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REPORT ON
AIRBORNE GEOPHYSICAL SURVEY
IN
NORTHEASTERN ALBERTA
FOR
ANCO EXPLORATION LIMITED
BY
CANADIAN AERO MINERAL SURVEYS LIMITED
Project No. 9568

CANADIAN AERO *Mineral Surveys* LIMITED

REPORT ON

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IN

NORTHEASTERN ALBERTA

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ANCO EXPLORATION LIMITED

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CANADIAN AERO MINERAL SURVEYS LIMITED

PROJECT NO. 9568

OTTAWA, ONTARIO,
October 8, 1969.

Robert W. Stemp, P.Eng.,
Chief Geophysicist.

CANADIAN AERO *Mineral Surveys* LIMITED

TABLE OF CONTENTS

Accompanying this Report:-

- Three Plan Maps at the scale of 1" = ½ mile.

REPORT ON
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IN
NORTHEASTERN ALBERTA
FOR
ANCO EXPLORATION LIMITED

I. INTRODUCTION

This report pertains to the combined airborne electromagnetic, magnetic, and gamma ray spectrometer survey flown on behalf of Anco Exploration Limited in the Lake Athabasca area of Alberta over mineral permits 93 to 102. The survey was flown between September 15 and September 18, 1969, by the Canadian Aero Mineral Surveys Limited geophysically equipped Canso aircraft (registration CF-JJG) based at Uranium City.

The survey was flown at a mean terrain clearance of 150' with flight lines spaced at ¼ mile intervals. All traverses were oriented approximately N45°W. The geophysical data acquired totalled 2796.5 line miles.

The following Canadian Aero Mineral Surveys Limited personnel were associated with the project:

P.	Korpatt	Pilot
B.	Duperron	Co-Pilot
R.	Herron	Aircraft Mechanic
R.	Kupkee	Geophysical Operator
B.	Barrett	Data Compiler
W.	Knappers	Data Chief
D.	Fitzsimmons	Chief Draftsman
R.W.	Stemp	Geophysicist.

The E.M. data and all magnetic anomalies coincident with conductors are plotted on three plan maps at the scale of 1" = ½ mile. Uranium anomalies are also presented on the same plan maps. An airphoto laydown provided the base for these maps.

II. GEOLOGY

The following maps were used as references:

(1) Geological Survey of Canada - Preliminary Map 55-33
Scale: 1" = 16 miles.

(2) Geological Survey of Canada - Map 16 - 1961
Scale: 1" = 4 miles.

About half of the survey area is covered by the Athabasca sandstone formation. The remainder of the area to the south and west is heavily drift covered but the basement lithology is believed to consist primarily of Precambrian granites and granitic gneisses. The Black Bay fault may extend into the northeast corner of the survey area.

III. DISCUSSION OF RESULTS

Geophysically speaking, the survey area was very inactive. This is apparently due to both the Athabasca sandstone and the heavy drift cover in the area.

No definite bedrock conductors were detected by the airborne survey. Four X-type or "doubtful" anomalies have been plotted but they may be caused by aircraft turbulence. Ground follow-up of these is not recommended unless additional information

supports them. If sulphides do exist in the area they are either too deep, or too small or disseminated to be detected by the Canso electromagnetic equipment.

The gamma ray spectrometer results also exhibit a very flat background throughout the entire survey area. This is to be expected in an area almost or entirely drift covered as radiometric surveys essentially map surface radioactivity. However, a number of uranium anomalies of about 1½ times background have been plotted on the plan maps. Individually these are very weak indications, but where a number of these fall in the same general area it increases their significance. This is the case in the northeast corner of sheet 2 and to some extent the northeast corner of sheet 1.

IV. RECOMMENDATIONS AND CONCLUSIONS

Ground follow-up of the uranium indications in the northeast corner of sheets 1 and 2 is recommended. Although they are weak, they are definitely anomalous to the general area and may be significant. Strong anomalies should not be expected in areas of heavy drift cover. No ground follow-up can be recommended on the basis of the electromagnetic results.

Respectfully submitted,

R. W. Stemp

Robert W. Stemp, P.Eng.,
Chief Geophysicist.

OTTAWA, ONTARIO,
October 8, 1969.

PROJECT NO. 9568 - PERMITS 93 TO 102

Anomaly	Fiducials	In-Phase Quad	Altitude	Magnetics	Rate	Comments
38A	632/5	70/60	125	NIL	X	
84A	126/9	80/20	150	NIL	X	
85A	7688/92	40/0	125	NIL	X	
105A	42/6	90/30	180	NIL	X	

A D D E N D U M

For this survey the Canso was also equipped with an Exploranium gamma ray spectrometer. Three 6-inch diameter by 4-inch thickness thallium activated sodium iodide crystals are utilized. A complete range of ratemeter count rates and time constants are available. Upper and lower threshold settings are continuously adjustable allowing for the discrimination of potassium, uranium, and thorium. Four channels of results are presented on a separate 6" Clevite light sensitive recorder together with an altimeter trace. All channels, sensitivities, zero settings etc. are indicated on the chart at the start of flight one. Any additional changes are noted on the flight logs.

APPENDIX II

A. EQUIPMENT

The electromagnetic unit and the magnetometer are the key instruments in the Canadian Aero Mineral Surveys Limited Canso survey system. The remainder of the equipment consist of a radar altimeter, an accelerometer, a continuous-strip camera, two recorders and a fiducial numbering system.

The EM unit is the Canadian Aero Service Limited MARK III low frequency (390 c.p.s.) in-phase/out-of-phase system. The transmitter coil is mounted forward of the nose of the aircraft and the receiving coil is housed inside the extremety of a special tail stinger to the rear of the aircraft. The coil orientation is vertical coaxial (i.e. both coils have a common horizontal axis).

An electronic null device is adjusted so that in the absence of a conductor within the range of the system no signal is recorded. The anomalous signal is divided into two components, the "in-phase" component having the same phase as the transmitted field and the "quadrature" or "out-of-phase" component being at right angles to it. These two components are continuously recorded on two channels of a 6" Clevite Brush Rectilinear light beam Recorder.

The magnetometer used in the survey was the total intensity Model III Fluxgate saturable core instrument, developed by Gulf Research and Development Company and installed in a fiberglass housing hung from the tailstinger.

Output of the magnetometer is presented as one channel on the Brush Rectilinear Recorder to facilitate correlation with the EM traces. It is also presented at a larger scale on a Gulf Research and Development Rectilinear Recorder with 12 inch chart width.

Five sensitivity settings are available: 300, 600, 1200, 2400 and 4800 gammas for full 12 inch deflection on the Gulf chart. Corresponding step values are respectively 250, 500, 1000, 2000 and 4000 gammas. The usable short term sensitivity is approximately 5 gammas and the total dynamic ranges are 250,000 gammas for the 4800, 2400 and 1200 gamma settings, 149,800 gammas for the 600 gamma setting and 74,900 gammas on the 300 gamma setting. Generally a sensitivity setting of 600 or 1200 gammas is used for this type of survey.

A Honeywell radar-altimeter provides a continuous terrain clearance profile on the Clevite Recorder. Because EM response decays rapidly with increasing altitude, this terrain clearance information is important in the analysis of the EM data.

A vertical accelerometer mounted in the aircraft provides a record of the air turbulence and of any drastic manoeuvres of the aircraft. The accelerometer trace, recorded on the Brush rectilinear recorder, is often helpful in recognizing spurious blips on the EM traces caused by air turbulence or drastic manoeuvres.

A vertically mounted Aeropath AS-5 continuous strip 35 mm. camera, using a 14.5 mm. focal length lens, records the entire flight path of the aircraft.

Synchronization of the flim strip with the two recorders employed is accomplished by means of an automatic fiducial numbering system, which prints simultaneous time markers on all records at regular time intervals, usually 10 seconds.

Due to the time constant used in the electromagnetic unit, both the EM in-phase and quadrature recordings are delayed by approximately 1 second. This is taken into account when plotting the position of each anomaly.

B. DESCRIPTION OF RECORDS

Rectilinear Magnetic Record

With the chart oriented so that fiducial numbers increase from left to right, upward deflections on the chart indicate increases in the total magnetic field of the earth. On the 1200 scale the smallest division on the chart is approximatelt equivalent to 10 gammas. When the record "steps" a change of approximately 1000 gammas is indicated.

6" Clevite Brush Rectilinear Record

With the chart oriented so that fiducial numbers increase from right to left the tracings from the bottom to the top of the chart are as follows:

Fiducial markers - same comments as above.

Channel 1) EM Quadrature - positive upward. 1 minor division represents approximately 30 parts per million, referred to the primary field at the receiving coil.

Channel 2) EM In-Phase - positive upward. Same scale as Quadrature.

Channel 3) Radar Altimeter. Altitude increases upwards. 100' is 21 minor divisions from bottom of chart. Each minor division represents approximately 15'.

Channel 4) Magnetometer - positive upward. On the 1200 scale a step is approximately 1000 gammas.

Channel 5) Accelerometer.

C. SURVEY AND MAP COMPILATION PROCEDURES

Uncontrolled airphoto mosaics usually serve as base maps for flying the survey and for compilation of the geophysical data. The most common scale is 1/4 mile per inch.

The flight lines are oriented perpendicular to the assumed longest dimension of massive sulphide occurrences anticipated in the survey area. Occasionally two or more line directions have to be used to accommodate changes of geological strike within the area. Line spacings normally range between 1/8 mile and 1/4 mile.

The navigator is provided with "flight strips" of the area to be surveyed. These flight strips are a copy of the airphoto mosaic, with the intended flight lines inked and numbered. Navigation along the parallel flight lines is accomplished by visual means based on the physical detail observed on the photos. The aircraft is flown at a terrain clearance of 150 feet or, in rough terrain, at the lowest safe altitude.

Flight path is recovered in the field by comparison of the 35 mm. strip film with the airphoto mosaics. Identifiable points are marked on the mosaics and designated by numbers determined from the fiducial numbering system on the film. These recovered flight lines provide the positional basis for plotting the geophysical data. The EM anomalies are listed and graded in the field and are often plotted on the field mosaics to permit immediate acquisition of ground.

In out Ottawa office screened positives of the mosaics are prepared, upon which are drafted the recovered fiducial points, the interpolated flight lines positions and the significant geophysical data. The geophysical data are subjected to a careful analysis by a geophysicist who prepares an interpretation report including recommendations for further work.

D. DATA PRESENTATION

The data presentation procedure which we employ for the Canso geophysical system is a combination of an anomaly listing and a plan map plot of graded EM anomalies. The anomaly listing provides the significant details concerning each anomaly and the map gives a "bird's eye view" of the conductors detected.

For purposes of listing and to facilitate reference in the report each EM anomaly is assigned a "name", which is made up of the number of the line upon which the anomaly occurs plus a letter. For example, on line 257 anomalies would be named 257A, 257B, 257C, etc., from south to north or from west to east. The letter which appears beside each EM anomaly on the map is therefore part of its name. These names also appear on the Brush records and in the anomaly list.

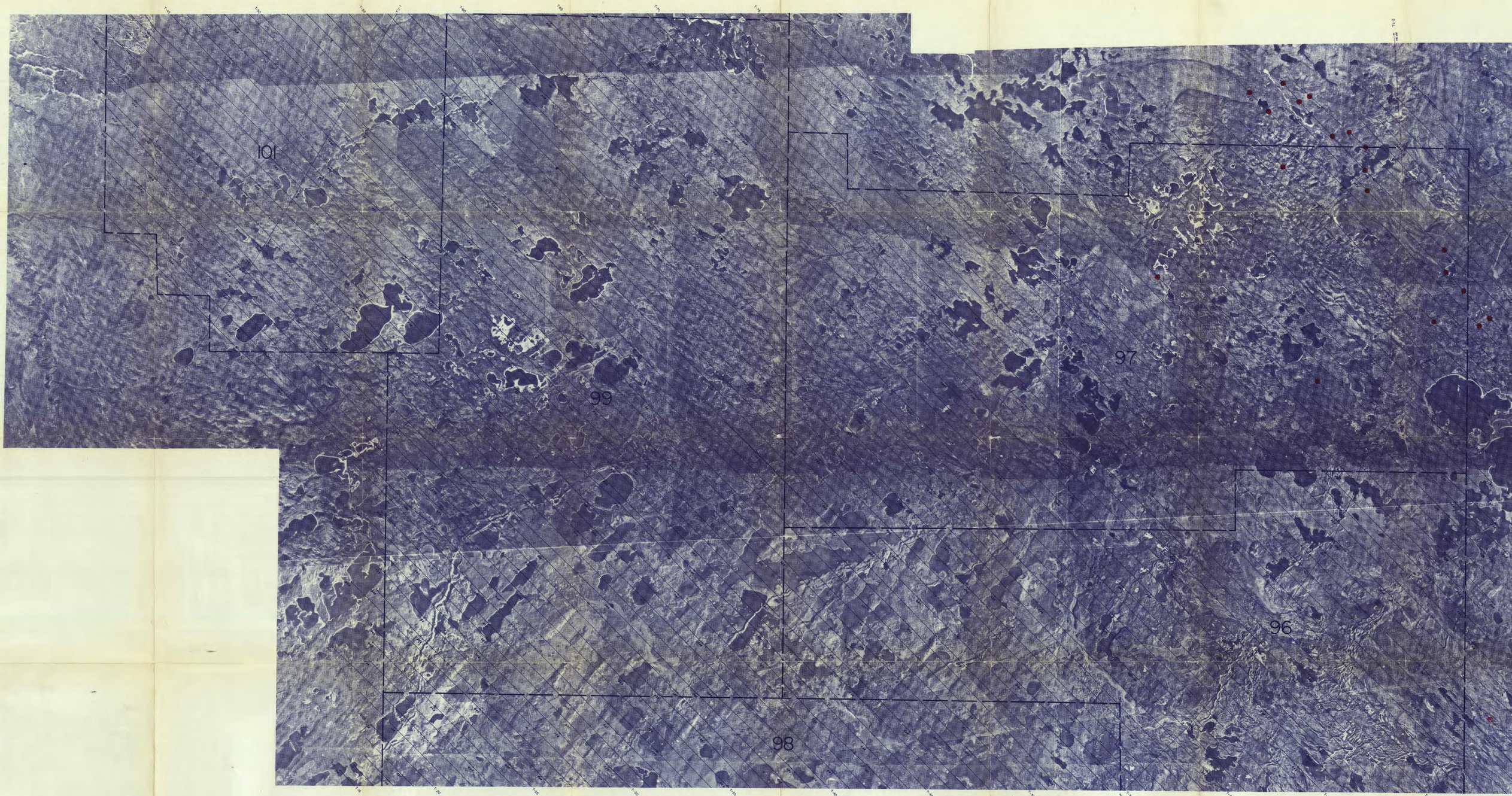
The anomaly list contains the fiducial numbers at the edges of the EM anomaly, the in-phase and quadrature amplitudes in p.p.m., the altitude at which the anomaly was detected, the positional relationship of the EM anomaly to magnetic anomalies (if any), a rating, and comments concerning any other pertinent characteristics of the anomaly.

The nomenclature used in the "magnetics" column of the anomaly list requires some explanation. The main terms used are side, flank, edge and direct. These refer to the position of the EM peak relative to the axis of the magnetic feature. "Direct" depicts coincident peaks and similar widths; "edge" is slightly offset; "flank" is somewhere along the flank of the magnetic anomaly; "side" is down near the base. "N. Flank 800g" means that the EM anomaly occurs along the northern flank of a magnetic feature of 800 gammas total amplitude. When one peak of a multiple EM anomaly coincides with a magnetic high the specific peak may be designated. For example, if the southern peak of a double EM anomaly coincided with a 250 gamma magnetic anomaly the nomenclature would be "Dir. S. 250g".

The rating assigned to each EM anomaly in the listing determines the symbol which represents the anomaly on the map. Six categories of anomalies are defined: 1A, 1B, 2A, 2B, 3, and X. The numbers "1", "2" and "/" are primarily a measure of in-phase amplitude corrected for altitude variation: "1" is for very large anomalies, "2" for intermediate, and "3" for relatively weak response. This rating is sometimes affected by the shape, by the in-phase to quadrature ratio, or by the location of the anomaly. The letters "A" and "B" merely refer to the magnetics: "A" indicates a directly coincident magnetic anomaly, and "B" indicates the lack thereof. The "X" rating is reserved for questionable anomalies. The legend on the map shows the symbol used for each of these ratings. In general, the more the rectangle is filled in, the stronger the anomaly.

In the case of directly coincident magnetic anomalies, the amplitude of the magnetic feature is shown on the EM map. It is stencilled beneath the symbol which portrays the EM anomaly.

During the final interpretation stage, EM anomalies are correlated from line to line wherever possible and the conductive zones are outlined. All definite conductors are numbered on the map and discussed in the report.



E.M. LEGEND

1 A ANOMALY
1 B ANOMALY
2 A ANOMALY
2 B ANOMALY
3 ANOMALY
X type ANOMALY

(APPROX)

AIRBORNE GEOPHYSICAL SURVEY

PERMITS 93 to 102 inclusive

ALBERTA

ANCO EXPLORATION LIMITED

SCALE 1 INCH TO 2640 FEET (APPROXIMATELY)

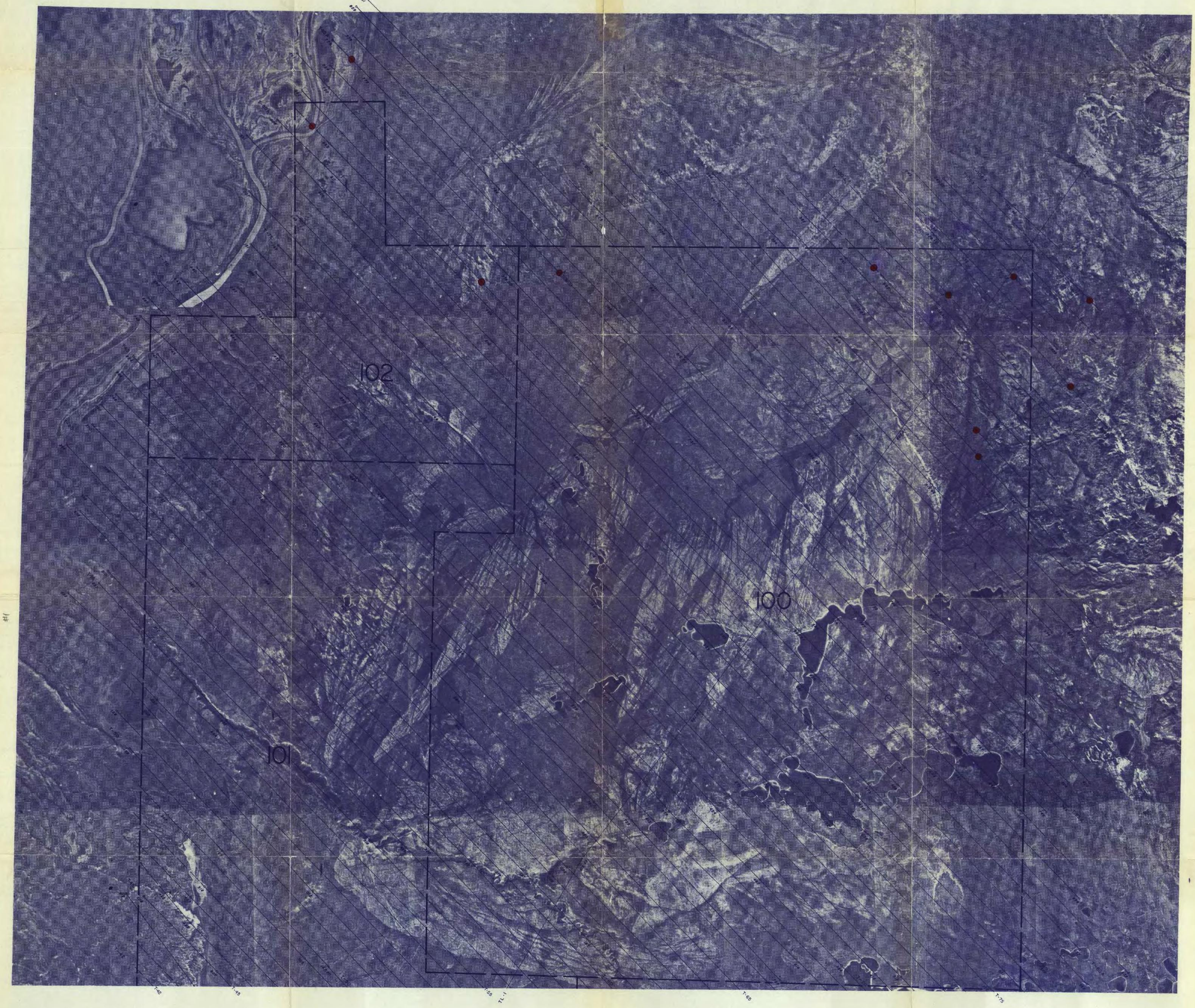
RADIOMETRIC LEGEND

ANOMALY 1.5 - 2x BACKGROUND

MEAN TERRAIN CLEARANCE ....150 FEET
TRAVERSE INTERVAL ..... 1/4 MILE
HORIZONTAL CONTROL .... BASED ON PHOTO LAYOUTS

SHEET INDEX

CANADIAN AERO SERVICE LIMITED
OTTAWA ONTARIO



E.M. LEGEND

1 A ANOMALY	
1 B ANOMALY	
2 A ANOMALY	
2 B ANOMALY	
3 ANOMALY	
X type ANOMALY	

(APPROX)

AIRBORNE GEOPHYSICAL SURVEY

PERMITS 93 to 102 inclusive

ALBERTA

ANCO EXPLORATION LIMITED

SCALE 1 INCH TO 2640 FEET (APPROXIMATELY)

RADIOMETRIC LEGEND

○ ..... ANOMALY 1.5 - 2x BACKGROUND

MEAN TERRAIN CLEARANCE ..... 150 FEET
TRAVERSE INTERVAL ..... 1/4 MILE
HORIZONTAL CONTROL ..... BASED ON PHOTO LAYDOWN

SHEET INDEX

2

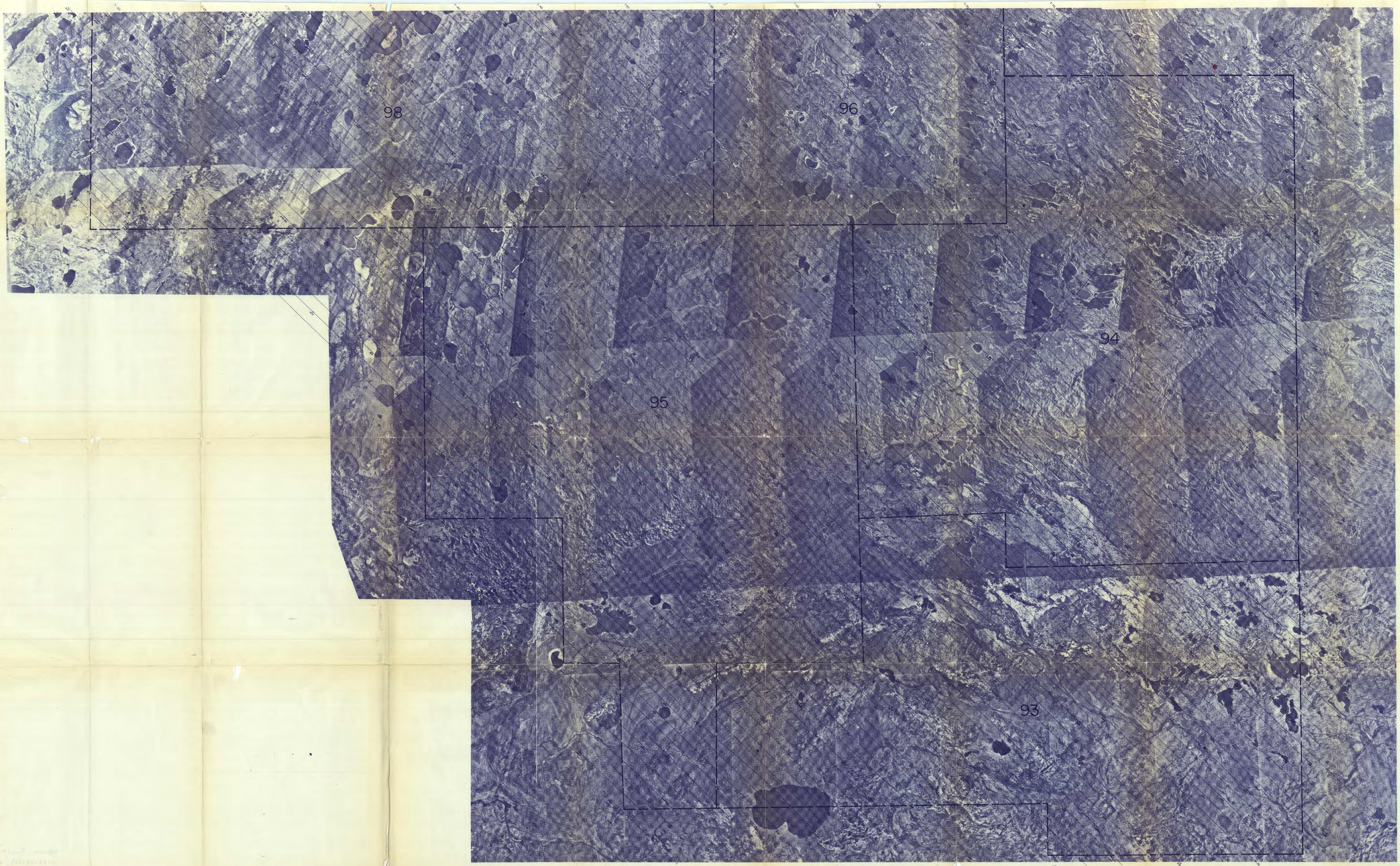
3

CANADIAN AERO SERVICE LIMITED
OTTAWA, ONTARIO

19690032

[redacted]

C.A.S. 9568



SHEET INDEX

1
2

CANADIAN AERO SERVICE LIMITED
OTTAWA , ONTARIO

(APPROX)

AIRBORNE GEOPHYSICAL SURVEY

PERMITS 93 to 102 inclusive

ALBERTA

ANCO EXPLORATION LIMITED

SCALE: 1 INCH TO 2640 FEET (APPROXIMATELY)

E.M. LEGEND

1 A ANOMALY
1 B ANOMALY
2 A ANOMALY
2 B ANOMALY
3 ANOMALY
X type ANOMALY

MEAN TERRAIN CLEARANCE ....250 FEET
TRAVERSE INTERVAL ..... 1/4 MILE
HORIZONTAL CONTROL .... BASED ON PHOTO LAYDOWN

RADIOMETRIC LEGEND

○ ..... ANOMALY 1.5 - 2x BACKGROUND

19690032 #5

C.A.S. 9068

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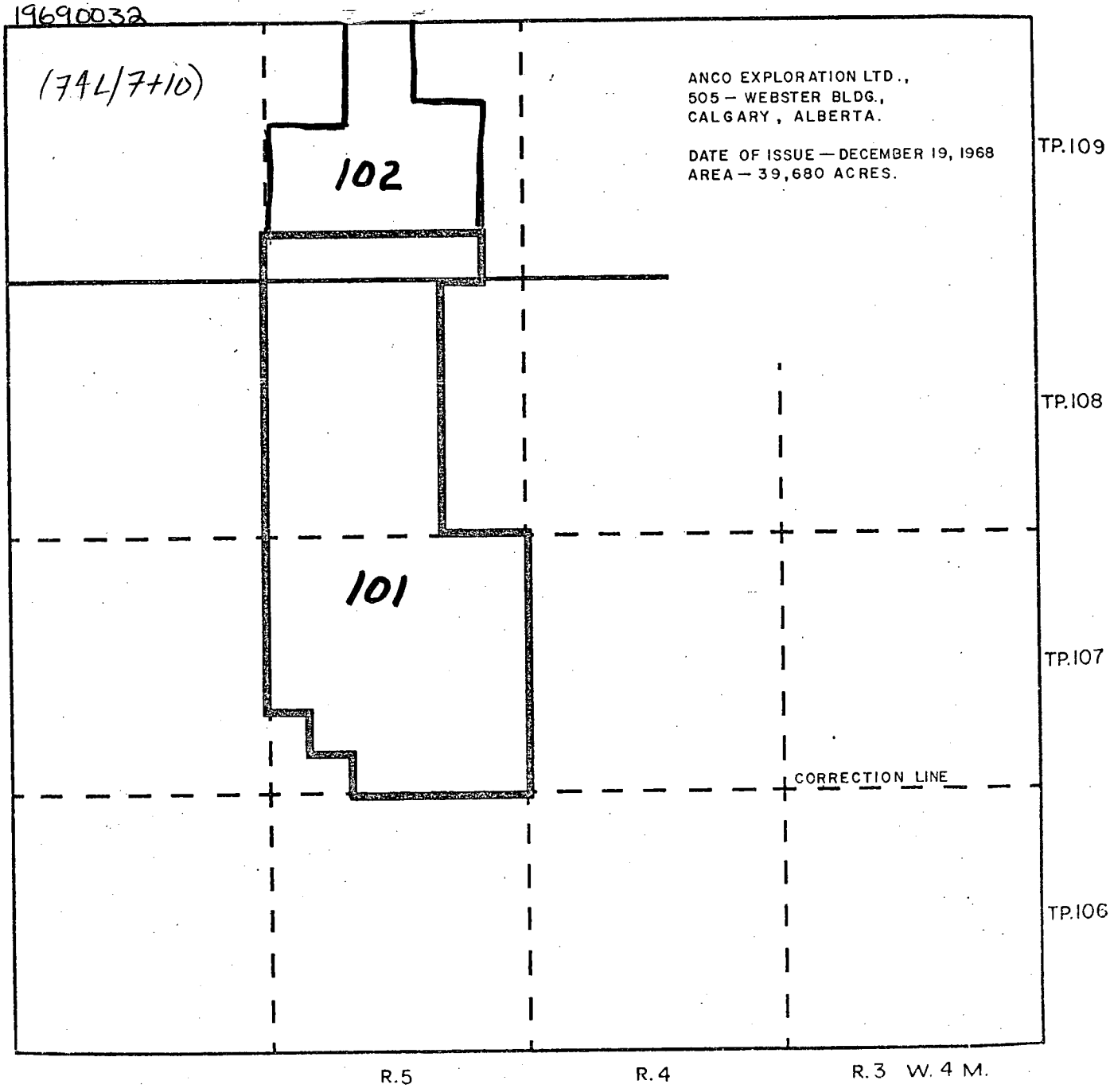

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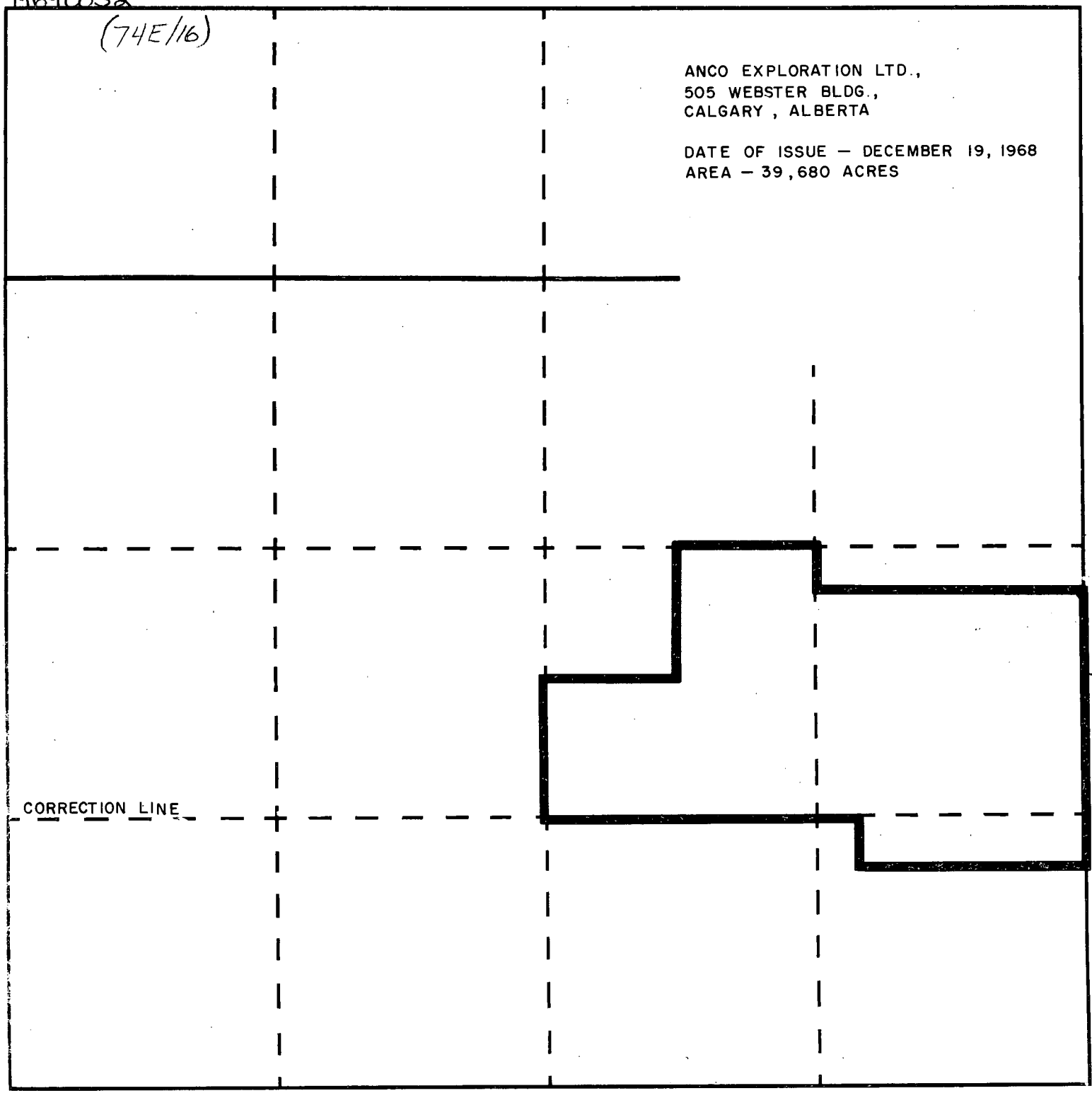

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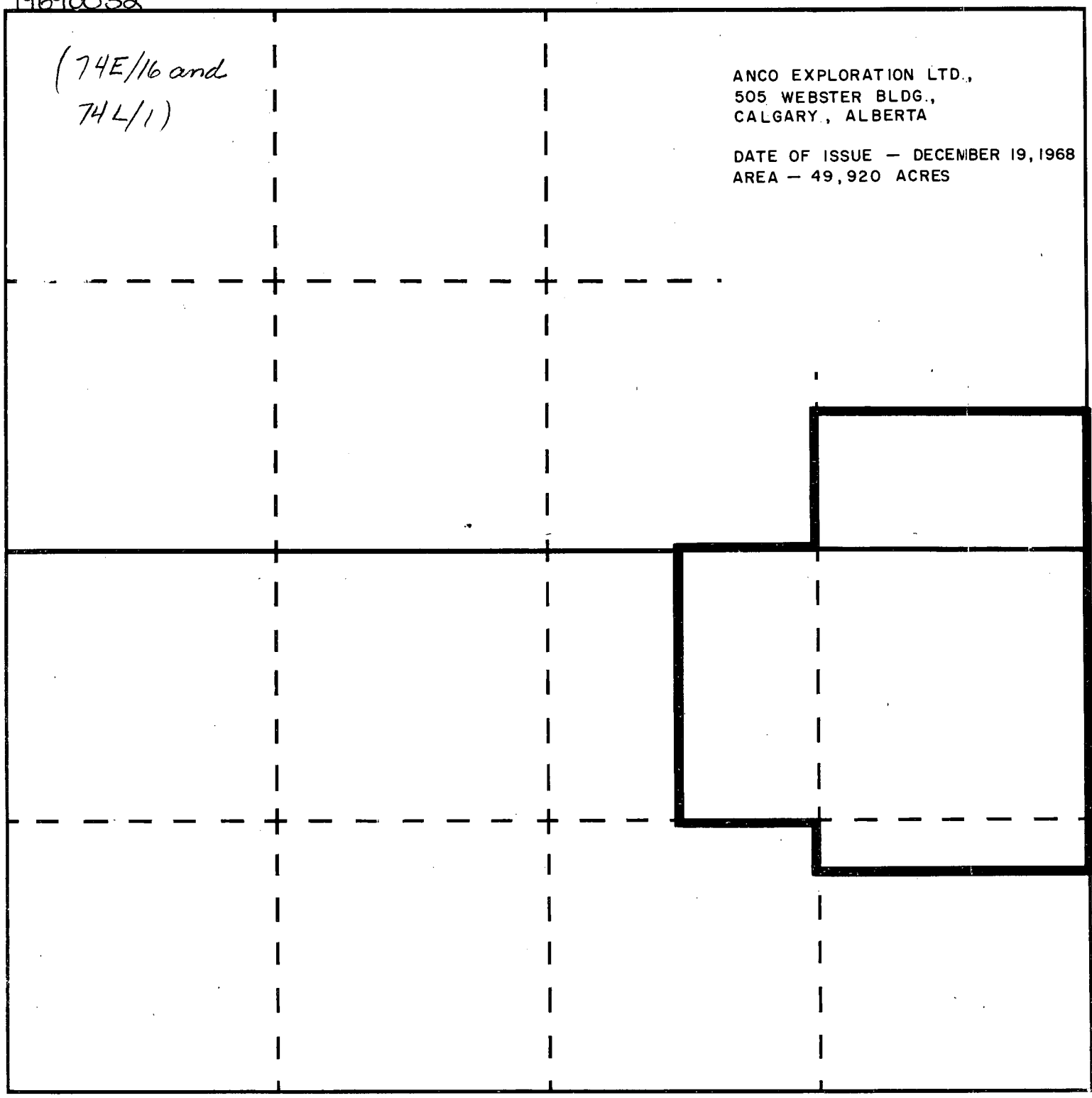

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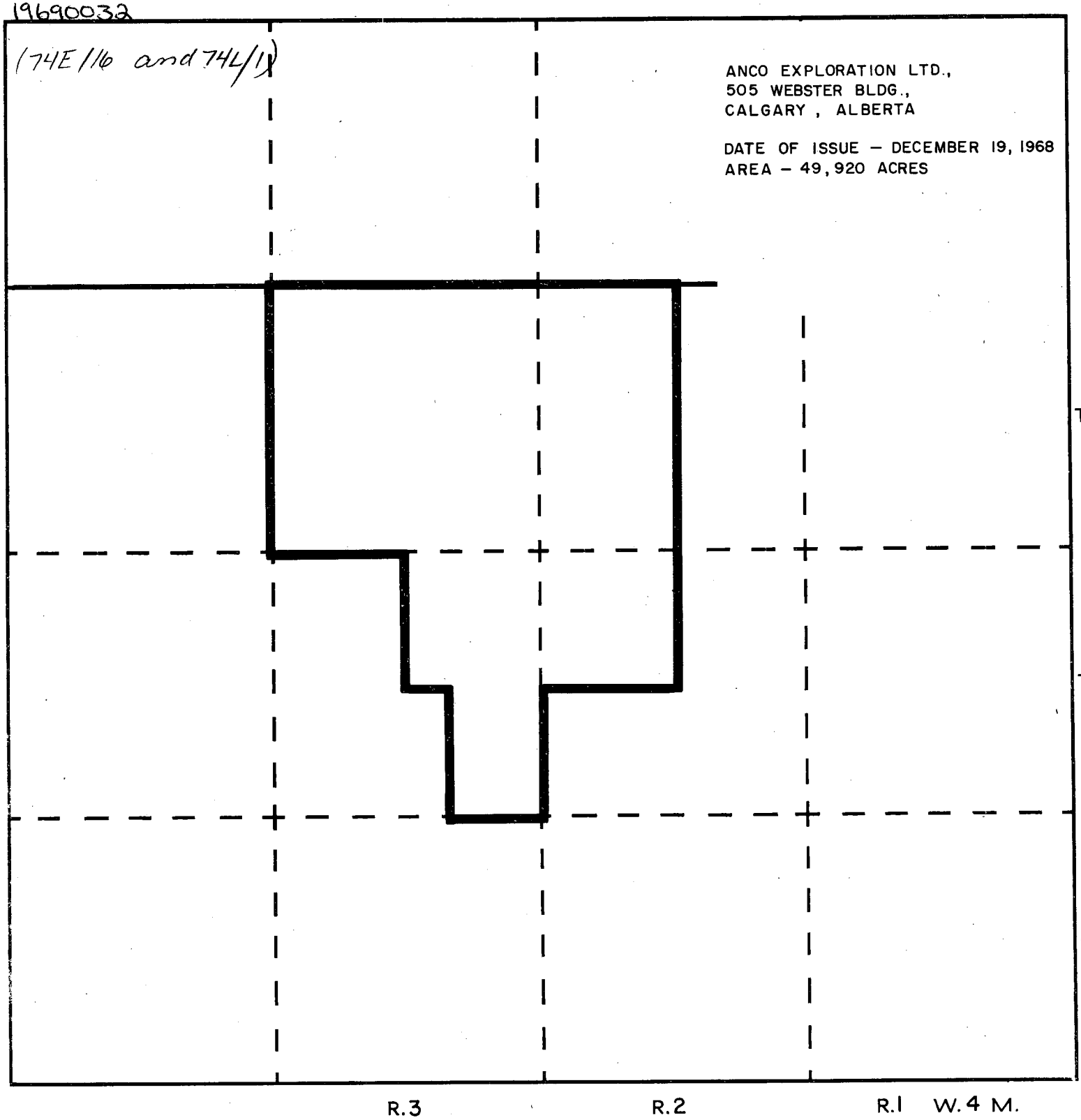

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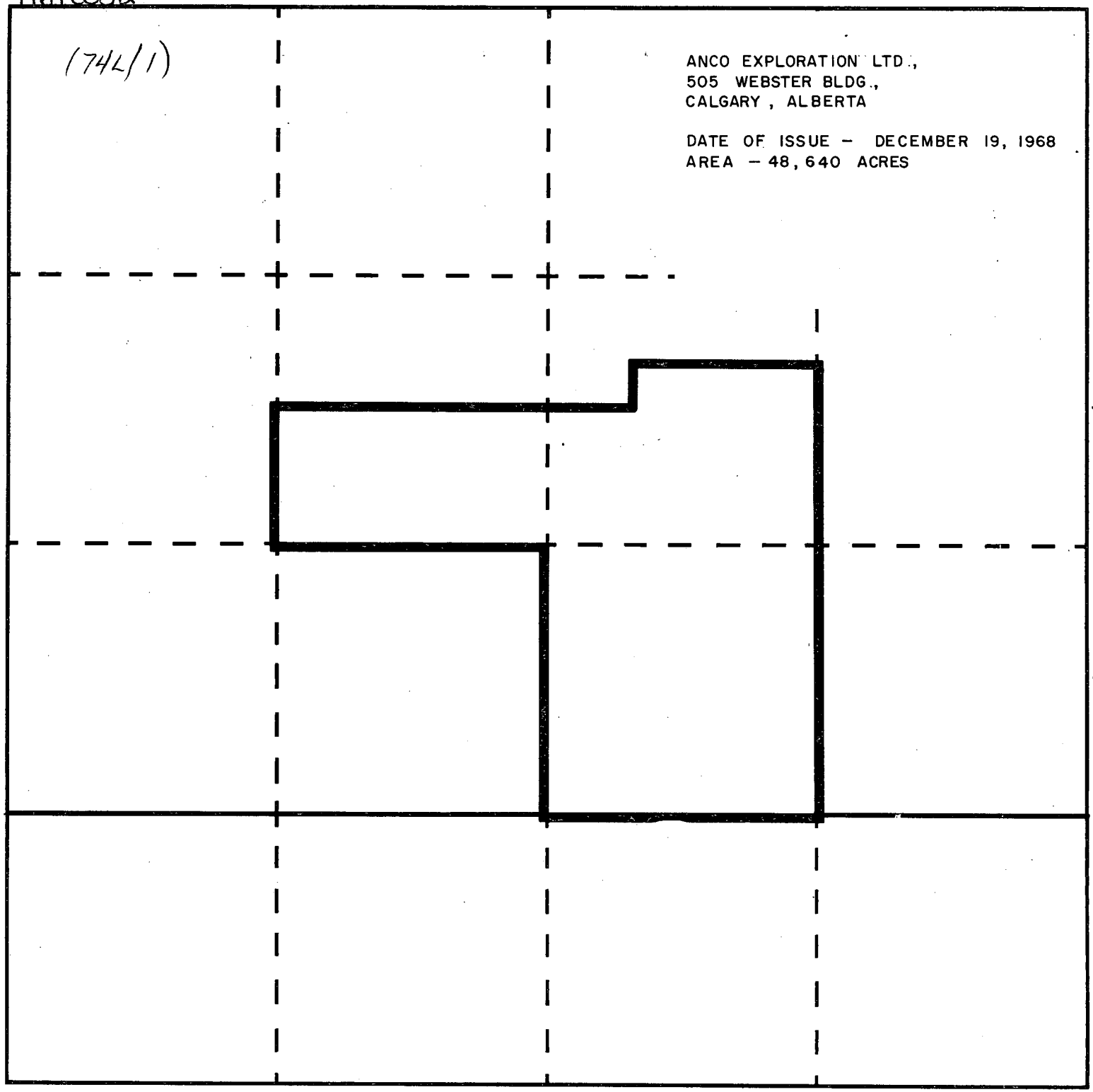

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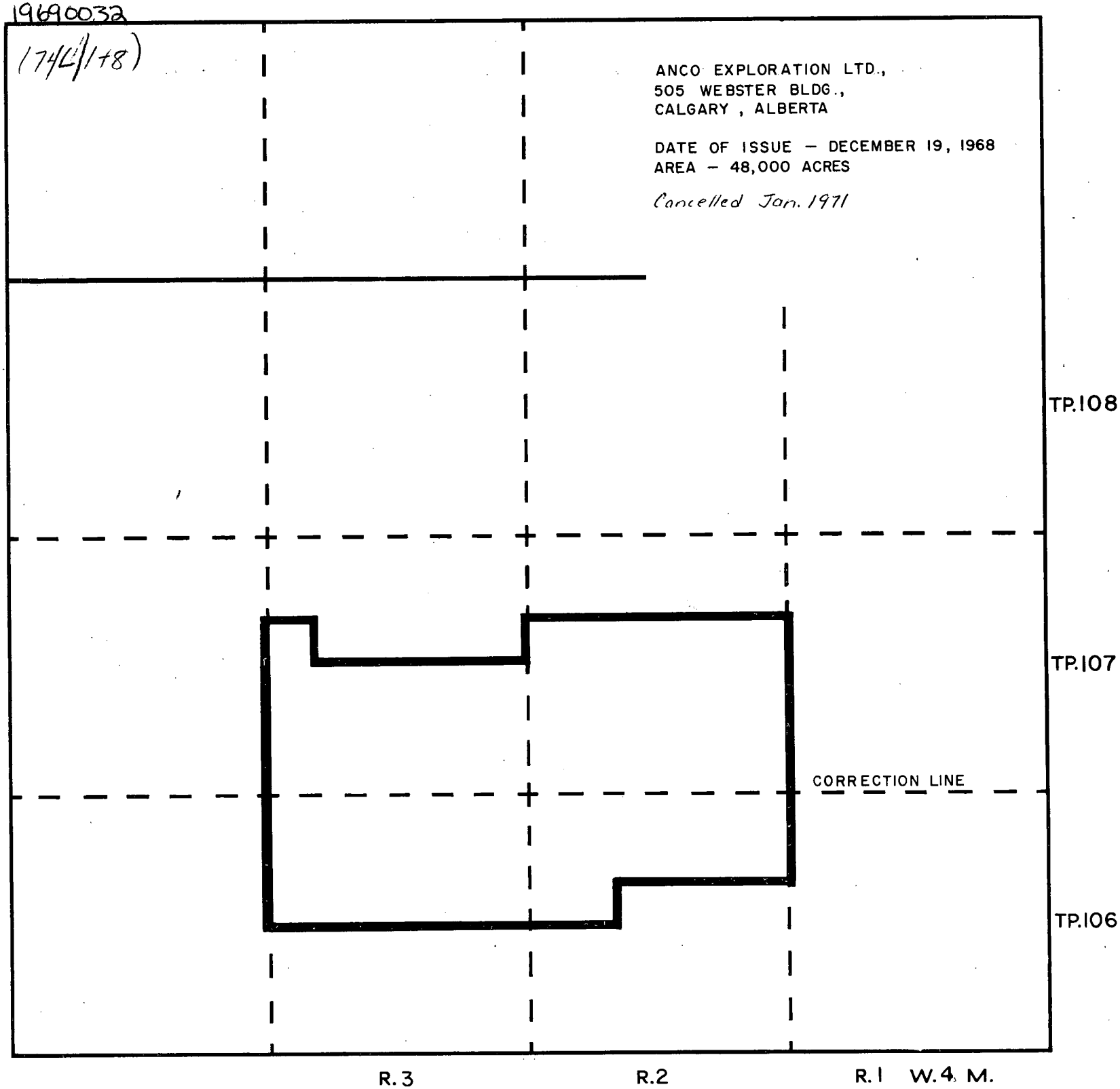
Cancelled Jan. 1971



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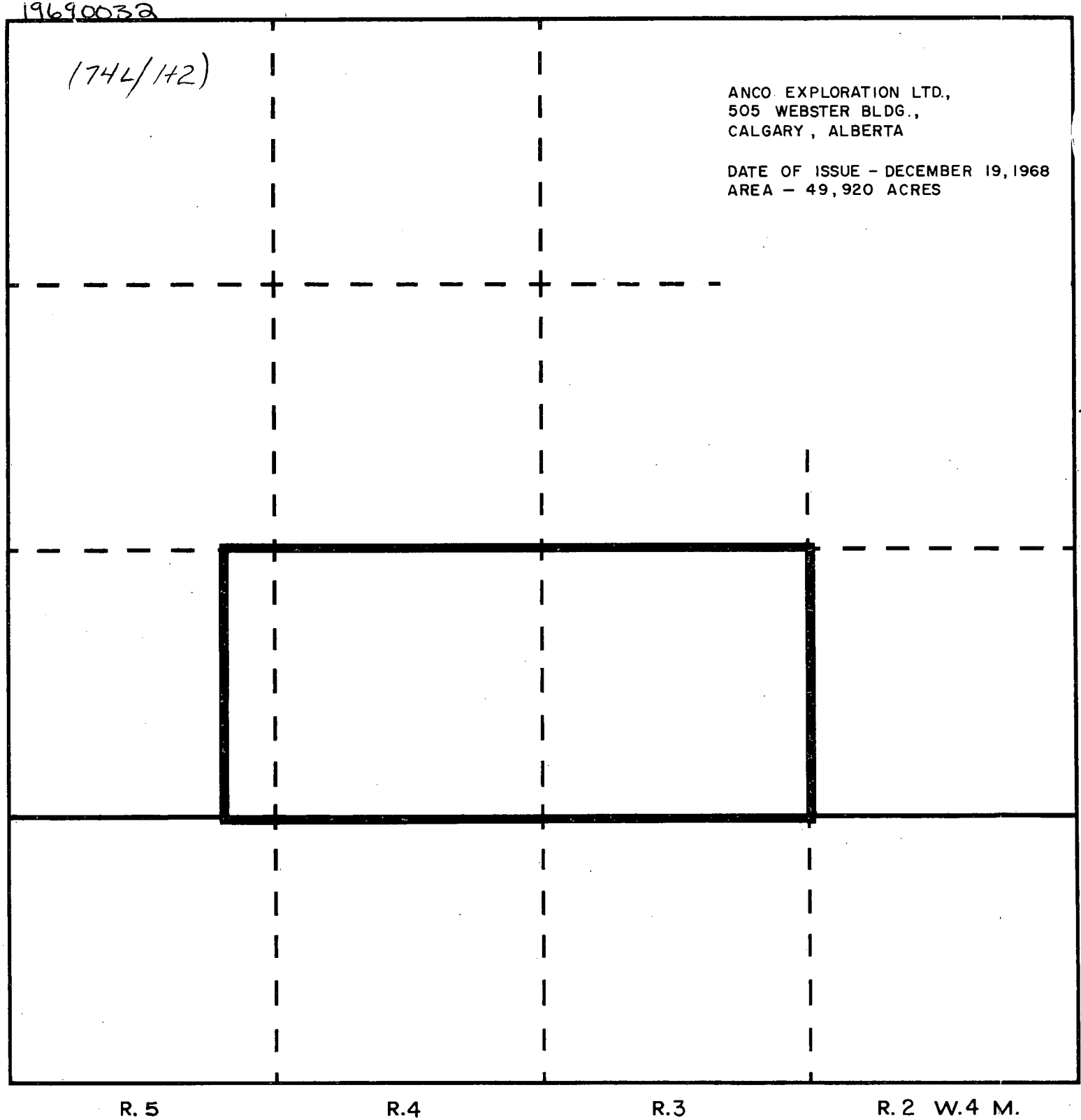

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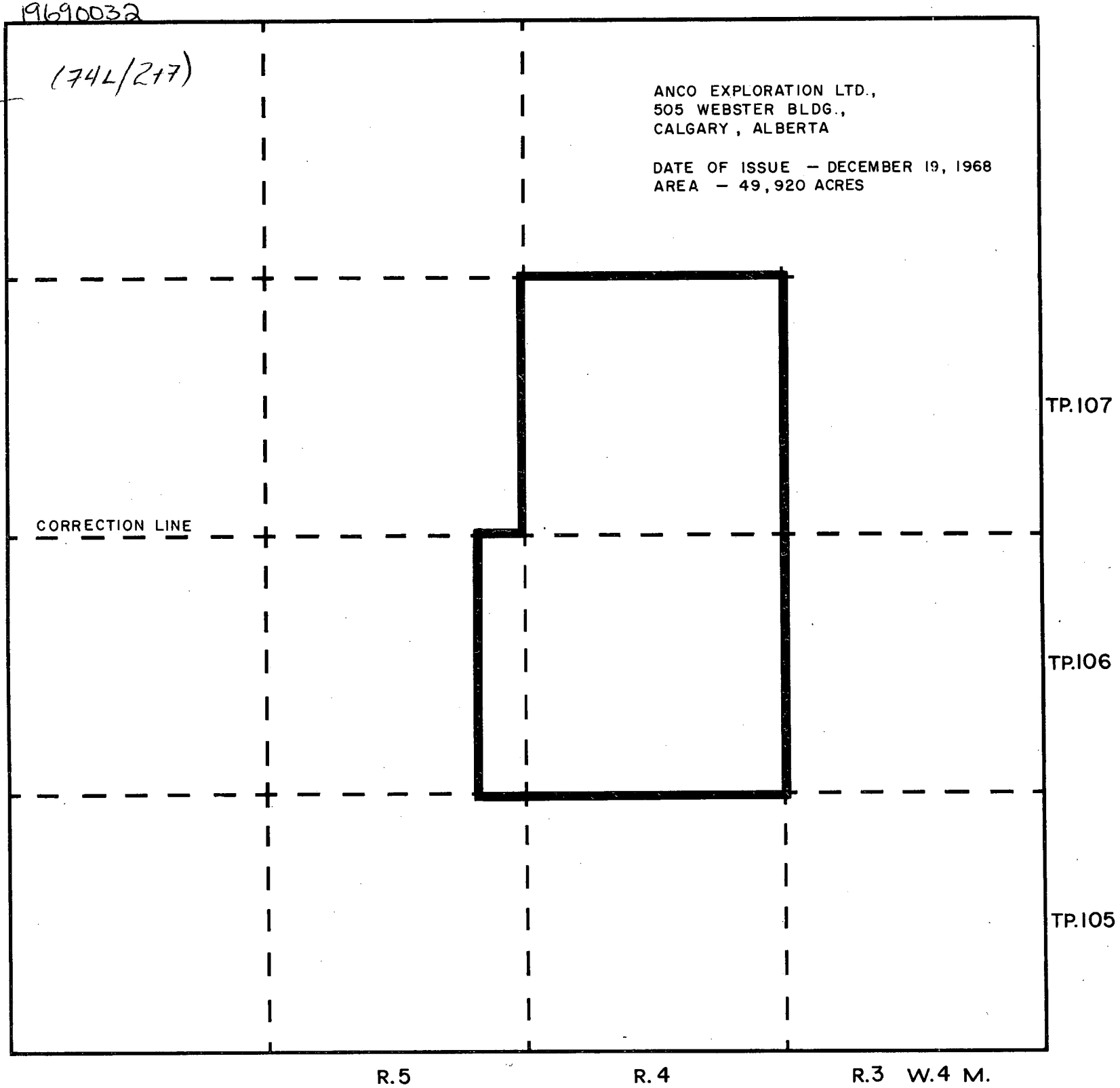

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(174L/7+10)

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DATE OF ISSUE – DECEMBER 19, 1968
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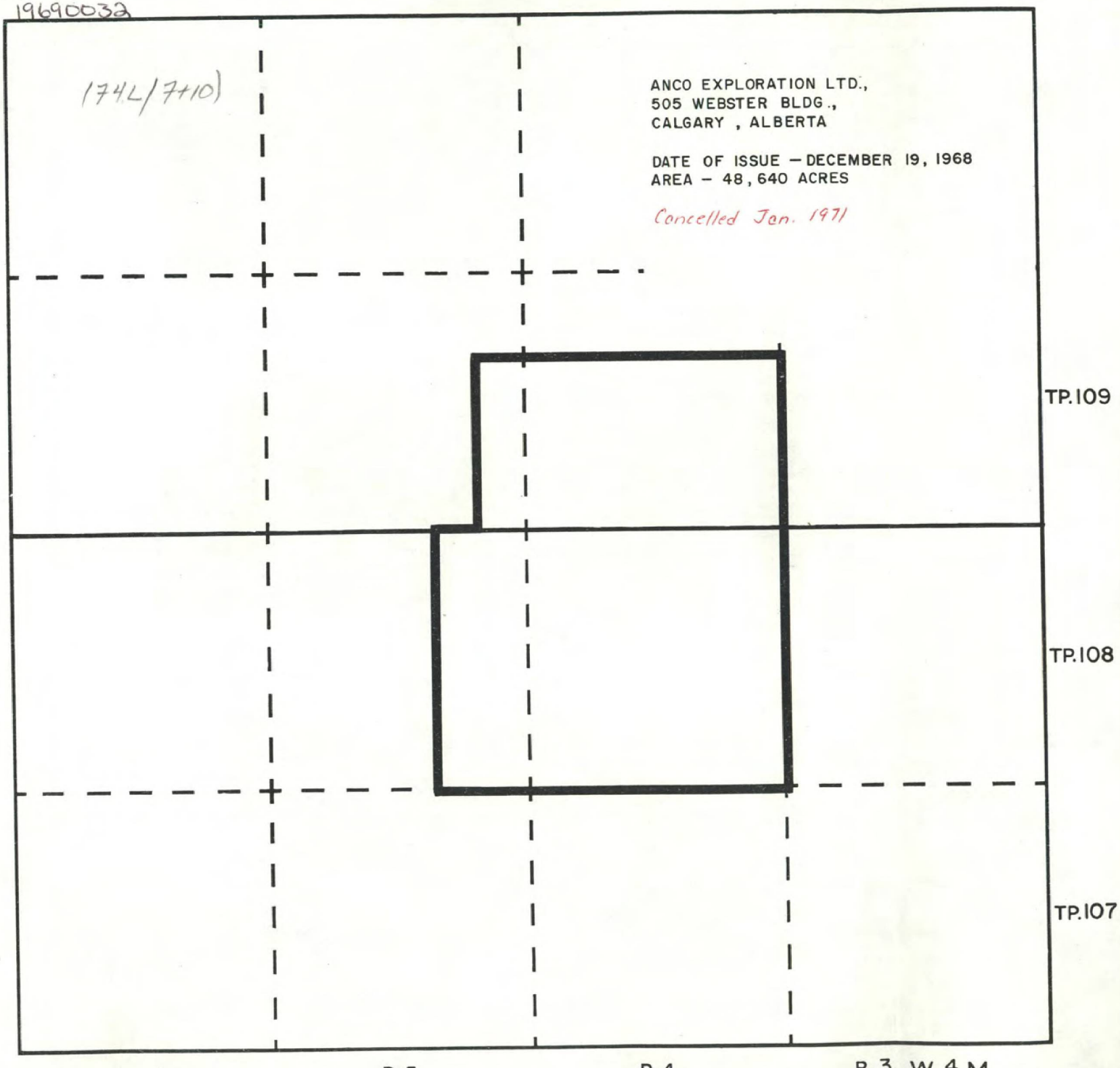

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