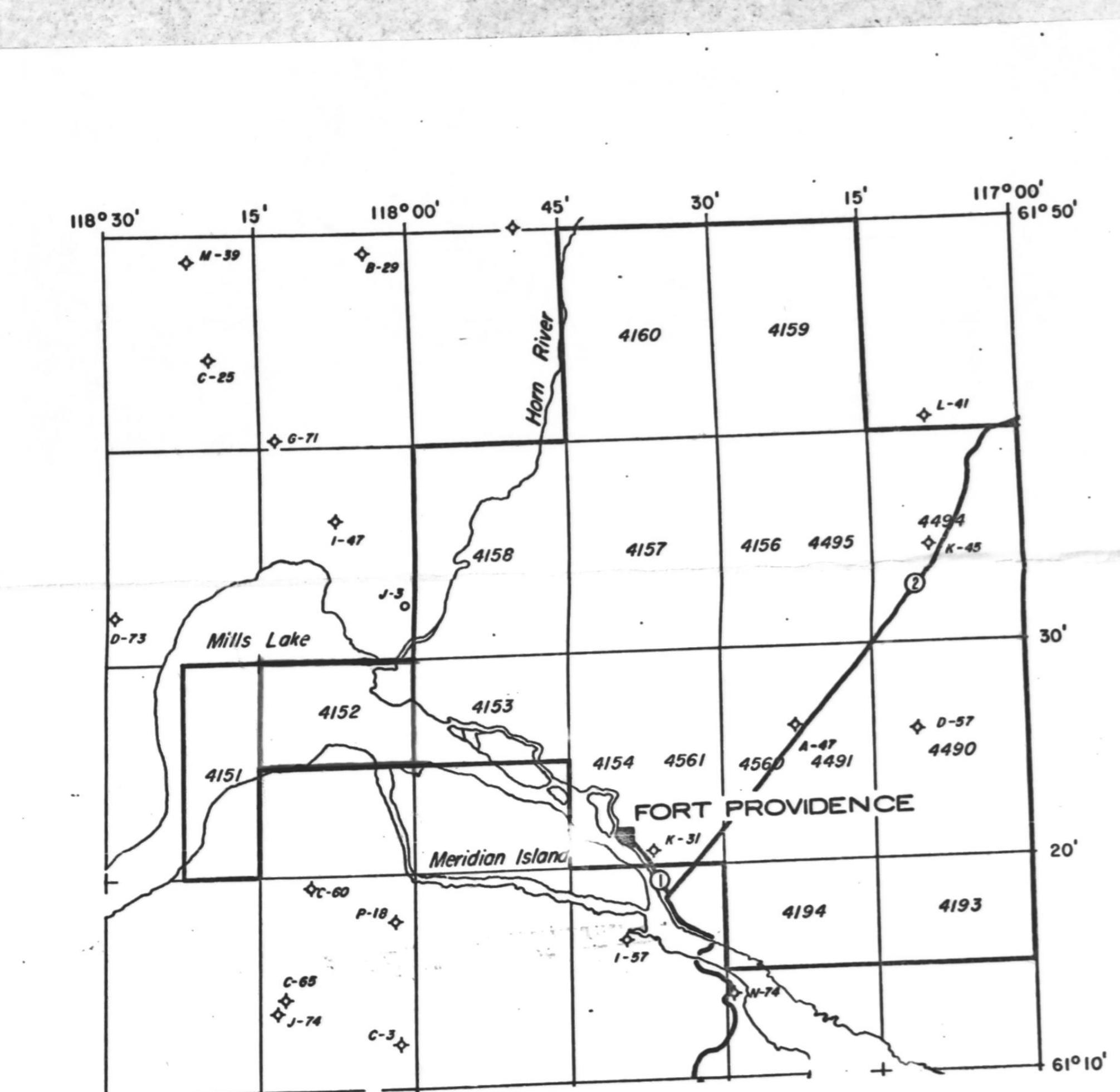
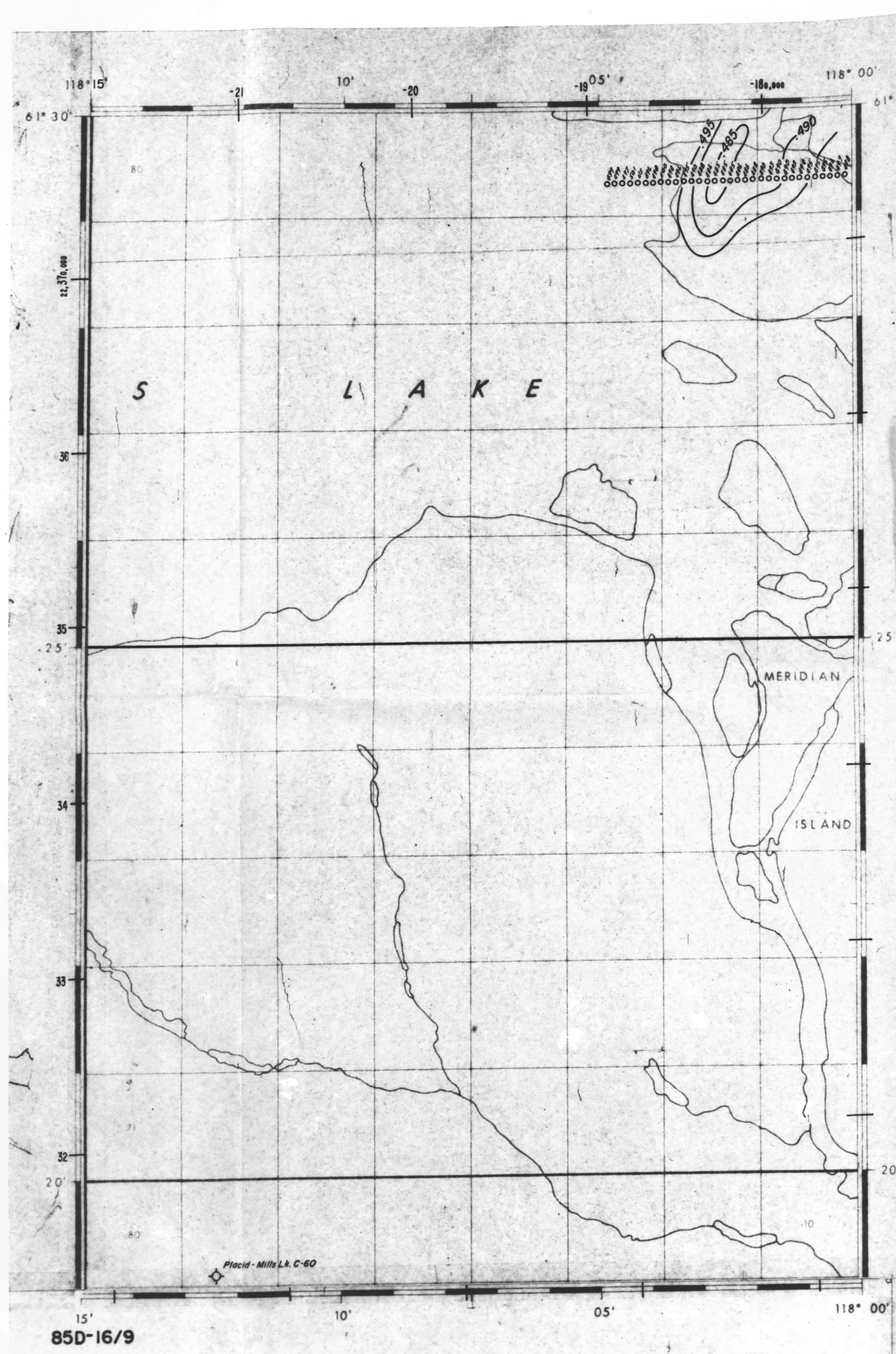
1.25 inches to 1 mile approximately



Seismic Revised 10/12/70
Values Revised 5/27/70
Contours Revised 9/25/70
Wells Revised 10/27/70

Gp 85F-6/3 I V C

PROPRIETARY



**FORT PROVIDENCE AREA
IMPERIAL OIL ENTERPRISES LTD.**

SCALE: 1:500,000

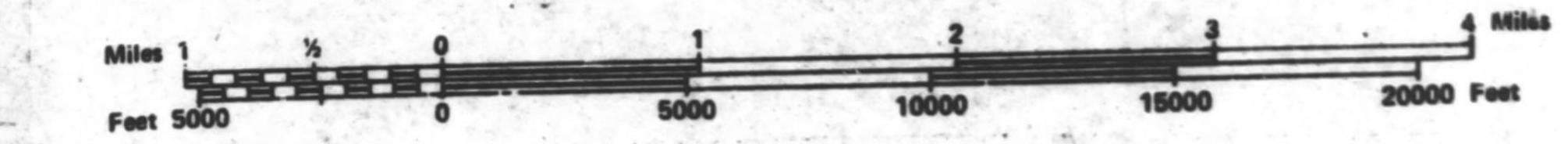
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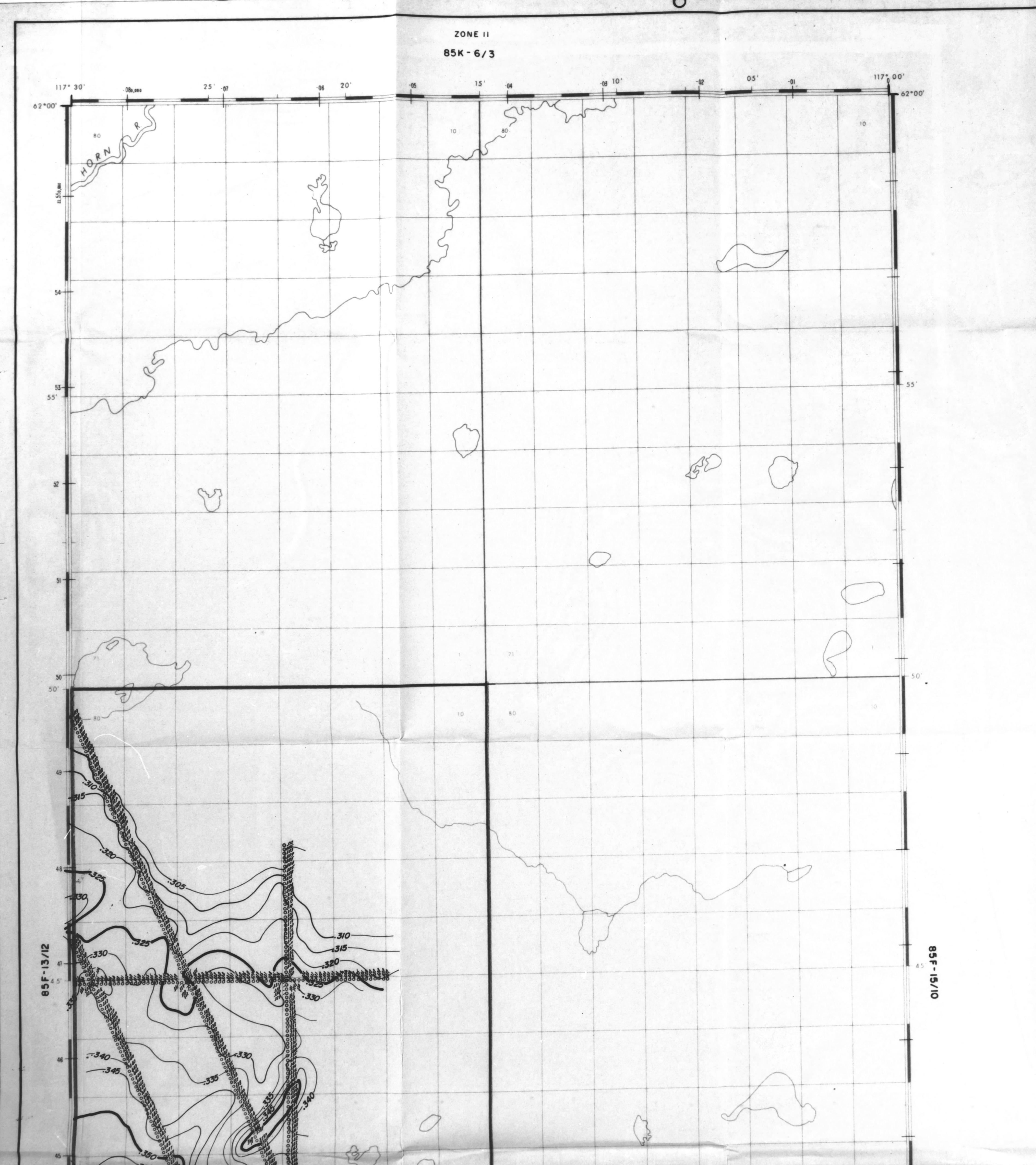
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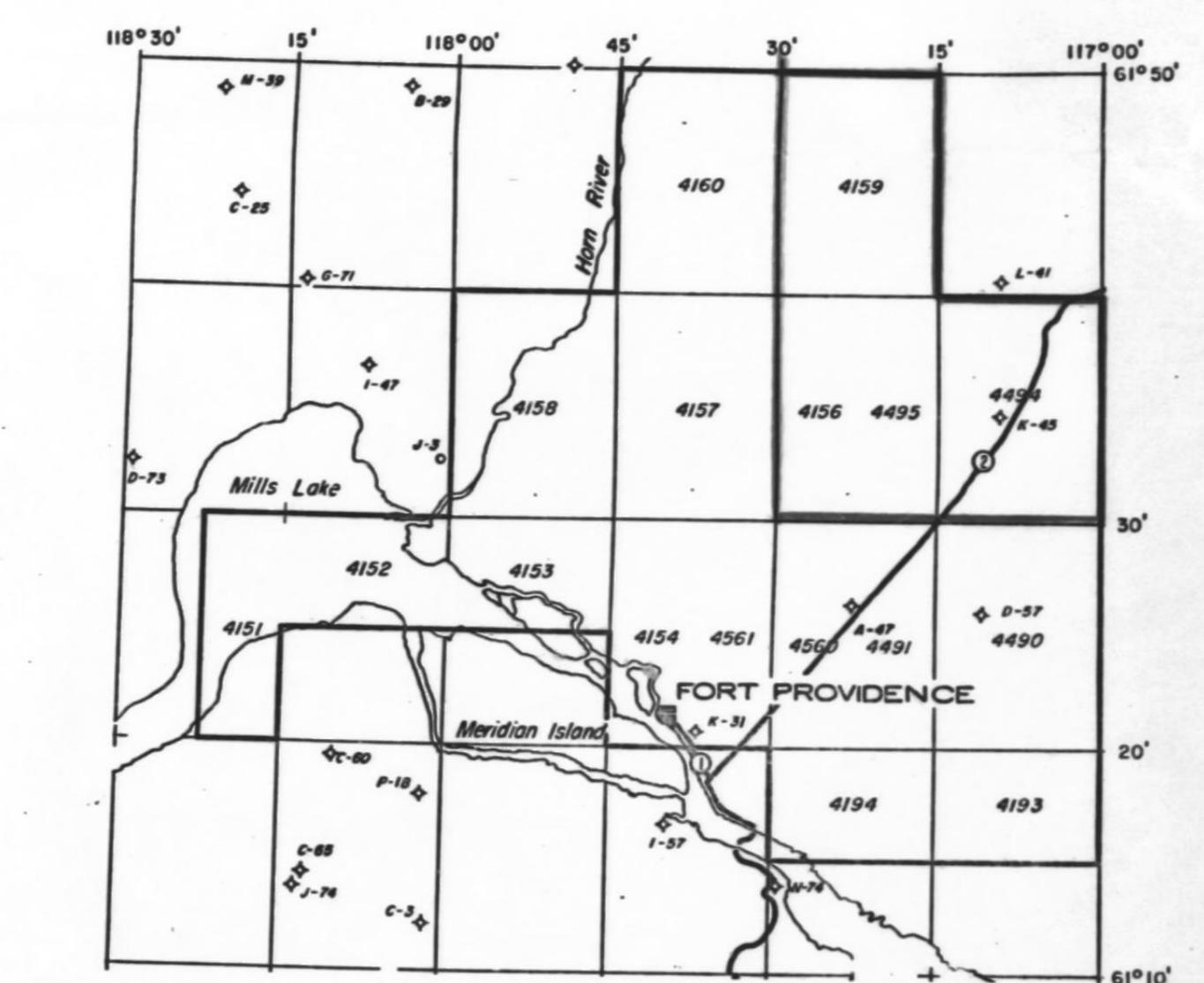
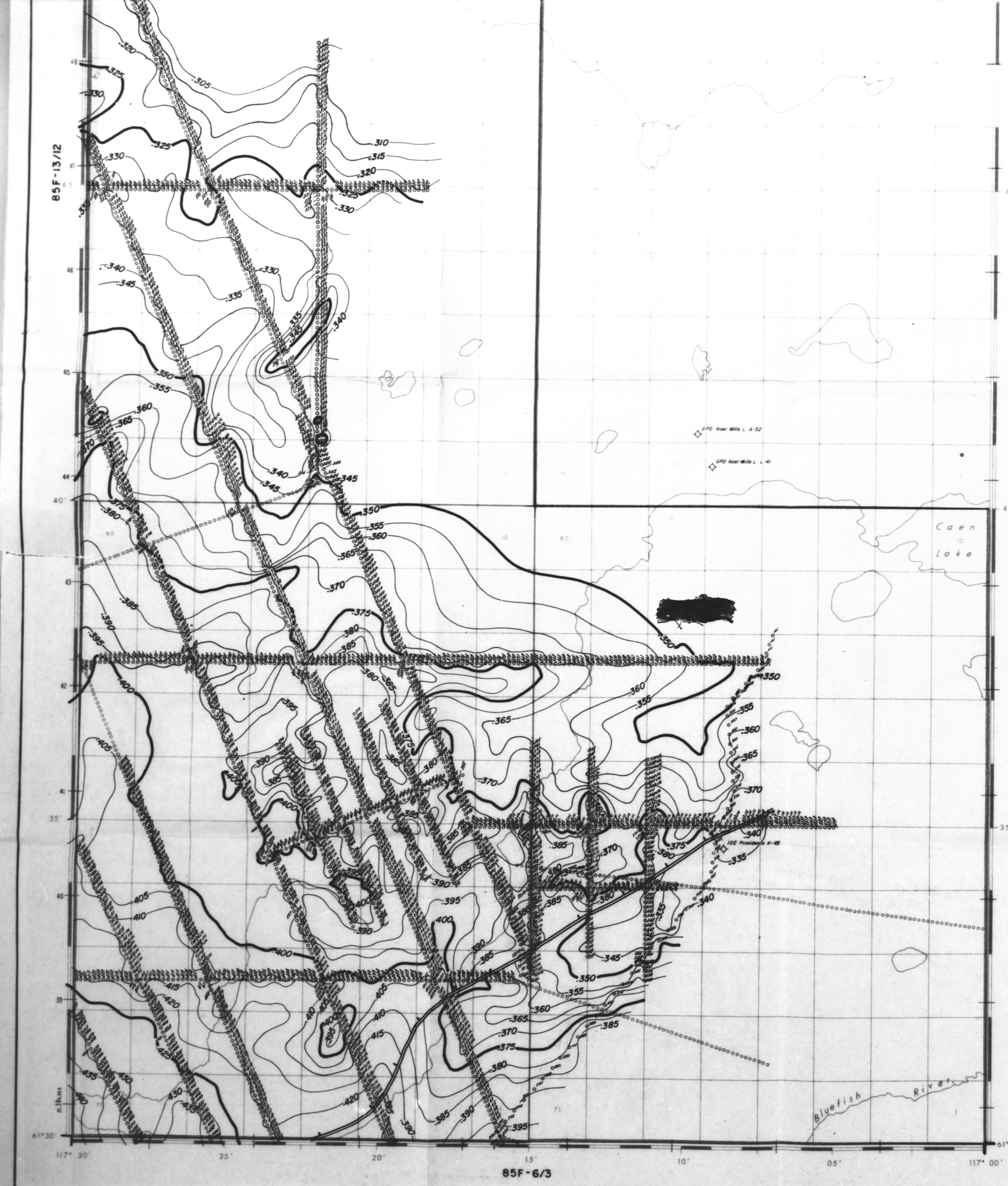
**MIDDLE DEVONIAN CARBONATE STRUCTURE
MILLS LAKE 85 E - 8/1**

SCALE 1 : 50,000

1.25 inches to 1 mile approximately





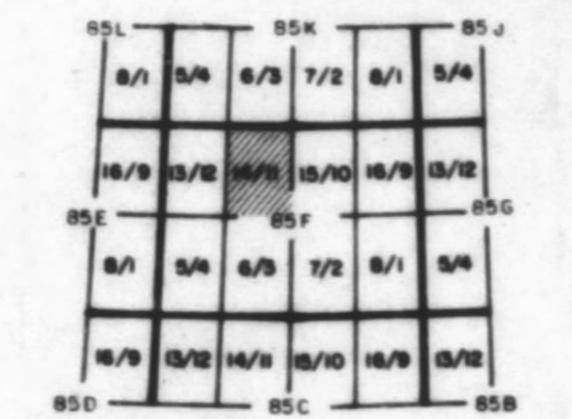


**FORT PROVIDENCE AREA
IMPERIAL OIL ENTERPRISES LTD.**

SCALE: 1:500,000

INDEX TO MAD SPUTTER

AREA TO BED SHEETS



NOTE: LVL-THICK LVL. CORRECTIONS NOT ADEQUATE.

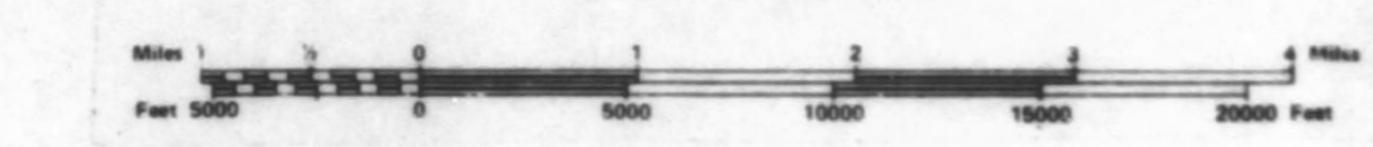
SEISMOGRAPH MAP
STRUCTURE
MIDDLE DEVONIAN CARBONATE

Contour Interval 0.005 SECS.
Datums: Plane 1500' Velocity 10,000'.

FALAISE LAKE 85 F - 14/11

SCALE 1 : 50,000

1.25 inches to 1 mile approximately



PROPRIETARY

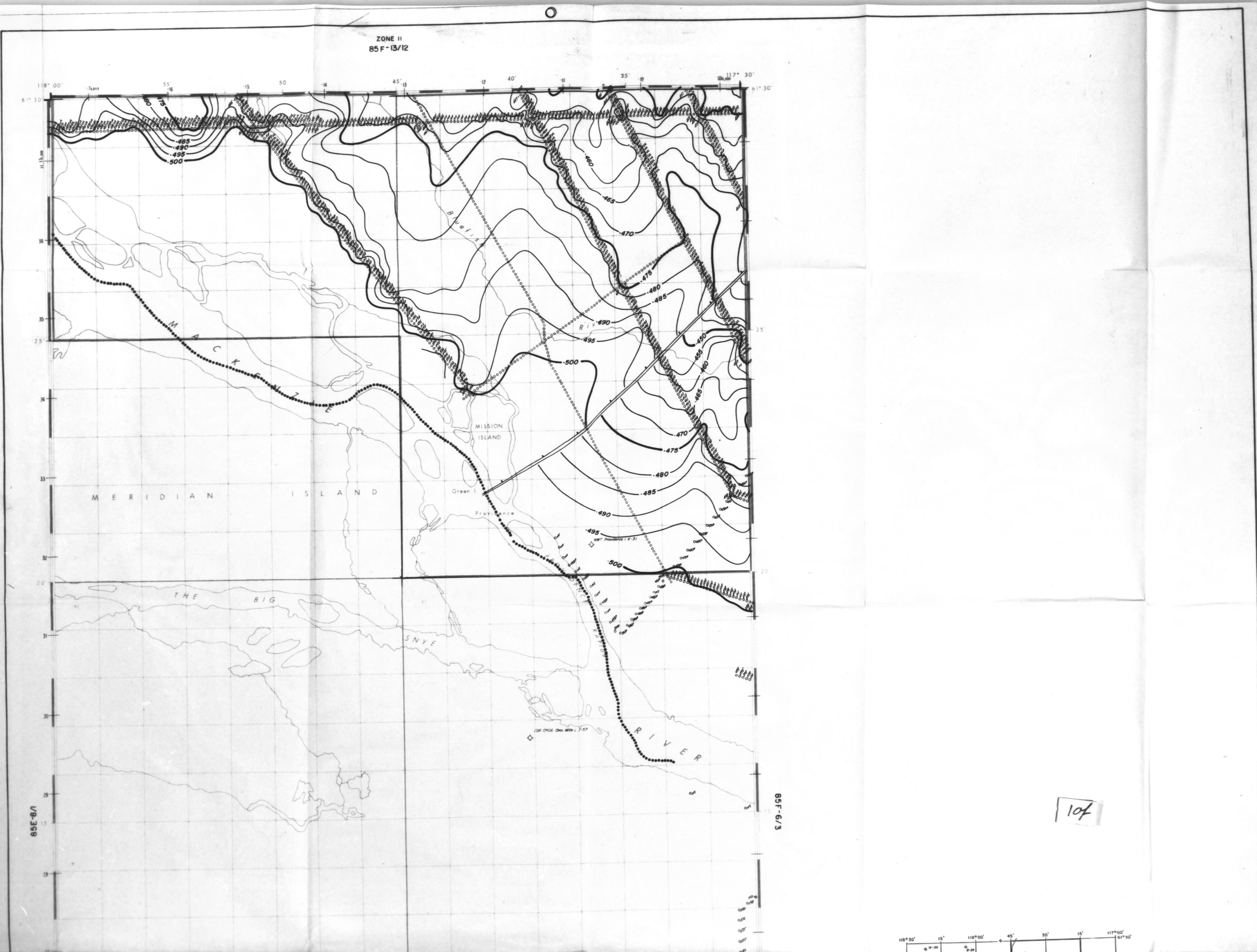
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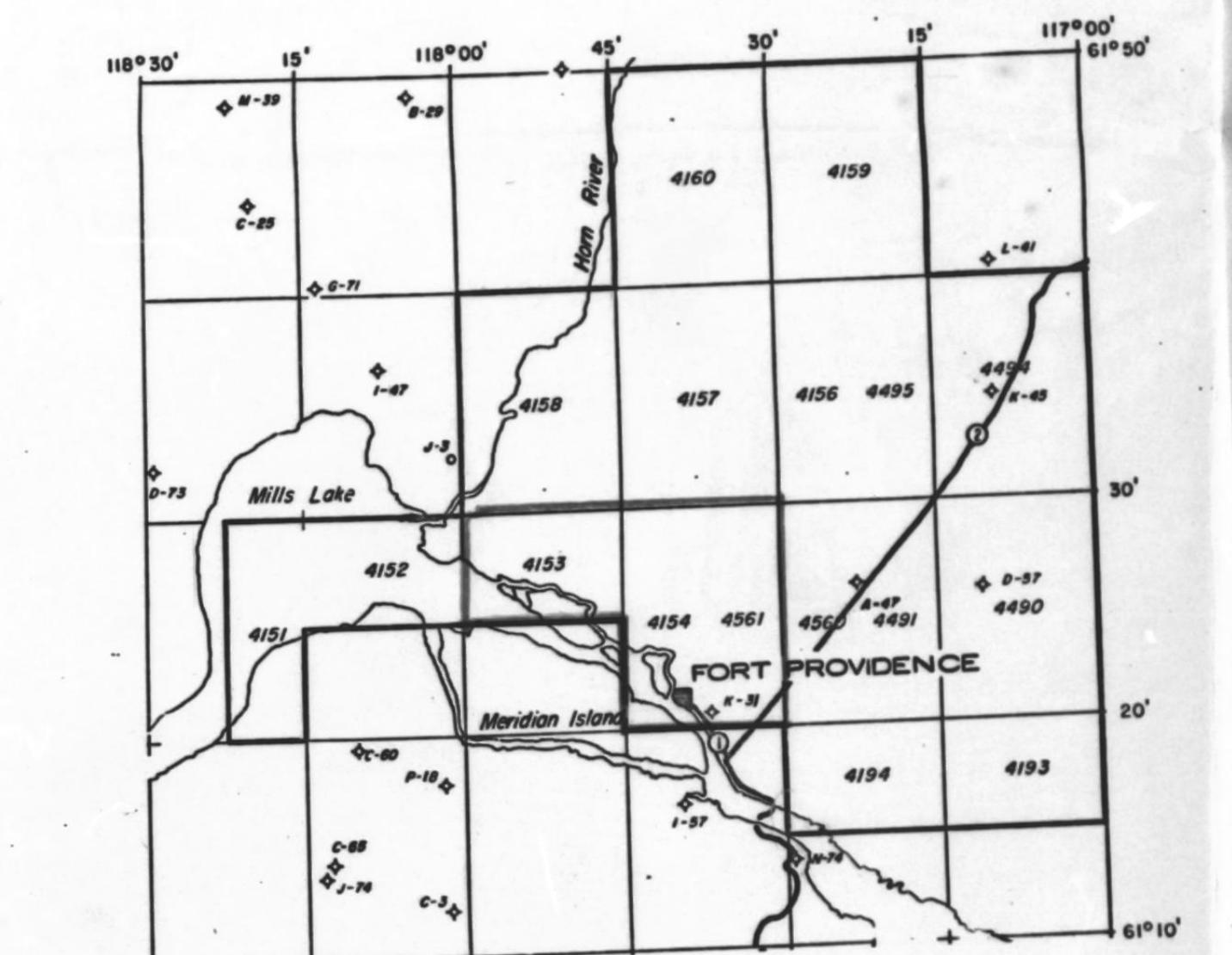
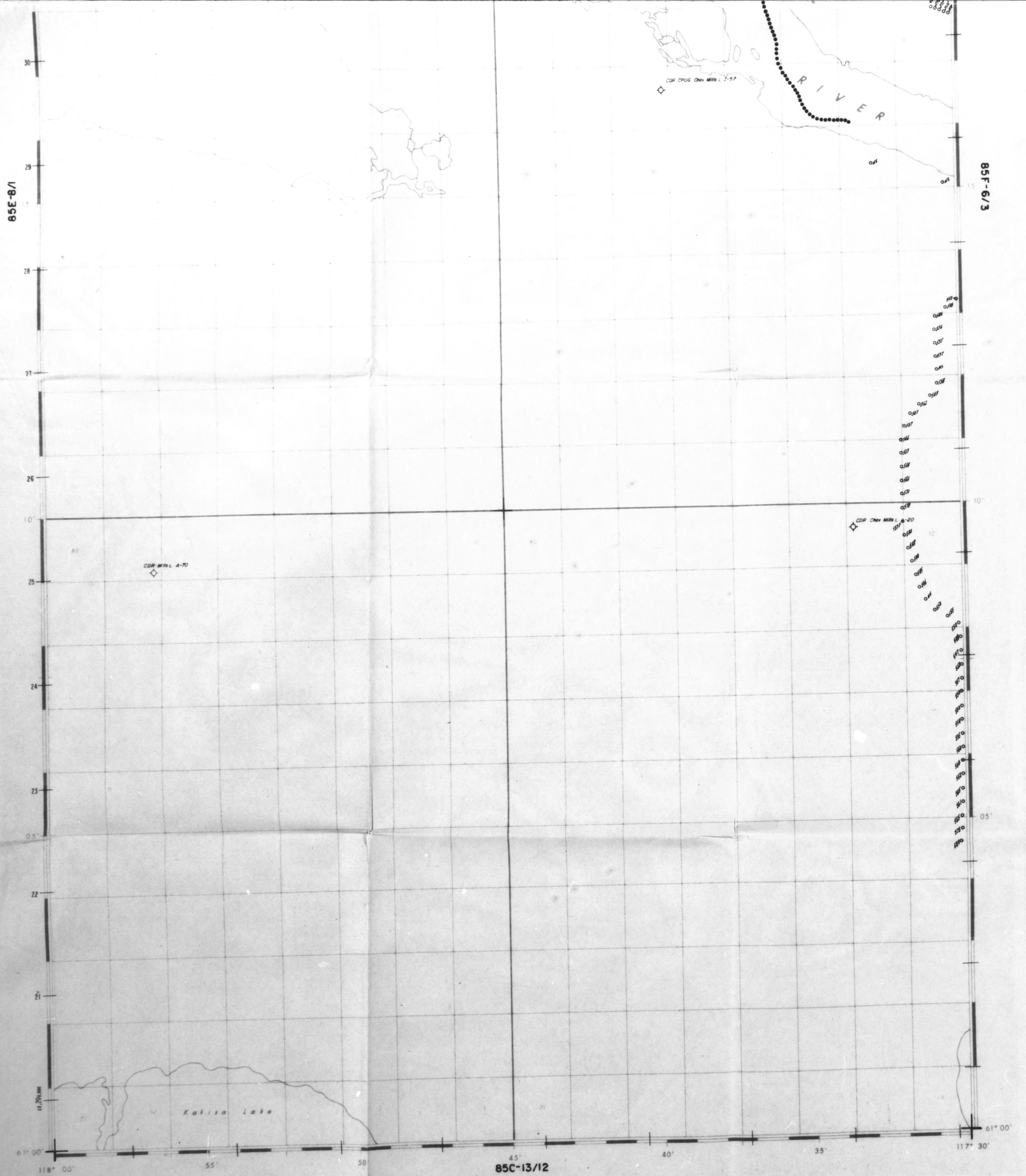
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MAN'S REPRODUCTIONS & PHOTOMAPPING LTD.

10,000 ft. Coordinates, Territorial Plane Coordinate System
Transverse Mercator Projection, 6 Zones.

Seismic Revised 1000
Values Revised 5000.00
Contours Revised 5000.00
Wells Revised 1000.00

Gp	85F-14/II	I	V	C		
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FORT PROVIDENCE AREA
IMPERIAL OIL ENTERPRISES LTD.

SCALE: 1:500,000

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85I	85H	85G
85F		85E
85D	85C	85B
85D	85C	85B

NOTE: LVL - THICK LVL, CORRECTIONS NOT ADEQUATE.

SEISMOGRAPH MAP
STRUCTURE
MIDDLE DEVONIAN CARBONATE

Contour Interval 5.000 SECS.
Datum: Plane 1500 Velocity 10,000 ft.

FALAISE LAKE 85 F - 5 / 4

272
PROPRIETARY

SCALE 1: 50,000
1.25 inches to 1 mile approximately

Miles 1 2 3 4
Feet 5000 10000 15000 20000

Seismic Revised
Values Revised
Contours Revised
Wells Revised

Gp 85F-5/4 I V C