ASSESSMENT REPORT
(GEOPHYSICS)

for the

WILLIAMS CREEK CLAIM BLOCK and the LIBERTY and FREE GOLD CLAIMS

CARIBOO MINING DIVISION B.C.

NTS 93H/04E
Latitude 53°05' N , Longitude 121°32' W

Prepared by

James M.L. Brown B Sc

17 Barton Ave.
Winnipeg Manitoba
R2M 1E8

April 3 1992

Geological Branch
Victoria B.C.

Dear Sir or Madam

Please find enclosed a copy of the statement of the amounts paid to have the assessment work recorded on the Williams Creek claim group and the Liberty and Free Gold claims.Two copies of the of the report are also included.

Thank You

James M.L. Brown

James M L Brown

GA1500 BRITISH COLUMBIA REVENUE MANAGEMENT SYSTEM
GST# R107864738 TRANSACTION RECEIPT PAGE 1

MARCH 19,1992 10:01 TRANSACTION ID: 1000013 TYPE: COUNTER
00075 QUESNEL

	ITEM PRICE	QUANT	AMOUNT
0589 MINERAL: DOCUMENTS DISTRICT 2075 MINING DIST. 03 - CARIBOO REFERENCE: 300056	10.00	1	10.00
0589 MINERAL: DOCUMENTS DESCRIPTION WILL DISTRICT 2075 MINING DIST. 03 - CARIBOO	10.00	1	10.00
0584 MINERAL: WORK FEES DISTRICT 2075 MINING DIST. 03 - CARIBOO REFERENCE: RECORD NUMBER 265920	500.00	1	500.00
0584 MINERAL: WORK FEES DISTRICT 2075 MINING DIST. 03 - CARIBOO REFERENCE: RECORD NUMBER 10493 300056 58 60	225.00	1	225.00

TRANSACTION TOTAL 745.00
TERMS OF PAYMENT CHEQUE 745.00
PURCHASER'S NAME OR TRADING NAME TOTAL PAYMENTS 745.00

JAMES BROWN CHANGE 0.00

GA1500 BRITISH COLUMBIA REVENUE MANAGEMENT SYSTEM
GST# R107864738 TRANSACTION RECEIPT PAGE 1

MARCH 10,1992 12:47 TRANSACTION ID: 1000045 TYPE: COUNTER
00075 QUESNEL(GOV'T AGENT)
DESCRIPTION: REFERENCE:

	ITEM PRICE	QUANT	AMOUNT
1590 FREE MINER - INDIVIDUAL YEARLY FEE CLIENT # 128390	25.00	1	25.00
1590 FREE MINER - INDIVIDUAL YEARLY FEE CLIENT # 121621	25.00	1	25.00

TRANSACTION TOTAL 50.00
TERMS OF PAYMENT CHEQUE 50.00
TOTAL PAYMENTS 50.00

CHANGE 0.00

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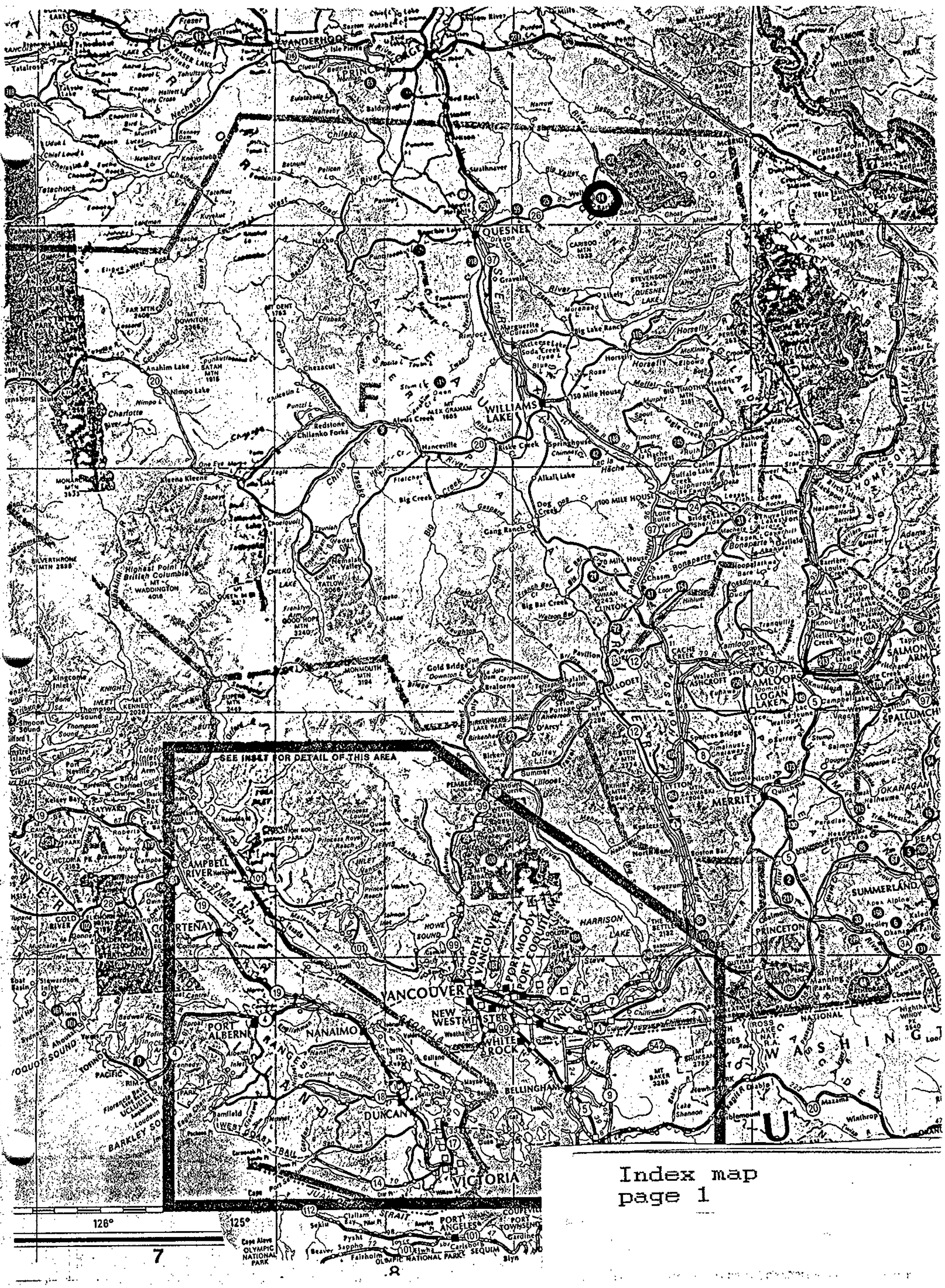

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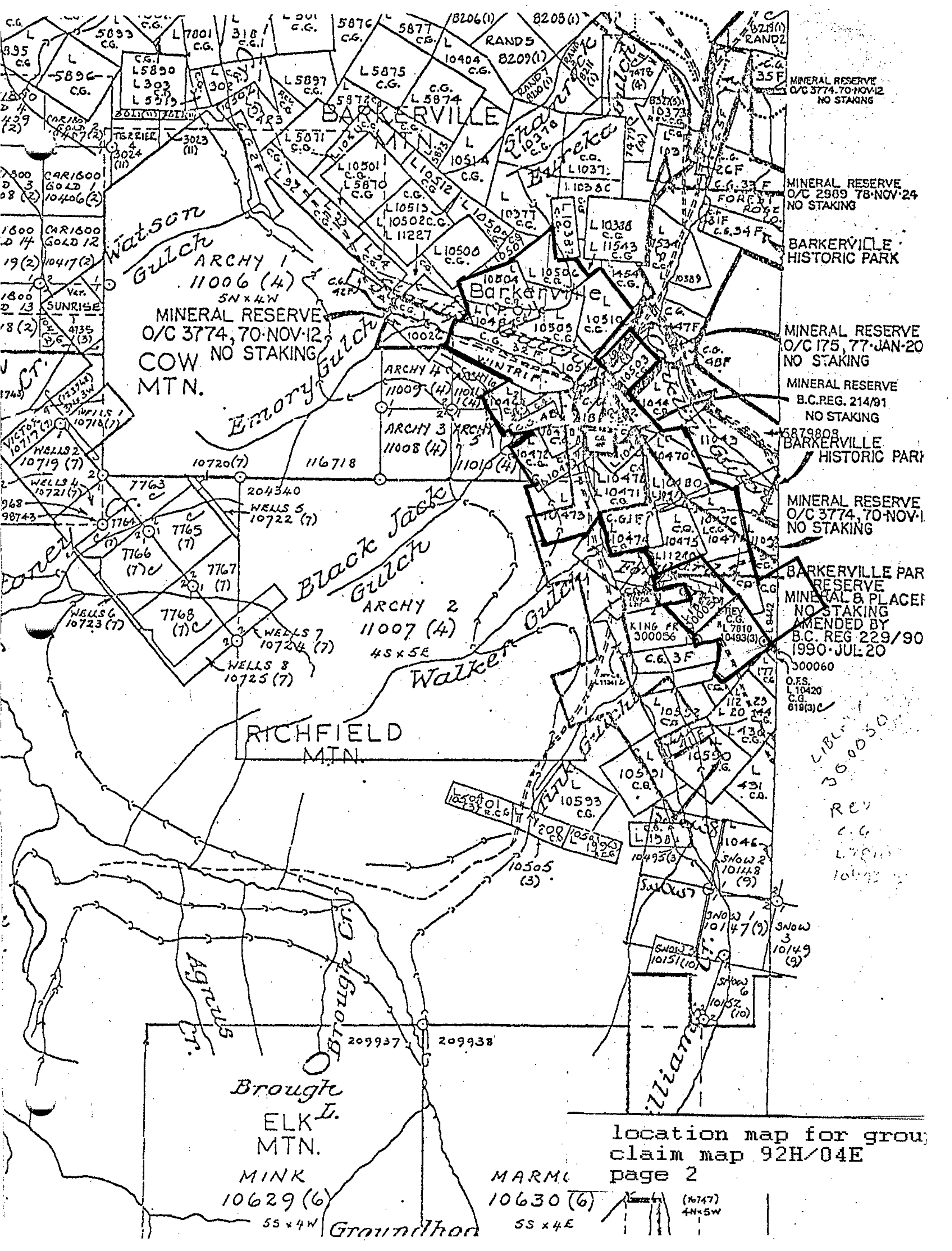

location map for grou
claim map 92H/04E
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SUMMARY

1) 22750 metres of line and magnetometer and VLF-EM survey completed.

2) VLF results indicate part of the old Stouts creek valley - pre glacial - also the most worked area on the claim.

3) Mag results indicate a possible remanent of a paleochannel and also the trend of the major structure .

4) Recommended - trenching and sampling and detailed mag work.

INTRODUCTION

An exploration program was carried out on Williams Creek Exploration Ltd. patent and crown grant claims in Barkerville B.C. from July to October 1992. The program was carried out under the supervision of the author at the request of Williams Creek Exploration.

LOCATION , ACCESS and TITLE

The mining claims lie immediately south of the historic town of Barkerville in the Cariboo Mining Division and can be located on claim map 93H/04E and is centred at about 53°05" N. 121° 53'32" W. The claims lie east and west of Williams creek which crosses the middle of the property.

Vegetation on the property consists mainly of second growth pine and spruce forest except in the "Gulchs" and in the vicinity of the creeks where a tangled jungle of alders grows. There is very little outcrop . There is evidence from old placer workings that the overburden in the "Gulchs" was deep

Access to the property is from Quesnel via the Barkerville - Wells highway (#26) , some 87 kms. west to the town of Barkerville. There is a trail which runs from Barkerville up Stouts Gulch and another which runs along Williams creek to the Richmond court house - permission is required to pass through Barkerville which is a Provincial Park.

The Williams Creek group consists of 28 Crown-grant and fractions and are wholly owned by Williams Creek Explorations Ltd.

CLAIM	RECORD NO.	CLAIM	RECORD NO.
Black Jack	1B	Hoover	10477
Homestake	4B	Tyee Fr.	10478
Cornish	1F	Nan Fr.	10479
Wintrip	32F	Meter Fr.	10480
Roosevelt	9442	Leeds Fr.	10481
Snowden	10467	Babs Fr.	10482
Westport	10468	Pat Fr.	10483
Black Jack Ext	10469	Tabu Fr.	10484
Blackbird	10470	Diller	10503
Royal Oak	10471	Morning Star	10504
Mammouth	10472	Evening Star	10505
Pilot	10473	Sirius	10506
Canadian	10475	Orion	10510
Armistice	10476	Venus Fr.	10516

Liberty 300050 owned by Mr. S Kocsis of Quesnel

Free Gold 7810 owned by Mr. Duane Poliquin of Vancouver.

PREVIOUS WORK

From 1860 to the present the area has had some placer mining activity. Around 1863 the search began for lode gold deposits and the Black Jack, Homestake, Cornish, and Wintrip claims were among the first staked . Prospecting and testing were carried on the major veins from 1877-1892. A 180 foot shaft was sunk on the Black Jack claim during period of 1887-1892.

In 1933 Brittania Mining and Smelting optioned the Westport claims (the property was known by that name at that time). They drove three adits, one on the Black Jack, one on the Westport and one on the Wintrip. The Wintrip adit is on the south bank of Stouts Gulch about 300 metres west of Williams creek – the adit entrance is caved. The westport adit is located in the west wall of a small canyon on Williams creek just up stream from Stouts creek. The Black Jack adit is on the east bank of Williams creek near the old shaft and is just east of where Stouts creek empties into Williams creek.

In 1938 Cariboo Gold Quartz Mining Co. Ltd. acquired the Westport claims and turned them over to Williams Creek Gold Quartz Mining Co. Ltd. in 1946. In 1946 about 10,000 feet of stripping was done on the Morning Star claim and some 15,000 feet of diamond drilling was done mainly on the Westport and Black Jack claims.

REGIONAL GEOLOGY

The regional geology of the area has been mapped by A. Sutherland-Brown (1957). The general area is underlain by the Cariboo Group of early Cambrian and Later age. The Cariboo Group is mainly clastic with some carbonate rock. The two units of the Cariboo group which are most important in the area are the Midas formation and the Snowshoe formation.

The major structure of interest in the area is the Island Mountain anticlinorium which runs northwesterly through the area. Most of the mineral deposits occur on the northeastern flank of the fold in the Snowshoe formation.

A number of major faults cross the Island Mountain anticlinorium. They are mainly normal faults which strike north 10-30 degrees east. The Barkerville and Siruis faults cut through the claims.

The area had undergone considerable erosion prior to recent glaciation. The old valleys and channels are filled with boulder till. Outcrop is limited throughout the area.

PROPERTY GEOLOGY

The claims are located on the northeastern flank of the Island Mountain anticlinorium near the contact between the Midas and Snowshoe formations. Glacial till covers most of the area.

The Snowshoe formation includes micaceous quartzites, interbedded phyllites, brown and green phyllites and limestone beds. Two north-south faults cross the property. The Sirius fault has an attitude of N to N20E witha steep easterly dip. The Barkerville fault strikes N to N10E and dips steeply east. They are both normal faults and are thought to have some dextral movement. The bedded Westport fault strikes N65W and dips 40 degrees NE , some believe it controls the mineralization.

Vein and replacement type mineralization occurs on the claims. There are four types of quartz veins in the area as defined by Sutherland-Brown, transverse, diagonal, northerly and strike. All four have been recognized on the claims.

GEOPHYSICS

A grid was surveyed and cut . The lines were cut at 100 metre intervals and stations were chained at 25 metre spacings along each line and east-west tie lines at 700 metres intervals.The grid lines are run north and south (true north). A total of 22750 metres of line was cut. The lines were laid out in this direction to cross all major structures , faults and veins systems at a close to perpendicular as possible.

A VLF-EM survey and a Magnetometer survey were carried out . The VLF-EM survey was used to find replacement sulphide deposits, contacts and faults. The Magnetometer survey was used to find contacts, faults and quartz zones.

The VLF EM survey was carried out with Pheonix VLF-2 EM unit.This unit measures the dip directly in degrees . A field strength component is also taken (total horizontal field).VLF units take measurements of the EM fields caused by the very low frequency radio transmitters based around the world.The station used in this survey was Cutler . A station is chosen so that it is as near as possible parallel to the general strike of the rocks in the vicinity of the survey.

A Geometrics model 856 magnetometer with gradiometer option was used. This is a proton mag with 2 sensors attached to a staff and seperated by one metre. Readings are taken simultaneously from both sensors and the difference between the readings is the gradient in gammas per metre at that location. The data are in gammas and are not corrected for diurnal effect. Any diurnal effect would not change the gradient.

RESULTS

The topography of the area prevents interpretation of the VLF-EM results directly. The dip angle data is Fraser Filtered and the results contoured. There is an anomaly between 2000N and 2700N shown within the 15 degree contour. This contour contains the Wintrip and Westport adits. It also contains the most placer mined part of Stouts Gulch . There is an anomaly on lines 7900E and 8000E at 1650N - this anoamly coincides with Black Jack Gulch and is a well worked placer area. The strange contours north of 2700N on lines 7800E - 8100E are artifacts of the contour program.

The results from the lower sensor of the magnetometer were used to interpret the survey. This data was made into a total field contour map. The anomalies on lines 7300E 2100N and 7600E 1800N may be the remanent of a paleochannel .

The mag data were computer processed to make a trend map with residuals. This contour map shows a general trend to the Northwest which coincides with the general plunge of the folding in the area. All of the known mineralization occurs within the 59000 gamma contour on this map.

Some of the one line or individual anomalies were seen to be caused by metal artifacts left over from the placer mining days.

Neither of the two faults known to cross the property were located with the VLF nor the Mag.

RECOMMENDATION

The VLF-EM failed to pick up the massive sulphide quartz vein in the Wintrip adit area showing the difficulty with VLF-EM use and interpretation in mountainous terrane. No further work with this unit is recommended.

A detailed grid with lines at 25 metre intervals should be laid out in the vicinity of the adits. A mag survey should be carried out taking readings continuously ie. 1 metre spacings. The quartz systems are usually less than 25 metres wide and 60 metres long. The completed survey was too coarse to pick up any such quartz systems.

STATEMENT OF QUALIFICATION

I, James M.L. Brown hereby certify that

1) I am a self employed exploration geologist residing at 17 Barton Ave . Winnipeg Manitoba

2) I received a Bachelor of Science degree from the University of Manitoba in 1961 and have been practicing my profession as a geologist since that time.

3) I received considerable training and experience in conducting geophysical surveys and the interpretation of the results while working for a major mining company.

Respectfully Submitted

James M.L. Brown

March 31 1992 James M L Brown

EXPENSES

Personnel:

Linecutting	
Sabre Exploration Services of Penticton B.C.	
Mr. Bernier and 3 men	
26 days @ $175/day/man	$18200.00
Geophysics	
J. Brown	
40 days @ $200 per day	$ 8000.00
P. Deveaux	
40 days @ $175 per day	$ 7000.00
	$33200.00
Disbursements	
Meals	
4 men x 26 days	$ 2840.00
2 men x 40 days	$ 2400.00
Accommodation	
4 men x 26 days	$ 1000.00
$250/week	
2 men x 40 days	$ 1500.00
$250/week	
Geophysical Equipment rental	
Mag and VLF minimum 2 months	
rental @ $3000/month	$ 6000.00
Vehicle rental	
60 days @ $40/day	$ 2400.00
11233 kms. @ .25/km	$ 2808.25
Gas, Oil Repairs	$ 617.65
Transit rental	$ 600.00
Hardware purchases	$ 909.11
Computer and Software Rental	
3 months @ $750/month	$ 2250.00
Express ,xerox	
report materials etc	$ 491.00
	$57016.01
Amount allocated to the	
WIN placer claim	$ 5521.13
	==========
TOTAL EXPENSES	$51494.88

APPENDIX
1

Preface

Magnetometers

A magnetometer is an instrument for measuring the intensity of the earth's magnetic field. Most rocks contain some magnetite, the most common magnetic mineral, and therefore produce some disturbances in the magnetic field. Soils and even some man made objects such as pottery can have magnetic properties.

Through interpretation of magnetometer readings, assumptions can be made about what exists beneath the surface, whether it is a pipeline, an ancient urn, a particular mineral, or geologic structure. The interpretation of magnetic data received from a magnetometer is sometimes a difficult task, made even more complex by constant changes in the earth's overall magnetic field, the size and distance of objects from the magnetometer, the amount of magnetic material the object contains, and the susceptibility of the object to absorb magnetism from other sources. On the other hand, many applications may require only simple interpretations of anomalies.

The proton precession magnetometer has become the principal instrument for magnetic studies because it combines high accuracy and ease of use. The Applicatons Manual for Portable Magnetometers, supplied with this instrument, includes general information on the use of magnetometers. It should be studied as a companion to this volume, which deals specifically with the G-856 Memory Mag™ magnetometer.

The G-856

The G-856 is a portable, man-carried magnetometer and a "base station" magnetometer. As a hand-carried instrument, it features simple, push button operation and a built-in digital memory which stores over 1000 readings. This relieves you of the need to log data in the field, eliminates transcription errors and most important, lets you use computers to automatically record and process the data from the magnetic survey.

The G-856 Memory-Mag magnetometer will also record automatically at regular intervals, so it can be left unattended to monitor diurnal changes in the earth's magnetic field. These readings are used to correct simultaneous field measurements for high accuracy surveys. Here again, the data may be fed directly into a computer so that the field data taken with an identical G-856 may be automatically corrected. The time-of-day is recorded with each reading taken in either mode from a built-in digital clock.

All operations are controlled from a weatherproof membrane switch front panel. The sequence of operations was carefully designed to be very simple to operate and yet flexible. Erasing the memory requires an intricate, fail-safe sequence to protect the data, except for the most recent reading which can be easily deleted and replaced if desired.

A single connector is used for the sensor and data output. The output format is in the universal RS-232, understood by most small and large computers and some printers. The data may also be printed and graphed on the G-866 Recording Magnetometer, or stored for later analysis on digital tape recorders like Geometrics G-724M.

Physically, the G-856 is compact and lightweight. It is weatherproof and operates over a wide temperature range. It is powered by eight D-Cell batteries, sufficient for about 3000 readings.

Above all, the G-856 is a high-precision magnetometer, the result of many years experience in the manufacture of similar instruments. An internal programming switch allows modification of the cycle times to ensure that the G-856 works properly near the magnetic equator and in high gradients where other models may operate only marginally or fail to obtain reliable data.

> The operation of the instrument is controlled by a microprocessor and the control program may be changed at any time for product improvement or other considerations. In that event, you may find variations between this manual and the operation of your actual instrument operation. Such variations will have no adverse effect and should be recognizeable as you familiarize yourself with operation.

Contents of this Manual

This manual presents the operating instructions for the G-856. Included are step-by-step instructions on how to:

*operate the magnetometer

*use the special features in surveying

*retrieve data

*maintain the magnetometer

Clarification of Terms

The terms used to describe the actions of the operator or functions of the magnetometer may be new to some. For example, the areas or buttons, on the front panel will be called "keys". The words "sampling", "cycling", and "taking a reading" are all synonymous, and "mode" is used to refer to different parts of the magnetometer's operation, its different capabilities. The G-856 has two parts of operation--auto (automatic) mode and survey mode (regular field operation where the operator pushes buttons to take a reading).

There are two functions on most keys. When accessing the numbers on the keys, the magnetometer is said to be in numeric mode. When using a key to exercise a command (e.g. TUNE), the magnetometer is said to be in the command mode.

Chapter 2

Field Operation

This chapter will discuss the features and performance of the Memory-Mag magnetometer in regard to actual survey use. Included here is information on sensor attachment and a discussion of sensor orientation and positioning in relation to the repeatability of the instrument's readings. Discussed also are testing for magnetic noise and some particular features concerning the use of the magnetometer as both a base station and also a survey unit.

Sensor Attachment

Inside the sensor case are coils of wire submerged in a hydrocarbon fluid, in this case decane.* The following section presents proper mounting procedures for the sensor.

1. Check for sensor fluid volume by shaking and listening for a "sloshing" sound. The fluid should sound like its about 1 cm. from the top of the sensor. If you need to add fluid:

   A. Remove the blue cap plug on the sensor.

   B. Fill with Decane to within 1 cm. from the top.

   C. Replace plug.

2. Attach the signal cable to the sensor. The short one is for backpack use, the longer cable for use with the staff.

3. Attach the sensor to the staff and assemble the sections, or place the sensor in the backpack and attach it to the carrying harness.

Sensor Orientation

The sensor is marked with an arrow and the letter "N". During operation this arrow should be roughly pointed either north or south. Aligning the sensor this way will place the coil axis perpendicular to the earth's field and produce an optimum signal.

As surveys approach low magnetic latitudes where the field dip is less than 40° and the field value generallly below 40,000 gammas, (such as near the magnetic equator where the field is close to horizontal) the sensor should be mounted horizontally (saddlemount) on the staff. In this manner the sensor coils will be properly oriented for maximum signal.

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*Decane is available from chemical supply houses, oil refineries, petroleum products distributors, or Geometrics. Decane is flammable, but unlike gasoline is <u>not</u> explosive, so it may be carried on airplanes.

Sensor Position/Repeatability

Sensor position, in this case meaning the exact and consistent placing of the sensor, is very important to the repeatability of the system. Repeatability means getting the same count for several readings taken consecutively when the sensor is not moved. This relationship between sensor position and repeatability becomes more and more critical as portable magnetometers increase in sensitivity. The following instances are of particular concern: areas of high gradients, areas where the diurnal field is changing rapidly, and areas where magnetic dust is present. It's because of these instances that a 0.1 gamma magnetometer may not repeat as consistently as a 1 gamma unit. To illustrate, consider the following comparisons:

HIGH GRADIENTS: In an area of 1 sq. meter where the magnetic field varies by several tenths of a gamma every 15 centimeters, a 1 gamma magnetometer will not be affected by moving the sensor slightly, or even moving it as much as 30 or 40 cm.

However, given those same conditions, the repeatability of a 0.1 gamma magnetometer will be affected, and possibly quite noticeably by moving the sensor as little as a few centimeters.

RAPID DIURNAL CHANGES: Consider also that even if the sensor is held perfectly still, a 0.1 gamma magnetometer will pick up subtle changes in the diurnal field that a 1 gamma magnetometer would never detect. The is of particular concern during high sunspot activity.

MAGNETIC DUST: Added to this is the possibility that the sensor itself may be magnetically contaminated due to an inclusion or surface adherence. This may affect data greatly if the sensor is rotated or the orientation continually changed.

As a note to the above, there may be other complications to repeatability. One is electrical noise in the system that may produce variations on the order of 0.1 gamma. Another possibility is the random count of protons by the system. Again, a comparision between a 1.0 gamma magnetometer and a 0.1 gamma magnetometer is needed to make the point.

To explain further, the G-856 operates by counting the frequency of spinning protons in the sensor (for more information see Applications Manual for Portable Magnetometers). The length of, or the amount of time involved in this count affects repeatability in a very subtle way. For instance, in a 1 gamma magnetometer, given a normal 3 second cycle time, a certain number of protons will be available for the count. As an example, 53795.2. The 1 gamma magnetometer will round that count to 53795. The next count is 53795.3. Again the magnetometer rounds to 53795. In a 0.1 gamma magnetometer, however, that count will be more accurate; the magnetometer reports the counts as 53795.2 and 53795.3 respectively. Of course, this accuracy lessens the repeatability.

Truncating Digits on the Display

In areas of very high gradients, often times the environment does not permit the magnetometer to capture an accurate count. This happens because the sensor signal collapses, or dies, before the count time has ended, creating an inaccurate picture of the field. The operator will recognize the symptoms of high gradients by noting truncated digits on the display. When the signal has collapsed too soon, the magnetometer will drop the least significant digit and leave an incomplete reading on the display.

Depending on the resolution you need, this is most likely not a problem. If the cause is high gradients, there is no need for 0.1 gamma resolution. A similar effect may be observed in very low fields. You can usually improve the signal strength by lengthening the polarization time and/or shortening the count time. See Using the Programming Switch in Chapter 4.

Magnetic Environment

In surveying, it's important that magnetic field readings be as true as possible and not be affected by articles of clothing and personal accessories. Jewelry, keys, watches, belt buckles, pocket knives, zippers, etc. can affect the total magnetic field reading. Objects suspected to be magnetic may be checked in the following manner:

1. Mount the sensor on the staff, place the suspected article far away from the sensor, and take several readings. Each reading should repeat to ±1 gamma. (For details see Sensor Position/Repeatability on the previous page.)

2. Place the suspected article fairly close to the sensor, and again note the readings.

3. Remove the article and again take several readings to check for a diurnal shift in the earth's field. If a shift is present, repeat the test.

4. If no diurnal shift is present, you can assume that the article is magnetic if the first group and the second group of readings varied by more than 1 gamma.

If the article is highly magnetic, or if the sensor is inside or near a building or vehicle, the proton precession signal will be lost, giving completely erratic readings.

The magnetometer can not reliably be operated in areas that are known sources of radio frequency energy, where power line noise (transformers) is present, in buildings, or near highly magnetic objects. The sensor should always be placed on the staff above the ground, or in the "backpack". The sensor will NOT operate properly when placed directly on the ground.

Magnetic Surveys

SURVEY OPERATION

During survey operation and after the instrument is tuned to the local field intensity (refer to Chapter 1), the operator need only depress the READ key to observe the reading, and if the reading is acceptable, the STORE key. If the reading is in question, for example a sudden shift of several hundred gammas, another reading should be taken.

The sensor is normally mounted on the staff or may be mounted in the backpack for surveys requiring lower mapping accuracy, rapid operation, or in rugged terrain. Because of the magnetic properties of most D-cell batteries, however, only the cardboard or plastic jacketed batteries should be used in the console for this application (refer to Chapter 4, Batteries).

USE OF THE LINE NUMBER IN SURVEYING

The memory feature of the G-856 offers some unique methods for logging a survey. The Memory-Mag magnetometer obviously eliminates the need to write down each magnetic field reading, but it also can eliminate other kinds of notes usually taken during a survey. The use of the line number marker (the three digit number set by depressing TIME, SHIFT, the numbers, and ENTER) is efficient in two ways:

1) It can be changed every time a new survey line is begun, thereby eliminating the need to count stations in a line, and

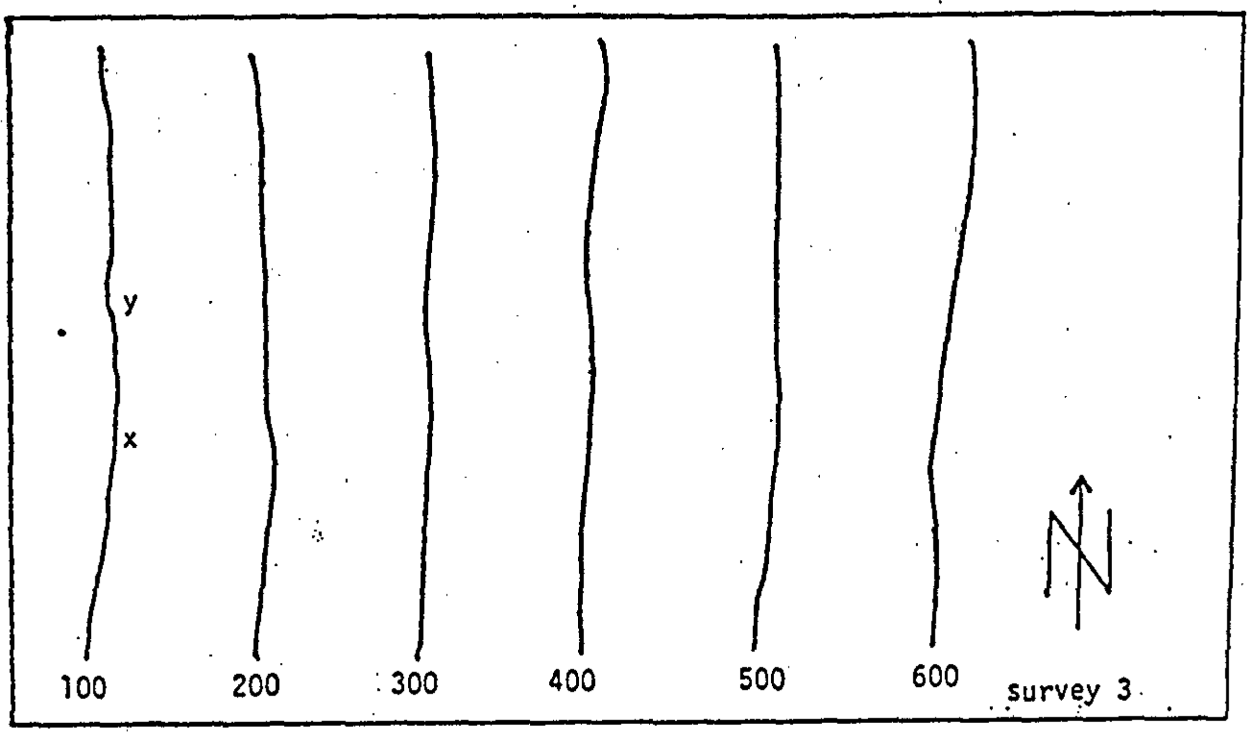
2) When anomalies show up, and the points on a line previously surveyed need to be filled in, the line number marker can be used as a coded notation.

As an example, presented here is a hypothetical study of a section of ground suspected to have a linear magnetic anomoly such as a fault, a dike or a buried stream channel. As in all such surveys, you would start with a map of the area (see Figure 6). You would mark survey lines on the map either in a grid or along some natural topographic features. Actually, locating your survey point geographically is one of the most difficult aspects of magnetic surveys, but a detailed analysis is not necessary for this illustration. The six lines have been labeled as shown from 100 to 600.

In the field, you would locate yourself at the Southwest corner at the bottom of line 100. If you are using a base station, you would check the clock on the G-856. The Julian Day will label your data as occuring on this date, but assume that you are conducting six similar surveys and that this is the third one today. You could mark your field logs with the time of day you started, but instead label this job number 3 by setting the Julian Date to 3. Depress AUTO, TIME, SHIFT, 3, and ENTER. There are of course, three digits available, so other information could be recorded.

Figure 6

Use of the Line Number in Surveying



Tune the magnetometer and take a few readings (but don't store any) and establish that the horizontal gradient is small and your best interval between readings is 25 meters. Now you are ready to start the survey. You will label the data by setting the Line Number to 125 (line 100, interval 25 meters). Press TIME, SHIFT, 1, 2, 5, ENTER. That information will be recorded with each reading stored in the memory and you will use it later. The coding scheme should also be recorded in your field notes, along with the date and exact time the survey was started. Since you have already done two other surveys, log the battery voltage and the first station number to be used (press READ to see the numbers) and signal strength (press TUNE).

Now that you are ready, conducting the survey is easy. Stand at the beginning of line 100, press READ, wait for the answer, visually check it, and press STORE. Walk up the line 25 meters and take another reading. Continue on in this same manner.

Now suppose that you reached point X on the map and noticed that the last two readings were unusually different than the previous ones. Of course you can review your data at any time by pressing RECALL a few times, and confirm that the last two readings are different than several of the preceeding ones.

You conclude that you may be in the area you're looking for, and that you really want to take readings much closer together, starting back two stations. You are standing still all this time, so you are physically at the last point. You will erase that record while you stand there by pressing READ (to make sure you're at the top of the data), RECALL (do not store the last reading), ERASE, ERASE. Now, you walk back to the previous station. Press RECALL, ERASE, ERASE. Continue until you have relocated yourself at the last station where you have good data.

Now change to five meter intervals to get a more precise profile of the anomaly. Press TIME, SHIFT, 1, 0, 5, ENTER, which sets your Line Number to 105, coding the line and the interval. You would now continue your survey by walking up the line five meters, storing the data, and continuing thus until you notice that at point Y the field again becomes constant.

Now reset the line number to 125. Depress TIME, SHIFT, 1, 2, 5, ENTER, and walk up the line 25 meters. Take and store a reading and continue to the end of the line. At the end of line 100, you should record the ending station number and any other remarks relevant to the survey--but its just insurance. Everything regarding the data is in the memory.

Now move to the north end of line 200 and, as an example, suppose that you decide to tighten up the survey a little by changing to 20 meter intervals. Record 220 as the line number. Depress TIME, SHIFT, 2, 2, 0, ENTER. Start surveying south. Again, if anomolies show up, edit, change the intervals, and label the record as before. Continue for the rest of the lines and note in your field book that you walked north on the odd numbered lines and south on the even numbered lines. Record your ending time, signal strength, and battery voltage.

Other procedures can be contrived to use the Julian Day and Line Number for record labeling purposes. This example is only one of many posible combinations. Once a procedure is adopted, an attempt should be made at consistency. If the previous procedure is above the skill level of your operators, try the following alternatives.

Set the clock and Julian Date at the base camp. Go to the start of line 100 and tune the magnetometer to the field reading. Push READ, STORE, and RECALL. Write the station number displayed during RECALL on the map. Continue the sequence, surveying along line 100 and writing the station number on the map at each location. The operator might as well also write the field number on the map, which at first glance would seem to defeat the purpose of the memory, but this does provide a check against transcription errors.

A more likely procedure is to write the station number on the map at locations of specific interest including the start and finish of each traverse, physical landmarks, any point where the interval changes, and areas with interesting anomalies. The unrecorded station numbers can be filled in later by manual or computerized interpolation.

Now suppose that your survey is complete and you are ready to list the data on your printer. At the base camp you would plug in your optional RS-232 adaptor cable to a printer, and list the information from just this survey. The log book would tell you that the first station is 372, so you want to start your list from a little before that one. Press: OUTPUT, SHIFT, 3, 7, 0, ENTER. The display starts flashing OUT and the station numbers and the printer start listing a column of data like this:

825	2	131527	370	512498
825	2	131545	371	512511
125	3	140511	372	498733
125	3	140622	374	498710
125	3	140651	375	498725
125	3	140705	376	498735
105	3	141211	377	498744
105	3	141225	378	498772
105	3	141245	379	49879
105	3	141303	380	49882
105	3	141325	381	498833
105	3	141241	382	498841
105	3	141359	383	498845
125	3	141429	384	498853
125	3	141455	385	498874
125	3	141507	386	498882
220	3	141902	387	498557
220	3	141922	388	498551
220	3	141945	389	498542

At this point, you press CLEAR which stops the printer. The first column is the line number and interval spacing. The second column is the Julian Date, which you used instead to label the survey area. The third column is time of day (24 hour clock), the fourth column is the station number, and the last is the magnetic field to six digits.

You would then attempt to construct your survey from the data. Looking at column 2, notice that the first two readings are from a different survey so you can ignore them. The time difference between the readings at stations 371 and 372 is further verification. The third line, column one, tells you that the reading is from line 100 with a 25 meter interval between stations as per our adopted convention in survey area 3, and you started at 2:05 in the afternoon. The readings proceed up (north) on line 100 until station number 377. Notice here that the interval expressed in column one changed to 5 meters (377 is 5 meters from 376) and notice the extra time consumed between readings while you backtracked and erased. The readings at stations 379 and 380 have only five digits, which tells you that the signal was weak, probably because of a high local magnetic gradient from a buried magnetic object. At reading 384, you resumed a 25 meter interval for the balance of line 100. Reading 387 is of course the first reading headed south on line 200 at 20 meter intervals. The time between reading 386 and 387 is about right for a line change.

The above example is intended to show that by using a standard operating convention and some common sense you can reconstruct the field activities with a minimum of note taking. It is prudent to examine the data while your memory is still fresh os that you can account for long time gaps and strange information.

Summary

This chapter has discussed field operation in general, and has included information on sensor attachment and orientation, sensor positioning with respect to repeatability, magnetic noise, and survey techniques.

The following chapter, Data Retrieval, presents some of the configurations possible for automatic retrieval of data.

APPENDIX D

G-856 GRADIOMETER OPTION INSTRUCTIONS

1. PURPOSE

The G-856 Gradiometer Option allows a single G-856 chassis to take successive reads from two vertically separated sensors. The result is a measurement of vertical gradient independent of time variations. See Note 1.

2. CONTENTS

This option consists of a Remote Start Switch Box, two special sensor cables, a special second sensor, a staff modification kit, and a Velcro strip.

3. PREPARATION

Configure the G-856 console for normal polarize, normal gate, and disable 3 read averaging. To do this, set switches 1 through 4 on the G-856 cpu board to the "off" position.

Assemble the staff and sensors. Start by removing the standard cable from the original sensor and attaching one of the special sensor cables. Next, connect the staff modification kit parts to the top of one staff section and the bottom of another staff section so that the threaded shafts point towards each other. The second sensor, with two threaded caps, will mount between these two staff sections. Sensor separation may be controlled by choosing an appropriate pair of staff sections.

Then assemble staff sections and mount the sensors. The sensor cables may now be connected to the Remote Start Switch box, and the Remote Start Switch may be connected to the G-856 front panel connector. Attach the Velcro strip to the top of the G-856 black front panel bezel. Mount the Remote Start box to this mating Velcro strip.

4. OPERATION

To initiate a gradiometer read cycle, depress the Cycle button on the Remote Start Switch. The G-856 will then take two readings, the first from the bottom sensor, an the second from the top sensor.

Data may be automatically stored by entering the following key sequence on the G-856 front panel prior to starting the read cycle :

AUTO / STORE / ENTER

The G-856 will then store all readings until the following key sequence is entered :

AUTO / STORE / CLEAR

5. DATA STORAGE

Gradiometer readings are stored a pairs of field readings. Assuming that the G-856 memory were cleared before operation as a gradiometer, reading 000 would be the first bottom sensor reading and 001 would be the first top sensor reading. From then on each even numbered reading will be from the bottom sensor and each odd numbered reading will be from the top sensor. The RS232 output format is described on page 42 of the G-856X manual.

NOTE 1

In situations where changes in the earth's field are significant during the interval between sensor reads, some correction of the data may be necessary.

APPENDIX
2

Chapter 17

Performing Trend-Surface Analyses

The TREND* Option

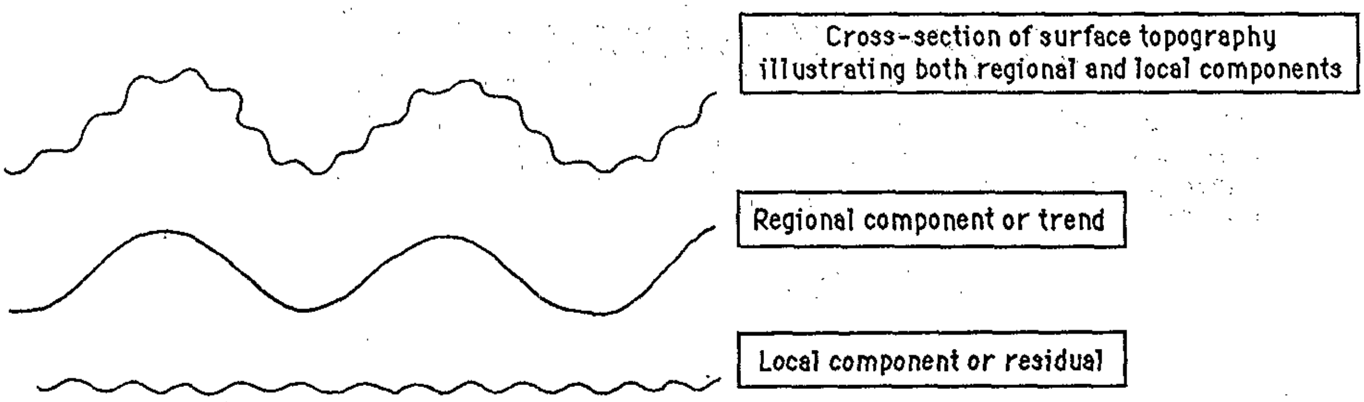
The TREND* Option

TREND performs polynomial trend surface analyses on a set of data. This involves fitting a surface (represented by a polynomial equation of up to six orders) to your data points, determining which order of the polynomial produces the best fit to your given data, and creating a data grid (a binary *GRID* file) using the trend surface equation. In addition to isolating the regional trend, TREND permits you to identify localized areas that show aberration or residuals from this trend.

TREND works with the assumption that spatially-distributed z-values (such as your control point data) have *two components:*

- ➡ a regional component (= "trend")
- ➡ a localized component (= "residual")

TREND is used to determine the regional trend component and create a grid model of it, and to isolate the local residual variations. A simplified example is shown below:



What is a Polynomial Trend Surface?

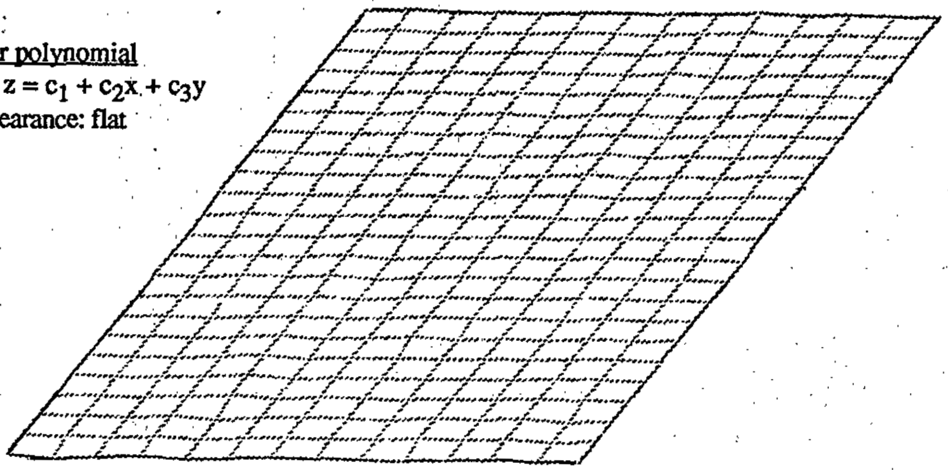
A polynomial trend surface is a three-dimensional surface fitted by a polynomial equation (just like an "nth" order regression is a set of points fitted by a line). The "order" of a trend surface equation refers to the highest values of the exponents used in the equation. For example, an equation involving x^2 and y^2 is a "second order" equation. An equation involving x^3 and y^3 would be a "third order" equation, and so on. Some examples of polynomial trend surfaces are shown on the next page.

A first order polynomial

Equation: $z = c_1 + c_2x + c_3y$

Surface appearance: flat

Example:

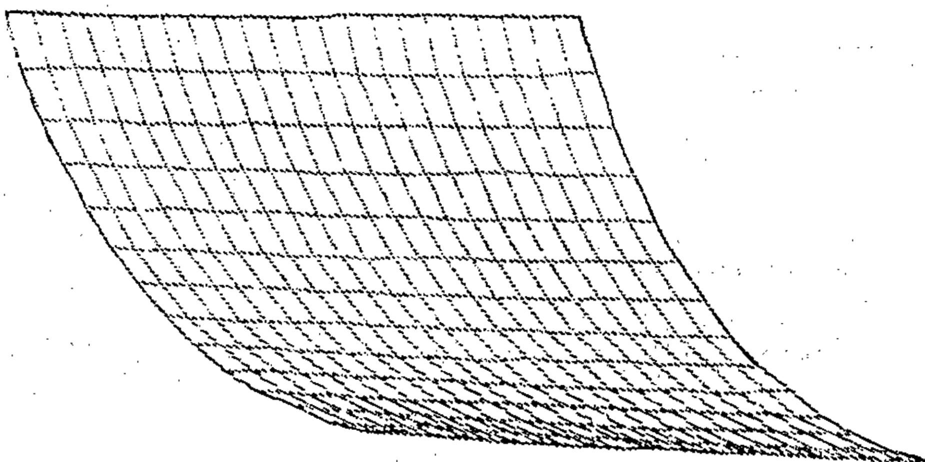


A second order polynomial

Equation: $z = c_1 + c_2x + c_3y + c_4x^2 + c_5xy + c_6y^2$

Surface appearance: one bending moment

Example:

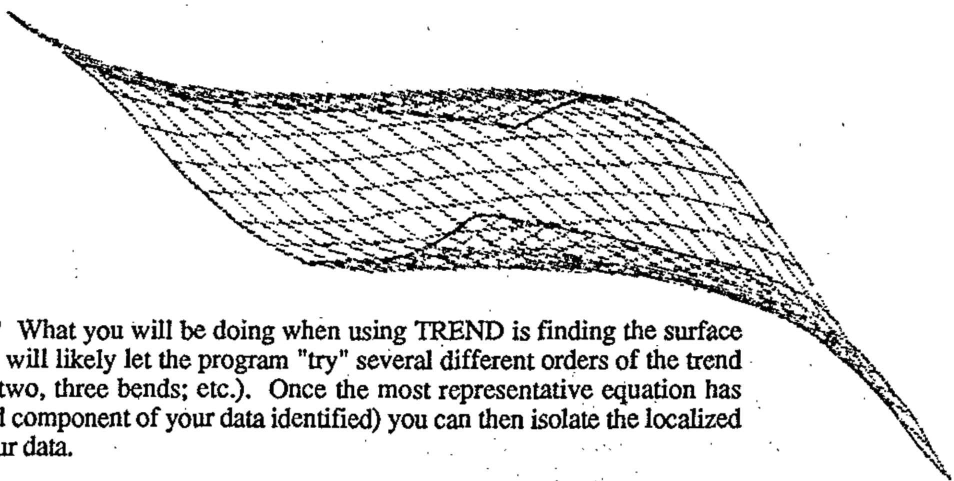


Third order polynomial

Equation: $c_1 + c_2x + c_3y + c_4x^2 + c_5xy + c_6y^2 + c_7x^3 + c_8x^2y + c_9xy^2 + c_{10}y^3$

Surface appearance: two bending moments

Example:



How does this relate to your data? What you will be doing when using TREND is finding the surface that best fits your data points; you will likely let the program "try" several different orders of the trend surface equation (no bends; one, two, three bends; etc.). Once the most representative equation has been chosen (and the regional trend component of your data identified) you can then isolate the localized (or "residual") characteristics of your data.

Please note that if your data set has both clustered and scattered data points, the clustered points may overly influence the trend surface that is generated. In order to avoid this, you might "weed out" some of the data points in the congested areas.

GEOLOGICAL BRANCH
ASSESSMENT REPORT

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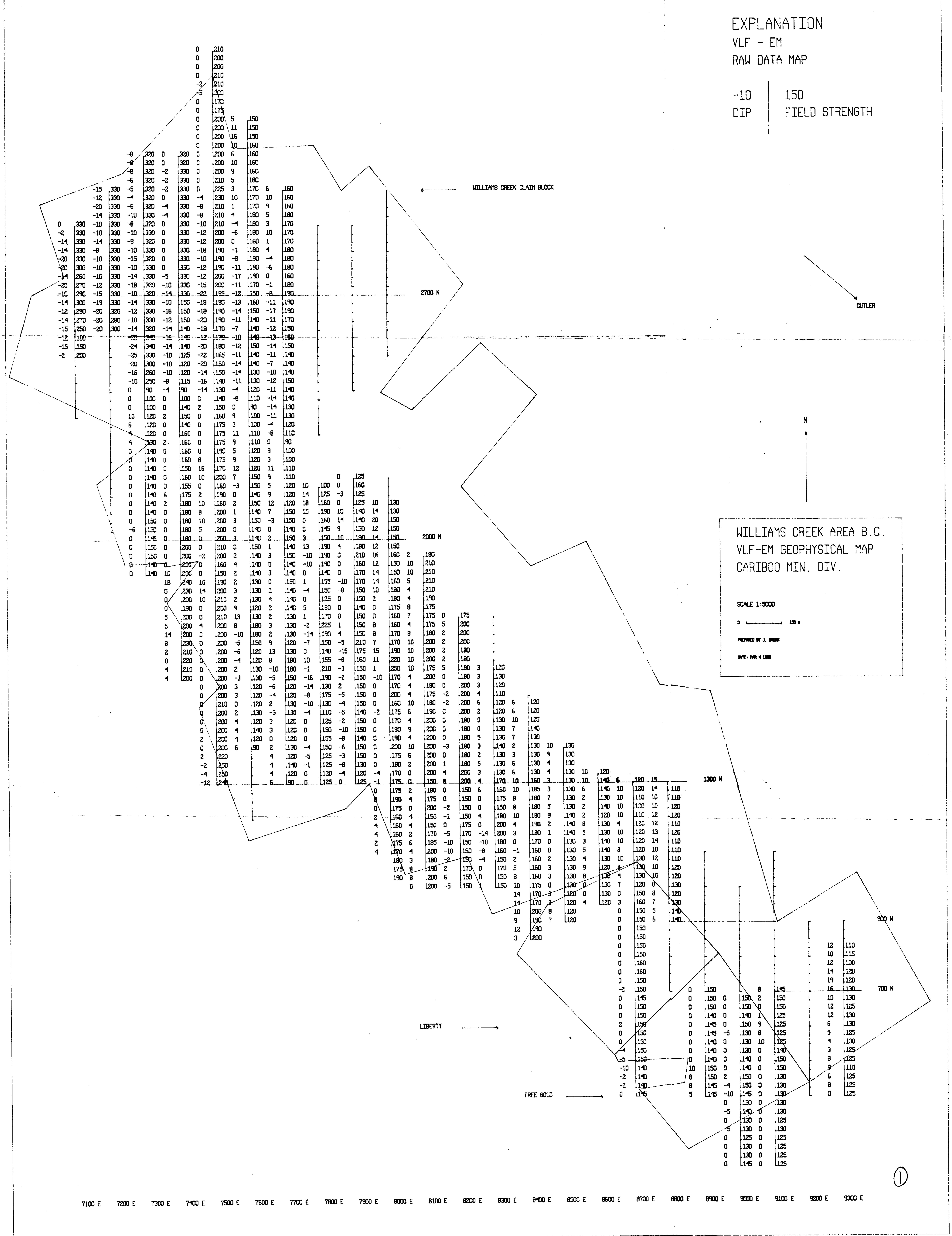
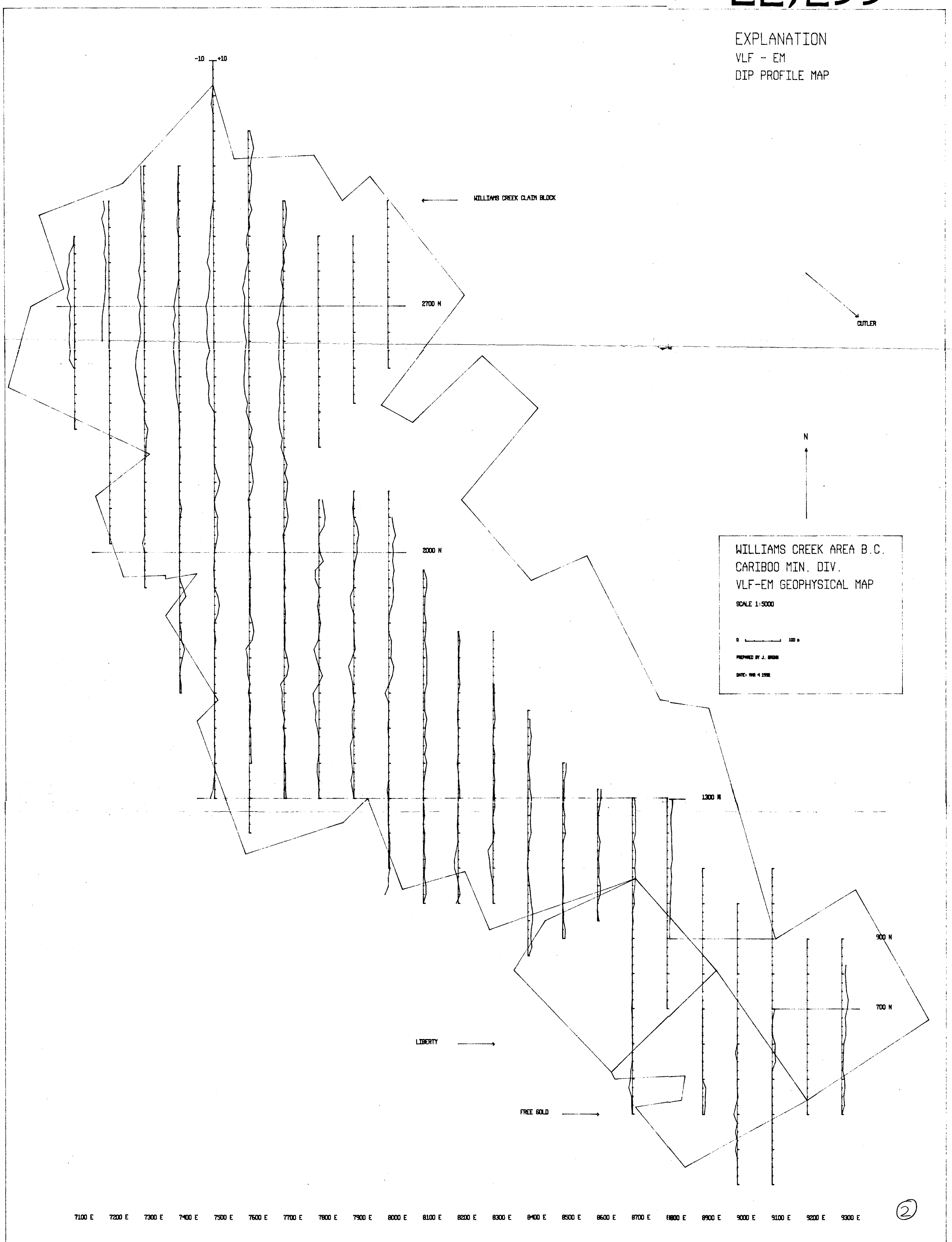


GEOLOGICAL BRANCH
ASSESSMENT REPORT

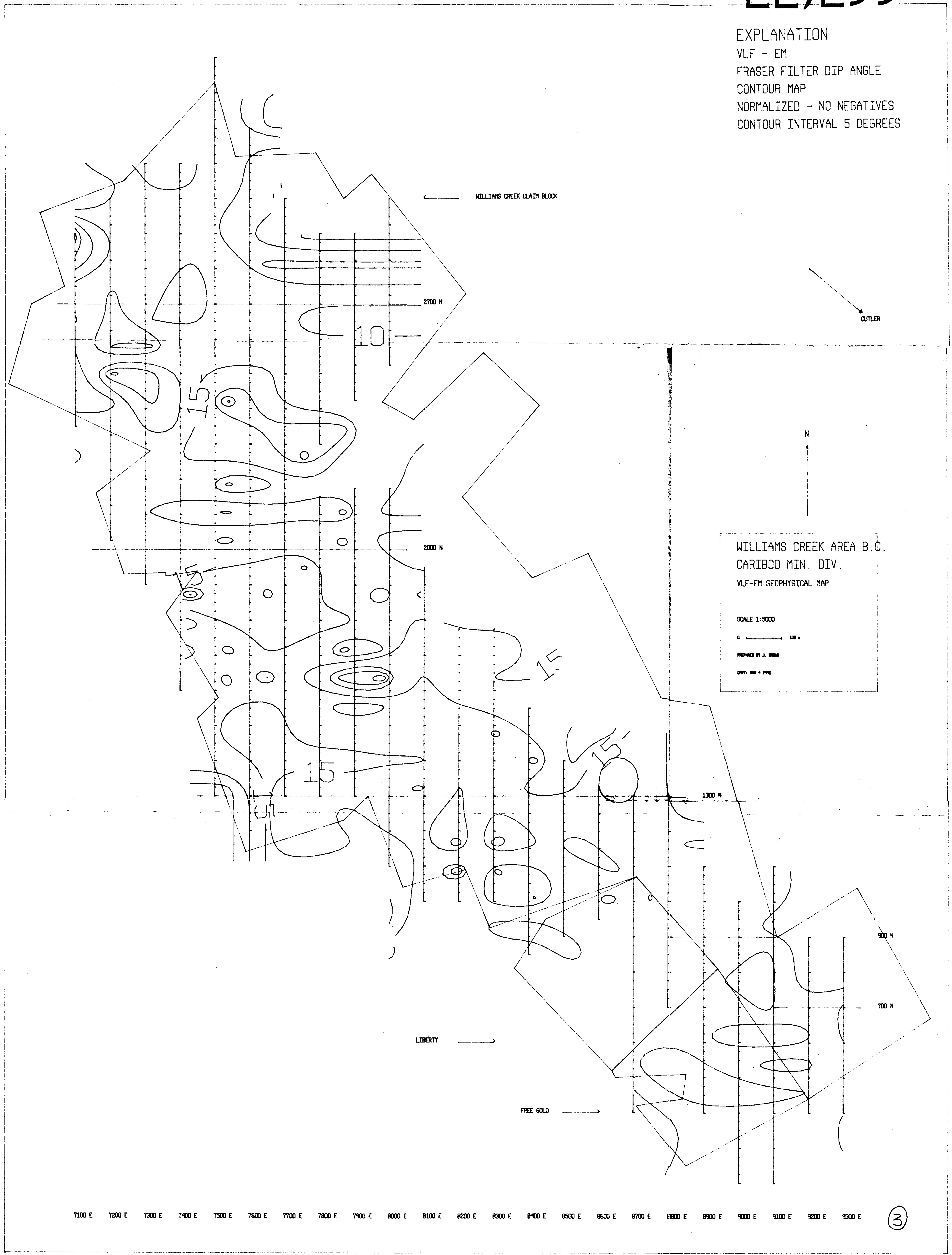
22,255



②

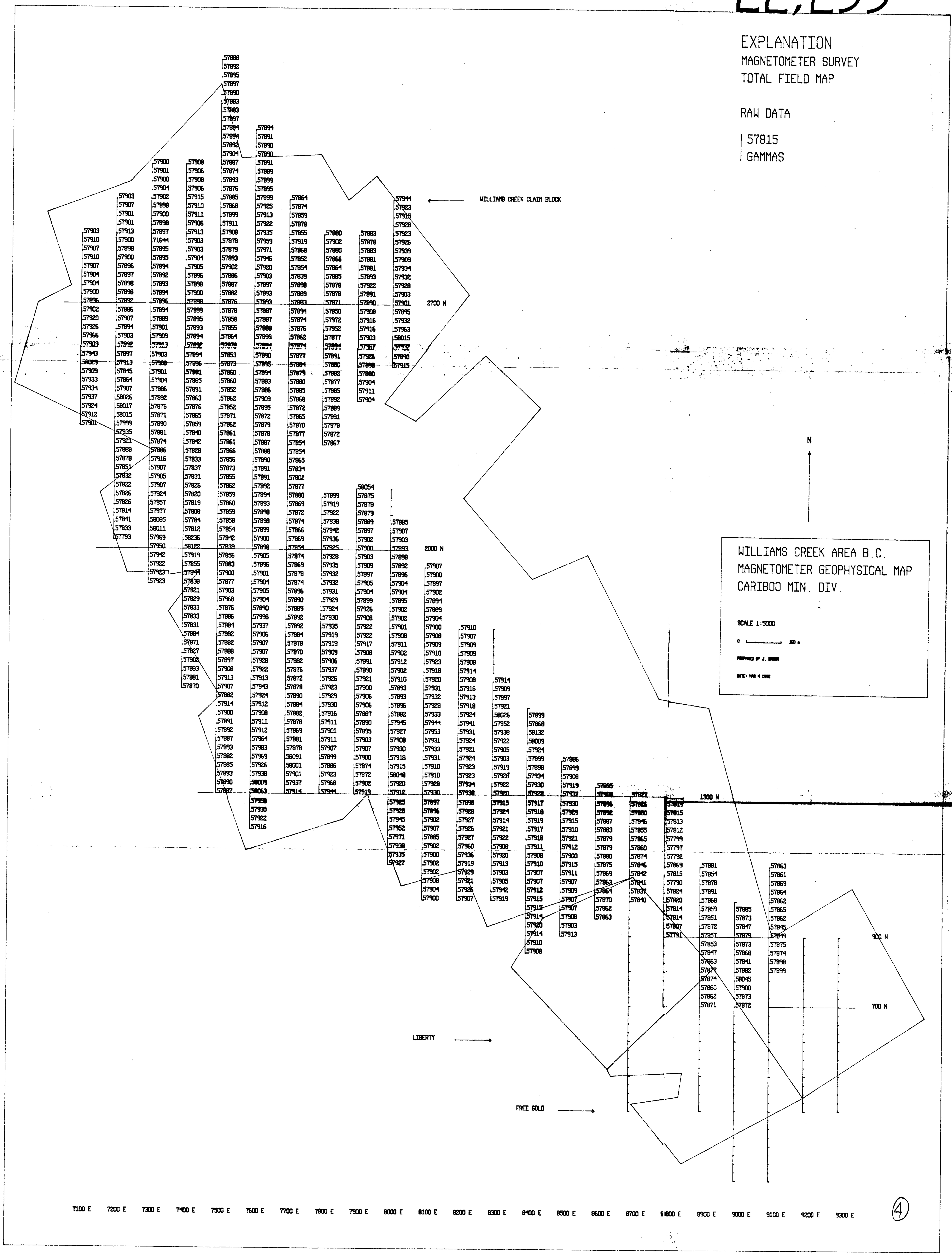
GEOLOGICAL BRANCH ASSESSMENT REPORT

22,255



GEOLOGICAL BRANCH
ASSESSMENT REPORT

22,255



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ASSESSMENT REPORT

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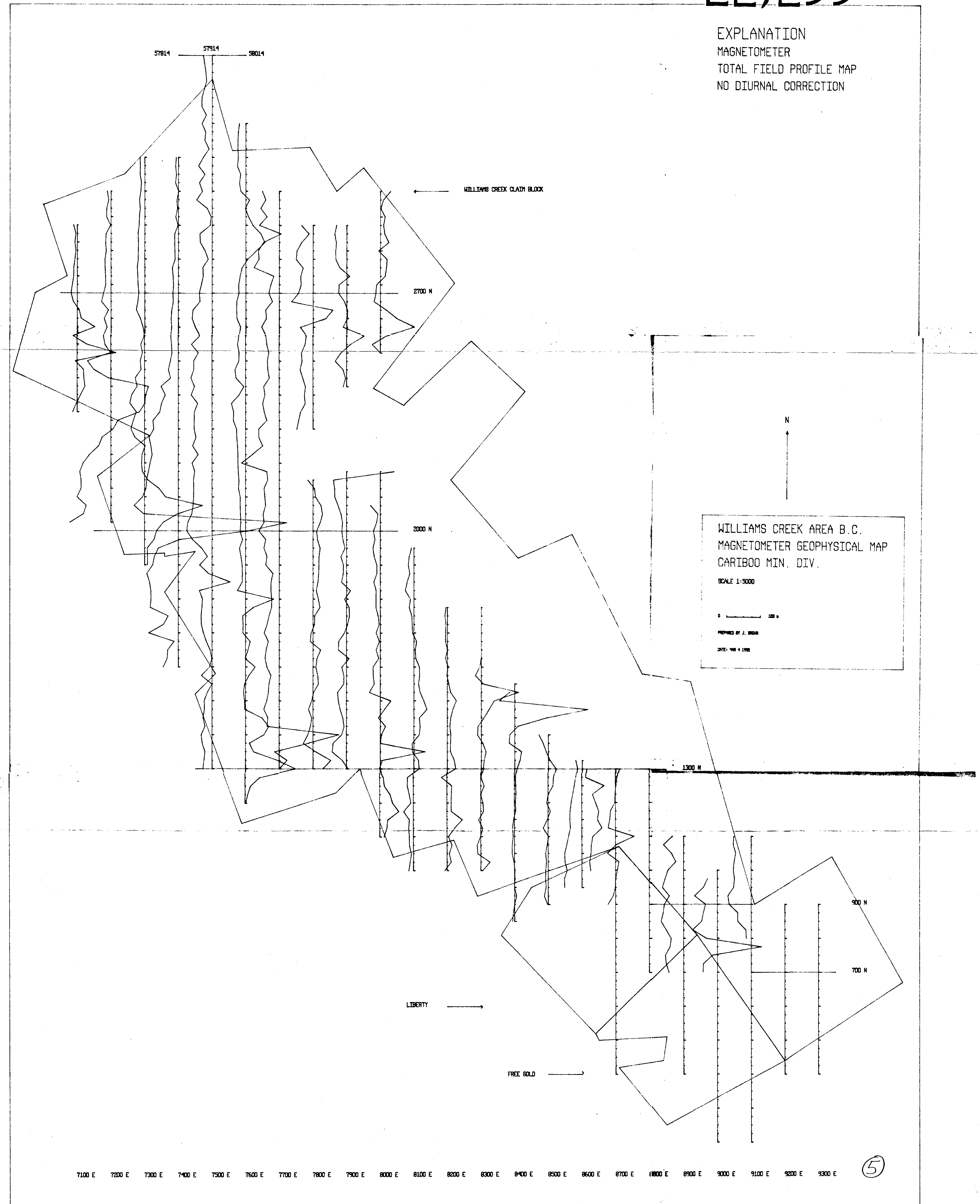

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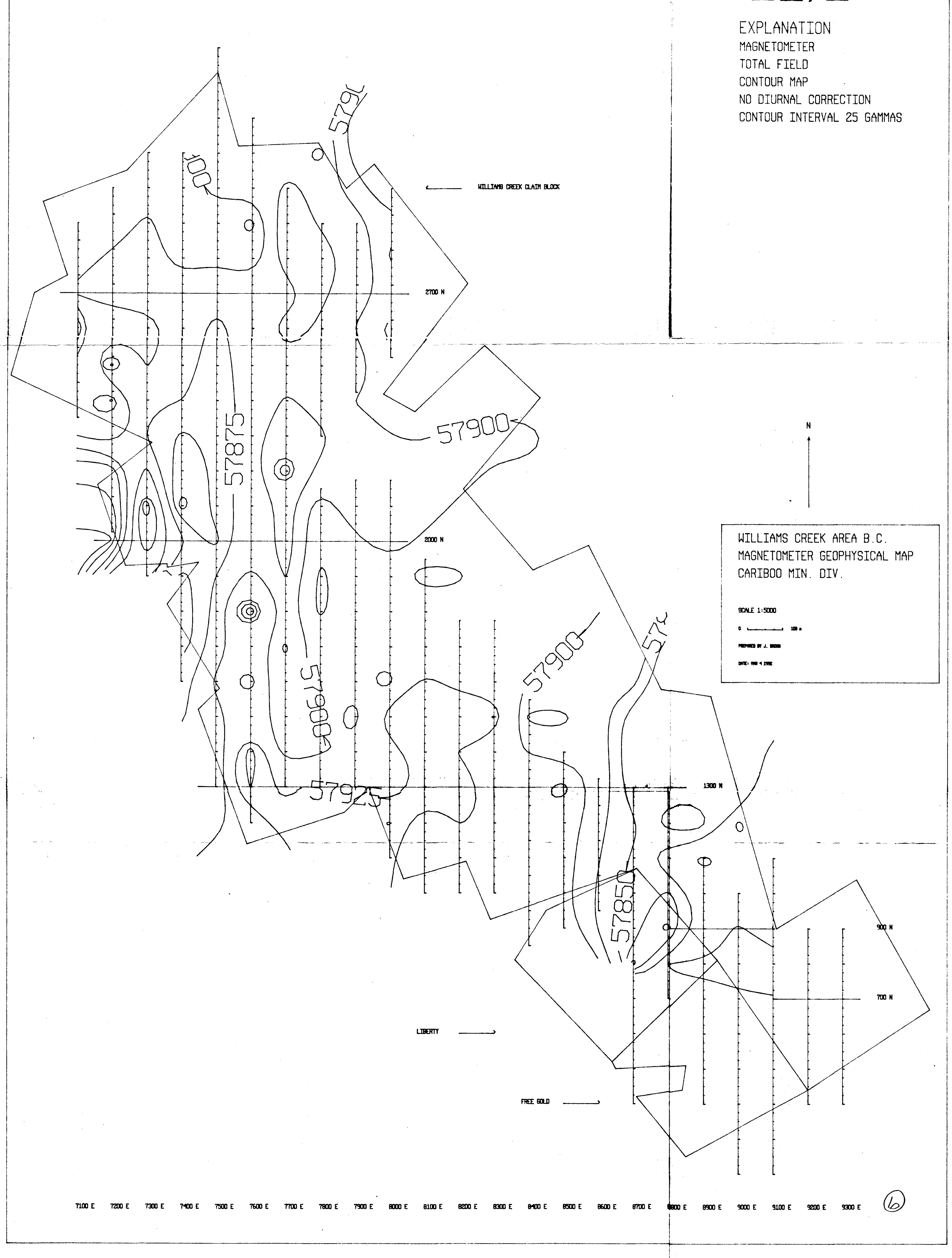
GEOLOGICAL BRANCH
ASSESSMENT REPORT

22,255



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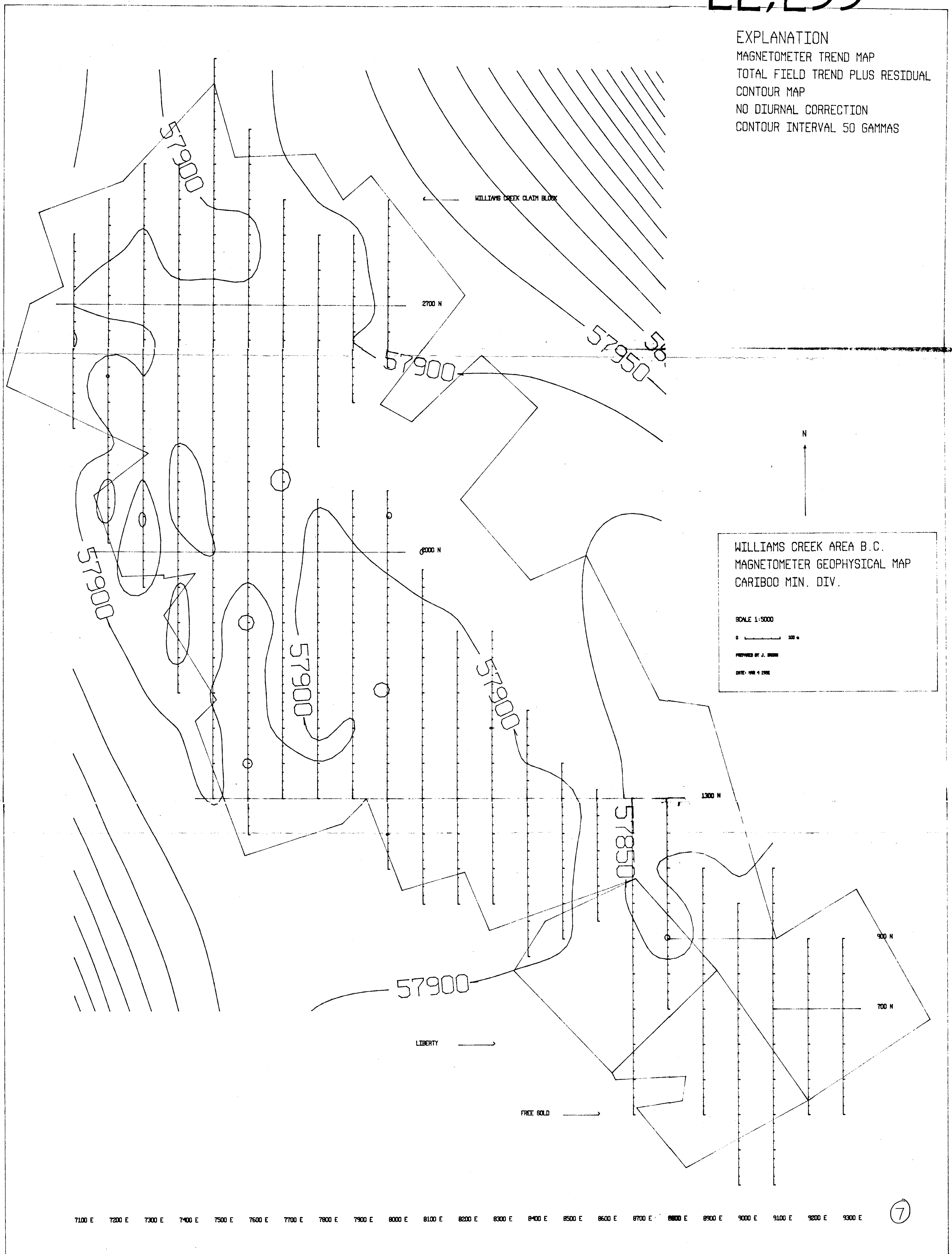
EXPLANATION
MAGNETOMETER TREND MAP
TOTAL FIELD TREND PLUS RESIDUAL
CONTOUR MAP
NO DIURNAL CORRECTION
CONTOUR INTERVAL 50 GAMMAS
WILLIAMS CREEK CLAIM BLOCK
2700 N
2000 N
1300 N
900 N
700 N
57900
57950
57850
N
LIBERTY
FREE GOLD
WILLIAMS CREEK AREA B.C.
MAGNETOMETER GEOPHYSICAL MAP
CARIBOO MIN. DIV.
SCALE 1:5000
0
100 m
7100 E
7200 E
7300 E
7400 E
7500 E
7600 E
7700 E
7800 E
7900 E
8000 E
8100 E
8200 E
8300 E
8400 E
8500 E
8600 E
8700 E
8800 E
8900 E
9000 E
9100 E
9200 E
9300 E

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