

TENNECO OIL COMPANY (TENNECO)
SUBSIDIARY OF TENNECO CORPORATION
EXPLOITATION DEPT. - CALGARY, ALBERTA, CANADA.
TROUT LAKE AREA - N.W.T.

SURFACE		ELEVATIONS	
SCALE: 1 MILE TO 1 INCH		DATE OCT. 31, 1961	A.P.E.
DATUM		INTERPRETER: W.T. ROSSON	
REINTERPRETED		GEOLOGIST	
CONTOUR INT 50 Feet		TENNECO APPROVED	
REMARKS		DRAWN	
SEISMIC SURVEY BY VELOCITY SURVEYS LTD.			

16-6-5-2

SEISMIC SURVEY
ON
PERMITS NO. 3020, 3021, 3022 N. W. T.
for
TENNECO OIL COMPANY
Sept. 1951

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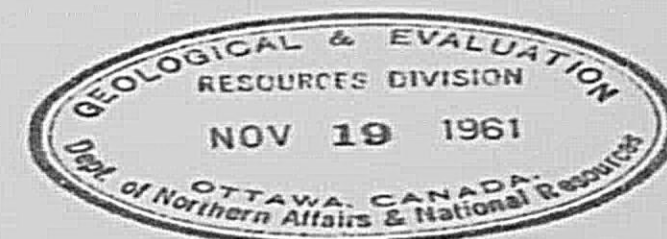
FINAL SEISMIC REPORT
on
PERMITS 3020, 3021, 3022
NORTHWEST TERRITORIES

for
TENNECO OIL COMPANY
by
VELOCITY SURVEYS LIMITED
November, 1961.

Headquarters: 530A - 6th Avenue S. W.,
Calgary, Alberta.

Seismologist: W. T. Robson

Supervisors: F. C. McConnell
P. R. Grier



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FINAL REPORT

PERMITS 3020, 3021, 3022 NORTHWEST TERRITORIES

A. INTRODUCTION

Velocity Surveys Limited, Party No. 3, carried out a reflection correlation survey between August 12th and September 4th, 1961, in the above area. Since the area is inaccessible by land this time of year, the charges and the geophones were laid out in various lakes and rivers. The men and equipment were transported between locations by a J helicopter, and the crew was quartered in a tent camp on the prospect.

B. GENERAL INFORMATION

1. Topography and Weather

The area is gently rolling, with a gradual rise in elevations to the southwest, and a moderate to sparse forest cover. Lakes and muskegs abound. The weather was normal, with a few windy and rainy days which slowed production.

2. Surveying

Horizontal control was obtained from aerial photographs. Vertical control was determined from two altimeters, one for a standard at base camp, the other recording the shot point elevation. The elevations are correct to ± 3 feet. The spread offset distance was measured from the length of communication line laid out between the shot point and instruments.

3. Recording Equipment

A set of S. I. E., P11, amplifiers was mounted in the helicopter. Six Electro-Tech EVP-5 marine geophones were arranged in parallel, with 20 foot spacing on the cable, a single geophone running one amplifier. The 24 trace camera recorded the following inputs; six traces straight, 20-64-1 filter; six traces mix, the same; six straight, 30-42-2 filter; and six mixed, the same.

4. Field Techniques

The six geophones, with twenty foot spacing, were laid along lake bottoms or where about five feet of water was available. The charges were also placed in the lake bottom in order to obtain the maximum tamping effect from the water. This depth was usually from six to eight feet.

An offset of at least five hundred feet from the charge is required to avoid damage to these geophones, however, this offset distance was increased up to 1,500 feet in order to prevent the severe air blast from interfering with the desired reflection events. We have now determined where the deepest reflection occurs over the area, so for any similar future work, the offset could be reduced to 1,200 feet or less, especially in the eastern portion of the prospect.

The only limitation to the amount of control is the availability of suitable bodies of water. This would make spring and early summer the best times to carry out this type of operation, if

dense control is desired. In places where the water was not deep enough for the hydrophones, normal land geophones were used, two per trace laid along the lake shores.

The helicopter was very successful at transporting the crew between locations, with from 10 to 15 holes a day obtained on half of the working days. Strong winds and low ceilings cut production on the other days.

C. COMPUTATION

The two-way reflection times have been corrected to a 1,000 foot datum, using 7,000 feet per second. This velocity was estimated from horizontal velocities observed from the first geophone arrival time at varying spread offsets. Since the shot is above the normal weathering, a low velocity layer time correction was made to the shallowest refractor. A velocity of 13,500 feet per second was observed for this refractor, probably the Wabamun. An intercept time was estimated for each location and a time correction to the refractor was computed. The intercept was obtained as follows:

$$I = T_s - \frac{X}{V_2} \quad \text{where:}$$

T_s = Short trace arrival time
 X = Shot point offset
 V_2 = 13,500 feet per second

Since the reflection time was obtained from traces which were laid out at distances varying between 800 and 1,500 feet, a correction was also made for this variation. Our velocity information is from a few sonic logs, several miles from the prospect, so the 1,400 foot spread was taken as the standard spread. If we used zero spread as the standard, the possible error due to velocity variations would be increased by the necessity to correct for normal move out to 1,500 feet, and all of the records would need correction. Since the 1,400 foot spreads were a plurality, the number of corrections was decreased and the amount of correction was decreased, since the great majority of the spreads had a 1,200 foot spread or over. A list of the spread corrections is appended, for which we use the approximation:

$$T = \frac{X^2}{2V^2T_0}$$

D. INTERPRETATION

A. General

Four maps are presented on a scale of one inch equals one mile, with a contour interval of .010 seconds. They are as follows:

<u>Map</u>	<u>Approx. Time</u>	<u>Reliability</u>
1. Hay River Shale	.320	Poor
2. Slave Point	.600	Good
3. Precambrian	.680	Fair
4. Hay River-Slave Point Isochron		Poor

Reflection identifications were made from shot points at wells a few miles from the prospect and from sonic logs in these wells. The Slave Point identification is believed to be the most reliable; the Hay River Shale reflection is poor, while the depth to the Precambrian is uncertain.

The Hay River Shale and the Slave Point maps have values corrected for spread and L. V. L; the datum velocity was changed to 7,000 feet per second. The Precambrian map, by Mr. S. A. Mouritsen, is corrected to datum only, using 6,000 feet per second, as originally computed. Since our spread and L. V. L. corrections are based on velocity assumptions which may be incorrect for the prospect, the latter values were unaltered to show the effect that these corrections had on the values. In addition, there are some local variations in correlations, but the general picture is the same for the two independent correlations.

E. FINDINGS

A large prominent anticline, with .020 to .050 seconds of closure shows up on all horizon maps. It runs northwest-southeast across the north-central part of the prospect and has three local high domes on the main anticline. The Slave Point map shows a possible extension of this feature or perhaps a separate feature to the southeast of the primary anomaly.

The correlations on and off the main anticline are generally good, the correlations to the southeast are questionable. The variation in dip to the southwest between the Slave Point and Precambrian maps is due to the L. V. L. corrections on the Slave Point map, which are large where the surface rises steeply. In addition, of course, control to the southwest is negligible.

The Hay River Shale map is based on a poor reflection, however, the map generally resembles the other two, with a strong anticlinal nose extending northwest-southeast in the same location as the anticlines on the deeper maps.

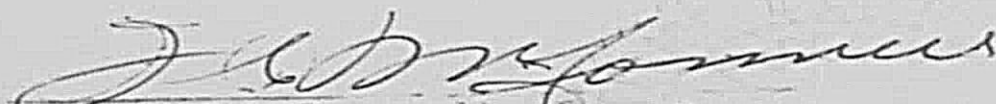
The Hay River-Slave Point isochron is based on poor data, but a strong thinning closure shows up over the highest part of the main anticline.

In conclusion, there is a large structure in the central part of the area, based on fair to good correlations.

There is a great variation in reflection character in some areas which may be the result of faulting.

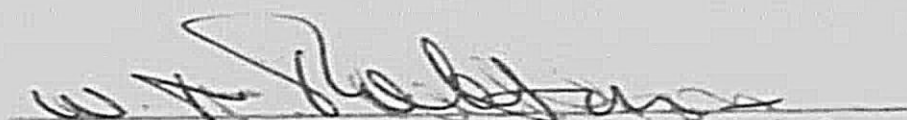
We believe that a few continuous lines would confirm this structure and that this water correlation method has made a good preliminary evaluation of the prospect.

Approved:


F. C. McCall

Respectfully submitted,

VELOCITY SURVEYS LIMITED


W. T. Robson - Seismologist

INTERPRETATION REPORT

A study of the water correlation records in the above permits was made to give an independent interpretation of this area.

The record quality varied from good to poor, but enough good records were scattered across the prospect to give a fair picture of the sub-surface. The control varied from good to poor.

Sub-surface control from wells outside the area was used to identify the reflections, and we mapped the Hay River Shale, the Slave Point and the Precambrian.

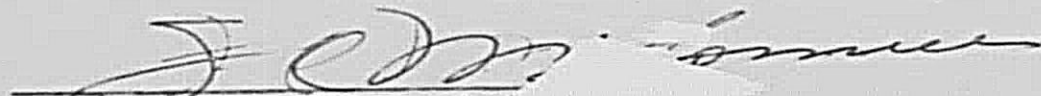
A large anticline with at least .020 seconds of reversal was mapped in the central part of the area. This feature is based on good correlations and fair control. While the possibility of faulting cannot be excluded, the lack of continuous control makes it difficult to locate them.

The method is good for evaluating a prospect in summer, although some modifications in spread distances and offsets would give better move-out and weathering control.

Respectfully submitted,

VELOCITY SURVEYS LIMITED

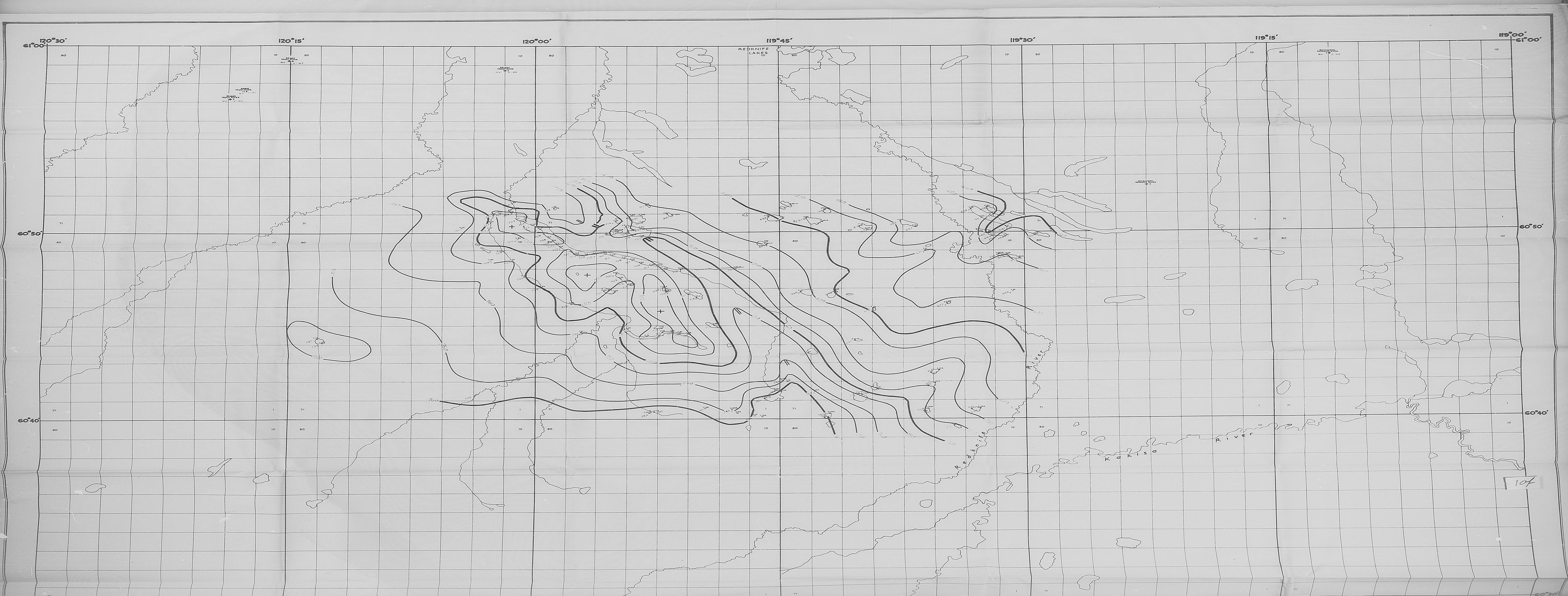
Approved:

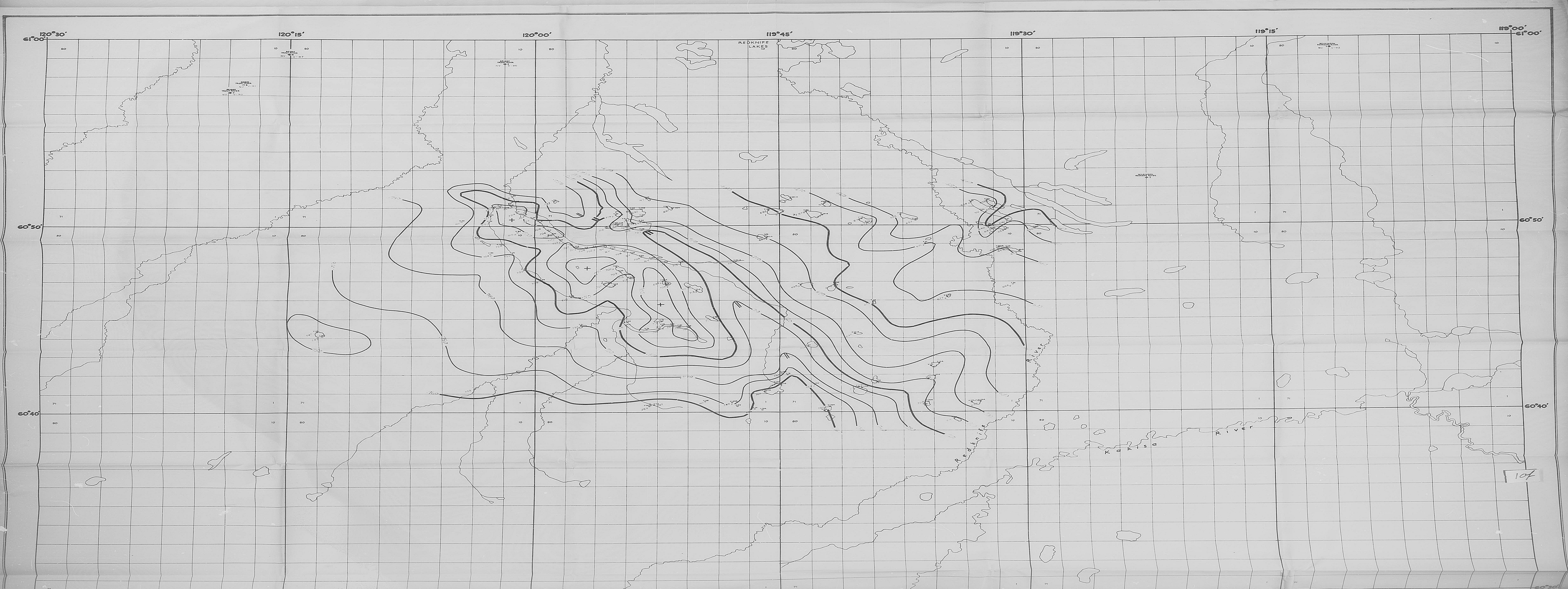

F. E. McConne


S. A. Mouritsen - Seismologist

SPREAD CORRECTIONS

<u>Spread</u>	<u>Horizons</u>		
	<u>A</u>	<u>D</u>	<u>E</u>
1500	-3	-2	-2
1400	Stand.	Stand.	Stand.
1350	+2	+1	+1
1300	+4	+2	+2
1250	+6	+3	+3
1200	+8	+4	+3
1150	+9	+4	+4
1100	+11	+5	+5
1050	+12	+6	+5
1000	+13	+7	+6
950	+15	+7	+7
900	+16	+8	+7
800	+18	+9	+7





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60°30' 120°30'

60°40' 120°15'

60°50' 120°00'

119°45'

119°30'

119°15'

119°00'

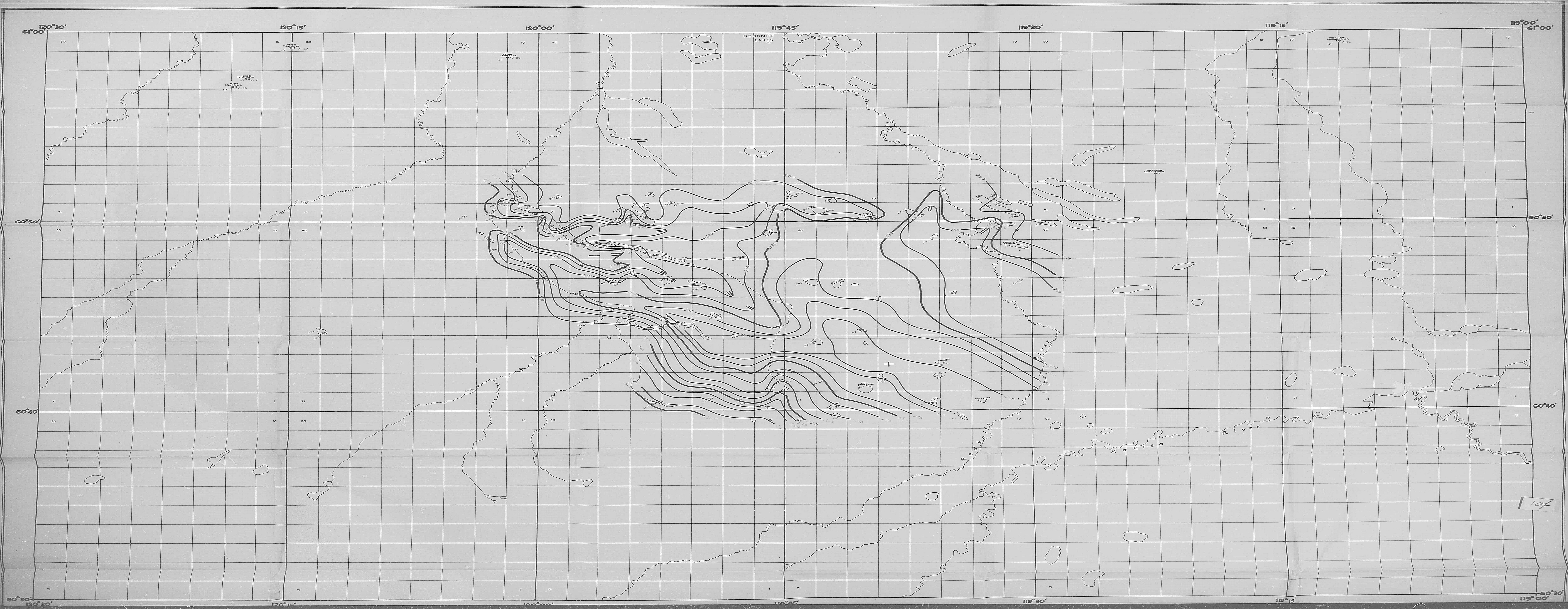
272

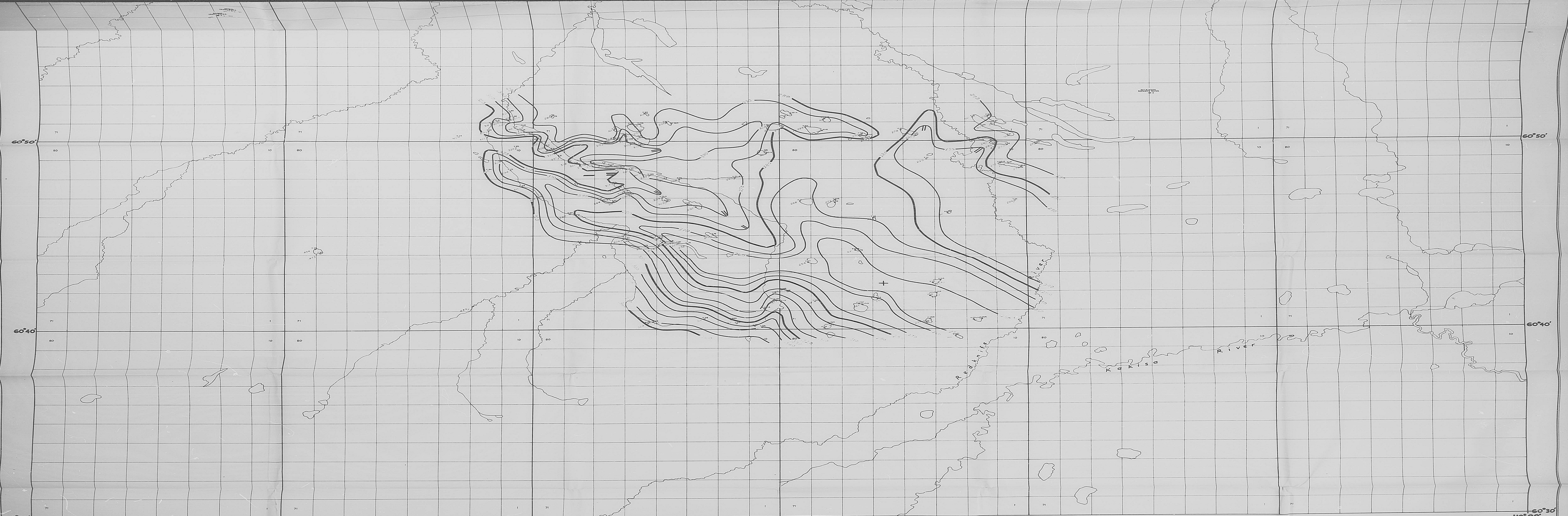
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TROUT LAKE AREA - N.W.T.

PRECAMBRIAN

SCALE: 1 MILE TO 1 INCH	DATE: OCT. 31, 1961, A.P.E.
DATUM: 1000'	INTERPRETER: S.A. MOURITSEN
CONTROL: 6000' ±	GEOLOGIST: REINTERPRETED
CONTOUR INT: 100' ±	TENNECO APPROVED
REMARKS: NO SPREAD OR LEVEL CORRECTION	USAWN
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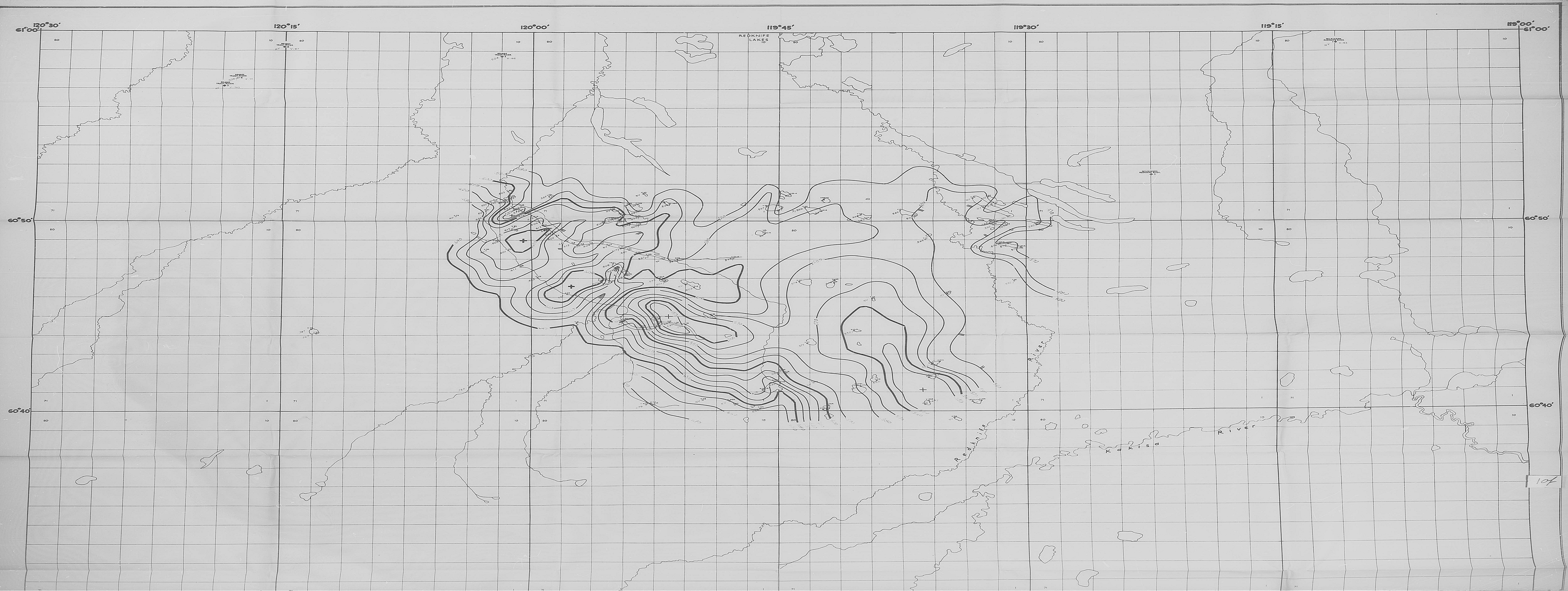


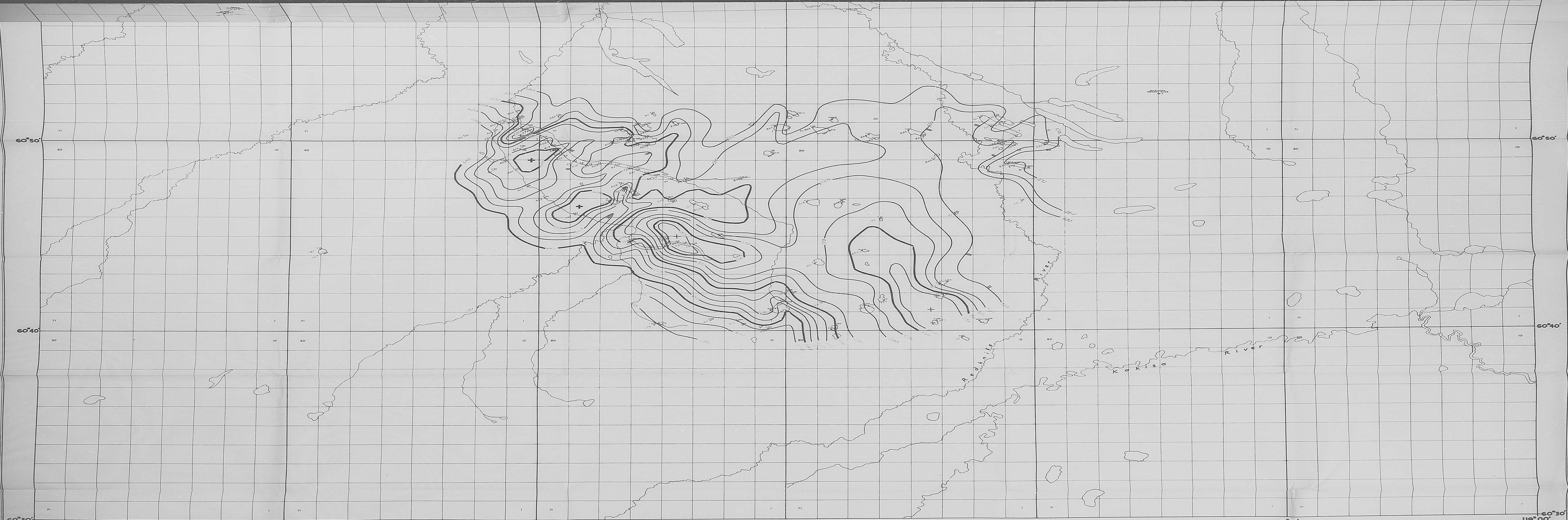
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HAY RIVER SHALE

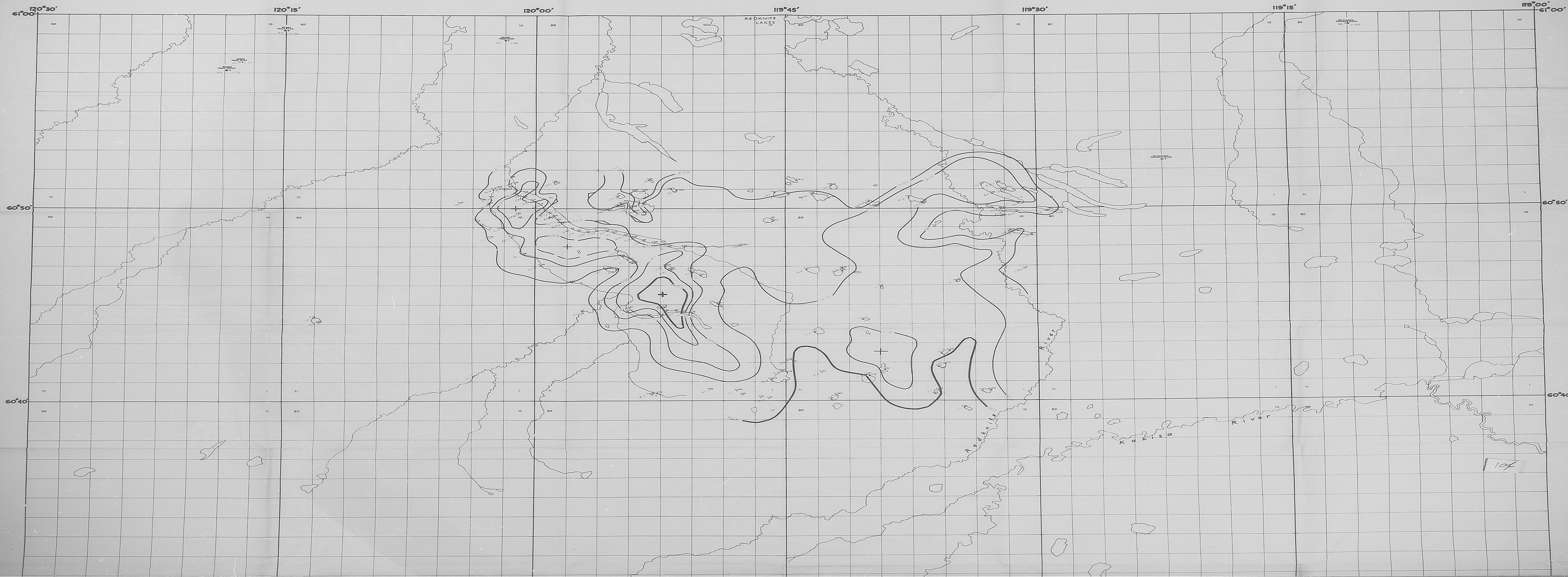
SCALE : 1 MILE TO 1 INCH	DATE : Oct. 31, 1961 A.P.E.
DATUM : 1950	INTERPRETER : W.T. ROBSON
*DATUM : 7000's	GEOLOGIST
*CONTROL	REINTERPRETED
CONTOUR INT. : 100 Sec.	TENNECO APPROVED
REMARKS : Corrected to 1400' spread	DRAWN
SEISMIC SURVEY BY VELOCITY SURVEYS LTD.	

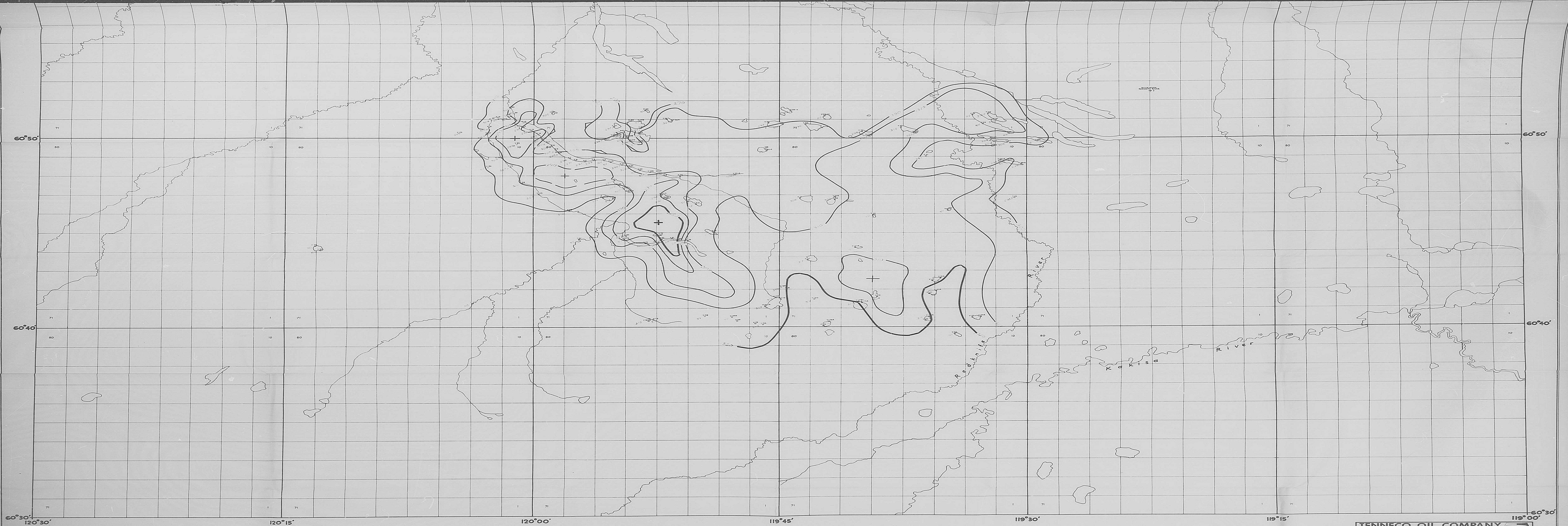
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EXPLORATION DEPT. CALGARY, ALBERTA, CANADA	
TROUT LAKE AREA - N.W.T.	
SLAVE POINT	
SCALE: 1 MILE TO 1 INCH	DATE: OCT. 31, 1961, A.P.E.
DATUM: 1000'	INTERPRETER: W.T. ROBSON
DATUM: 7000'±	GEOLOGIST
CONTROL: 010 sec	REINTERPRETER
REMARKS: Corrected to 1400' spread, and L.V.L.	TENNECO APPROVED
DRAWN	
SEISMIC SURVEY BY VELOCITY SURVEYS LTD.	





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TROUT LAKE AREA - N.W.T.

HAY RIVER SHALE - SLAVE POINT ISOCHRON

SCALE: 1 MILE TO 1 INCH	DATE: OCT. 31, 1961 A.P.E.
DATUM: 1000'	INTERPRETER: W.T. ROBSON
*DATUM: 7000'/4	GEOLOGIST
*CONTROL	REINTERPRETER
CONTOUR INT. 100 Feet	TENNECO APPROVED
REMARKS	DRAWN

SEISMIC SURVEY BY
VELOCITY SURVEYS LTD.

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