

0123-63060
TN 27, 18
C4
A58
C.2

GEOLOGICAL REPORT

ON THE

ANTIMONY STOCK

116 B 8

Latitude $64^{\circ} 17'$

Longitude $138^{\circ} 15'$

July 1976

for

Chevron Standard Limited
Minerals Staff
Vancouver, B.C.

by

Godfrey Walton

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INTRODUCTION

The C Claims (69 in total) are located 35 miles northeast of Dawson City on Antimony Mountain. Geological prospecting mapping, grid construction, radiometric surveys, rock, soil and silt sampling were carried out by G. Dales, J. Gajda, W. Pritchard and G. Walton from July 22nd to August 13, 1976. The geophysical instruments that were used for the radiometric surveys were 5 rented Scintrex scintillometers and one TV-5 multichannel spectrometer.

SURVEYS

(a) Geophysical Survey

The survey was conducted on previously constructed grids using the Scintrex scintillometers. The instruments were held at waist level and were continually left in the 'on' position. Readings were recorded every 100 feet on the grid and this survey was run concurrently with the soil survey.

(b) Geochemical Survey

This survey combined three separate areas of data and they are soil, stream silt and rock. Rigid soil sampling was conducted over the grid used for radiometrics. Sample spacing of 200 feet was established and kept if the conditions permitted; in some areas the ground was covered by talus or occasional outcrop.

An attempt was made to take the soil samples from the B horizon but this was not possible in every case. The soil formation is very poor in many areas with only the A and C horizons or a very poor B horizon being present. However, neither the ph nor Eh were taken at any of the sample locations. This extra data may have made the interpretation a lot simpler.

The background established for the area was anything below 20 ppm Uranium. Only values above 20 were anomalous and noted.

The stream silts were only taken on one creek. It was aimed at discovering if uranium was being deposited by the creek on the banks or in the silt. Samples were taken above and below each tributary and also up the tributary. The main creek gave the highest values and they were all anomalous. In all samples the lowest size fraction was sampled although in some cases this fraction was coarse silt or fine sand.

The rock sampling was normally done in conjunction with mapping and anomalous radiometric values. The samples are, therefore, quite randomly distributed throughout the map area. In most cases a fresh sample was taken, however, since the majority of the rock was in the form of frost heave or talus only a sample of the top 4 inches was possible. The sample was in two forms; one a hand sample for either geochemical or petrographic analysis or both and two a chip sample for geochemical analysis.

The background values for the rock samples was 5 - 25 ppm. The higher ppm rock values are anomalous, however, you would not normally expect a highly anomalous soil or stream silt sample. Since we get anomalous silt and stream samples it must be the organic content in the soil that is attracting the uranium.

(c) Interpretation of Data

The surveys all produced anomalous values, however, once they were plotted on topographic maps it was easy to understand the anomalies and how they are influenced by the topography.

In the radiometric survey it was found that different backgrounds were obtained depending on whether you traverse on outcrop/talus or covered area (snow, soil, and water). In addition individual rock types gave different background levels (see Table 1). In this case the radiometrics contour tend to outline areas of talus and outcrop or areas of varying amounts of soil cover. In small areas anomalous values of up to 1000 cps

were obtained, however, these were found to be very coarse grained varieties of the syenite. Other anomalous areas were 600 - 800 cps over 1500 feet, however, no significant uranium content was found after analysing these rocks.

<u>Rock Types</u>		<u>Counts</u>
Outcrop/Talus	Nepheline Monzonite	500 - 600 cps
	Dykes	400 cps
	Contact rock	100 - 200 cps
Covered Ground	Soil - depending on cover	200 - 500 cps

Established background values in counts per second over Scintrex hand held scintillometer at waist level.

TABLE 1.

The soil sampling survey was run concurrently with the radiometric survey. It has produced several anomalous values which once plotted and contoured on a topographic map indicated an interesting relationship (see Map 2).

The anomalous values appear to be related to some of the streams. They are located on the banks of the streams or in hollows or flat moose pastures. These two types of areas have abundant organic material in the soil which produces a good reducing environment favourable for uranium concentration. The anomalous values that are present in the soil samples are probably secondary anomalies due to ground water enrichment. There appears to be no other explanation that will justify the appearance of the contours.

The stream silt samples were taken from one stream that had previously been sampled and had produced high values. The samples at this time proved to be a little lower although they were still anomalous. The whole area is quite puzzling since both the soil samples and the silt samples have produced highly anomalous results, while the rocks are hardly geochemical anomalous (see Table 2.).

<u>Rock Number</u>	<u>U ppm</u>
RA 76 - 93	46
94	37
95	17
100	16
101	9
102	5
103	6
104	15
121	52
GW 37A	14
37B	12
38	22
HW 72	14
74	55
GD 26 - 7	28
27 - 7	22
26/7	27
GW 27'	18
27	23

TABLE 2. URANIUM ROCK ASSAYS IN PPM

In considering the geophysical and the geochemical surveys together they all suggest the same important point. The important point is the intrusive as a whole is enriched in uranium but is not further enriched to be of economic interest.

In addition there have been no secondary processes that have enriched the uranium in any zones. However, with leaching of the intrusive by ground water and rain water it would produce groundwater enriched in uranium. This ground water when it goes through a reducing environment or organic material it will enrich the area. If the enrichment is large enough then an economic deposit would be formed.

GEOLOGY

(a) General

The Cretaceous intrusion is surrounded by Cambrian to Precambrian sediments. The sediments are composed of slates, quartzite, sandstones and mudstone beds which dip steeply away from the intrusive. The sediments are highly contact metamorphosed (hornfels to slate) around the intrusive but the metamorphism disappears rapidly as you move away from the intrusive. The intrusive varies from a monzonite to a nepheline monzonite.

From surface mapping there are two intrusive stocks that are separated by 1500 feet of sediments. Since the mineralogy and texture are so similar they are probably connected at depth.

Aerial reconnaissance and radiometrics outlined the intrusive extremely well because of the different weathering characteristics and the high background radioactivity in the intrusive.

(b) Petrology

Three major rock phases have been observed during the mapping and samples of the intrusives and area. They are as follows:

- a) Monzonite to nepheline monzonite
- b) Dyke - feldspar porphyry
lamprophyre
- c) Sediments - shales, quartzite, sandstone

The components of these major units will be discussed.

A petrographic study of the intrusive was completed and is documented in Appendix A. The following average mineralogy of intrusive is the result of this petrographic study:

Nepheline	0 - 10%
K-feldspar	30 - 40%
Plagioclase	30 - 40%
Garnet	5 - 10%
Biotite	0 - 5%

The northern portion of the intrusive has no visible nepheline in hand specimen while the southern portion is quite nepheline rich. The majority of the intrusive appears to be a coarse grained locally porphyritic syenite. The feldspar phenocrysts range in size from $\frac{1}{4}$ " to 1" in length and they are surrounded by medium to coarse grained matrix. The mafics are composed of hornblende and garnet with some deuteritic biotite.

The mineralogy remains essentially the same but the texture can change a lot from porphyritic (trachitic) to equigranular. There do appear to be a number of shells of differing textures that are more noticeable in the northern intrusive, however, they were not separated into mappable units of gradational contacts and the majority of the area was talus covered.

One of these shells appears to have a higher radioactive background than the surrounding shells. This rock has very hematized feldspars which appear 'glassy' and are $\frac{1}{4}$ " in length and surrounded by medium matrix consisting of feldspar and hornblende. The rock appearance is very red because of the hematized feldspars. This unit did not give an appreciable value above the rest of the intrusive after assaying.

There appears to have only been a few minor secondary processes but they are not sufficient to be important economically. Locally there are pegmatitic phases of the syenite, however, they have no extent. They appear randomly distributed and characteristically have no mafics. No pegmatites or quartz veins were seen. Some dykes of differing composition were mapped, however, their width and length is very limited.

The dykes can be classified as two distinct groups (a) feldspar porphyry dykes and (b) lamprophyre dykes. These dykes are separated and are located in two distinct areas. The lamprophyre were only seen in the southern portion of the claim block while the feldspar porphyry dykes were seen in the northern portion of the claim block.

The feldspar porphyry dykes are composed of euhedral plagioclase laths in a fine grained matrix of K-feldspar and plagioclase giving a correct composition of monzonite porphyry to granodiorite porphyry. The matrix is normally highly altered to clays however at times a fresh piece of rock is found and it shows a fine grained, brown to pink matrix. It is too fine grained to identify any other minerals in hand specimens. No samples were taken for a petrographic study.

The lamprophyre dykes were not numerous but they were noted in two localities. In hand sample the mineralogy appeared as following: hornblende-biotite, minor K-feldspar and chlorite. The rock was medium grained schistose because the biotite flakes were aligned parallel to the sides of the dyke. No samples of the rock were taken for petrographic use.

The surrounding sedimentary rocks consist of shales, quartzites and mudstones and are metamorphosed to slates close to the intrusive. The metamorphic aureole disappears quite rapidly, although its exact width was not mapped. The sediments were all very fine grained, quite highly fractured and were rusty coloured.

The slates range from black to dark green in colour and are interbedded with white quartzite on a scale of 20 to 30 feet. The rocks are all very fine grained and it was not possible to identify the separate mineralogy for each rock type. The quartzite was very clean while the slates are very dirty.

(c) Structure

The structure of the intrusive is represented by:

- (i) small offset faults
- (ii) joints
- (iii) locally a poor foliation

The rocks are generally massive, and poorly jointed although locally they can be well foliated and well jointed.

The small offset faults are visible in hand specimen and often do not extend further than a hand sample with offsets of up to 2" inches. The joints' density is not very high with the average being 3 to 5 per cubic foot. The vertically dipping north-south joint set are the major ones. The foliation is not extensive and is composed of feldspar laths being aligned and is only a very minor effect.

The structure in the dykes and the sediments is represented by:

- (i) schistosity
- (ii) joint

The schistosity is well developed in the sediment rocks and in some of the dykes. Much of the sedimentary rocks are talus and it is composed of chips of rock that have cleaved along the well developed schistosity. The lamprophyre dyke also has an extremely well developed schistosity. However, the monzonite porphyry does not have any foliation; the feldspar laths are randomly arranged.

The sedimentary and dyke rocks have well developed joint sets although their orientation is only documented in a few localities because of the high percentage of talus over outcrop. The two major directions are north-south, steeply dipping and N 80° E steeply dipping. No other structures associated with the sedimentary and dyke rocks near the intrusive were observed.

(d) Economics

The claims were staked for the uranium potential of the area. All work done on them was based on uranium prospecting although other signs of mineralization were looked for. Very few indicators were found in the rock although some pyrite was seen but no other economic minerals were observed.

Soils and silt samples gave very anomalous values but the rocks did not indicate large or any significant anomaly. The rock generally had a higher background but there does not appear to have been any secondary hypogene remobilization. The lack of any secondary remobilization must be due to the lack of secondary effects within the intrusive.

No uranium bearing minerals were seen in outcrop or in the petrographic study or under the ultraviolet lamp.

The high values in the soils and the silts must be due to a leaching of the intrusive by the ground water and its deposition in hollows and organic areas. However, a little more in depth study of the soil and stream silts should be done to check this possibility.

CONCLUSIONS

- 1) A careful look at the chemical conditions of the soil to understand why some areas attract uranium while others do not. Is it just uranium's affinity for organic material?
- 2) There is little or no evidence of secondary processes after the initial emplacement of the intrusive.
- 3) The intrusive was either emplaced at depth or emplaced in a partially solid form as indicated by the limited extent of the chilled margin.
- 4) The intrusive as a whole has a high uranium background, however, there have been no processes to remobilize this uranium and deposit it in a suitable environment.

RECOMMENDATIONS

A small program of intensive geochemical sampling including measurement of pH values at each location is recommended in order to prove or disprove the present interpretation of the anomalous uranium concentration in soils. Carried out at the beginning of the season this would completely write off the Antimony Mountain property or revive it.

G. Walton

A P P E N D I X A

PETROGRAPHIC STUDY

General Statement

The rocks of the Antimony Stock have the following characteristics:

- 1) They were intruded as a dry stock which after differentiation had concentrated enough water to form hornblende and biotite.
- 2) No apparent economic uranium mineralization.
- 3) Abundant nepheline.
- 4) Minor calcite associated with the stock.

The stock appears to have been a dry nepheline syenite that originally crystallized augite. Through differentiation the vapour phase increased until there was sufficient water to crystallize hydrous phases (hornblende and biotite). These phases reacted with the original augite and formed coronas around the augite cores.

RA-76-111 Nepheline Syenite

<u>Mineralogy</u>	<u>Description</u>	<u>Percentage</u>
K-feldspar	- as euhedral crystals and forming part of the matrix	40%
Plagioclase	- primarily large anhedral crystals	20%
Nepheline	- comprising the matrix with K-feldspar	15%
Biotite	- formed by deuteric alteration of hornblende	15%
Calcite	- small crystals	10%
Hematite	- small anhedral crystals	< 1%

Textures

The rock is fine to medium grained and porphyritic. The phenocrysts are K-feldspar. There is very small percentage of mafics which are found primarily in the matrix. Any phenocryst of biotite appear to have broken down into small grains so now it appears as if it is an aggregate of biotite crystals.

Radioactivity

No radioactive minerals were noticed.

RA-76-114 Nepheline Monzonite

<u>Mineralogy</u>	<u>Description</u>	<u>Percentage</u>
K-feldspar	- Coarse grained, anhedral crystals as phenocrysts	40%
Plagioclase	- some fine to medium equigranular crystals in the matrix	25%
Nepheline	- mainly found in the matrix with some feldspar	10%
Hornblende	- medium grained crystals with rims of biotite	15 - 20%
Biotite	- alteration product of hornblende, has zircon halos	5 - 10%
Zircon	-	< 1%

Textures

The rock has a fine to medium grained matrix that has large feldspar and hornblende phenocrysts. The feldspar phenocrysts are the larger and are also zoned. There are a number of well twinned (Albite Law) plagioclase phenocryst. There is no apparent foliation due to alignment of crystals.

Radioactivity

No radioactive minerals other than zircon.

RA-76-117 Nepheline Monzonite

<u>Mineralogy</u>	<u>Description</u>	<u>Percentage</u>
K-feldspar	- exsolution of plagioclase in K-feldspar	25%
Plagioclase	- highly zoned and twinned	35%
Nepheline	-	10%
Hornblende	- as smaller phenocrysts	15 - 20%
Biotite	- as inclusions in hornblende and as discrete grains	15 - 20%
Calcite	-	5%

Textures

The rock is medium grained with large feldspar (primarily plagioclase) phenocrysts. There are small hornblende phenocrysts associated with the feldspars. The grains are all randomly orientated and highly zoned. The plagioclases tend to have numerous twin planes.

Radioactivity

No radioactive minerals were seen.

RA-76-118 Augite Monzonite

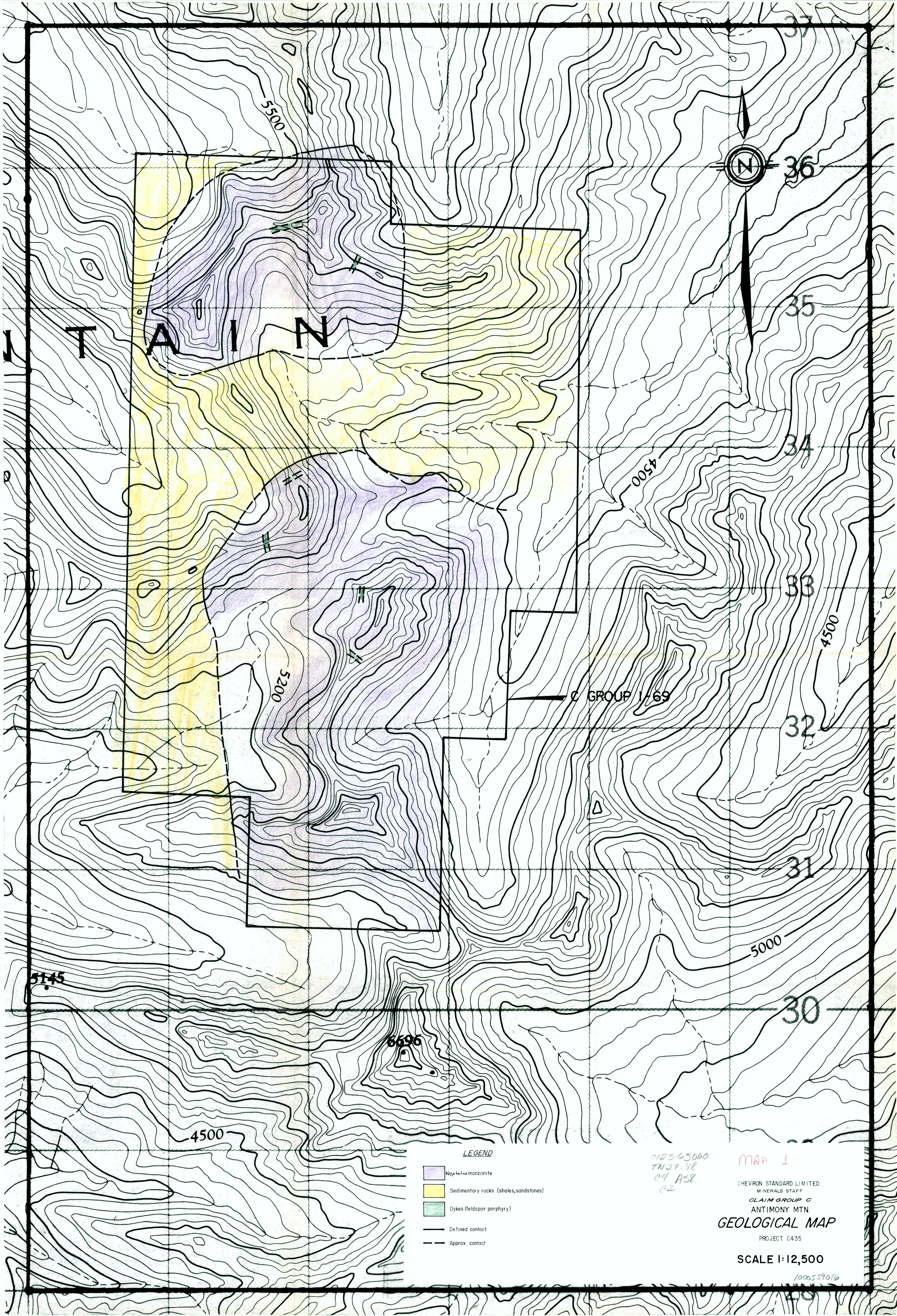
<u>Mineralogy</u>	<u>Description</u>	<u>Percentage</u>
K-feldspar	-	15%
Plagioclase	- occurs in small twinned laths	40%
Augite	- occurs as phenocrysts rimmed by hornblende	25%
Hornblende	- rims augite	10%
Biotite	-	10%
Hematite	- discrete grains	1 - 2%

Textures

The rock is medium grained and equigranular. The plagioclase is essentially only as laths that are highly twinned, however, it is possible to find some plagioclase in the matrix. The hornblende is seen rimming the augite which indicates a time sequence for the two mafic minerals. The original crystallization would have been augite or a pyroxene because alkaline melts tend to be dry. However, eventually the magma would become hydrated enough to crystallize hornblende. Therefore, the pyroxene would react with the melt to assist the formation of hornblende.

Radioactivity

There is no visible sign of radioactivity.



ANTIMONY



- LEGEND**
- Nephelinemonzonite
 - Sedimentary rocks (shales, sandstones)
 - Dykes (feldspar porphyry)
 - Defined contact
 - Approx. contact

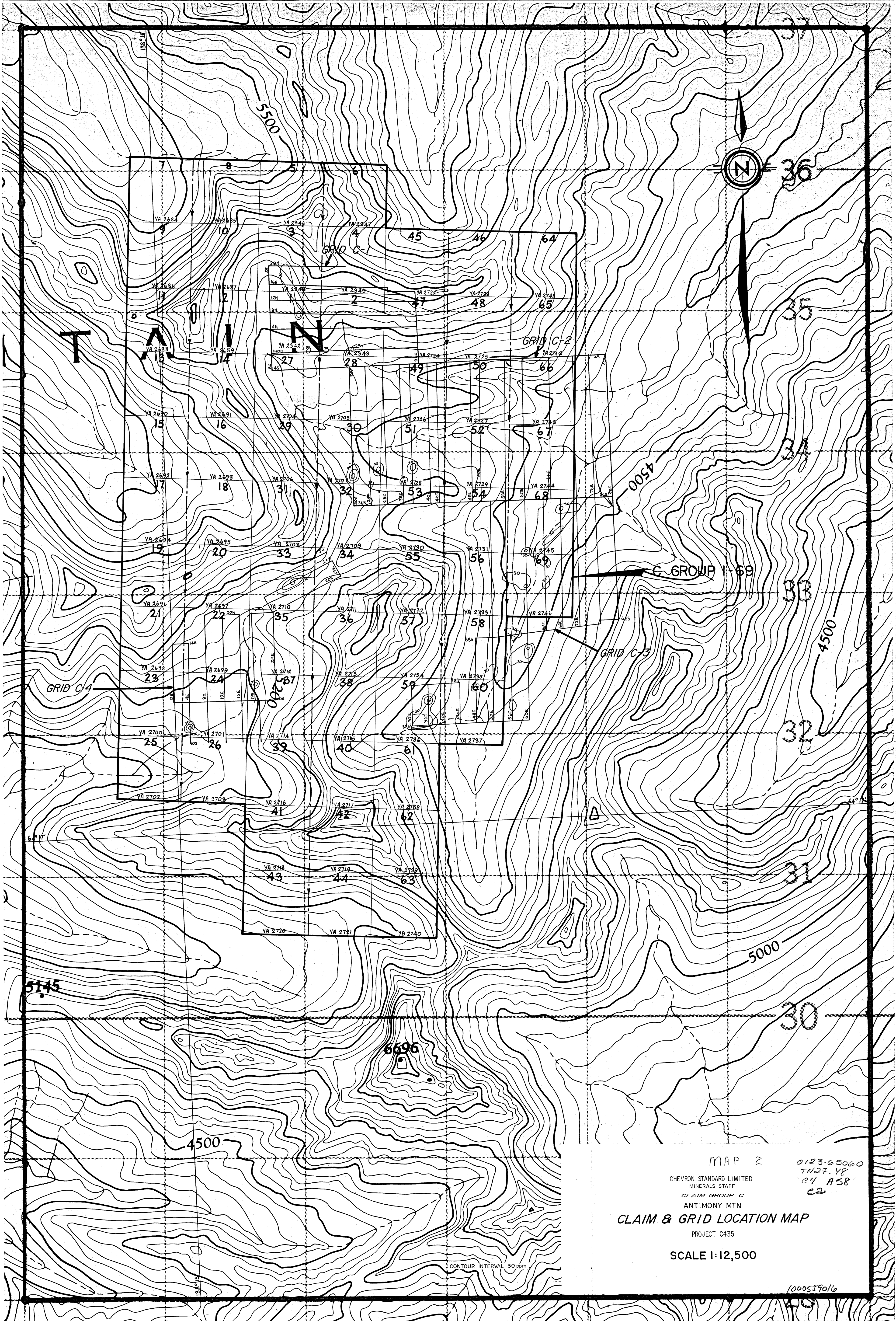
0123-65060
TN27-V8
C4 A58
C2

MAP 1

CHEVRON STANDARD LIMITED
MINERALS STAFF
CLAIM GROUP C
ANTIMONY MTN
GEOLOGICAL MAP
PROJECT C435

SCALE 1:12,500

1006559016



MAP 2

CHEVRON STANDARD LIMITED
MINERALS STAFF
CLAIM GROUP C
ANTIMONY MTN.

CLAIM & GRID LOCATION MAP

PROJECT C435

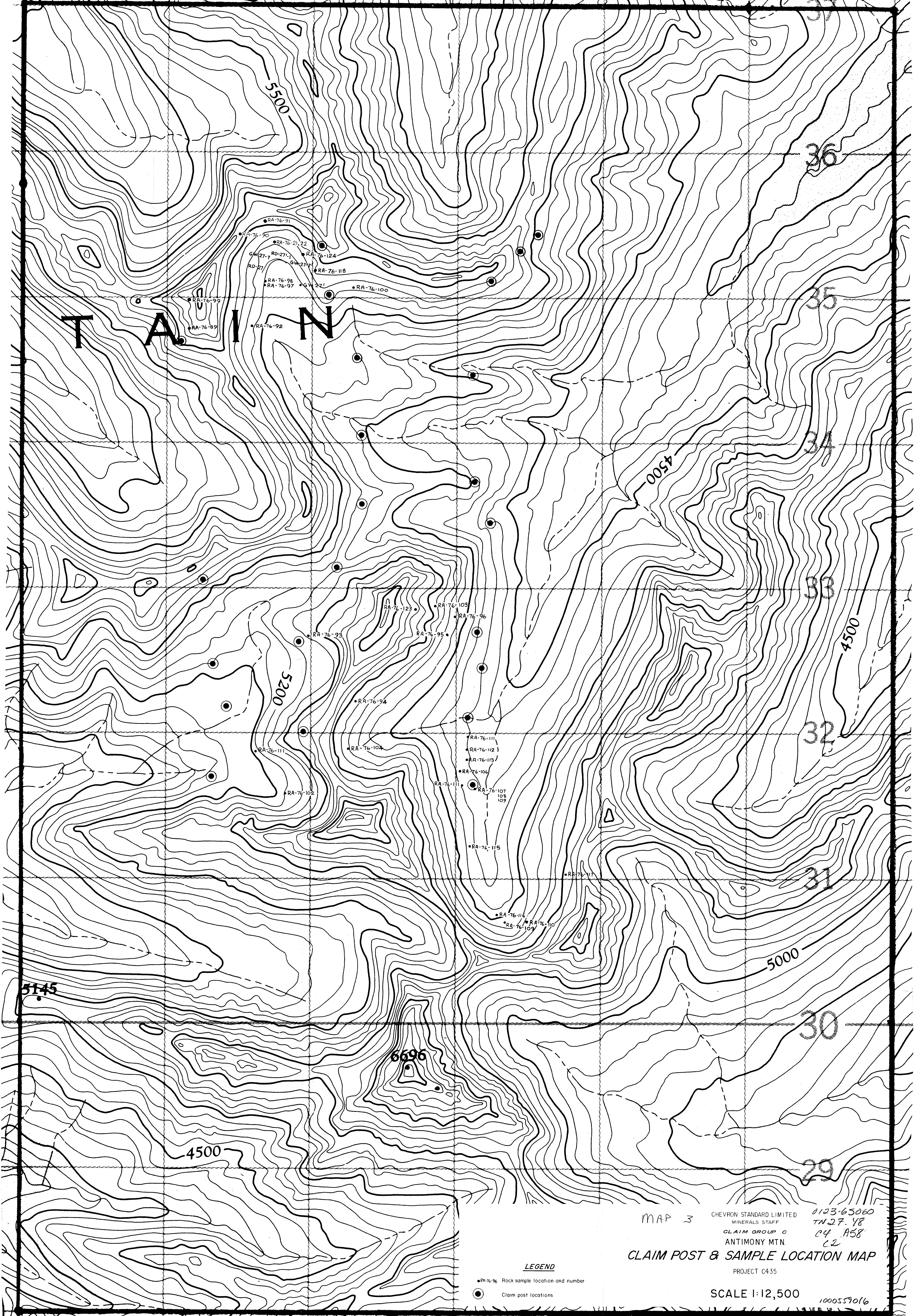
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0123-65060
TN27.Y8
C4 A58
C2

1000559016

CONTOUR INTERVAL 30 ppm

ANTIMONY MOUNTAIN



MAP 3
CHEVRON STANDARD LIMITED
MINERALS STAFF
CLAIM GROUP C
ANTIMONY MTN
PROJECT C435

0123-65080
TN 27-48
04 A58
C2

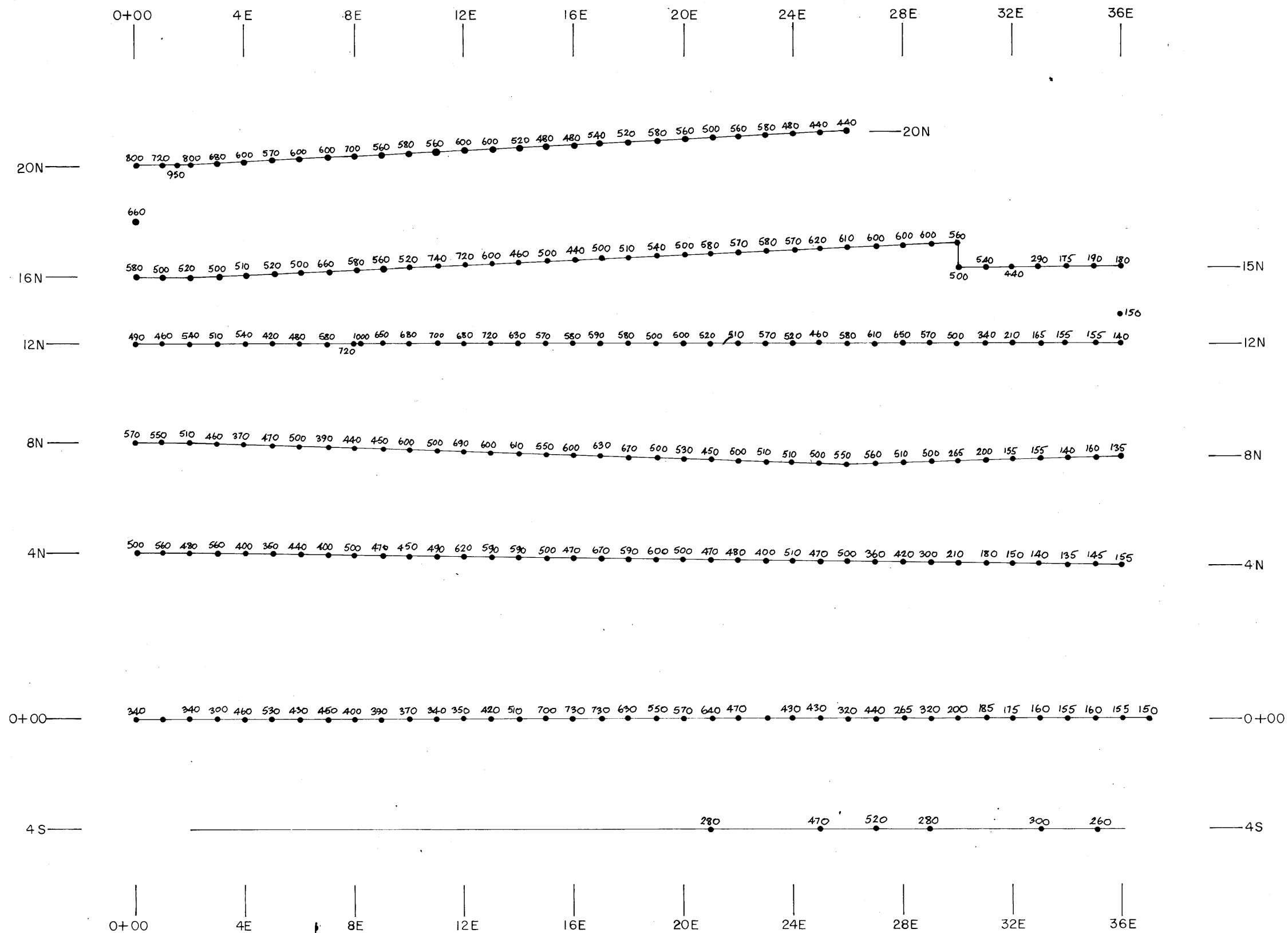
CLAIM POST & SAMPLE LOCATION MAP

LEGEND

- RA-76-94 Rock sample location and number
- Claim post locations

SCALE 1:12,500

1000559016



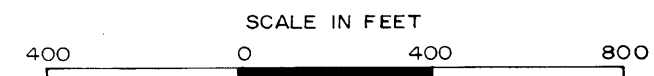
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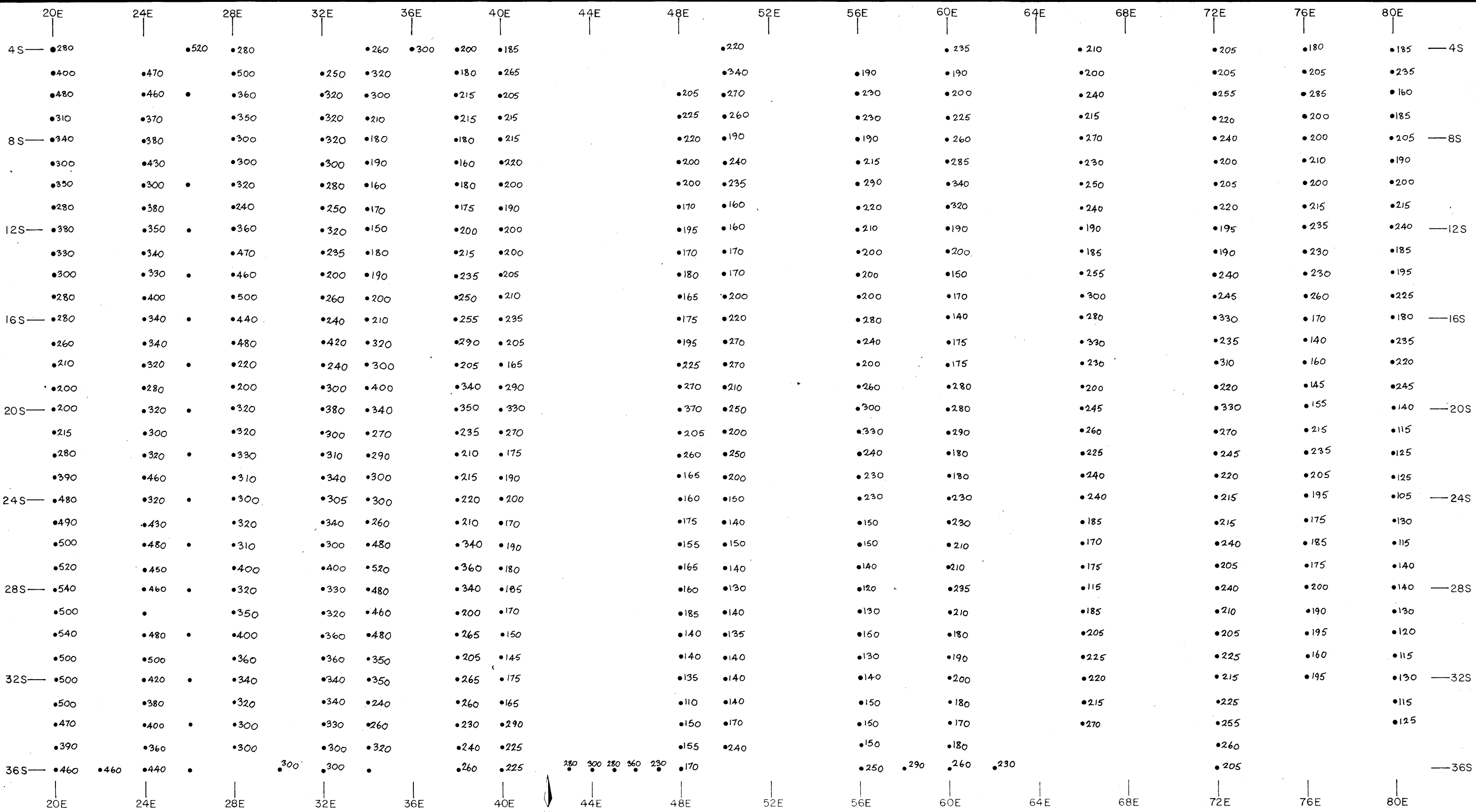
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012365060
MAP 4 TN 27.18
C4 A58
CS

CHEVRON STANDARD LIMITED
MINERALS STAFF

**CLAIM GROUP
RADIOMETRIC SURVEY
GRID C-1
PROJECT C435**





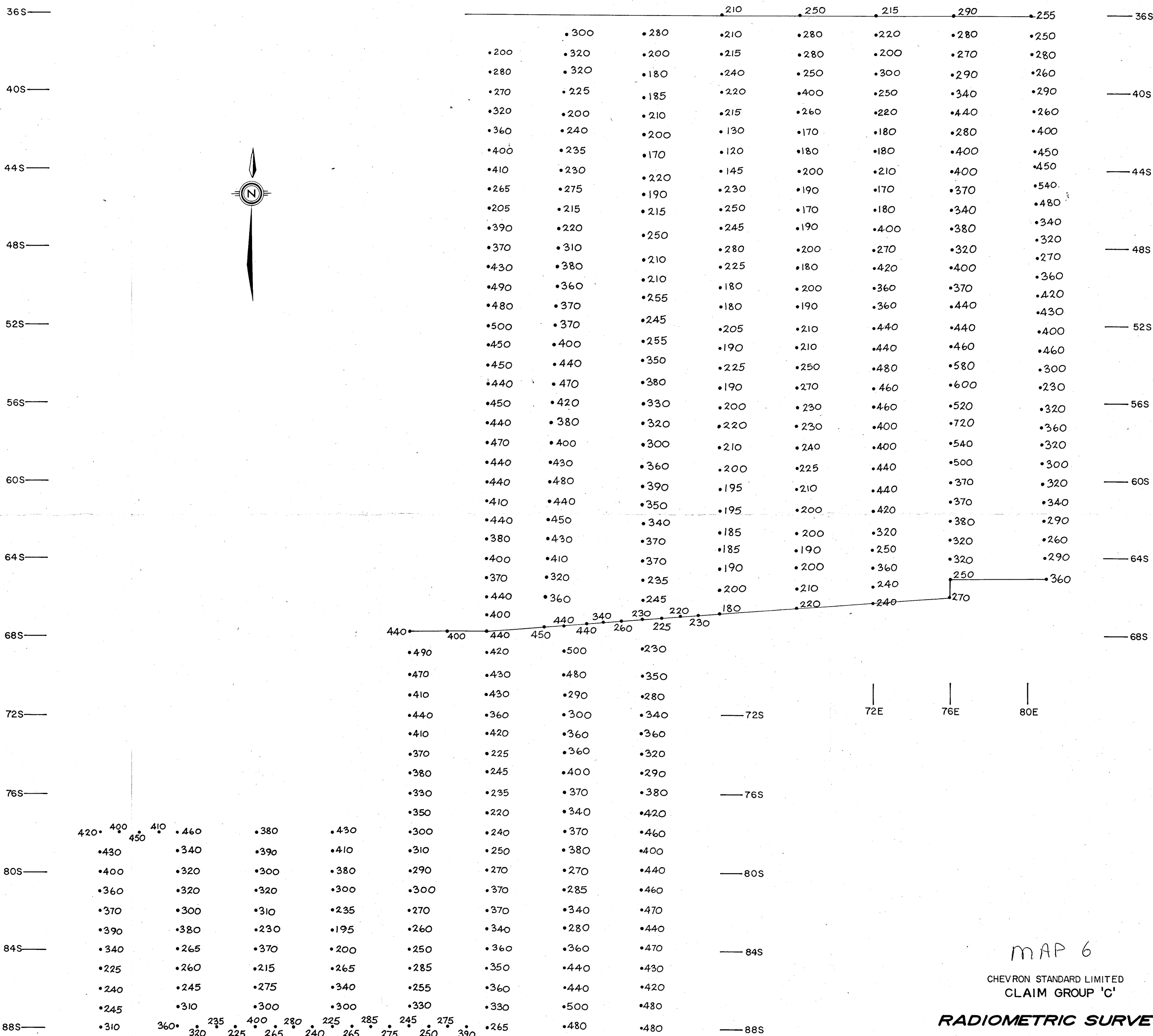
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MAP 5
0123-65060
TN 27. 48
04 A58
02

CHEVRON STANDARD LIMITED
MINERALS STAFF
CLAIM GROUP
RADIOMETRIC SURVEY
GRID C-2
PROJECT C435
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72E 76E 80E

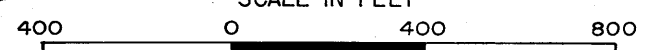
MAP 6

CHEVRON STANDARD LIMITED
CLAIM GROUP 'C'

RADIOMETRIC SURVEY

GRID C3
ANTIMONY AREA
PROJECT C435

SCALE IN FEET

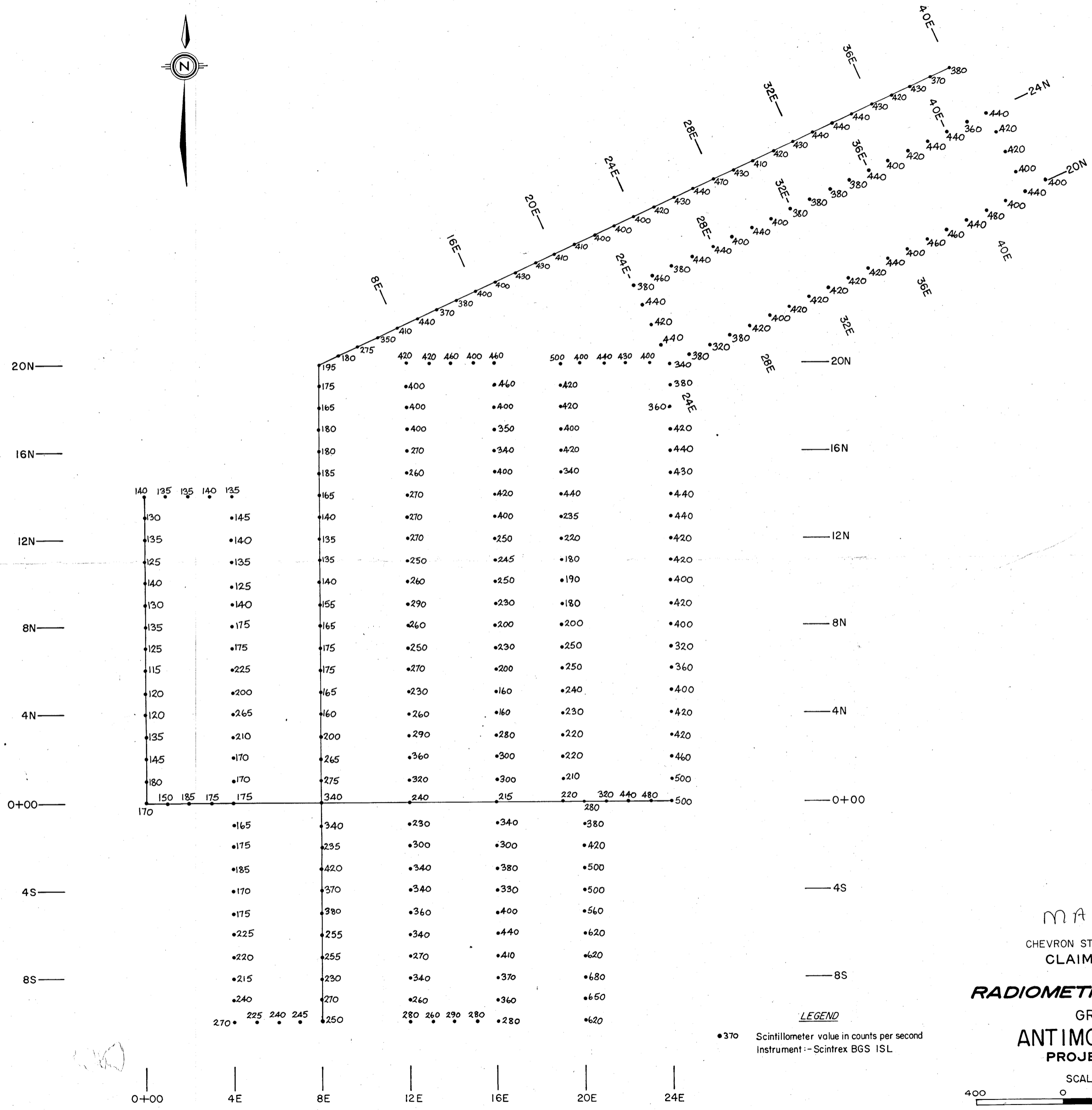
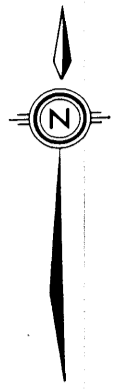


LEGEND

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Instrument--Scintrex BGS ISL

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TN 27 Y8
C4 A58
c2

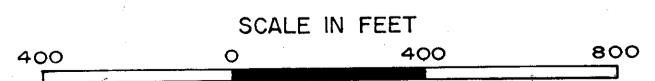
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MAP 7
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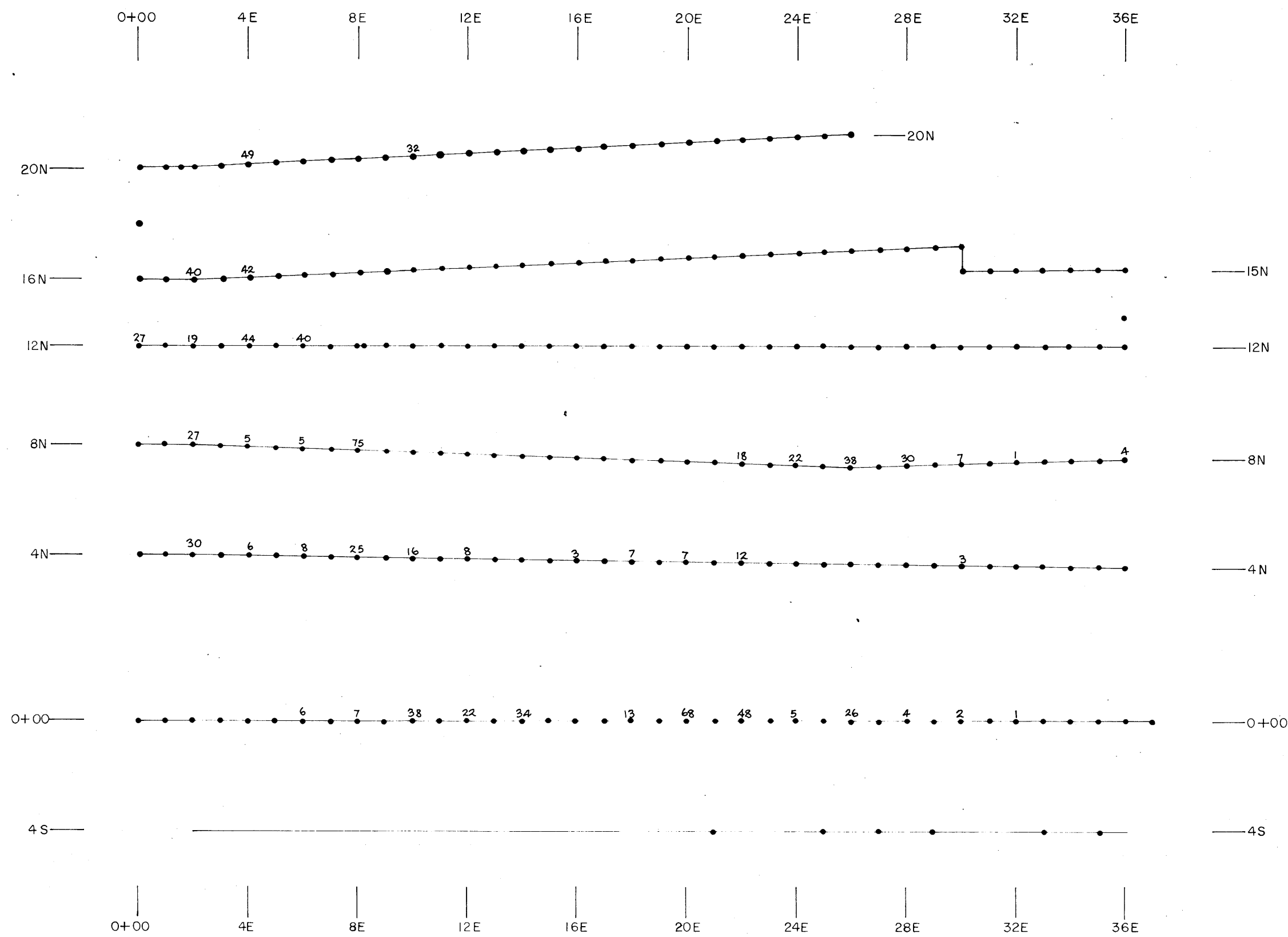
CHEVRON STANDARD LIMITED
 CLAIM GROUP 'C'

RADIOMETRIC SURVEY
 GRID C4
ANTIMONY AREA
PROJECT C435



LEGEND
 •370 Scintillometer value in counts per second
 Instrument :- Scintrex BGS ISL

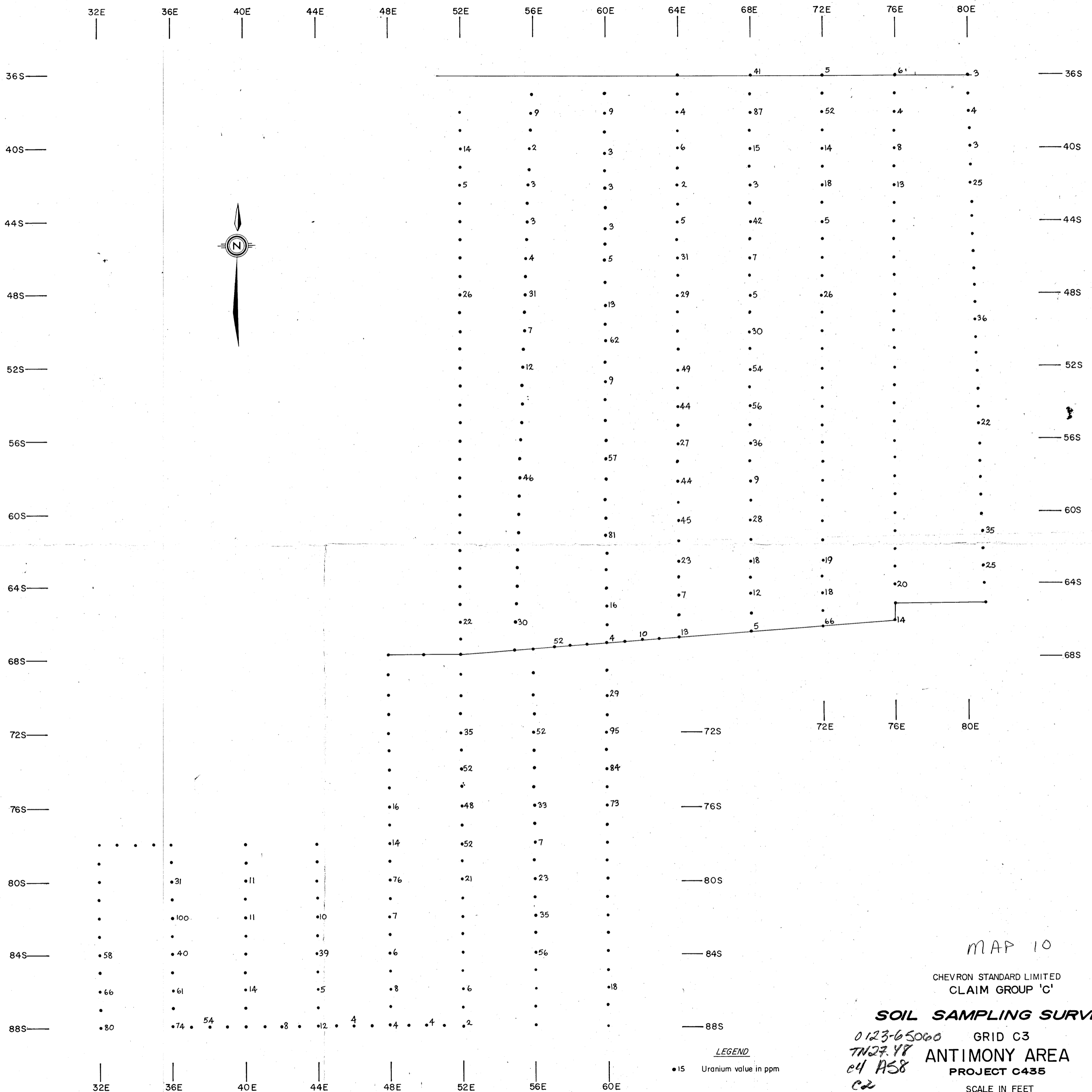
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LEGEND
●30 Uranium value in ppm

MAP 8 0123-65060
TN27.48
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c2
CHEVRON STANDARD LIMITED
MINERALS STAFF
CLAIM GROUP
GEOCHEMISTRY
GRID C-1
PROJECT C435





CHEVRON STANDARD LIMITED
CLAIM GROUP 'C'

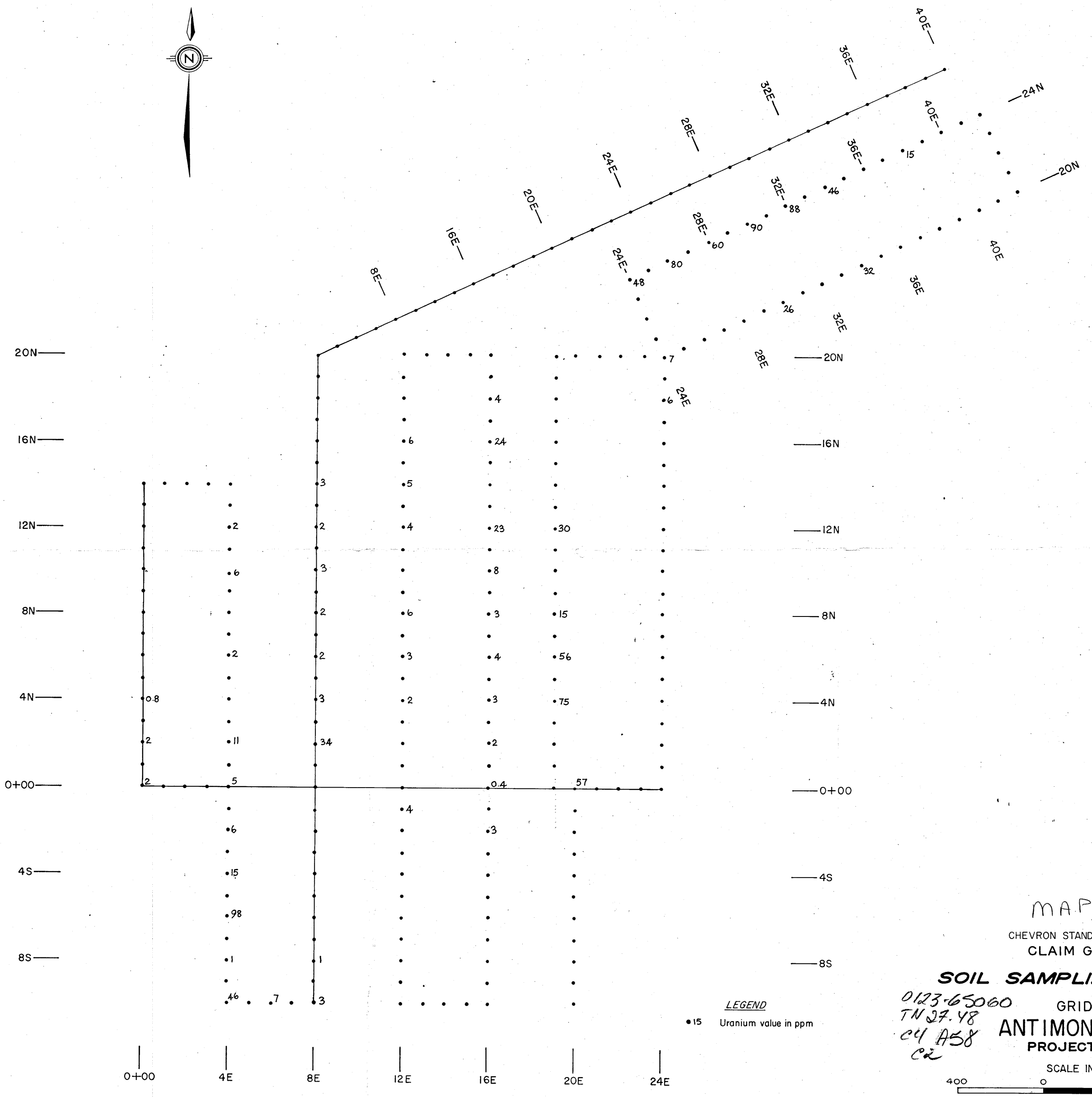
SOIL SAMPLING SURVEY

0123-65060 GRID C3
TN27.48 ANTIMONY AREA
c4 A58 PROJECT C435
c2

SCALE IN FEET



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LEGEND
 • 15 Uranium value in ppm

MAP 11

CHEVRON STANDARD LIMITED
 CLAIM GROUP 'C'

SOIL SAMPLING SURVEY

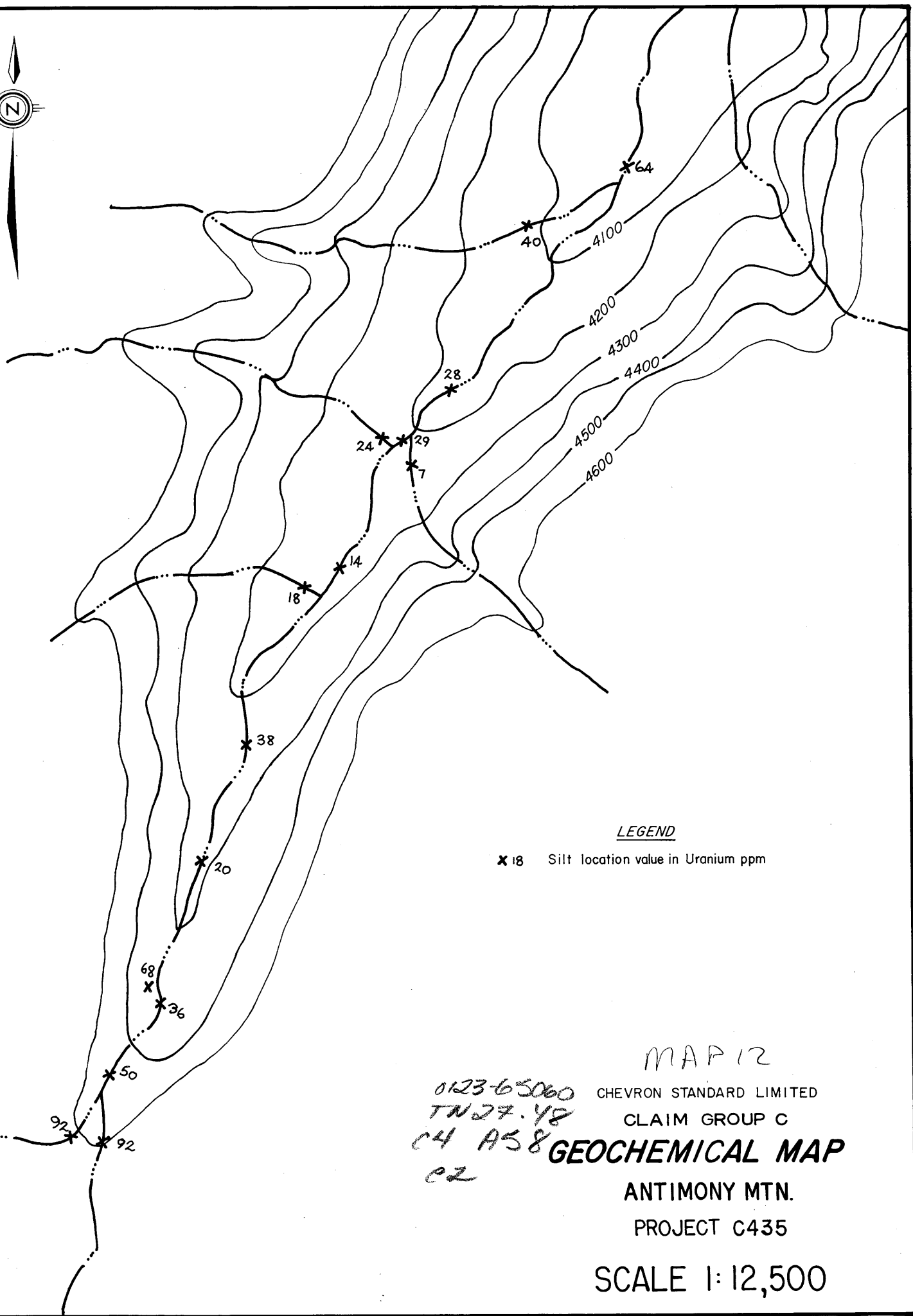
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GRID C4
ANTIMONY AREA
 PROJECT C435

SCALE IN FEET



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LEGEND

x 18 Silt location value in Uranium ppm

MAP 12
0123-65060
TN 27.48
C4 A58
C2
CHEVRON STANDARD LIMITED
CLAIM GROUP C
GEOCHEMICAL MAP
ANTIMONY MTN.
PROJECT C435
SCALE 1:12,500