# GRAVITY SURVEY

of the

# MARK CLAIMS GROUP, YUKON TERRITORY

for

CANADIAN RESERVE OIL & GAS LTD.

by

OVERLAND EXPLORATION SERVICES (1969) LTD.

RECEIVED
AUG. 16 1971
MINING INSPECTORS OFFICE
WHITEHORSE, Y.T.

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of

$ 38,369.56

D B Craig

Resident Geologist or
~~Resident Mining Engineer~~

Considered as representation work under Section 53 (2) Yukon Quartz Mining Act.

Commissioner of Yukon Territory

060963

# ANVIL PROSPECT
# (MARK GROUP)
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# INTRODUCTION

In August 1970, Overland Exploration Services (1969) Ltd., conducted a gravity survey on the Mark Claim Group for Canadian Reserve Oil and Gas Ltd. The Mark Group of Claims is not a continuous group, but split into two separate groups; and for the purpose of this report we will refer to the two as Mark East Group and Mark West Group. This survey was carried out on grid lines spaced 750 feet apart, and the gravity station interval along these lines was 200 feet. Overland Exploration carried out the work from base camps set up at strategic locations on the prospect and this camp was moved in and out, and was supplied by helicopter. Overland stocked food stuffs and gasoline at Faro townsite in order to shorten the helicopter haul to the prospect. The Mark Group of Claims is situated 20 miles northwest of Anvil townsite on Map Sheet 105K-5 and Map Sheet 105L-8. These claims are situated about latitude and longitude 134° 00' West and 62° 25' North.

## DATA

| | | |
|---|---|---|
| Bouguer Free-Air Correction Factor | - | 0.06 |
| Latitude Correction | - | 4911.15 feet/milligal |
| Density | - | 2.65 |
| Diurnal Drift | - | Taken from Base Plots |
| Terrain Corrections | - | Taken Where Necessary |
| Meter Numbers | - | Worden No. 806 |
| | - | LaCoste & Romberg No. 181 & No. 225 |
| Meter Constants | - | No. 806 - 0.08351<br>No. 181 - 1.05556<br>No. 225 - 1.06040 |
| Base Value | - | Arbritary value of 500 milligals |

## SURVEY & FIELD PROCEDURE

The Horizontal and Vertical Survey was conducted with a T-1 A Theodolite. Stations were located and elevated along each of the grid lines. The elevation was then closed across the extremities of the grid lines, all of the clousures thus formed were under 2.5 feet. A field plot of the actual elevation closures has been included with this report. The gravity readings were taken with a Worden Master and LaCoste & Romberg meter and stations were metered on a two and one-half hour run from base to base interval. The base station plots were used for graphing the diurnal gravity drift which in turn was applied to all station readings. Each gravity station run had several repeat stations from preceding runs in order to prove the repeatability of the gravity meter. The repeats were all within a 0.00 to 0.08 milligal range. All gravity readings were corrected for diurnal tidal drift, Bouguer Free-Air-Correction, latitude correction, and terrain correction. A density factor of 0.06 for

a surface density of 2.65 has been used in this interpretation.

## INTERPRETATION

Included with the interpretation of the Mark Claim Block is:

- Elevation Map
- Bouguer Gravity Map
- Residual Gravity Map
- Bouguer Profiles showing regional gradient and residual features.

The basis of this gravity interpretation is the examination of residual gravity highs and lows from a regional gravity gradient. We have attempted to construct a regional gravity gradient over the Mark Claim Block are which filters out deep-seated gravitational effects. Apparent positive and negative deviations from this gradient are considered as being "residual" and to probably emanate from within the top 1,000 feet of the geological section. The interpretation of this report is an investigation of these residual anomalies. Overland has tested rocks from within the Anvil area and

have assembled density data to the degree that average densities for known rock types are now available. Using these average densities, along with the known densities of massive sulphides in the Anvil area, we have been able to establish the perameters whereby anomalies can be investigated for the necessary contrast which would equate them to possible sulphide deposits. The following is a discussion of the various maps presented.

## BOUGUER GRAVITY MAP

The Bouguer Gravity Map is a total intensity map which displays the entire gravitational field. Quite often it is of little value and the main gravitational features appearing on this map are sourced from major density changes deep within the earth's crust. Occasionally shallow features and trends can display enough relief to have visual significance and be discernible against the deeper and broader background.

The Bouguer Map of the Mark West area shows a broad, deep-seated gravity high which strikes northwest-southeast along the base line. This high is flanked by a steep dipping gradient to the northeast and southwest. The mass distribution as seen on the Mark West Claims suggests the presence of dense material striking northeast-southwest across the entire area. The mass deficient area lying to the northeast and southwest of this gravity positive represents areas

of less dense material butting against the high density material. Local highs and lows (some of which are quite obvious) on the Bouguer Map are to be investigated in detail and the Residual Gravity and interpretative portions of this report.

The Bouguer Gravity on the Mark Claims East shows the location of the Mark East Block to be on the flank of a fairly steep gravity gradient. The gradient is rising to the west with the Mark Group situated on the eastern flank.

## RESIDUAL GRAVITY MAP

The Residual Gravity Map of the Mark Claims Group is presented on three sheets. Map No. 1, and Map No. 2 cover the West Block of the Mark Claims Group, while Map No. 3 covers the East Block.

The Residual Gravity Map shows the difference (in gravity) between the observed gravity and the regional gravity gradient. The regional gravity gradient on the Mark Claims Group has been constructed from a profile analysis of the surveyed gravity lines and is designed to attempt to eliminate deep-seated gravity features which complicate the identification of the shallow-sourced gravity features. These shallow features may indicate mineralized areas. By using this method, the deep seated gravity events are filtered out or supressed to a point where the remaining or residual gravity is (mostly) emanating from above a predetermined maximum depth. In the case of the Mark Claims Group area this investigation depth is 1,000 feet or less below surface.

The following is a summary and analysis of the important gravity anomalies which appear along the 56 gravity lines which comprise this survey. Three-dimensional model studies have been performed on all of the significant anomalies. These studies have parameters based on known differential densities existing between massive-sulphides and Cambrian metamorphic rock in this area. There are several geological conditions which can produce gravity anomalies which are similar to the anomalies caused by sulphide bodies. Two of the more common such conditions are:

(1) Where we find a steep-flanked knob or ridge of Cambrian rock in contact with surface till we can expect to find a gravity anomaly having similar quantitive dimensions to those of a sulphide body, and

(2) Where a very dense intrusive rock is present.

However, anomalies having the characteristics of known sulphide deposits must be drilled because

only the drill will reveal their true composition.

## MAP SHEET NO. 1

### ANOMALY "A"

The "A" Anomaly is located on the west side of Map Sheet No. 1, at the northwest limit of the surveyed area. It is probably caused by a mass which is "slab" shaped and which is present at a depth (maximum of 700 feet below surface. By using the appropriate formula for a slab-shaped mass the calculated weight of the anomaly causing mass is 42,500,000 metric tons. However, the causative mass is unlikely to be perfectly slab-shaped feature and thus our weight calculations are only an estimate.

The A, B, D, F and G anomalies form a regional trend and appear to emanate from the same source. These anomalies are situated on a large gravitational high which forms the regional background for the western portion of the Mark Claims Group.

This gravity high indicates that the area is underlain by denser rock which strikes northwest-southeast. The majority of the residual gravity highs that we see along this regionally high area appear at or near the crest of the main feature.

The two most likely causes of the residual anomalies A, B, D, F and G are either:

(1) denser material situated within the mass of the large gravity positive.

(2) portions of the main dense material protrude upwards into the overlying glacial till.

Either of these cases will give a residual gravity positive anomaly superimposed on the main background.

"B" ANOMALY

The "B" Anomaly is very similar to the "A" Anomaly and appears to be a continuation of the same series of residual highs. This residual high has two closely associated mass sources (plus a possible third

lying to the southwest which exerts only a minor influence). The two main features are expected to reflect "slab-shaped" masses which are present at a maximum depth of 700 feet below surface. Calculations of the larger amplitude feature (1.3 milligals) reveals that the weight of the causative mass to be 11,800,000 metric tons.

## "C" ANOMALY

The "C" Anomaly is a small low relief gravity high situated on Line No. 48 South. We consider the "C" Anomaly to have a fairly low priority in the order of exploration. We suggest a cross-line parallel to the base line to be located at Station 9 South on Line No. 48 and extending to Line No.50 in the northwest and Line No. 46 in the southeast. Such a line would provide more detail on this anomaly.

## "D" ANOMALY

As will be seen on the gravity profile constructed along Lines 41 to 45 inclusive the "D"

Anomaly is very closely related to the apex of the major density high feature which runs through the entire area. The whole of the "D" Anomaly is probably made up of at least four individual sources that meld together. The source material for that portion of the anomaly which lies north of the base line is most likely topographic highs on the underlying rock. For further definition of this area a northwest-southwest grid of gravity lines paralleling the base line could be run across this feature. If, after this additional program has been carried out east and west flanks can be seen on the "D" Anomaly then we can better evaluate the true source of the individual highs.

The portion of the "D" Anomaly lying south of the base line has more interest and signifigance inasmuch as it is sourced on the flank of the major underlying gravity positive. This portion of the anomaly is sourced from a slab-shaped mass located about 500 feet below surface. The excess weight of this mass is about 40,000,000 metric tons.

## "E" ANOMALY

The "E" Anomaly is a 1.2 milligal density high located along the flank of the major underlying feature. The source of this anomaly appears to be a slab lying 500 to 600 feet below surface. The calculated excess weight of this anomaly is about 18,000,000 tons.

## "F" ANOMALY

The "F" Anomaly is a poorly defined anomaly having less than one milligal or relief and very small areal extent.

## "G" ANOMALY

The "G" Anomaly is very similar to the portion of the "D" Anomaly which lies to the north of the base line. Again we see a large mass area made up of many small local anomalies. Generally the whole of the "G" Anomaly is associated with the apex of the underlying major high and because of this we feel that this area will have to be grided with northwest-southeast lines to provide additional detail. Two of the individual

gravity positives that make up the "G" Anomaly are very local and quite interesting and have been colored on the Residual Gravity Map.

## MAP SHEET NO. 2

### "L" ANOMALY

The "L" Anomaly is a local gravity high situated on Line No. 36 which attains a magnitude of less than one milligal. It is only crossed by one line and we feel further work should be done to establish whether or not the No. 36 Line crosses the anomaly at its apex or on a flank. If only the east flank has been crossed a much larger feature could be present to the west.

### "K" ANOMALY

The "K" Anomaly is a low magnitude anomaly of very little interest, however, if further work was to be done on "L" the cross lines should also be surveyed across the "K" location.

"J" ANOMALY

The "J" Anomaly is another local high which appears on Line No. 34. This anomaly does not attain the magnitude that we wish to see when looking for a sulphide body to native rock contrast and therefore, we suggest that "J" be placed low in the order of exploration.

"H" ANOMALY

The "H" Anomaly is another series of local density highs forming a large mass area made up of individual pods of dense material. Some of these individual highs reach the magnitude of one milligal and again we suggest a northwest-southeast series of grid lines to help define the area of the local highs and the exact magnitude that they attain.

MAP SHEET NO. 3

Map Sheet No. 3 covers the Mark East Claims. In this area we see two very interesting anomalies which are discussed below.

## "R" ANOMALY

The "R" Anomaly is another low magnitude anomaly and we place it low on the scale of exploration targets. There is a possibility that three or four additional northeast-southwest grid lines across the feature will show that the apex of the "R" Anomaly falls between Lines 23 and 24, and if this is the case the possibility that this feature reflects a massive sulphide body is greatly increased.

## "S" ANOMALY

The "S" Anomaly is a series of gravity highs which form a linear feature 7,000 feet long. We feel that where this feature is defined on the No. 20 Line at Stations 10 and 11, and 12 North is the best drilling target that we have discovered on the Mark East Claim Block portion of the survey. Here we find a feature which reaches a magnitude of 1.5 milligals and the source depth estimated to be 800 feet below surface. Unfortunately, the adjacent lines, 19 and 18, were impossible to obtain because of terrain conditions. However, on Line No. 17 we see a similar feature, slightly

narrower and smaller in magnitude. We have assumed from this that the feature is a vertical slab lying between Lines 17 and 20. This may not be true, and it is possible that the anomalies on Lines 17 and 20 are separate. Assuming that the causative mass is a continuous slab, it would represent a body in excess of about 2,000 feet long, having a width of 1,000 feet. The excess tonnage of such a mass would exceed 51 million tons. The southern portion of the "S" Anomaly appears on the profiles to be nothing more than a faulting in the native rock. However, there is always the possibility that this may not be true especially considering the appearance of the profile on Line No.14. Further work should be done on this portion of the anomaly before ruling it out as being insignificant in the exploration for a sulphide body.

## "T" ANOMALY

The "T" Anomaly is another instance where we may be seeing nothing more than faulting in the native rock. The profile on Line No. 20 could well have the

regional altered to wipe out the "T" Anomaly altogether which would leave a major low or mass deficient area lying between the anomalies "S" and "T". This alteration to the gradient would in no way affect the "S" Anomaly as it appears on Line No. 20. To the southeast of the "S" and "T" anomalies we do not feel that the remainder of the gravity highs should be investigated because of the reasons previously discussed in this report.

## CONCLUSIONS

The Mark Group of Claims contains some very interesting gravity anomalies in both the East and West Groups. We feel that some of these (as stated in the individual discussions) are worth drilling at this point, while others should still have further ground gravity work performed on them to locate the best possible location for a drill hole. We feel that some of the most interesting gravity anomalies we have seen in the Yukon are located on the Mark Group.

Respectfully submitted by:

OVERLAND EXPLORATION SERVICES (1969) LTD.

W. T. Salt

WTS/jp

# CERTIFICATE OF QUALIFICATIONS

I, David K.Y. Chen, Geophysicist, of 6405 - Center Street North, Calgary 47, Alberta, Canada, hereby certify that:

1. I am a professional geophysicist associated with Overland Exploration Services (1969) Ltd., 1347 - 12th Avenue S.W., Calgary 3, Alberta, Canada.

2. I have no direct or indirect interest in, nor do I have or expect to receive any direct or indirect interest in any properties of securities of Canadian Reserve Oil & Gas Ltd.

3. I have attended the National Hunan University of Changsha, Hunan, China, 1947, receiving a Bachelor of Science Degree in Mining Engineering; that I hold a Master's Degree in Earth Sciences (geophysics major) from New Mexico Institute Of Mining Technology at Socorro, New Mexico, U.S.A. During the period of 1964-67 I undertook part time graduate studies in geophysics at Washington University, St. Louis, Missouri, U.S.A. I have completed all requirements of the graduate courses for my Ph. Degree work in geophysics except the thesis.

4. Since 1957, I have been intensively engaged in seismic, gravity and magnetic surveys and interpretations for oil/ore exploration in the U.S.A. and Far East with several Chinese, U.S. and Canadian oil and geophysical companies. In 1947, I was engaged as a Petroleum Engineer supervising oil well drilling and production. In 1957, I became involved in the geophysical oil/ore exploration field I have held the following positions.

- Geophysicist
- Research Geophysicist
- Assistant Professor in Geophysics.

5. I am a member of the following academic and professional societies:

- Society of Exploration Geophysicists
- American Geophysical Union
- European Association of Exploration Geophysicists
- Association of Professional Engineers Of Alberta
- Geological Society of Republic Of China
- Chinese Petroleum Institute
- Chinese Institution of Mining and Metallurgical Engineers.

David K.Y. Chen

DAVID K.Y. CHEN
Professional Geophysicist

DKYC/jp

133°55'

L-26

L-25

53866

53865

53864

53867

53868

53869

53871

53872

53873

53874

53875

53876

53877

54306

54307

54308

54309

54310

54311

54312

54313

R

S

T

U

+1.00

0

+.60

LINE

BASE LINE

N

OVERLAND

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FOR

CANADIAN RESERVE OIL AND GAS LTD.

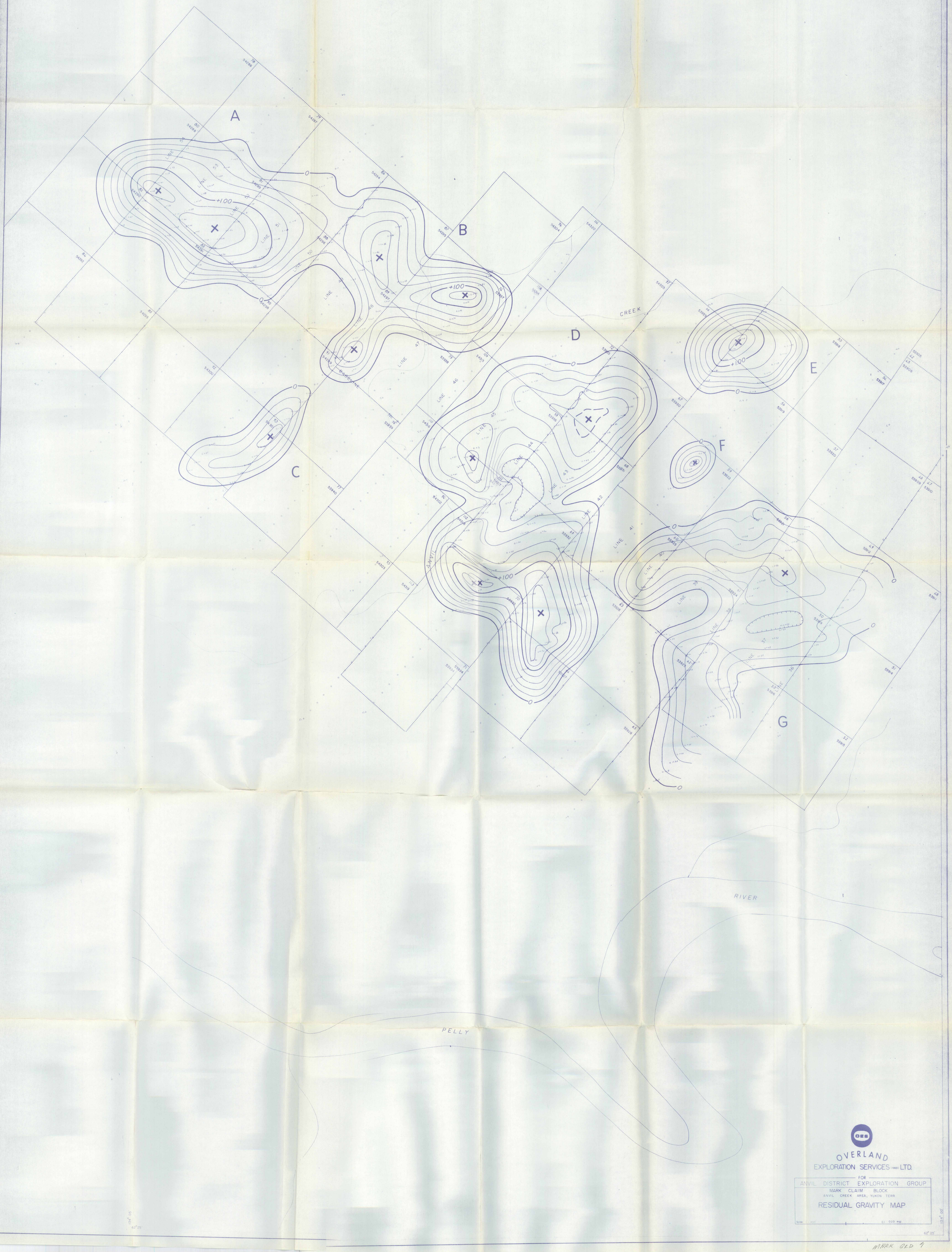
MARK CLAIM BLOCK

ANVIL CREEK AREA, YUKON TERR.

# RESIDUAL GRAVITY MAP

Scale: 1" = 400'

C.I.: 020 mgl




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FOR
ANVIL DISTRICT EXPLORATION GROUP
MARK CLAIM BLOCK
ANVIL CREEK AREA, YUKON TERR.

RESIDUAL GRAVITY MAP

Scale 1:400 C.I. 020 mgl

MARK GRD 1

62° 30'

134° 00'

+1.00

+40

+1.00

+60

+80

+80

+1.00

H

I

J

K

L

LINE 37

LINE 36

LINE 35

LINE 33

LINE 32

LINE 31

LINE 29

LINE 27

LINE 25

LINE 24

ANVIL CREEK

OES

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MARK CLAIM BLOCK
ANVIL CREEK AREA, YUKON TERR

RESIDUAL GRAVITY MAP

Scale 1:400 C.I. 0.20 mgl

MARK GRP #2

62° 30'

134° 00'

4300'
4700'
4775'
4200'
4100'
4000'
3900'
3800'
3700'
3600'
3500'
3400'
3300'
3200'
3100'
3000'
2800'
2975'
4700'
4600'
4400'
3800'
3500'
3400'
3200'
3000'
2900'
2800'
2700'
2600'
2500'
2600'
2800'
3000'
4000'

LINE

# OVERLAND
## EXPLORATION SERVICES (1969) LTD.

FOR

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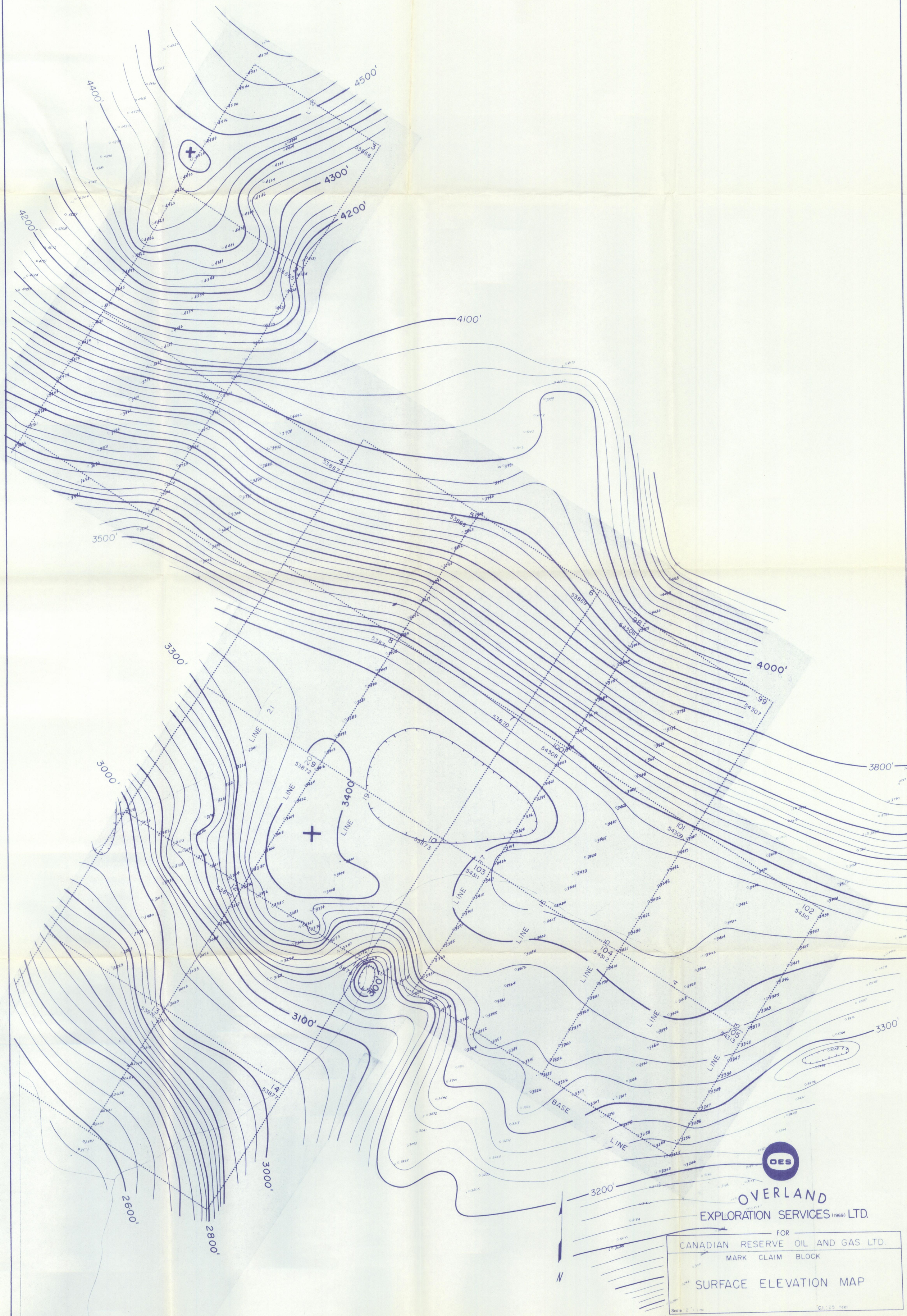
MARK CLAIM BLOCK

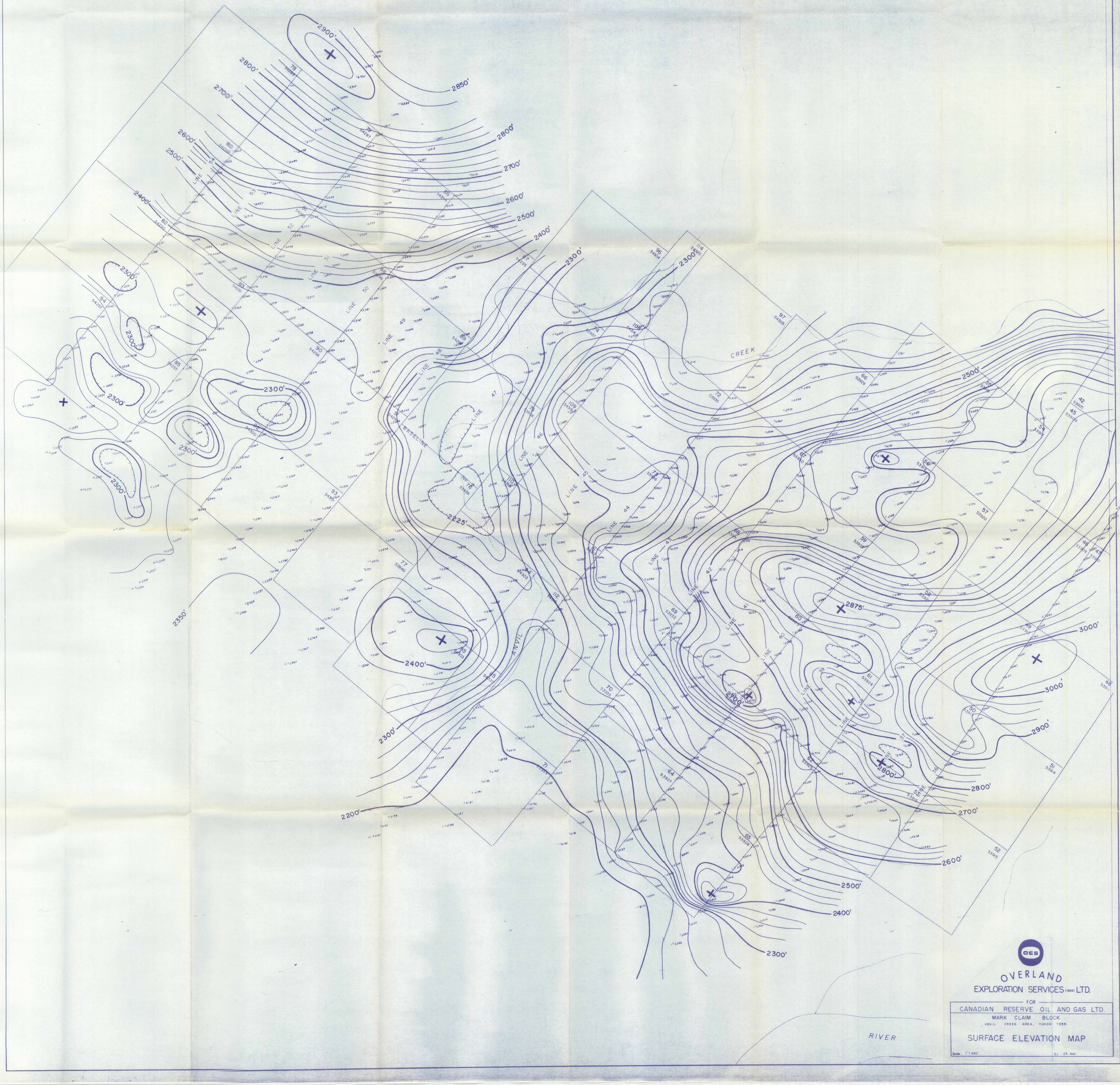
ANVIL CREEK AREA, YUKON TERR.

# SURFACE ELEVATION MAP

Scale: 1" = 400'

C.I. 25 feet


4500'
4400'
4300'
4200'
4100'
4000'
3800'
3500'
3400'
3300'
3100'
3000'
2800'
2600'
3200'
53866
53867
53868
53869
53870
53871
53872
53873
53874
53875
53876
54306
54307
54308
54309
54310
54311
54312
54313
LINE 1
LINE 2
LINE 3
LINE 4
LINE 5
LINE 6
LINE 7
BASE LINE
OES
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FOR
CANADIAN RESERVE OIL AND GAS LTD.
MARK CLAIM BLOCK
SURFACE ELEVATION MAP
Scale: 2" = 1 mi.
C.I.: 25 feet
N




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FOR
CANADIAN RESERVE OIL AND GAS LTD.
MARK CLAIM BLOCK
ANVIL CREEK AREA, YUKON TERR.

# SURFACE ELEVATION MAP

Scale 1" = 400'  C.I. 25 feet

680.00

678.00

677.00

683.00

679.00

695.00

685.00

680.00

675.00

681.00

CONTOUR INTERVAL : 0.20 MGL.

CONTOUR INTERVAL : 1.00 MGL.

Probable contacting line between Granite and Sedimentary rock.

N

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FOR

CANADIAN RESERVE OIL AND GAS LTD.

MARK CLAIM BLOCK

ANVIL CREEK AREA YUKON TERR.

# BOUGUER GRAVITY MAP

Scale : 1" = 400'

C.I. AS SHOWN

62° 30'

124° 00'




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FOR

CANADIAN RESERVE OIL AND GAS LTD.

MARK CLAIM BLOCK

ANVIL CREEK AREA, YUKON TERR.

# BOUGUER GRAVITY MAP

Scale: 1"=400' C.I.: 0.20 mgl

POSSIBLY "MARK GRP"