

SEISMIC SURVEY REPORT

FORT NORMAN AREA

Submitted to

AMERADA PETROLEUM CORPORATION

By

NATIONAL GEOPHYSICAL CO. LTD.

Abstracted for
Geo-Science Data Index
~~Date~~



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Geo-Science Data Index
Date _____

National Geophysical Co. of Canada Ltd.

SEISMIC SURVEY REPORT

on the

F O R T N O R M A N A R E A

Northwest Territories, Canada

Submitted to

AMERADA PETROLEUM CORPORATION

By

NATIONAL GEOPHYSICAL COMPANY OF CANADA, LIMITED

Party No. 40

National Geophysical Co. of Canada Ltd.

P R E F A C E

This report presents the results of the seismic survey conducted in the Fort Norman Area, Northwest Territories, Canada, for Amerada Petroleum Corporation during the winter period of 1966.

The work was performed by National Geophysical Company of Canada, Limited, Party No. 40 under the direction of Party Chief F.E. Ganoë.

The main objective was to conduct a reconnaissance survey over a designated area.

The survey was conducted over a period of 48.88 days between February 17th and April 11th, 1966.

A separate report covering the operational aspects of the survey is being submitted under separate cover.

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Figure II	National 26A Amplifier Curves
Figure III	Spread Arrangement Diagram

E N C L O S U R E S

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 - a. Slater River Area
 - b. Little Bear River Area
 - c. Mirror Lake Area
2. Horizon "B" Time Structure Map
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 - c. Mirror Lake Area
3. Hume to Horizon "B" Isochron
 - a. Slater River Area
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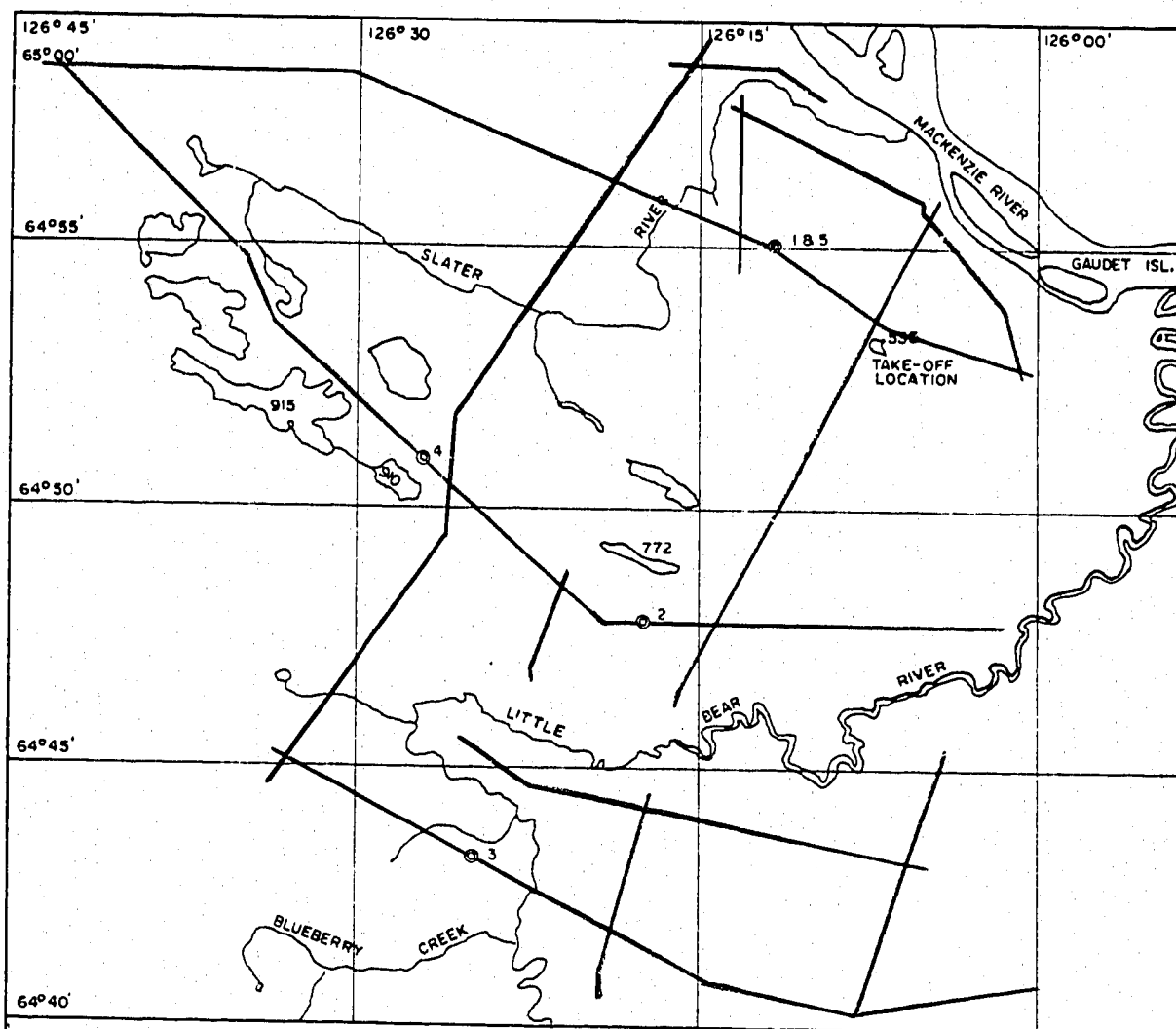


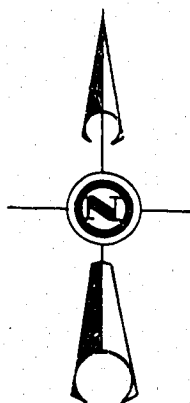
FIGURE NO. I

LOCATION MAP

FORT NORMAN AREA

NORTHWEST TERRITORIES, CANADA

NATIONAL GEOPHYSICAL COMPANY OF CANADA, LTD.



SCALE: 1" = 4 MILES

SEISMIC SURVEY REPORT

on the

F O R T N O R M A N A R E A

Northwest Territories, Canada

INTRODUCTION

The Fort Norman Area consists of lands held by Amerada Petroleum Corporation, Canadian Superior Oil Limited and Socony Mobil of Canada, Limited, and designated as Permits numbered P-3713, P-3714, P-3717, P-1720, P-3786 and P-3787. Under an agreement between the three parties Amerada Petroleum Corporation was to undertake a seismic survey within the Permit boundaries and divided equally on the Permits held by each participant.

For the initial stages of evaluation the program was one of a reconnaissance nature. Further detail stages of programming are to follow, depending upon the results of this initial assignment.

No wells had been drilled within the permits or near vicinity. The velocity information and reflection identification was supplied by Amerada Petroleum Corporation which they obtained from previous seismic control shot down the MacKenzie River.

RECORDING PROCEDURE

Initial shooting consisted of recording a Noise Spread of 6000 ft. in length. This Noise Spread was shot using Amerada's standard procedure which consists of using single shot holes and single geophones per trace with a space interval of 100 ft.

From the results of this Noise Spread it was ascertained that the optimum record could be obtained by using three hole patterns, 2000 ft. spreads with 2000 ft. offset and 20 ft. geophone spacing. This procedure was utilized throughout the area, except it was found necessary to cut the shotpoint locations to two hole patterns for a more economical operation.

All data was recorded on a techno AM tape while simultaneously a Monitor record was taken. Playback records were made from each tape. The Monitors were recorded in a AH-GH (13-24-90) filter setting and the Playbacks were recorded in a BH-GH (19-35-91) filter.

Frequency response versus filter setting for the National 26A amplifiers are included as Figure II.

DATA PRESENTATION

All original field records, including Playbacks, after being timed and labelled were forwarded to Amerada's Calgary Office. Prints of the

National Geophysical Co. of Canada Ltd.

Monitors were retained in the field office and were the data upon which the field interpretation was based.

The magnetic field tapes were forwarded to Amerada in Calgary along with the record shipments. Record sections were prepared in Amerada's Playback Center; all computations pertaining to their preparation were performed by Amerada personnel.

The field party received copies of the Noise Spread as well as the record sections. The sections were used only as a guide in areas of poor data in the field interpretation.

The records retained in the field office were corrected from the shot elevations to a datum plane of 350 ft. above sea level using a correction velocity of 10,000 ft./sec. Uphole times were used to correct from the shot elevation to the surface. The first breaks were plotted on the initial shooting and it was ascertained that a drift layer was not present in such amounts as to be a problem.

Reflection data was taken directly from the records without the "normal move out" being removed. The data as presented on the maps is an average of the short trace times on reversed profiles.

Time structural maps of the Hume Formation and an unidentified deeper event which is designated as Horizon "B" were prepared with a time interval map from the Hume to Horizon "B". These maps form the results of the

National Geophysical Co. of Canada Ltd.

survey.

RESULTS

Very little geological information is available for the Fort Norman Area; however positive identification of the Hume Horizon was made from a distant well. This is by far the most outstanding reflection in the area and is located at or near the top of the Middle Devonian. The Hume event consists chiefly of limestones and is overlain by shales of the Upper Devonian. Possible petroleum reservoirs are to be found in reef build-ups in the Upper Devonian shales and in fault traps in the lower part of the geological section.

The rate of the regional dip indicated by the enclosed structural maps is probably less than the actual case. No corrections were applied to correct for increased velocity resulting from the rapid thickening of overburden.

Record quality was generally good except in the vicinity of the MacKenzie River. The deeper reflections suffered; and in the southeastern portion of the area all usable data was missing due to faulting. One could rely confidently on correlations of the Hume reflection across fairly large gaps throughout the area. The Horizon "B" reflection was fairly continuous over the area but it could not be correlated very reliably due to the poor character of the reflection and the unconformity between it and the

shallower reflection.

Consider now the time structure maps, as mentioned earlier; these times are from 2000 foot offsets and do not have the normal move out time removed. Because of the loose nature of the program grid the contour interval is greater than normal. Further, the large grid affords considerable latitude in the manner of contouring.

The Hume time structure map indicates regional southwest dip at a rather uniform rate from the northern part of the area. However, about the center of the area there is some west nosing which changes the direction of dip to the south as the region of faulting is approached. In the vicinity of faulting the dip becomes anomalous as the direction changes to the southeast. The faults are believed to have a general northeast to southwest alignment, but the control is too loose to establish the exact location. The small fault in the vicinity of shotpoint YW 539 is down thrown to the southeast with about 30 to 50 milliseconds of throw. The major fault is believed to be an overthrust fault with the down thrown side to the northwest. The seismic control is insufficient across these faults to evaluate them properly.

The Horizon "B" time structure map is thought to be the control for the Cambrian or Precambrian formation. However, due to lack of well control in the area the identification is questionable. The dip in the northern half of the area was to the southwest which is regional. The southern

National Geophysical Co. of Canada Ltd.

half of the area has several reversals with flattening and west nosing which gives rise to a change in the rate and direction of dip in the vicinity of the overthrust fault. If the small fault as indicated on the Hume structure map cut this level, the record quality was not good enough for it to be mapped. The major overthrust fault is not definitely defined as to alignment and amount of throw. The record quality did not improve sufficiently after crossing this fault to re-establish this horizon on the east or upthrown side.

The Hume to Horizon "B" isochron map does not generally conform with either structure map due to the unconformity between these levels. The general attitude of this map is thinning from east to west. There is however a thin area located in the extreme northeast portion of the area. Also in the southern portion of the area the trend is thinning to the south. This thinning is due to the unconformity between the two structure maps as indicated by the reversals and flattening on Horizon "B".

CONCLUSION

The results of the survey reveals that the area contains several anomalous features. The major unconformity has not been sufficiently defined to reveal any stratigraphic traps which could be associated with it. Additional control is also necessary in the fault region to properly evaluate any favorable anomalies in connection with these faults.

Since the program was one of reconnaissance shooting, the primary objective was satisfactorily completed, that is, to ascertain if any anomalies existed, and if so, their general location and magnitude. It is recommended that additional seismic control is needed in these indicated areas of interest.

NATIONAL GEOPHYSICAL COMPANY
OF CANADA, LIMITED

F. E. Ganoe
F.E. Ganoe - Party Chief

H. C. Tims
H.C. Tims - Supervisor

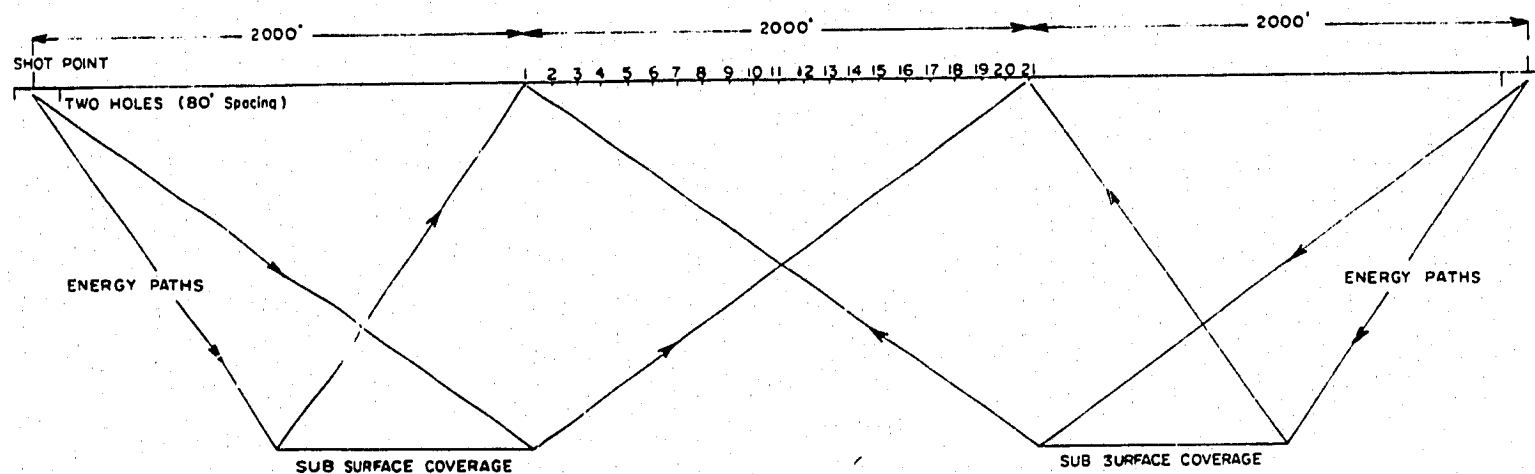


FIGURE NO III

STATION INTERVAL 100'

OFFSET 2000': SPREAD 2000' - 4000'

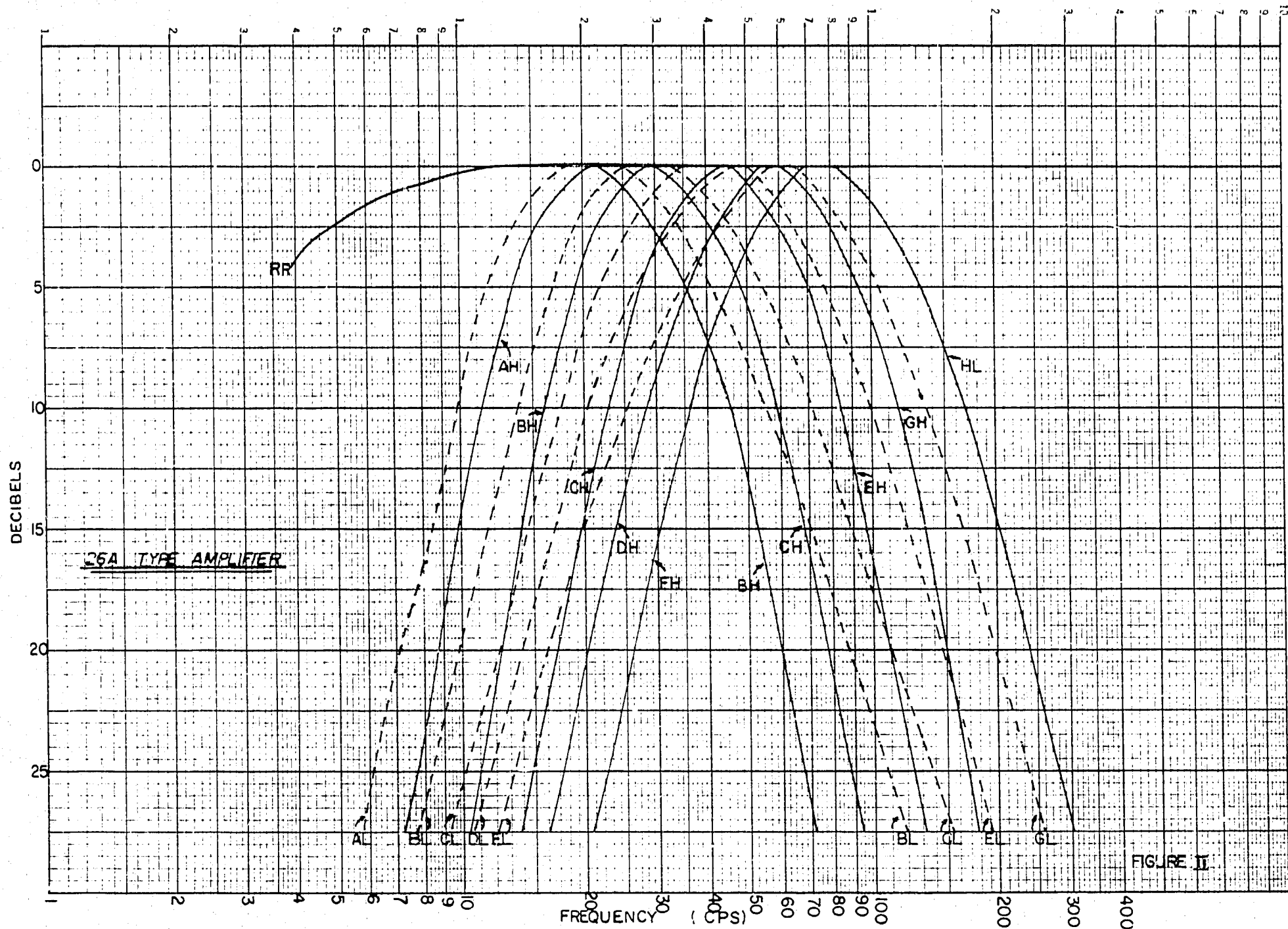
6 NATIONAL 14A SEISMOMETERS PER TRACE

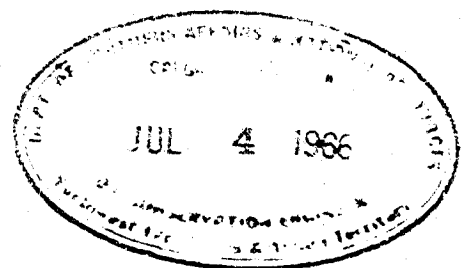
SPREAD ARRANGEMENT

FORT NORMAN AREA

NORTHWEST TERRITORIES, CANADA

NATIONAL GEOPHYSICAL COMPANY OF CANADA, LTD.





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- Figure III Spread Arrangement Diagram
- Base map Shot hole Elevations

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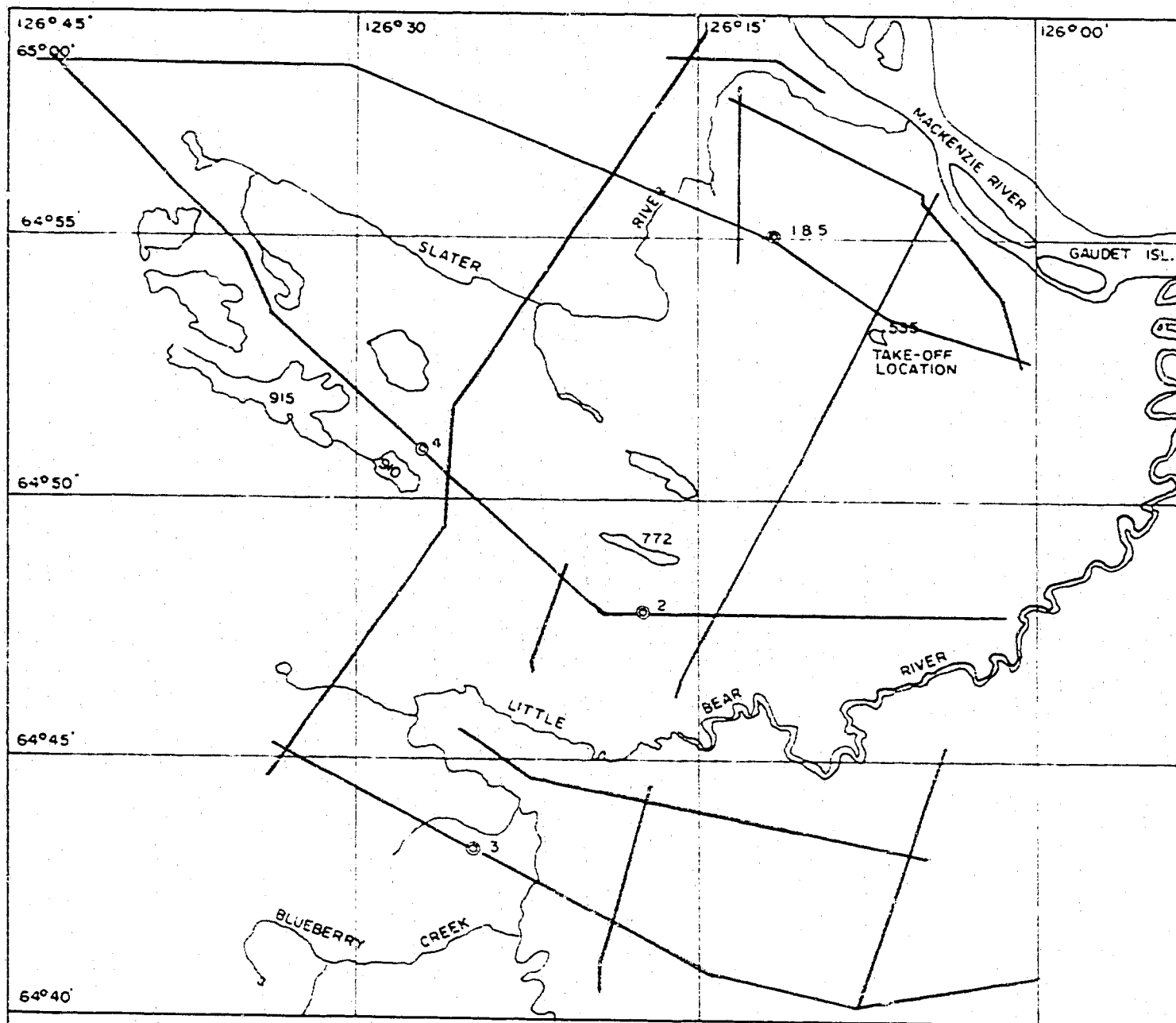


FIGURE NO. I

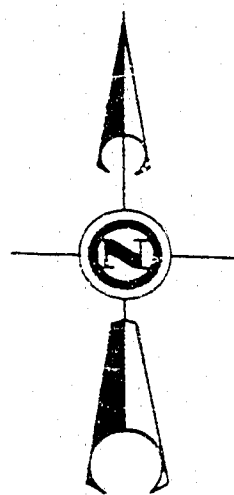
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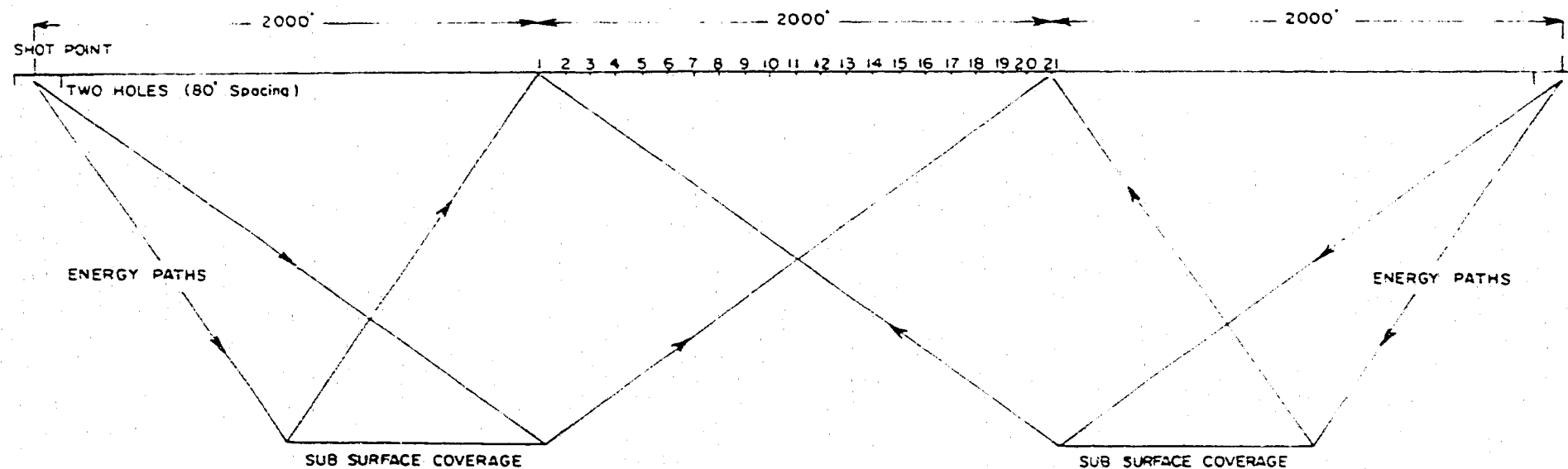


FIGURE NO III

STATION INTERVAL 100'
 OFFSET 2000': SPREAD 2000' - 4000'
 6 NATIONAL 14A SEISMOMETERS PER TRACE

SPREAD ARRANGEMENT

FORT NORMAN AREA

NORTHWEST TERRITORIES, CANADA

NATIONAL GEOPHYSICAL COMPANY OF CANADA, LTD.

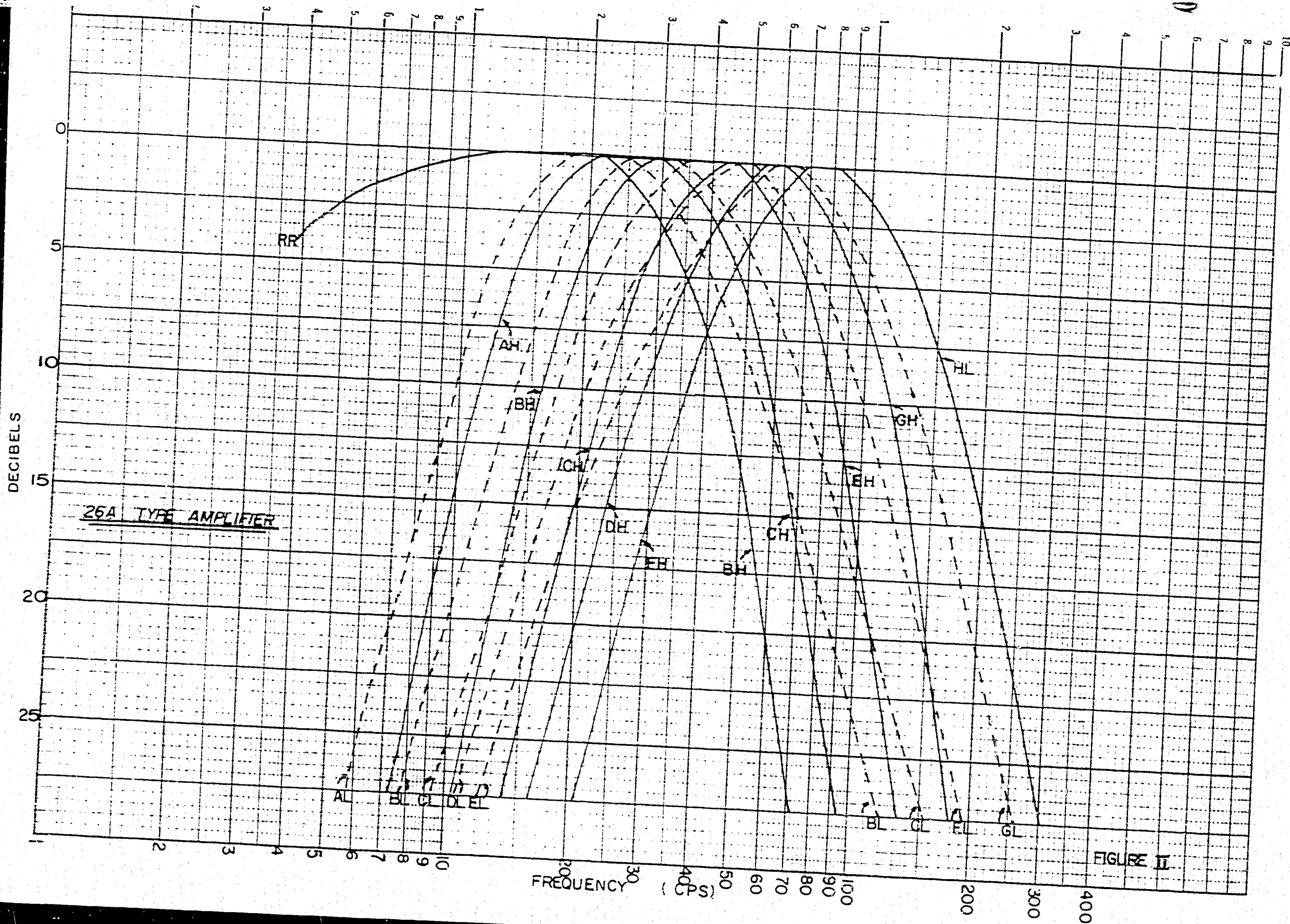
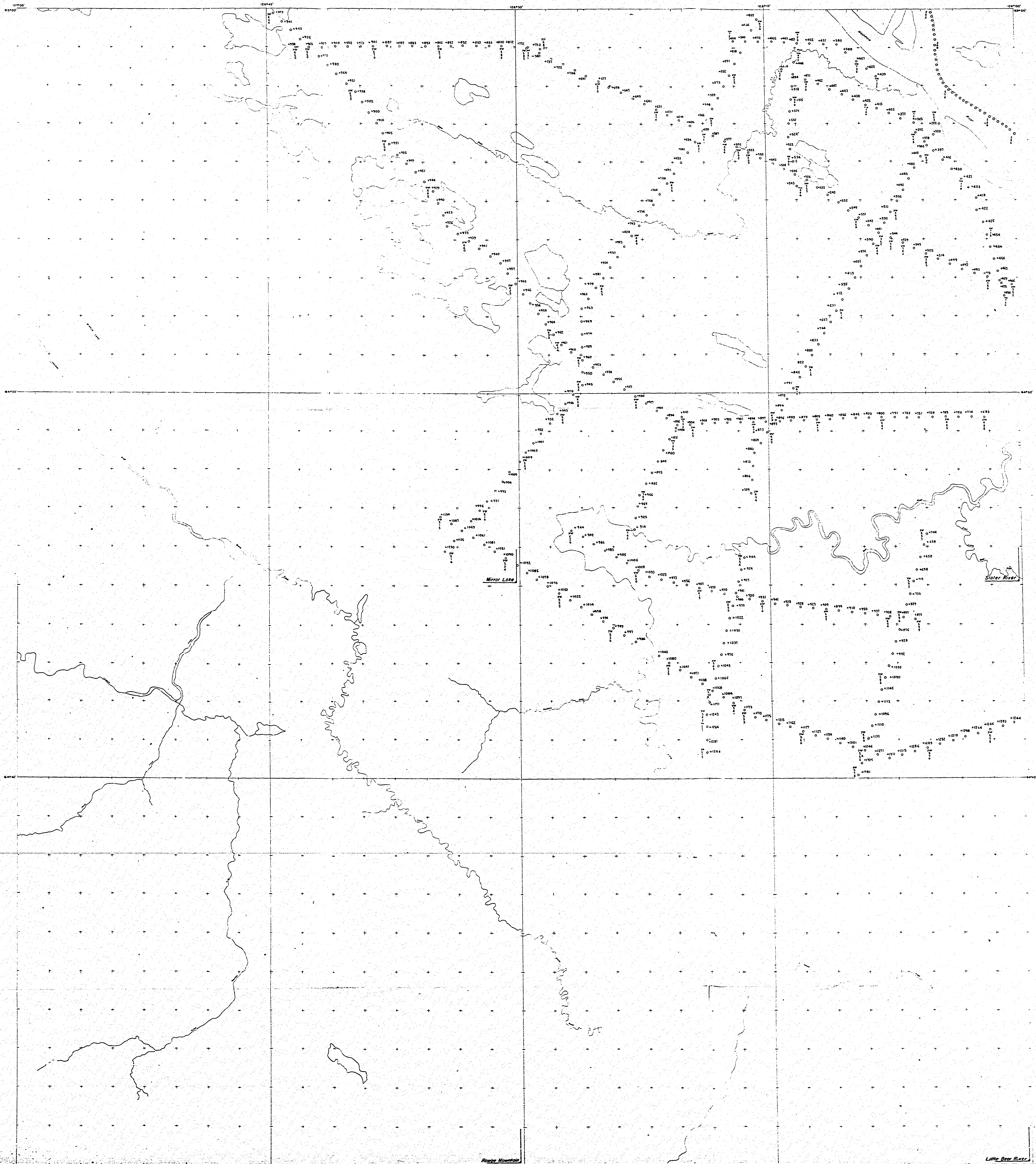
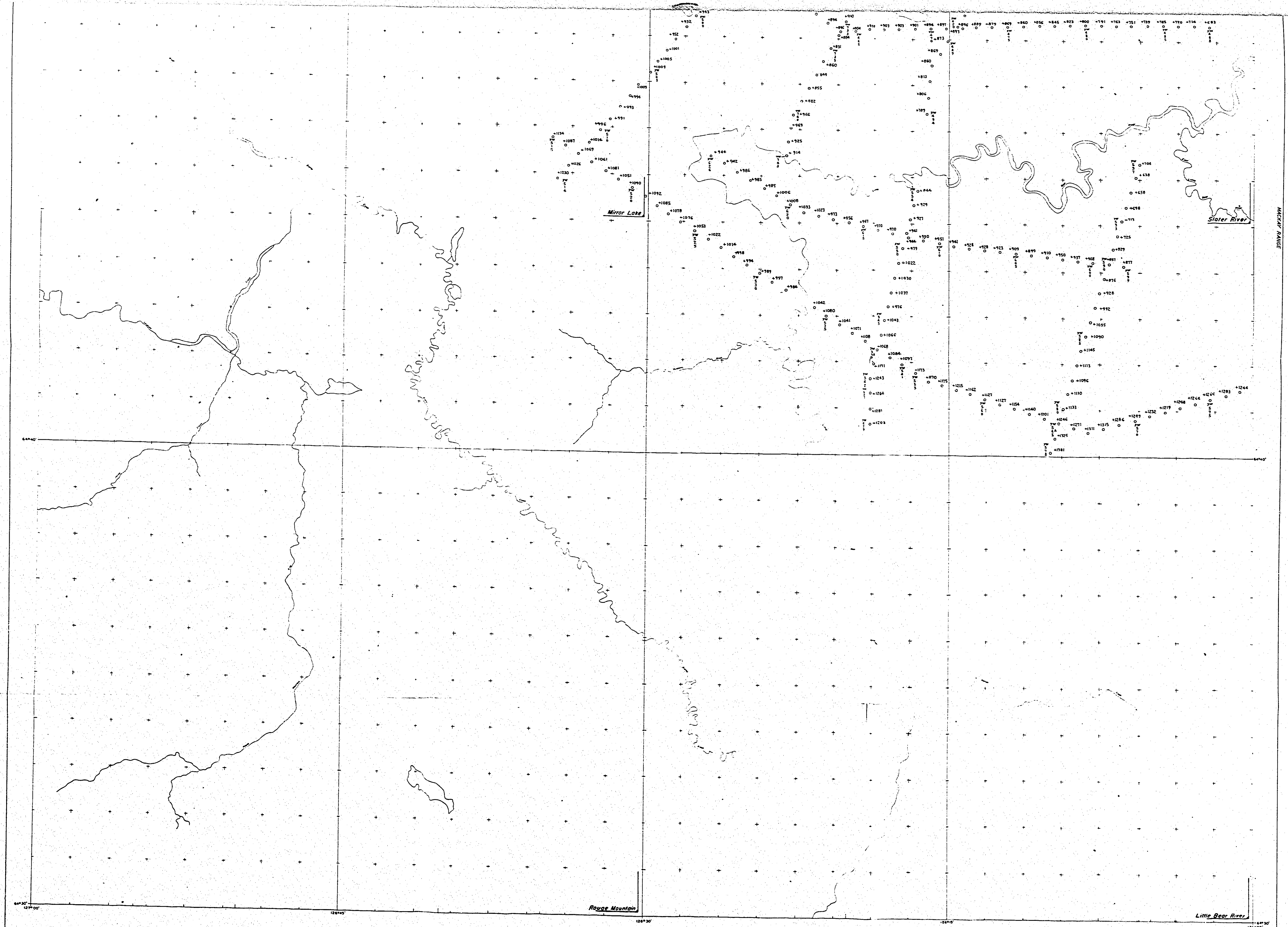


FIGURE II

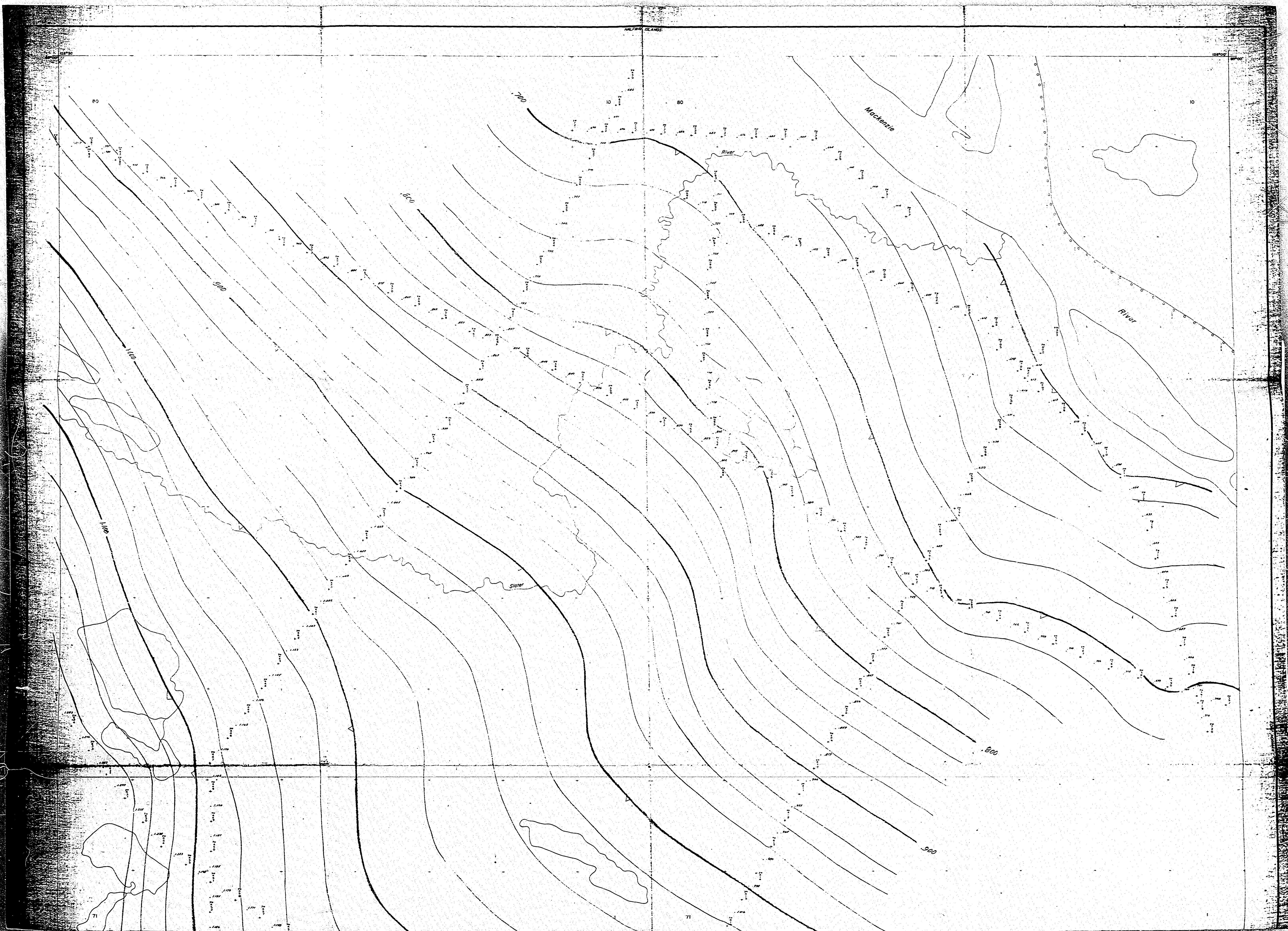
TEN MILE ISLAND

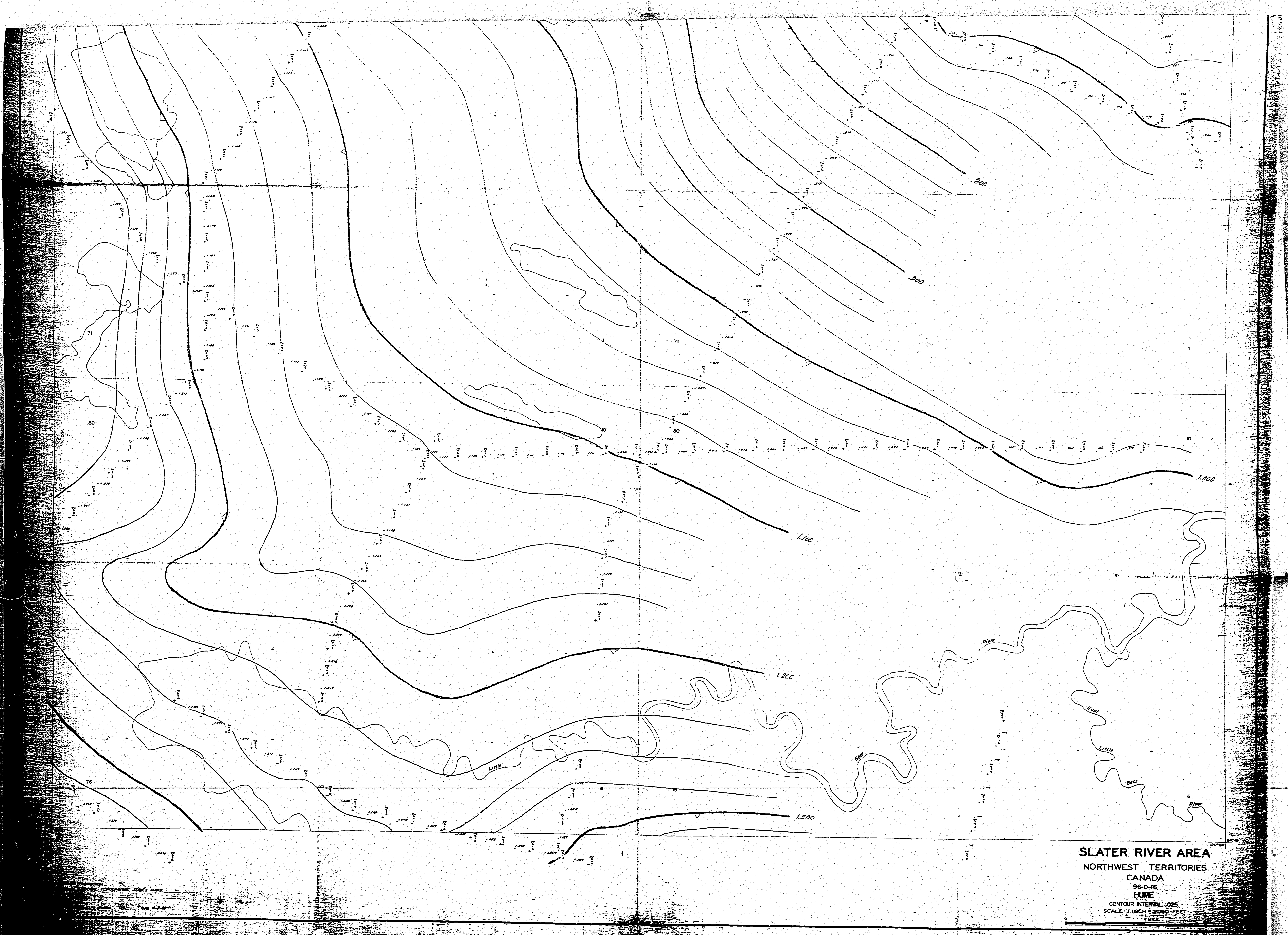




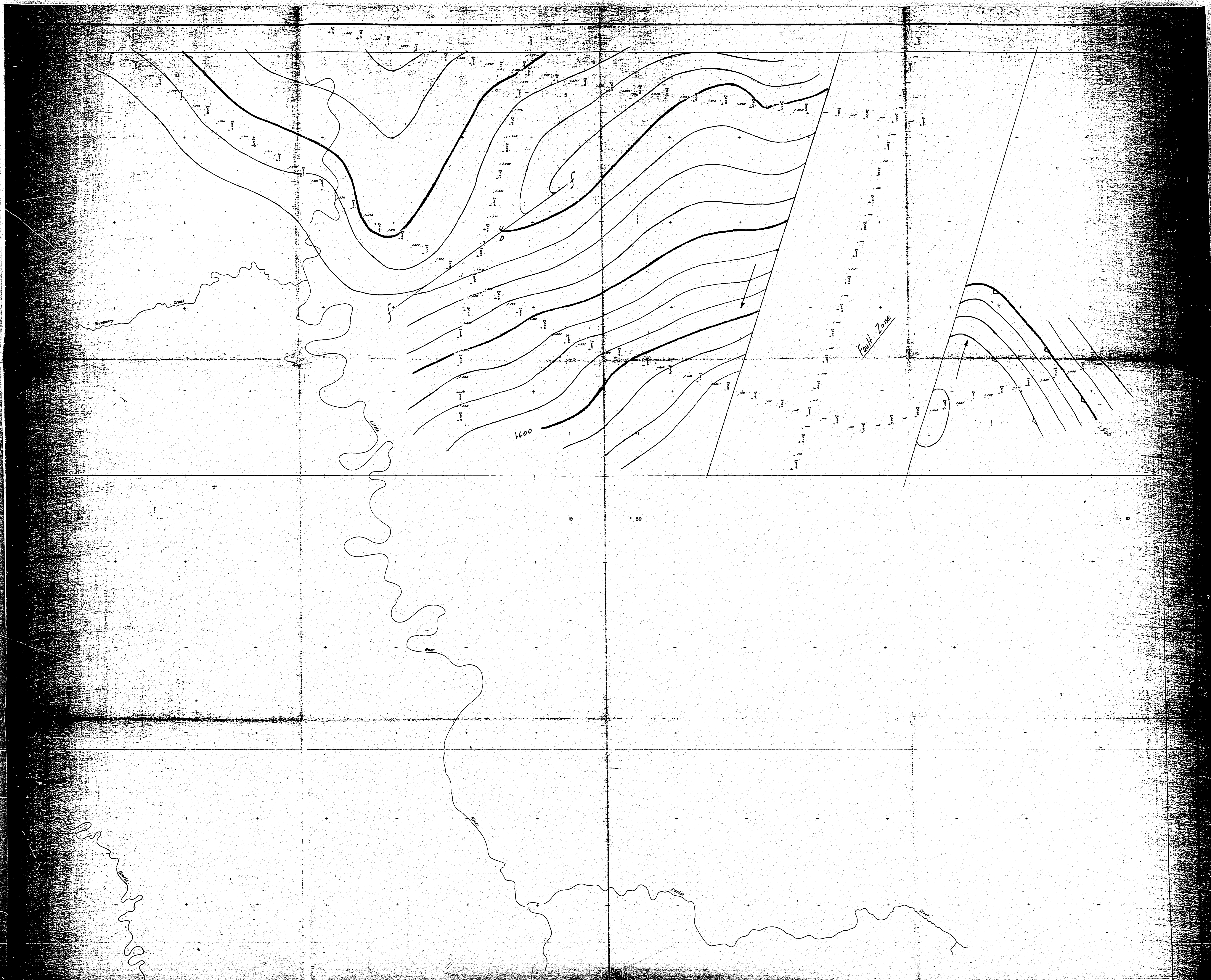
CANYON RANGES
NORTHWEST TERRITORIES
CANADA
SHOT HOLE
ELEVATIONS

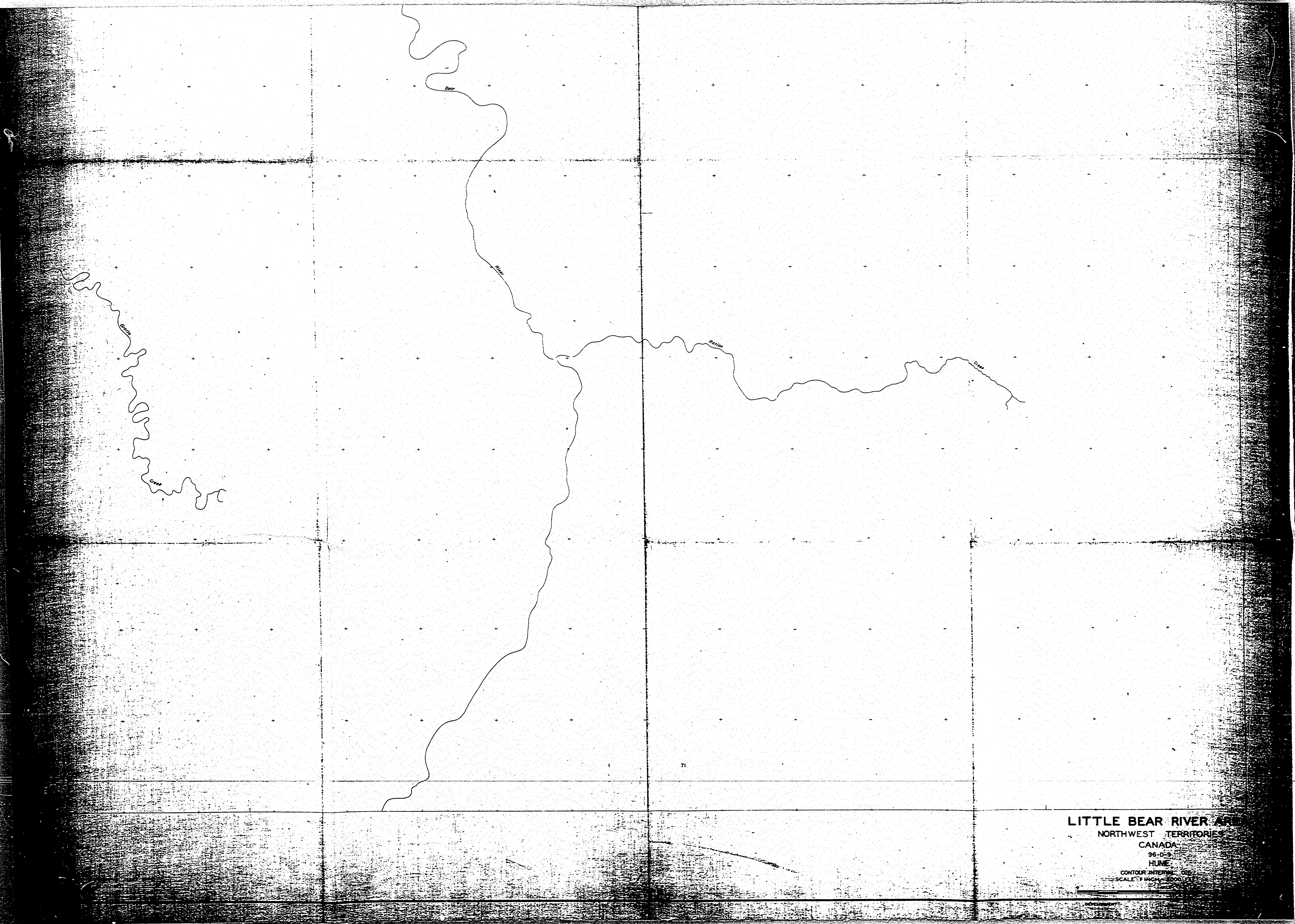
SCALE: 1 INCH = 1 MILE





SLATER RIVER AREA
NORTHWEST TERRITORIES
CANADA
96-D-16
JUNE
CONTOUR INTERVAL 100
SCALE 1 INCH = 2000 FEET
DEVELOPMENT





LITTLE BEAR RIVER AREA

NORTHWEST TERRITORIES

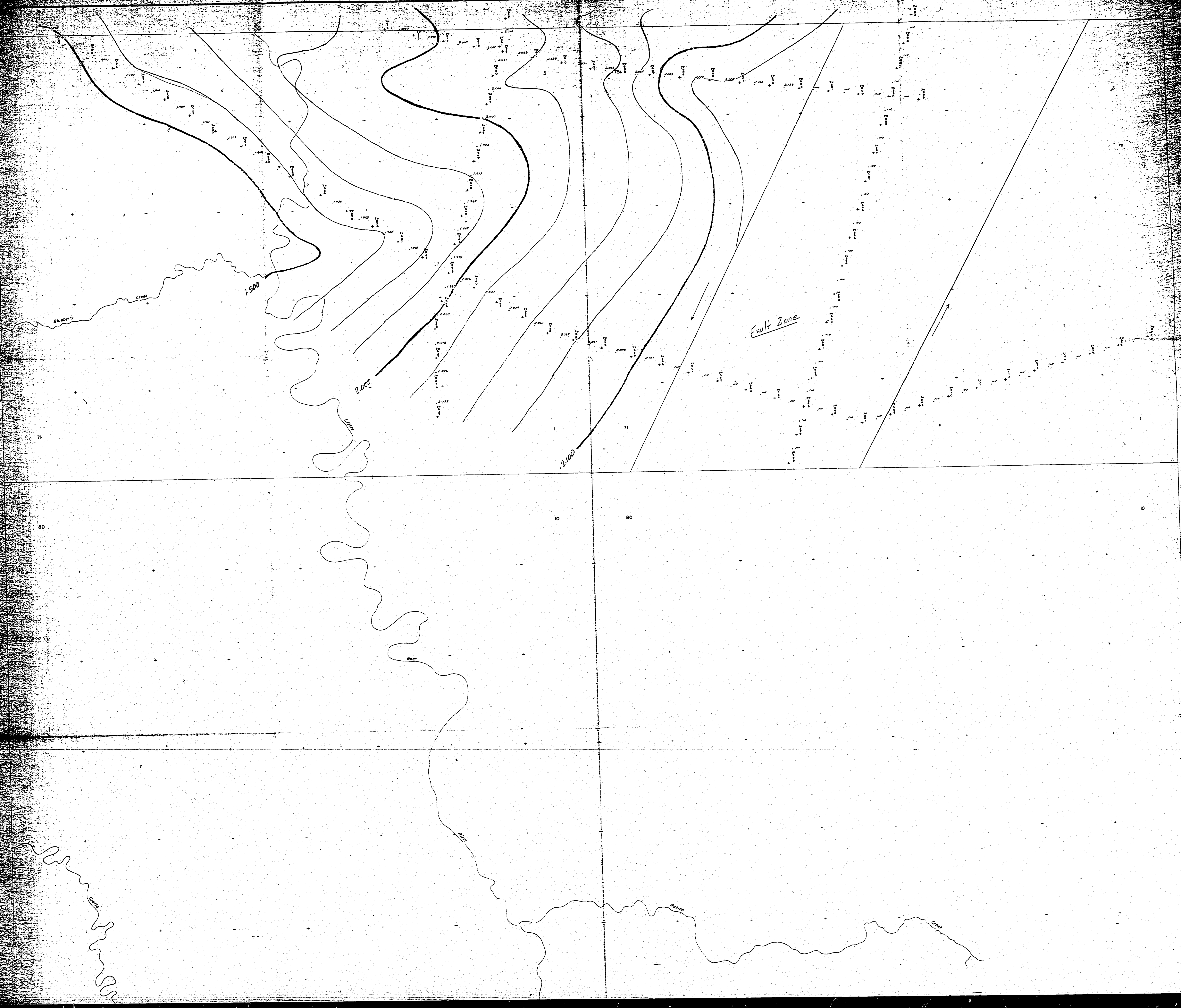
CANADA

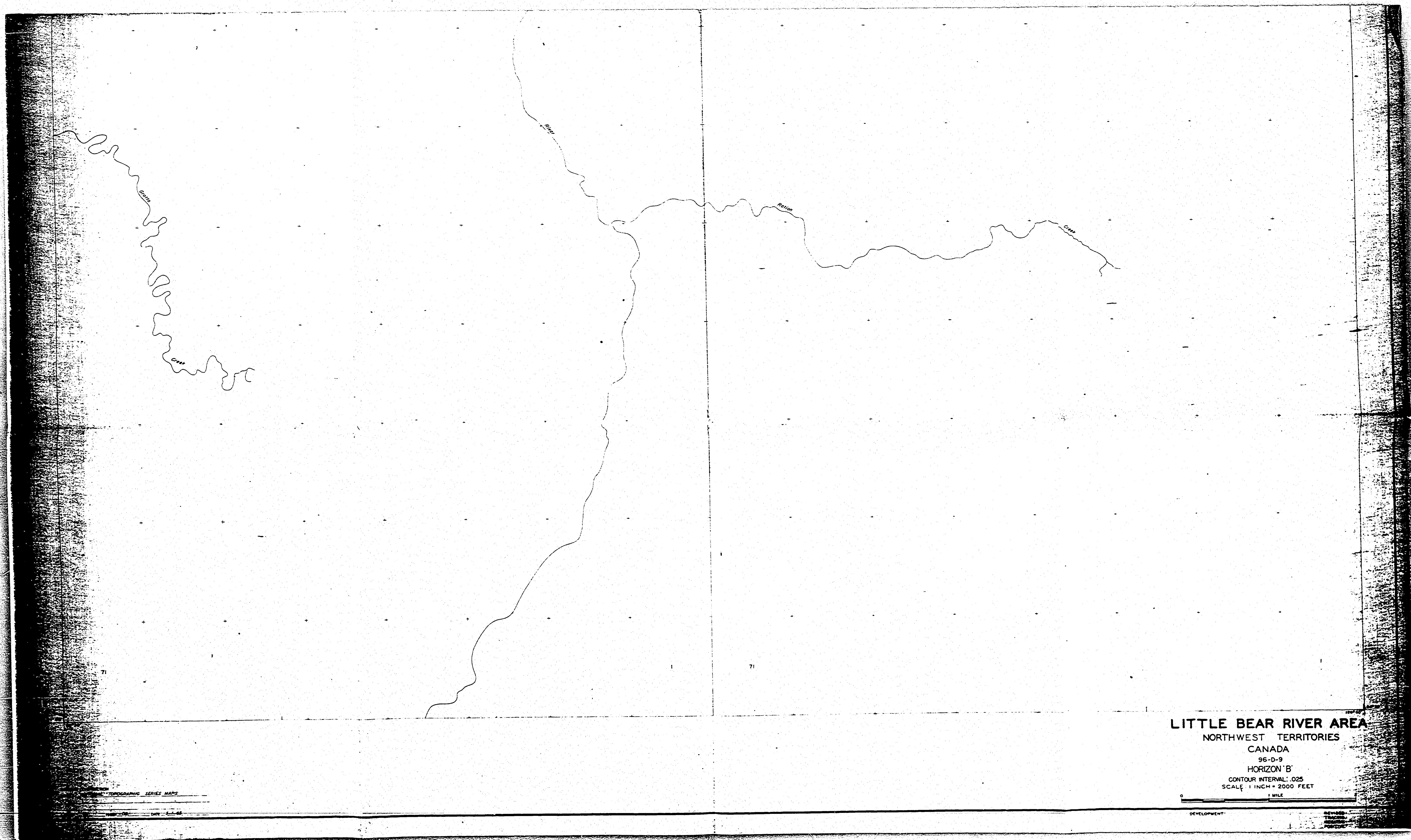
96-D-9

HUME

CONTOUR INTERVAL 100

SCALE 1 INCH = 1 MILE





LITTLE BEAR RIVER AREA

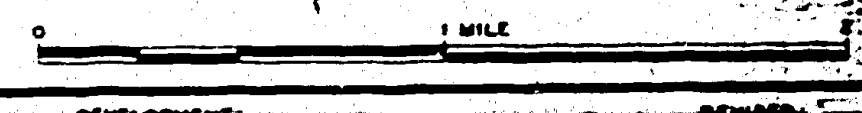
NORTHWEST TERRITORIES

CANADA

96-D-9

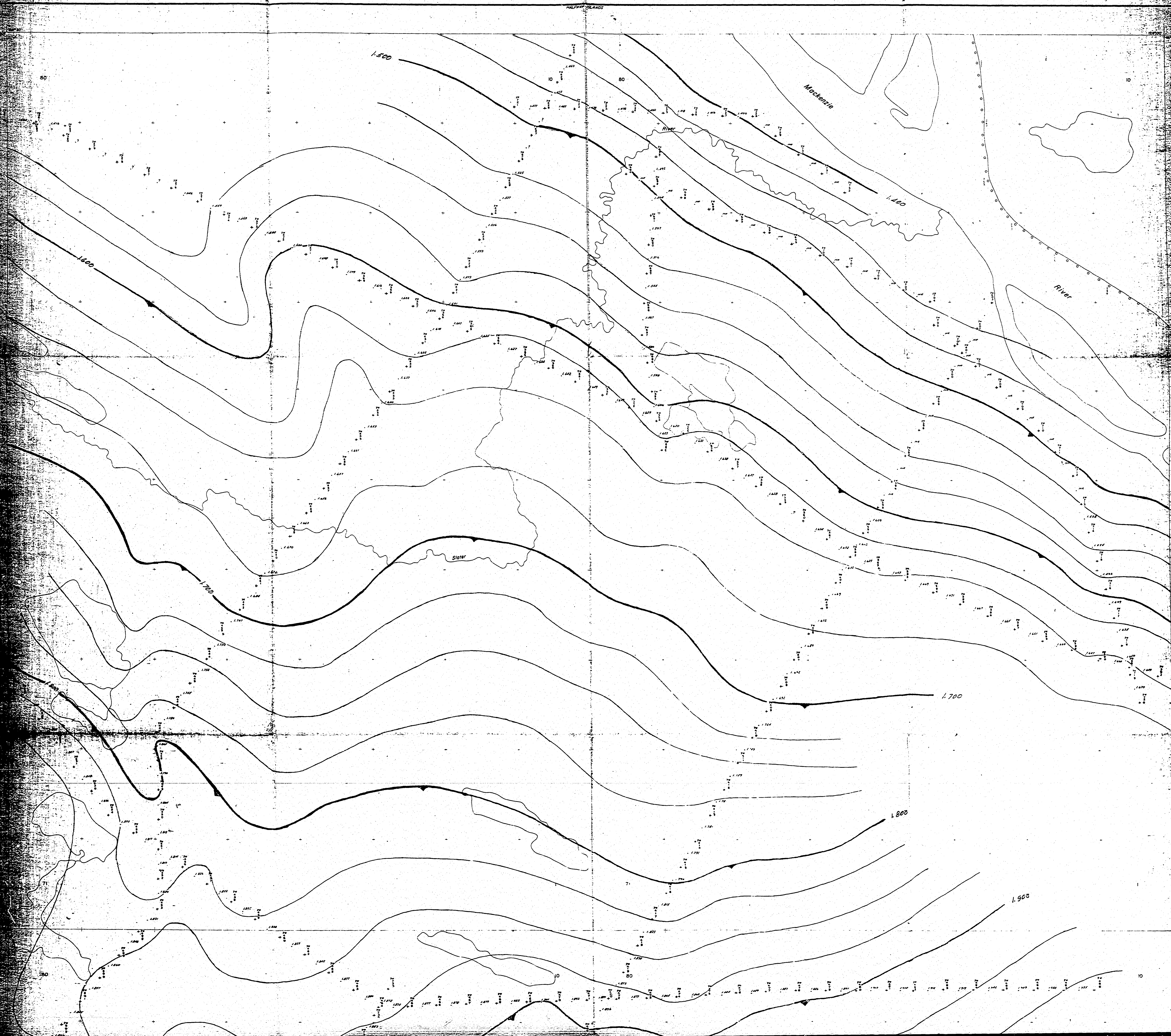
HORIZON B

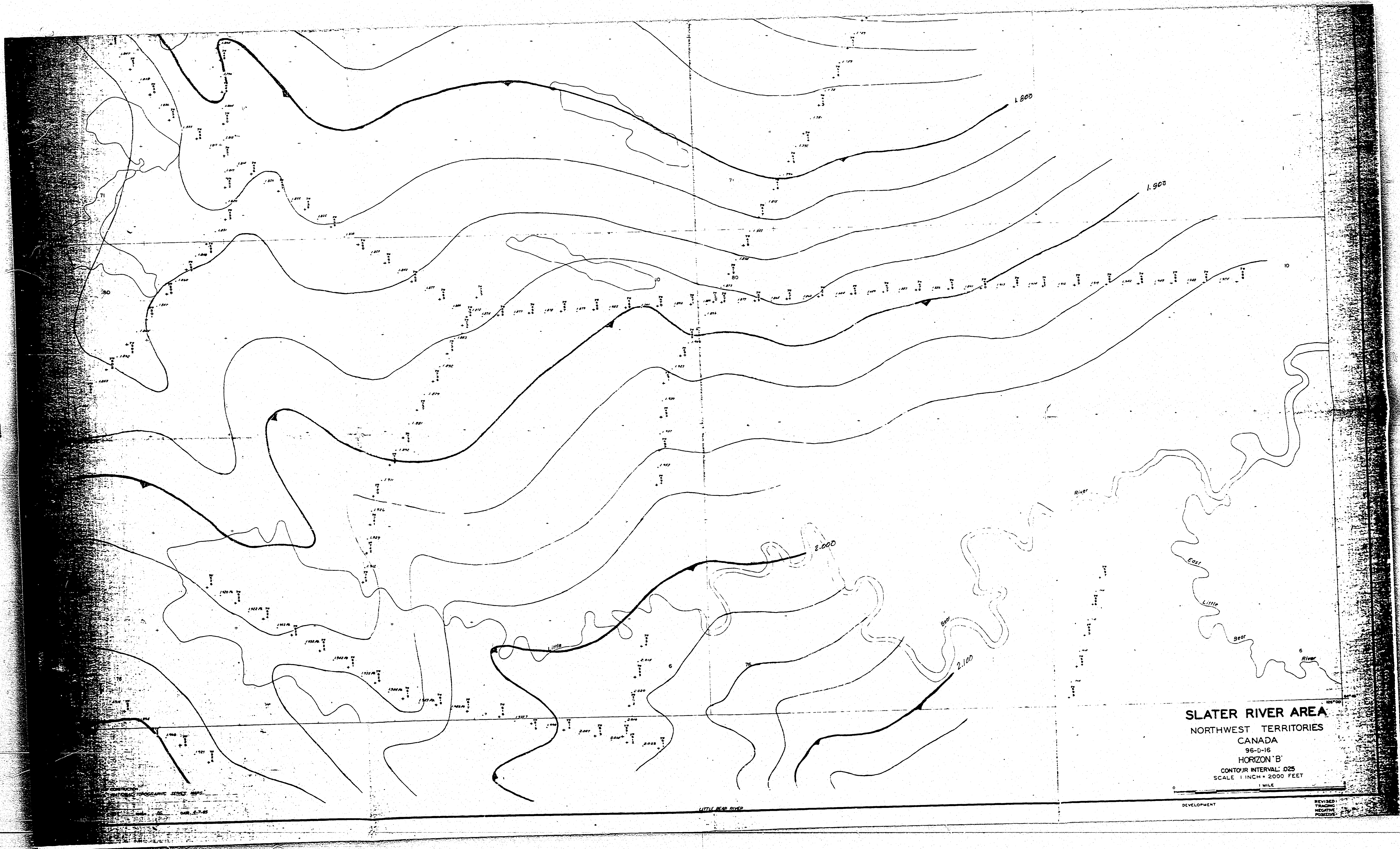
CONTOUR INTERVAL: 0.25
SCALE 1 INCH = 2000 FEET

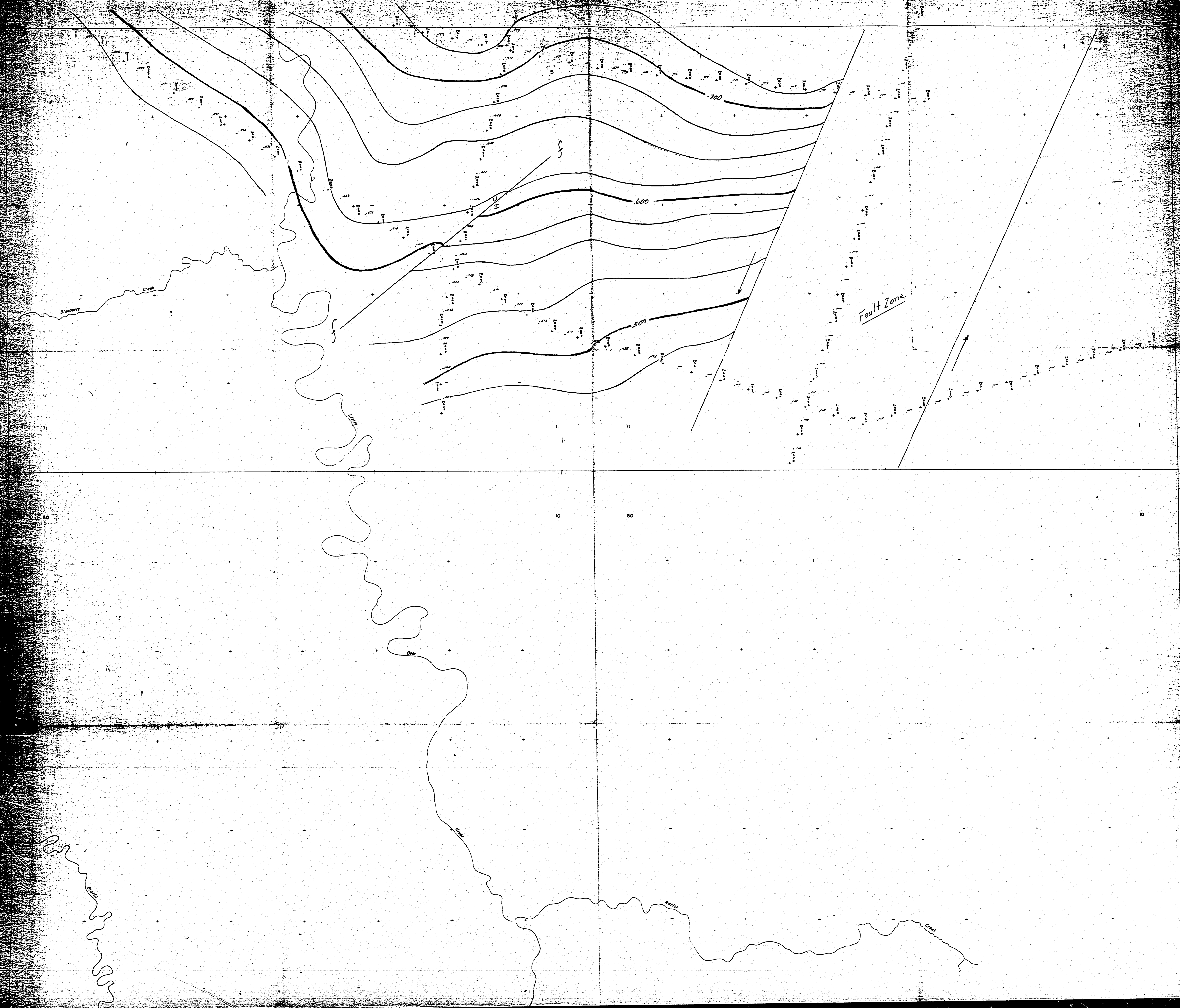


DEVELOPMENT

REVISIONS







LITTLE BEAR RIVER AREA

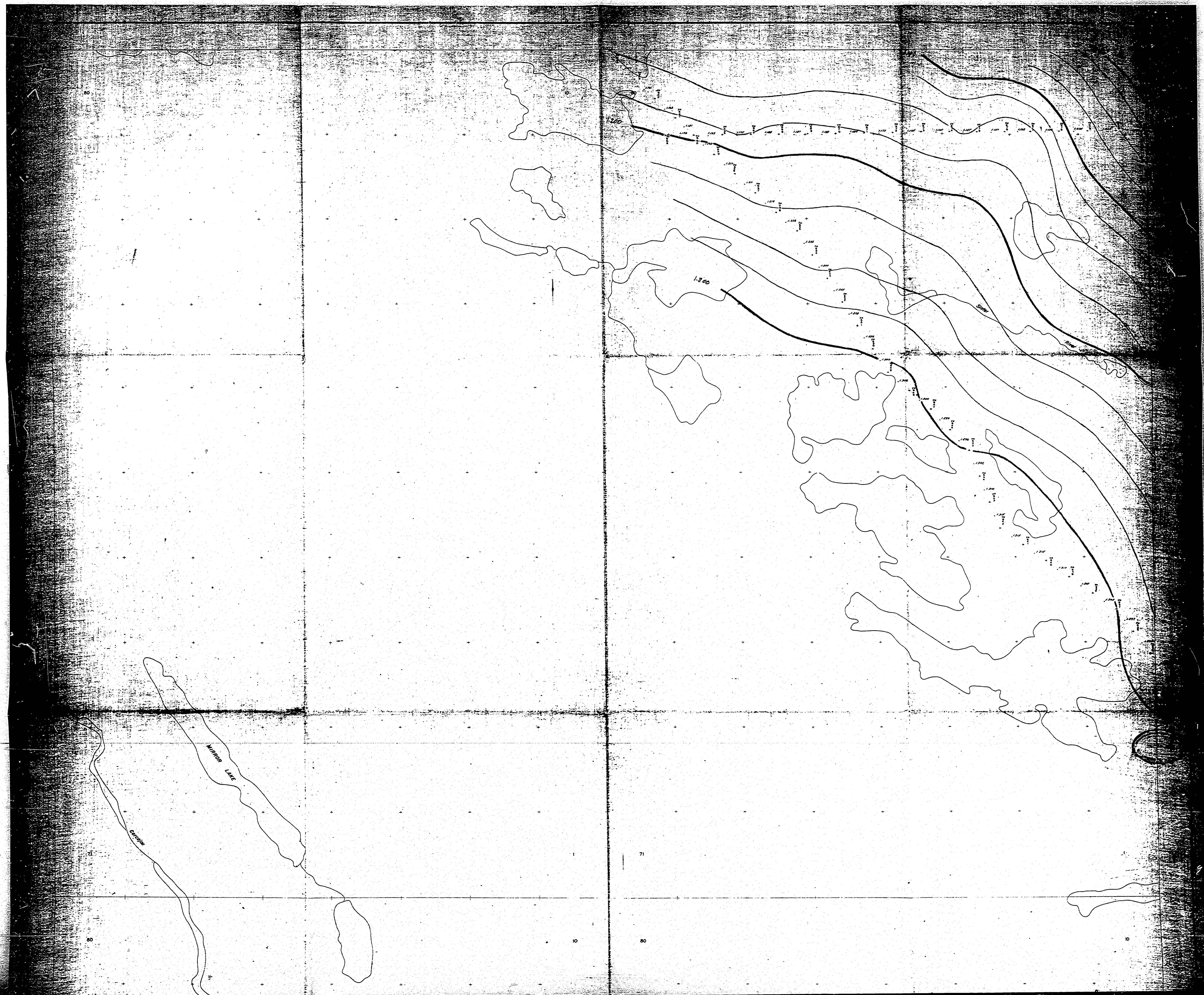
NORTHWEST TERRITORIES
CANADA

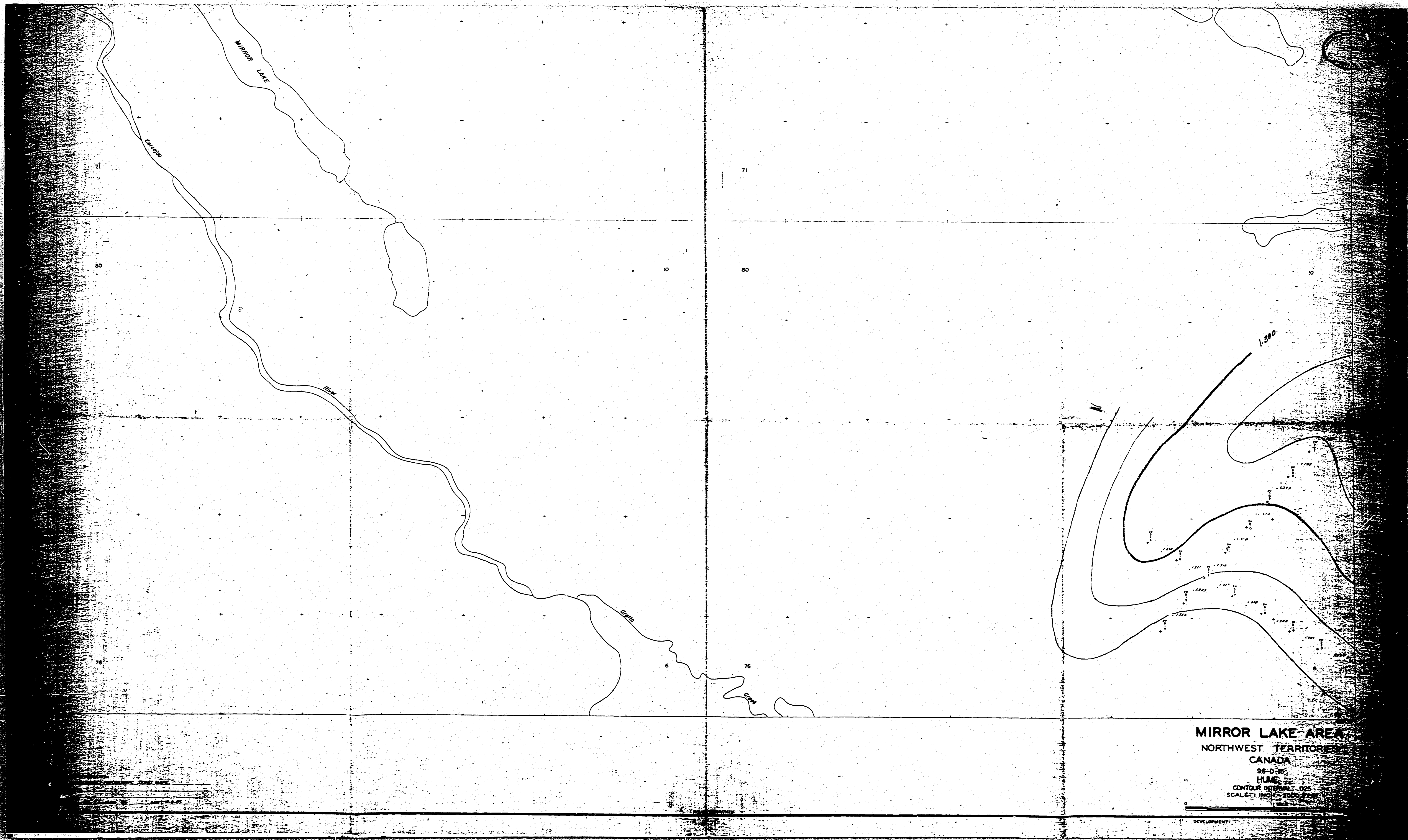
96-D-9
ISOCHRON: HUME TO HORIZON 'B'

CONTOUR INTERVAL: 025
SCALE: 1 INCH = 2000 FEET

1 MILE

DEVELOPMENT:





MIRROR LAKE AREA
NORTHWEST TERRITORIES
CANADA

98-0-15
H.M.E.
CONTOUR INTERVAL: 100
SCALE: 1 inch = 1 mile

DEVELOPMENT

BEAR ISLAND

1400

1700

1800

Siber

River

MIRROR LAKE

Carapoo

MIRROR LAKE

Cocopah

River

Cocopah

Cocopah

MIRROR LAKE AREA
NORTHWEST TERRITORIES
CANADA
96-D-15
HORIZON 'B'
CONTOUR INTERVAL .025
SCALE 1 INCH = 2000 FEET

0 1 MILE

DEVELOPMENT

80

Thin

Saw

River

500

500

MIRROR LAKE

Crocodile

71

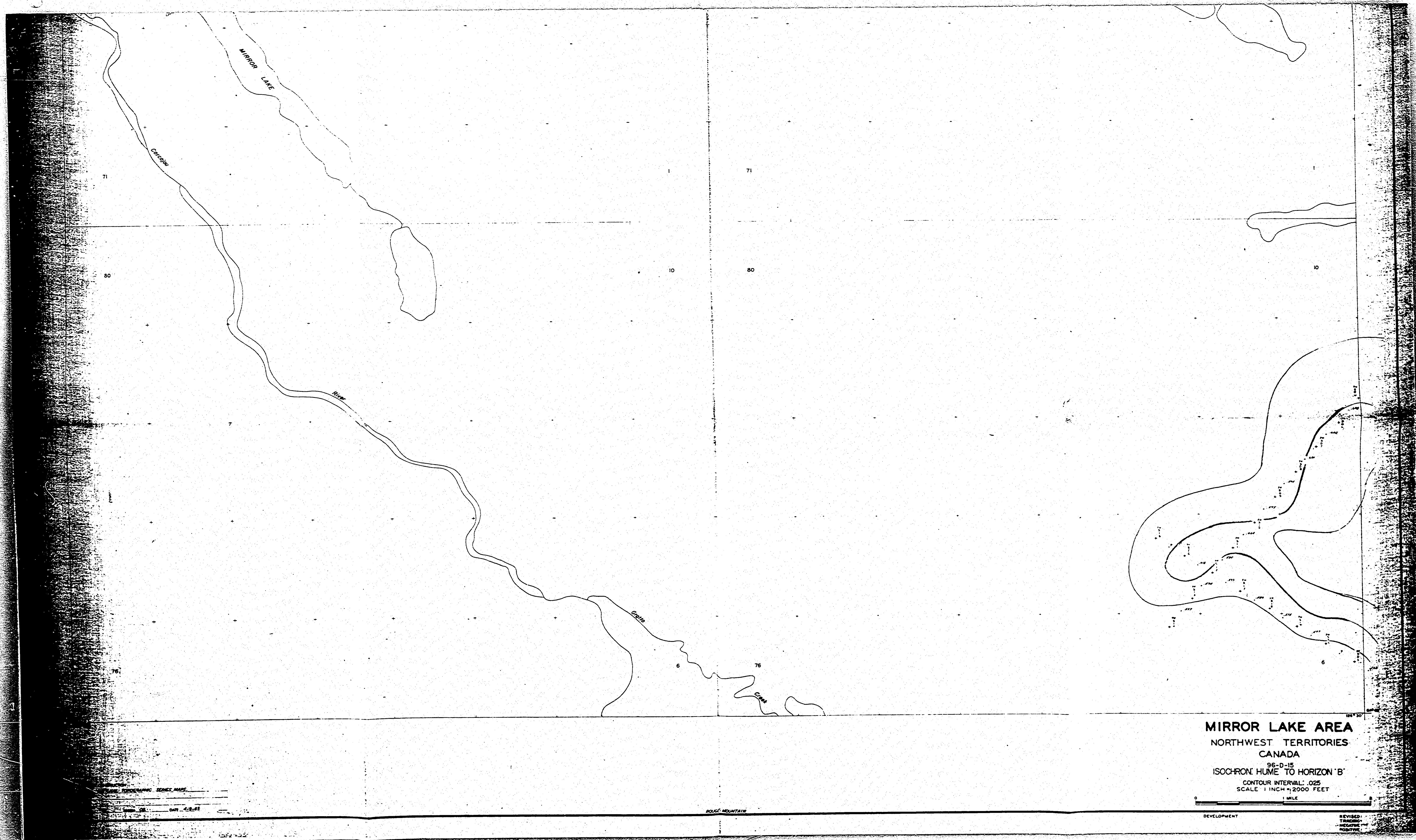
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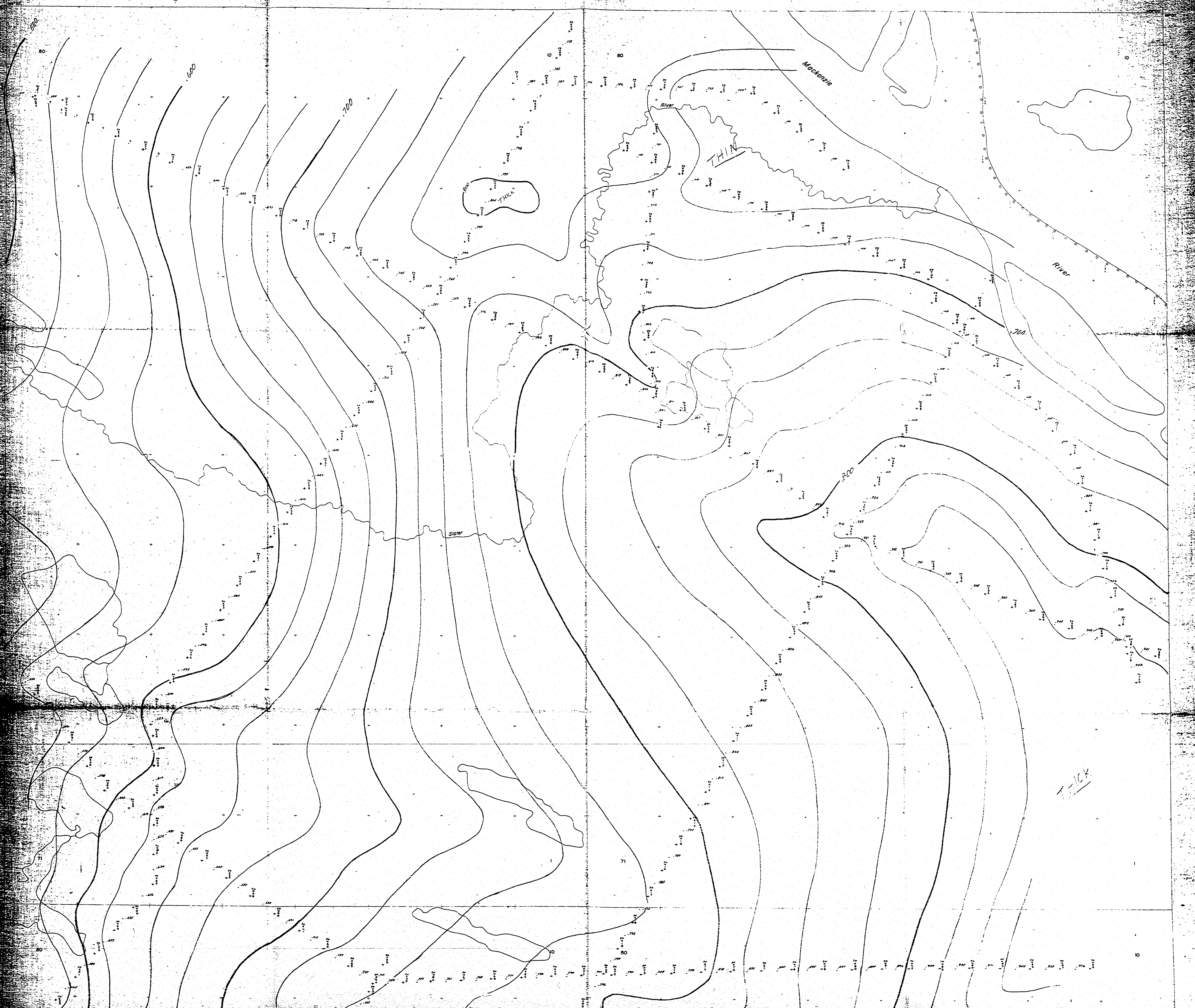
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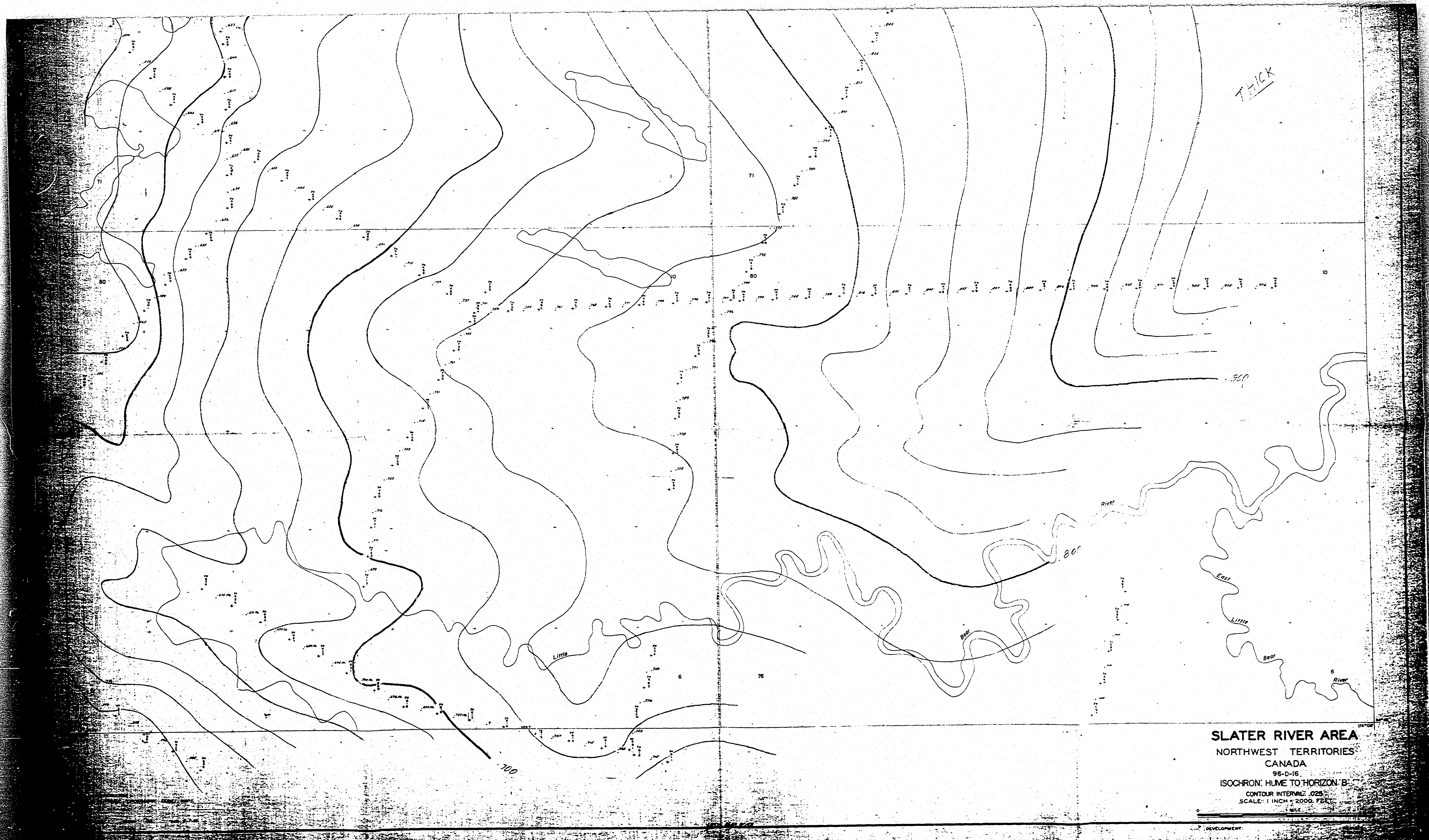
10

80

10







SLATER RIVER AREA
NORTHWEST TERRITORIES
CANADA
96-D-16
ISOCHRON: HUME TO HORIZON 'B'
CONTOUR INTERVAL: .025
SCALE: 1 INCH = 2000 FEET
1 MILE
DEVELOPMENT