FINAL REPORT

on

BUFFALO LAKE AREA
N. W. T.

for

TEXACO CANADA LIMITED

by

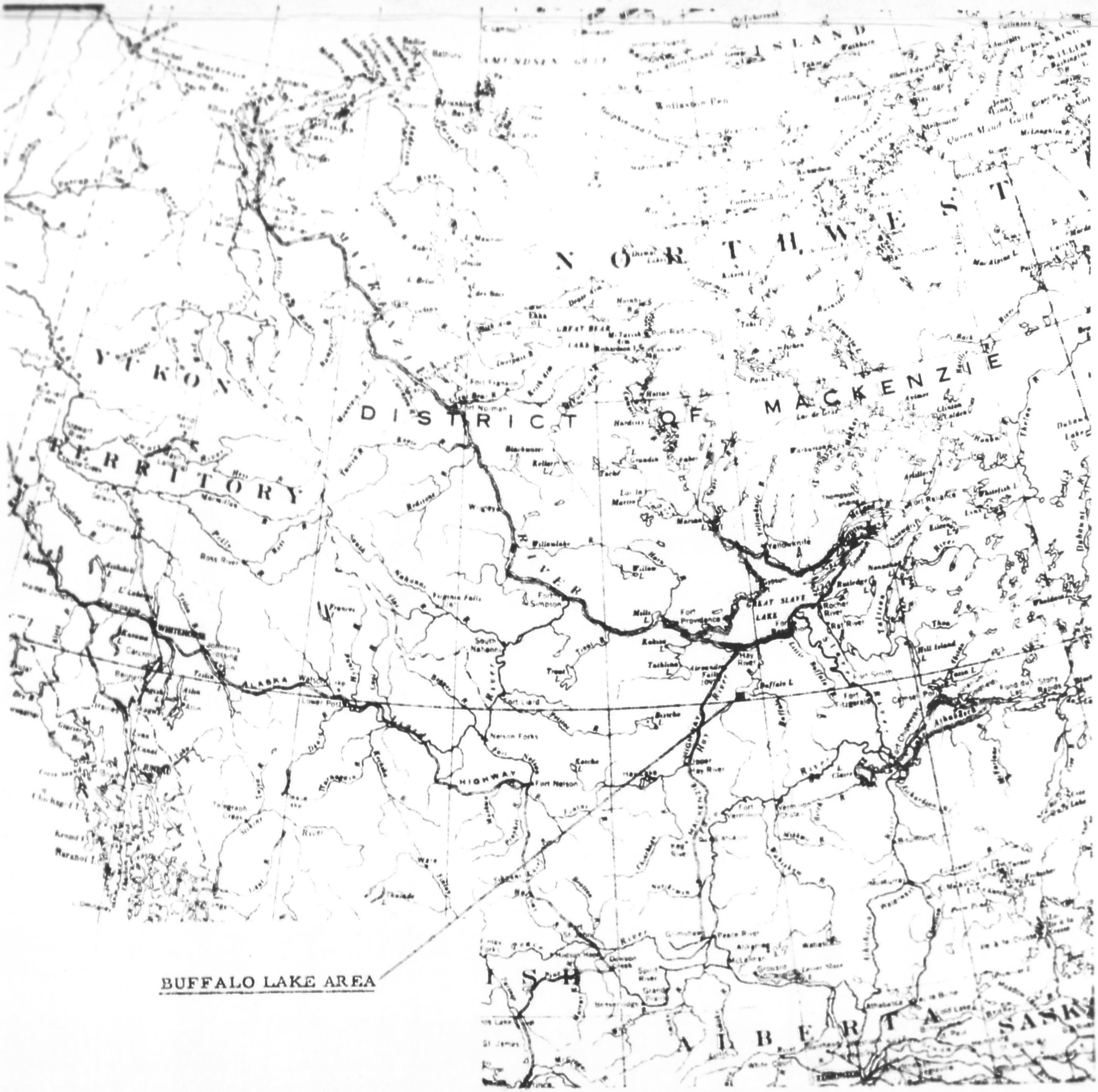
VELOCITY SURVEYS LIMITED

August, 1962.

Headquarters: 1603 Centre St. N.,
Calgary, Alberta.

Seismologist: W. T. Robson

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



BUFFALO LAKE AREA

FINAL REPORT

BUFFALO LAKE AREA
N. W. T.

A. GENERAL

From July 29th to August 3rd. 1962. Velocity Surveys Limited. Party No. 138. conducted a seismic correlation survey near Buffalo Lake. Northwest Territories.

Two helicopters. one operating and one shooting. were equipped with a set of 6 S. I. E., P-11 amplifiers and associated equipment. Six marine geophones (EVL-5) were suspended in the water at various locations in the rivers which flow into Buffalo Lake.

The record quality was fair to good. although. owing to the shallow section. only one or two events were identified as reflection energy.

Thirty-three locations were shot on the prospect. giving moderate control. A basement structure was mapped. This feature shows substantial northeast dip of .053 seconds. Two shots were taken at a well near the prospect for identification purposes.

B. COMPUTATION

The records were corrected to a datum of 900 feet. using a velocity of 6, 000 feet per second. Since very little relief occurs in the area. the elevations were run with altimeters. which are accurate

enough for this kind of survey.

A combination weathering and drift correction was estimated by subtracting the high velocity time (as observed on the 100 foot refraction spreads) from the total first arrival times. The resultant time (intercept) was used as the near surface correction. The formula used is as follows:

$$\text{Correction} = T - \frac{X}{V2}$$ where:

Correction equals near surface low velocity correction.
T equals first arrival time to nearest geophone.
X equals distance to geophone.
V2 equals first high speed velocity layer.

The high speed velocity from the average of observed velocities was about 15,000 feet per second.

A spread distance-variation correction was also applied to each record, using an 1,850 foot spread as standard and an estimated velocity of 12,000 feet per second. This moveout correction was estimated using the approximation:

$$\triangle T = \frac{X^2}{2V^2 To}$$ where:

$\triangle T$ equals moveout for spread.
X equals spread distance.
V equals average velocity through section.
To equals two-way reflection time.

The drift velocity was assumed to be 6,000 feet per second. The drift thickness in feet was computed by a standard refraction

method, using 6,000 feet per second as V1, 15,000 feet per second as V2 and the computed intercept.

C. INTERPRETATION

1. General

Three maps are submitted; the surface elevation, drift thickness and the possible Precambrian. (not received 7/24/64)

The Elk Point reflection likely occurs about .100 seconds above the Precambrian. However, owing to the shallow section and to the necessity for offsetting the geophones about 1,000 feet or more from the charge (to prevent the air blast from interfering with the reflection), the Elk Point reflection usually occurs just after the first arrivals and cannot be followed reliably. The surface and drift maps are contoured in feet, the Precambrian map in time. Identification of reflections was made at the well in LSD 5 of Section 35, Township 126, Range 12, West Fifth Meridian, ten miles southwest of the main shooting area.

2. Findings

The Precambrian map shows a substantial anomaly in the west-central part of the prospect, with over .050 seconds of northeast dip, presumably reverse. Since the records have been corrected for all low velocity material, this dip would amount to between 300 and 500 feet, depending on the actual velocity in the section.

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The drift thickness map shows a few hundred feet of variation, with a small feature in roughly the same location as the basement anomaly.

If there is a large Precambrian feature, it is likely that structural drape effects extend up to the highest competent bed. Here, the upper beds directly underlie the drift, so that the drift thickness actually indicates the relief in the upper beds. The dip on both sides of this upper horizon anomaly is between 200 and 300 feet. Since the drift has presumably been adequately corrected out of the records, we may say that the anomaly is fairly reliable.

D. CONCLUSION

This method is a reliable way to roughly evaluate northern permits in the summer season.

Although the correlation method is used, much closer control could be utilized to present a more reliable picture and then winter detail work could be carried out, avoiding non-prospective areas.

The anomaly mapped is believed to be fairly reliable.

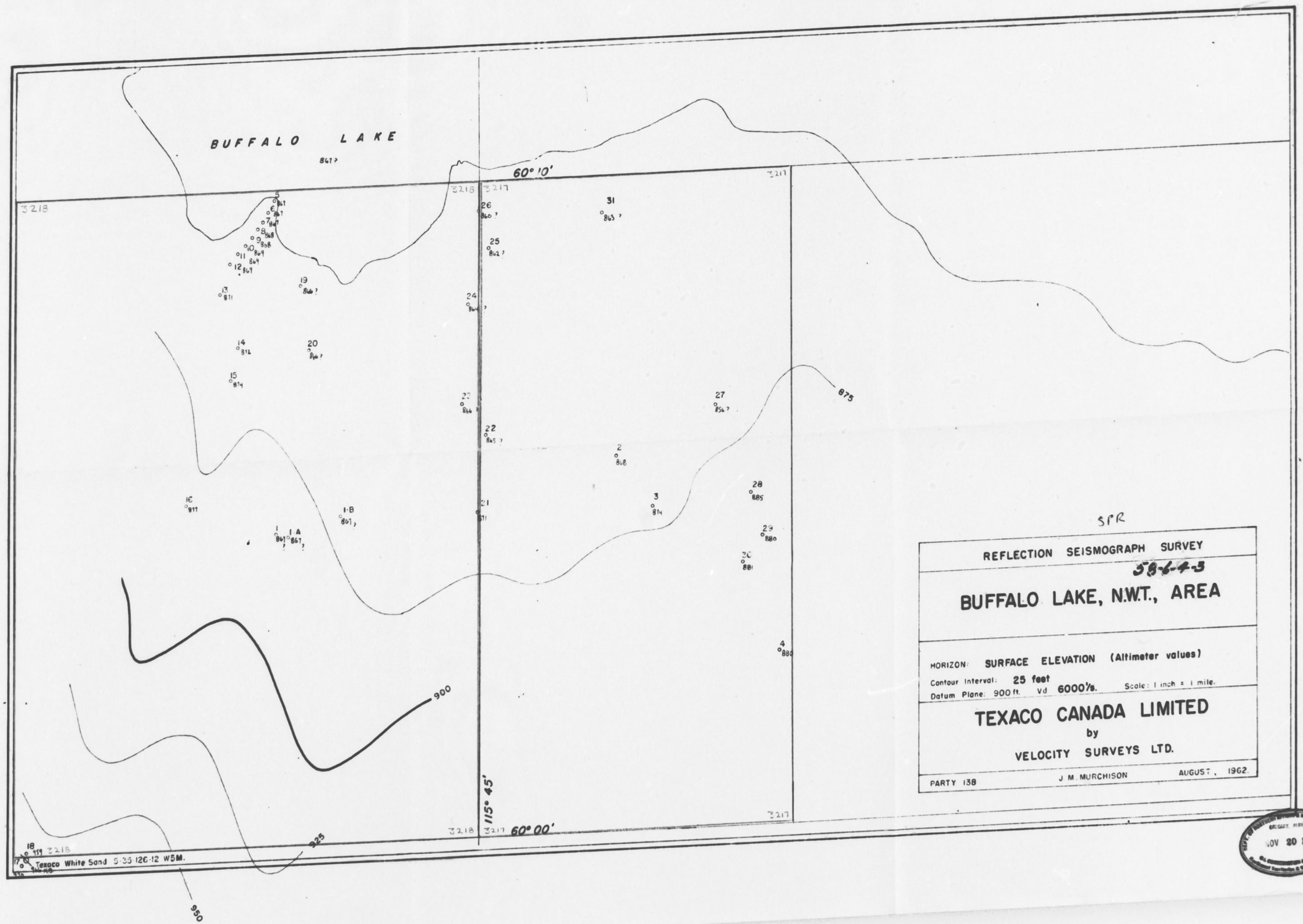
Respectfully submitted,

Approved:

VELOCITY SURVEYS LIMITED

F C M[illegible]el., P Eng.

W. T. Robson - Seismologist



SPR

REFLECTION SEISMOGRAPH SURVEY

59-6-43

BUFFALO LAKE, N.W.T., AREA

HORIZON: SURFACE ELEVATION (Altimeter values)

Contour Interval: 25 feet

Datum Plane: 900 ft. Vd 6000'/s. Scale: 1 inch = 1 mile.

TEXACO CANADA LIMITED

by

VELOCITY SURVEYS LTD.

PARTY 138 J. M. MURCHISON AUGUST, 1962.