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REPORT

of

GEOLOGICAL and GEOCHEMICAL SURVEYS

covering

DM GROUP of MINERAL CLAIMS of GRAHAM BOUSQUET GOLD MINES LIMITED

and

AFTON GROUP of MINERAL CLAIMS of AXEL BERGLUND

DM Group comprises DM 1 to 126 and DM Fractions 1 to 7 inclusive.

Afton Group comprises Afton 1 to 7 inclusive and Afton Fraction.

LOCATION

The area lies north and west of Latitude 50°37' North and Longitude 120°28' West; is approximately a rectangle three miles square, between eight and eleven miles west of Kamloops, B.C., being crossed in east-west direction by Trans-Canada Highway. The Sugarloaf Hill is a topographical feature near the southeast corner of the area.

AUTHOR

This report is compiled by the writer, under whose direction the work was done, the detailed geological report and mapping being the result of study and work of Professor Richard E. Jones, M. Sc., his report being shown in its entirety.

Signed Harry W. Darling

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REPORT covering COMBINED GEOLOGICAL and GEOCHEMICAL SURVEYS

of the

EM and AFTON GROUPS of MINERAL CLAIMS in the KAMLOOPS AREA, B.C.

1. INTRODUCTION

Previous investigation of the area in 1956 was made to determine the location of the claims and decide upon a course of procedure. The writer, with five men, had traversed it, finding all but three of the location posts. Two are assumed to have been lost in Hughes Lake and one to have been disturbed by road building operations.

A rough try-line was run by compass and chaining from the southeast corner to the northwest corner in the direction of the general strike of the formations observed, namely N.-60°W. Numerous trenches, pits, shafts and adits were seen and tied to this line. Some samples were taken at these old workings which are attributed to the work of former owners.

Memoir No. 249, by W. E. Cockfield, published by the Geological Survey of the Department of Mines, Canada, was consulted and studied, with particular reference to the description of the Iron Mask Batholith and the copper deposits associated with that feature.

Believing that former owners and prospectors would hardly be likely to have missed any exposed showings of mineralization and knowing that at least one former operator possessing sufficient capital and an excellent staff had abandoned the area, it was decided that the ordinary methods of surface prospecting would not be likely to result in the discovery of ore bodies. Of course, it was realised that the earlier investigators were looking for deposits of such nature that they could be mined for shipping ore or for a small milling operation.

The most ambitious operation had been the sinking of the Pothook Shaft, near which the competent company referred to previously had done considerable diamond drilling. This work had been done on the Afton claims and the results were available to the writer. Drilling had not disclosed a profitable ore body but had shown the presence of a very considerable amount of copper content. Core recovery had not been entirely satisfactory and it had been impossible to correlate results between drill holes.

As the area is almost entirely covered by soil and glacial drift, it was decided to conduct a geophysical survey as a first operation. Later in the year, an electro-magnetic (EM) survey, supplemented by some magnetometer and resistivity investigation, was completed. This resulted in the location of over ninety conductor zones, some of which were of a magnitude and intensity to justify further investigation.

In view of the high cost of diamond drilling and the unsatisfactory past performance of such work, it was decided that further investigation of the area by other means should first be undertaken to determine, if possible, just what the conductor zones might indicate.

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2. PROPERTY

The original DM property consisted of one hundred and eight claims. In making the geophysical survey, open ground was found and this gap in the middle of the west side of the property was staked for the company by the geophysical crew. This year, more open ground was discovered and a further number of claims were staked, as well as fractions, so that at present the claims number DM 1 to 126 and DM Fractions 1 to 7 inclusive.

The Afton Group and three old Crown Grant claims lie in the centre of the area. By arrangement, it was decided to survey the entire area, irrespective of boundaries, in order to obtain a complete picture.

3. LOCATION

The property involved is roughly three miles square and lies from eight to eleven or twelve miles west of Kamloops, B.C., with the Trans-Canada Highway passing across the more northerly claims. Sugarloaf Hill lies just southeast of the southeast corner and Cherry Creek flows through the southwest corner of the block.

4. AREA

All the claims are not full size and there is much overlapping, in fact some of the claims were found to be practically non-existent, so that it is probable that the extent is not much greater than 5000 acres. Much of the outlying ground does not appear to be of much value and should be allowed to lapse.

5. TOPOGRAPHY

No attempt has been made to produce a true topographical map, but streams, ponds, lakes, dry beds, swamps, roads, trails, power lines, pipe lines, buildings, fields, fences and buildings were indicated upon the geophysical map and were checked upon the geological map. The geological report (Jones) deals more fully with topography.

6. WORKINGS

Such trenches, pits, shafts and adits as were seen were noted on the geophysical map and more completely shown on the geological map. The ground slopes were shown on the geophysical map, which becomes useful in studying the geochemical mapping.

7. ACCESSIBILITY

With the Trans-Canada Highway passing through the property and numerous roads and trails running through it, all parts are readily accessible. Using a proper vehicle, it is not necessary to keep to the roads to reach almost any location. Kamloops to the east and Savona to the

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west are each about twelve miles distant. The Canadian Pacific Railway serves both of these points and the Canadian National Railway also serves Kamloops.

8. TIMBER

The area is desert-like, arid with less than ten inches of rain per year. Vegetation is confined to sagebrush, tumble weed, cactus and bunch grass, all typical range growth. Sparse timber is found only on the high ground at the southeast corner and around Hughes Lake. It would not be sufficient to support a very large mining operation.

9. WATER

Most of the ponds upon the property are probably residual from melting winter snow and dry up completely in the summer. A few that merely shrink up might be fed by occasional light rain. Some of the larger lakes remain through the year. Hughes Lake is fairly large and is fed by running water. Cherry Creek and one of its tributaries might be a source of water if rights can be obtained. The Thompson River is about four miles distant and at least a thousand feet lower elevation.

10. POWER

There are two power lines and a gas pipeline passing through the northern part of the area held and the oil pipeline is not far distant, so that there seems to be no lack of power facilities.

11. OTHER FACILITIES

Kamloops is an important community, providing the country around with the usual services and businesses. Trains of both railways provide eastward and westward passenger and freight movement. In addition, Canadian Pacific Airlines connect with Trans-Canada Airlines at Vancouver. Mail travels usually by air. Telegraph and telephone communication is good. There are adequate ordinary shops, but the nearest source of heavy or unusual supplies is Vancouver.

Savona is only a recreation spot on Kamloops Lake, with good camp sites and fishing and bathing.

12. PRELIMINARY to SURVEYS

The EM Survey had disclosed so many conductor zones that it seemed expedient to investigate such zones by some method other than extensive diamond drilling. Naturally, a geological survey became necessary, coincident with geochemical investigation. It was arranged that Professor Jones, of McMaster University, would arrive early in June to conduct this survey. The writer undertook to carry on the geochemical survey. Both were to work somewhat independently.

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13. PREPARATION

In preparation for the surveys, it was necessary to decide upon the manner of mapping for the sake of uniformity and the grid used by the geophysical crew of the previous year was adopted. The geochemical work started in May.

14. MAPPING

The scale used for the geophysical survey was 200 feet to the inch, which proved unwieldy. The mapping to that scale was reduced in size to 400 feet to the inch by use of proportionate dividers and photostat. The grid to the new scale was drawn accurately upon tracing cloth and three prints made upon sensitized tracing cloth, thus assuring three absolute triplicates. Upon one, the position of the claims and the EM (geophysical) anomalies (conductor zones) were then drawn. Upon another, the geological data was applied. Upon the third, the geochemical values were placed and the anomalies drawn. This procedure ensured that thin paper prints from the three could be superimposed for the work of correlation. These latter prints accompany this report. Ordinary white prints from the originals were made for use in the field and for the recording of notes.

15. GRID

The geophysical crew laid out the grid for their work upon the ground by running three baselines with transit and chain. The Centre Baseline starts at a point near Sugarloaf Hill and runs closely N.60°W. to the west side of property. The North Baseline was run in the same manner, parallel and 6,000 feet distant on the north. The South Baseline was run similarly, parallel and 6,000 feet distant to the south. Origin or zero point was selected upon the Centre Baseline near the centre of the area and hubs were set along baseline at 400 feet intervals. Zero Line was run at right angles to the Centre Baseline in both directions to establish its intersections with both North and South Baselines. Hubs at 400 feet intervals were set along those baselines. It was necessary to offset the east end of the South Baseline northerly 2500 feet at Line 40W to keep it within the property. Grid lines were then run northerly and southerly at the 400 feet intervals (tying in at the hubs) to the limits of the property. Stakes were placed at 100 feet intervals along these grid lines and properly marked for identification. All this work was done with reasonable accuracy.

It was necessary this year to replace many of the stakes (pickets) which had been disturbed or removed by cattle or humans. Many could be replaced by pacing, but some were measured in by telescope and stadia.

This grid was tied in by survey this year, to such Township, Range and Section markers and old Crown Grant posts as could be found. It was also tied to a survey of ground at the east boundary which the local B.C.L.S. made for the company last year.

All geological and geochemical work done this year used the grid for locations.

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16. <u>GEOCHEMICAL PROSPECTING</u>

Mining Engineers and Geologists have long known that there are "halos" in the wall rock surrounding sulphide ore bodies. Some bodies are mined to "assay walls" where the metallic content slowly or gradually diminishes. The "halos" are due to impregnation of surrounding adjacent rock by agents related to ore formation or by volatile material in gaseous form. Prospectors have panned upstream or upward across slopes looking for visual evidence of ore minerals in bits and pieces of the minerals sought. These bits and pieces constitute "anomalies" of another character, the results of weathering of rock and ore in place, transported by water, gravity or glacial movement.

In more recent years, it was realized that many ore minerals are affected by certain chemical reactions and weathering such that the products become soluble in water. These solutions can travel from their source. Like the prospectors' particles, they are also moved by force of gravity and the carrying power of water, but they can also be moved against gravity by capillary action through fine grained soils and by absorption of plants growing upon the surface. It is with these two latter means of movement that the geochemical prospector, working particularly in arid regions where low surface gradients prevail, should be interested, but he should not overlook the possibility of water transportation down hill, even in arid regions where a slight seasonal precipitation may take place, nor the possibility of glacial transportation. Glacial transportation can move the product of weathering to a locale distant from point of origin and then chemical reaction may take place to provide solution which can then be moved by capillarity to produce "false anomalies".

In the area under trial, excessive aridity and low gradients would appear to eliminate water activity. As for glacial carriage, geological indications are against that means.

Common usage defines Geochemical Surveys as the systematic determination of the chemical content of any element in natural material such as soil, glacial debris, vegetable matter, water and even rock or gossan. In the survey made, soil and glacial debris was tested.

Just as in geiger counter or scintillometer surveys for radioactive elements, it is necessary to eliminate the background count, so must the general content of elements sought in any area be eliminated. By definition, an anomalous condition must be something out of the ordinary. A geochemical anomaly must be a greater concentration of the element than the usual in the vicinity. Any particular area will have its normal geochemical background. Hence, a content is not considered anomalous unless it exceeds such background considerably or exceeds the adopted "threshold".

Although it is possible for concentrations of background material to occur, producing false anomalies, it is always more likely that anomalies will be derived from natural concentrations such as deposits or ore bodies in place.

The shape of a presumed anomaly and its location with reference to topography must always be considered. High content along a drainage channel usually indicates a source toward the upper end. Likewise,

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a fan shaped anomaly should indicate a source approaching the narrowing upper part. An anomaly that decreases in all directions should indicate a source directly below.

In any area, the background and anomalous values must be established by trial. In the survey here described, the average of the first 3400 samples taken was accepted as background and twice that average as threshold.

In U.S.G.S. Bulletin No. 1000-F, the following paragraph appears: - "In prospecting, soil analysis for traces of metals has become the most widely used and successful of the geochemical methods of mineral exploration. A great many field surveys of the metal content of residual soils over sulfide deposits have been made and, with no important exceptions, the dispersion pattern of metals in the soils was found to correspond closely with the distribution of metals in the underlying rock and hence probably with that in the rock from which the soil was derived."

Although the grand movement of the continental ice sheet has transported material hundreds of miles, the bulk of glacial tills is of relatively local origin. For instance, boulders in glacial debris in Northern New Brunswick were found to be identical to the underlying bedrock.

There is one known instance of an anomaly found exactly over an ore body lying directly below under 200 feet of glacial debris, reported in a U.S.G.S. publication.

17. SOIL SAMPLING

In the survey conducted, certain areas were disregarded after a preliminary study of the geology. First sampling was done over the principal conductor zones indicated by last year's EM survey. Geochemical anomalies were not always obtained where conductors were located. This led to the decision to enlarge the scope of the survey and complete one of much greater magnitude.

Samples were taken where there were grid line stakes or pickets, thence along lines 400 feet apart at 100 feet intervals. This spacing was deemed adequate to pick up areas of anomalous metal content. Closer lines in a selected locality, 200 feet apart, failed to affect the general picture. At two selected localities, samples were taken on a checkerboard layout at fifty feet intervals, for the purpose of a close comparison of the results with geology and rock sampling, these two localities having light soil cover. They will be discussed separately.

A 1½ inch ship augur was first used to take samples, which was soon replaced by a 2 inch closed soil augur. The latter held the sample better. In places where there were too many rock fragments for the use of augur, grub hoe and shovel were used. In all cases, to obtain uniformity, there being no humus, samples were taken at from nine to twelve inches depth. Samples seldom contained any moisture.

Samples were placed in small manilla paper bags which were plainly marked by the sampler with the number of grid line and distance from

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a baseline thus -

40 W - 12 S CBL meaning Line 4000 feet west of origin zero line, 1200 feet south of Centre Baseline.

Entry was made in a field book showing that the sample was taken, with any notation wanted. The bags were made into packages, usually of ten, in consecutive order, held by rubber bands, placed in haversack and carried from the field to the "laboratory" at field office. Here they were placed in consecutive order for testing the following day. Numbers were copied from field book to office notebook, with notations, keeping the regular order.

18. TESTING

Although other methods of testing are known, both the writer and the head sampler had previous experience with the dithizone method and the McPhar kit for applying it. As the McPhar kit was at hand, as well as some chemicals, it was used. A later kit and method by McPhar might have been preferable, as it identifies copper only whereas the one used identifies other metals than copper - zinc, lead, etc., in terms of zinc equivalents. Numerous samples sent to McPhar Geophysics Ltd. for laboratory tests showed presence of zinc as well as copper, the average ratio of all samples sent being 352 parts copper to 161 parts zinc. No other metals were identified. The returns on the samples sent checked well with the work being done in the field.

The average of 3400 tests first made was 145 parts per million, so 150 parts per million was accepted as background value and twice that as threshold value. In later plotting upon the map, 500 parts per million was considered anomalous.

A total of over 5000 samples was run, including many repeats. It was found that samples taken from the same locality would not always return the same results and that repeats of the same sample did not always check. In the main, however, check sampling and check testing showed no variation so great as to disturb results, if certain precautions were taken. A paper by the staff of McPhar Geophysics Ltd., which is available, deals with the problem of variations in field tests. It was found that well mixed composite samples from a locality would check fairly well, provided that they were properly screened to eliminate oversize.

Samples were screened to eliminate oversize and vegetation, then rolled on sheets of clean typewriter paper to mix thoroughly, spread out and rolled so that a finer fraction might be taken off by spatula.

The standard field kit and reagents supplied by McPhar Manufacturing Ltd. were used. The reagents as supplied are given "trade" names and exact strength and composition seems to be a trade secret.

The box containing the working apparatus has a measuring slot or "loading port" which just holds a glass vial of certain size. Alongside this slot are marks on the face plate of the box showing levels in the vial of 1, 2 and 3 milliliters. The vials supplied as test tubes are made by Kimble Glass Company of Toledo, Ohio, and described as

No. 60910-1, 1½ dram, 15.75 mm. by 50 mm. good quality glass. They are provided with a plastic screw cap with a pulp and vinyl liner.

There is a stainless steel cylinder with a close fitting plunger which cannot be removed and permits only a measured amount of soil sample to be introduced. The cylinder has a chamferred edge that just fits into the mouth of the vials. The spatula is used to put soil in the cylinder and the measured amount is introduced into the vial without spillage. When damp samples are taken, they are pressed into the cylinder with the spatula, which is used to level to the edge, and pushed into vial with the plunger. In any case, the plunger clears the cylinder of all particles of the sample, but it is wise to run the lip of the cylinder through the sample next to be tested to clean it thoroughly. The vial containing the sample is placed in the slot (loading port).

In the kit are four small plastic squeeze bottles. These are fitted with caps having a siphon tube with squirt end. Squeezing the bottle ejects liquid through the tube. The fourth has a plain tight cap. One bottle contains the "High Purity Metal-free Buffer Solvent" which is coloured pink. This is no doubt an ammonium citrate solution buffered to the right pH with ammonia and probably coloured with an indicator. Another contains "Dimulsol" coloured blue. This is a settling or clarifying agent of some sort. The third is for the dilute working solution containing dithizone. This dithizone solution is prepared as follows.

A capsule containing 100 mg. of finely powdered dithizone is emptied into the fourth polyethylene (plastic) bottle. 100 ml. of solution called "Chlorolene" is measured in a pyrex glass graduated bottle and poured into the plastic bottle with the dithizone, the bottle capped and shaken until all the powder is dissolved. Of course, it is important that all be dissolved. This is the stock concentrate, which must be kept in a cool dark place. The plain cap is removed and the cap fitted with siphon tube taken from the working solution bottle and put in its place. Inside the graduated glass bottle a small flask is fused to the side. The siphon is inserted in this and it is filled to the mark with concentrate, this being poured off into the glass bottle by tipping. This is done three times, thus measuring off 3 ml. of the concentrate into the glass graduate, to which 100 ml. of DMH solution is then poured. The graduate glass is stoppered and shaken to mix thoroughly. This then is the dilute working solution which will be poured into its polyethylene bottle, to which the siphon fitted cap is returned. This is a rich green in colour.

The vial containing the fraction of soil to be tested being in the slot, the Buffer Solvent is added to the first mark (1 ml.), vial is capped and removed to be shaken vigorously for 30 seconds, then replaced in slot and working dithizone solution added to the second mark (1 ml.), again capped and shaken, then demulsol is added and it must not be shaken again. The smallest amount of demulsol is used. If the upper layer of solution in the vial is red, orange, or yellow brown, the test is repeated using 2 ml. of dithizone solution. If it is still red, orange, or yellow brown, the test is repeated again using 3 ml.

By trial and comparison, it was found that this method by repetition could be done away with and the dithizone added one milliliter at a time, shaking between additions, until colours as shown in table

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appeared in reverse, demulsol omitted until the end. See the table below which appears on the face plate of the kit box.

mls. Dithizone added	PARTS METAL PER MILLION IN ZINC EQUIVALENTS							
3	0	150	300	450	600	750	900	VERY HIGH
2	0	100	200	300	400	500	600	HIGHER
1	0	50	100	150	200	250	300	HIGH
COLOURS	Green	Blue Green	Blue	Purple	Red Purple	Purple Red	Red	Yellow Orange Bronze

Another innovation was to make two frames, each having five slots with marks at the sides, in which the vials might be placed, so that ten tests might be made simultaneously. As the vials fitted tightly in the slots, they could all be shaken at the same time. Frames were made of aluminum. The two innovations saved much in time and reagents.

Frequently tests changed from a low colour value to a higher one if left standing for a short time. This could be that the solvent had not completely dissolved the metal in the short shaking period or that light and warmth had affected the dithizone or that the lead in the glass of the vial was being dissolved. Shaking for a longer period could be done, vials could be kept in darkness and cooler. Plastic vials might be preferable to glass. Vials left standing overnight invariably changed to a higher colour value.

All the reagents are supplied in pyrex bottles, which the solvent does not affect.

The concentrated dithizone stock, in a cool dark place, kept in the polyethylene bottle, does not deteriorate rapidly, but it was found advisable to discard it after a few days and wash the container out with some of the chlorelene. The working dithizone solution deteriorates more rapidly and it was found better to keep it shielded from light and use it all up within a few hours. Any left at day's end was discarded and bottle washed with DMB solution. If the graduated glass bottle were marked to 33 1/3, 66 2/3 millilitres as well as 25, 50, or instead of 25, 50, smaller amounts of working solution could be made up and less would need to be destroyed. Deteriorated solution gives unreliable results.

This is not criticism of the field kit, which was assembled and designed for simplicity and ease of handling; it was meant to carry in the field and not intended as laboratory equipment. A proper laboratory for a survey of the magnitude carried on would have served much better.

19. RECORDING RESULTS

As samples were tested, the results were recorded in the office notebook and then later were transferred to a form printed for the purpose whereon each grid line is shown, with the sample stations and result of test at each station in a column below. These forms were then used by the head sampler to map the results, upon a white print of the grid. On this print, the location of the samples were shown by small circles within which the value, if any, was printed. Later a draughtsman laid the tracing of the grid over this working plan and entered the values only, without the circles, and "contoured" these to show anomalous areas. Prints made from this were coloured for use with this report. On this final tracing, from which the final prints are made, all the samples taken are not indicated, as they were in outlying areas and without value.

20. <u>CHECKING by PHYSICAL WORK</u>

In order to check the meaning of the geochemical work and its reliability, two areas were selected for special attention, where a certain amount of trenching, pit and shaft sinking had been done many years ago. As Mr. Jones has mentioned these areas in the geological report, the same reference number will be used here.

A. <u>Location 1,</u> is on the hillside north of Hughes Lake. A long narrow geochemical anomaly is shown crossing this location and electro-magnetic anomalies B-16 and C-17 likewise. As Mr. Jones points out, no continuous "vein" is found on the surface. A ring of short holes was drilled around the collar of the shaft and pop-shot. A grab sample of"vein" material was sent for analysis and returned 2.1% copper, 0.16 oz. gold, 1.2 silver and 23.9% iron. It would appear that soil sampling confirmed this zone.

B. <u>Location 2,</u> is an area about 1200 long (E-W) and 400 feet wide (N-S) within which a considerable amount of work had been done. Two plans of this area have been made, one showing rock exposures and samples taken with assay returns, and the other showing the soil sampling at 50 feet intervals. These are on thin paper and may be superimposed. On the general geochemical map, an anomalous area is shown, particularly high around 20 E to 24E on the North Baseline. As could be expected, very high soil samples were obtained from the old dumps and in proximity to them, yet the rock samples taken for analysis returned very low copper content. This leads to the reasoning that material near or at surface, exposed for a long period to weathering, may impregnate soil far beyond the usual expectancy. It may be inferred that a deep deposit over which high soil samples are obtained might be expected to carry a greater concentration of metal.

C. <u>Location 3,</u> is an area about a thousand feet long (E-W) and 700 feet wide (N-S) in which a shaft, a pit, and some trenches were found. More trenching was done. Again soil sampling was carried on at 50 feet intervals and rock samples were taken. A large number of holes were drilled to obtain dust and chip samples. In addition, a rough topographical map was made, using level and stadia. As in the case of Locality 2, results were similar and same reasoning might be applied. Topography did not seem to play much part in location of geochemical highs.

<u>General</u> conclusion reached is that where mineral exposures exist close to surface exposed to weathering for a long period, a pattern of high soil samples will be obtained even though the rock is not heavily mineralized.

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When large areas of high anomalous indications are obtained and the soil cover is exceptionally thick, there is the expectancy of higher concentration of metal in the underlying rock.

From the localities mentioned, 130 rock samples were taken for analysis.

21. <u>CONCLUSION</u>

From geochemical survey alone, a wide-spread area of unusually high soil samples has been indicated. However, anomalies plotted on the map that do not cross more than one grid line, or do not extend for more than 200 feet along a grid line, should be disregarded for the present. Anomalies due to surface exposures which have been worked upon with little success may also be postponed for consideration at the moment. Those having a large extent cannot be ignored. These latter lie in the east central part of the property. They aggregate over 5,000,000 square feet in extent. If they denoted mineralization directly below, this area could cover the preposterous figure of a half million tons per vertical foot. Allowing for lateral dispersion in all directions, this figure would drop to one quarter, or 125,000 tons per vertical foot. It would be worh consideration, if a concentration of no less than 0.75% copper could be shown.

22. <u>COMMENTS</u>

The report by Mr. Jones is quite complete and insofar as the mapping is concerned should be considered very accurate. There are a few points that the writer wishes to mention.

It would not seem that glaciation could be responsible for moving mineralised material from the area where the old mines and prospects are located onto the property investigated, as the movement was in the opposite direction.

Although the general gradient is from the east to the west, the aridity is such as to be an argument against transportation of material by gravity and water drainage.

Although so many of the old mines and prospects were found at the margin of the Iron Mask Batholith, there were some more or less centrally located, so that the contact area need hot necessarily be the favourable situation. The geochemical work on this property did not show the contact to be the location of high soil samples.

Considerable space has been given by previous writers to the description of the Iron Mask Batholith and its complex phases or components, but there is no settlement of the argument whether they are due to differential segregation or successive intrusions, any one of which might have been accompanied by or followed by mineralization. The places where copper minerals were observed in breccia were in rocks of the batholith. It would seem that such brecciation must have occurred after the rock cooled, hence mineralization must have occurred after the intrusion. There are a succession of intrusives later than the batholithic rocks, any one of which might be responsible for mineralization accompanying or

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following such intrusion.

Mr. Jones and Mr. Carr (of the B.C. Geological Staff) both lean to the idea that brecciation in a competent rock will occur adjacent to softer basic rocks that generally alter to chlorite and/or serpentine. Piorite, pyroxenite, dunite, hornblendite all belong to this category. Mr. Jones has mapped occurrences of such rocks. Where high soil samples were taken near the occurrence of these rocks, further investigation would be indicated.

Mr. Jones appears justified in condemning the localities where sampling of old workings failed to show any structures containing a good copper content, but "is hardly to be expected that outcrops and old working subject to weathering for a long period would still retain copper minerals. These outcrops in themselves were proven of little value by the prospectors who worked upon them. This writer would point out that the highly brecciated (and higher mineralised ore) which might exist would be planed down by erosion and glaciation. They would to-day be in the low spots, covered by soil and glacial debris.

Mr. Jones has mapped a zone of basic rock along the south margin of the batholith that is "composed almost entirely of chlorite or serpentine". The Pothook shaft and the diamond drilling formerly mentioned would lie considerably north of the contact. It is possible that such work would have met with greater success if it had been done further to the south.

The matter of surface impoverishment and secondary enrichment has not been discussed. The copper minerals recognised are chalcopyrite, bornite, malachite, azurite and native metal. The writer has always considered malachite and azurite as secondary minerals, but there is some argument that they are primary in the present case. Insufficient data was collected to draw any conclusion.

The thought which has bothered the writer, whether the evidence of copper minerals is the promise of greater mineralization at depth or the "roots" of deposition which has been removed by erosion, has not been settled, but the presence of the "secondary" minerals might be taken as a top rather than a bottom position.

23. ACKNOWLEDGMENT

In closing, the writer wishes to compliment Mr. Jones on his scholarly report and effective mapping, thanking him for much assistance given beyond the nature of his employment. He particularly wishes to mention the hours spent by Mr. Jones in identification of the various rock formations by examination of the many thin sections which he prepared.

Thanks are due all members of the party, who showed unusual interest in their work.

Respectfully submitted,

Harry W. Darling

Harry W. Darling, B. Sc.,
P. Eng. Ontario,
Registered in British Columbia,
Consulting Mining Engineer.

Beamsville, Ontario,
November 30th, 1957.

FORM NO. L42611 P REPORT PAPER - GRAND & TOY LIMITED

CERTIFICATE

I, HARRY W. DARLING, of the Township of Clinton, County of Lincoln, Province of Ontario, hereby certify:

1. That I am a Mining Engineer and Geologist and reside at Darfield Farm, R.R. No. 1, Beamsville, Ontario;

2. That I am a graduate of the College of Mining, University of California, and have been practising my profession as such for fifty years;

3. That I have no direct nor indirect interest whatsoever in the properties of the company referred to in the accompanying report, nor do I expect to receive any interest;

4. That, however, I have purchased on the market shares of Graham Bousquet Gold Mines Limited in limited amount (12,000) for which I paid cash;

5. That the accompanying report is based upon personal examination and the results obtained under my personal direction of the work performed;

6. That I am a member of the Association of Professional Engineers of the Province of Ontario and am also registered with a similar association in the Province of British Columbia, also that I have been a member of the Canadian Institute of Mining and Metallurgy for thirty years.

Signed Harry W. Darling

Dated Nov. 30, 1957
at Toronto, Ontario.

RECORD OF EXPERIENCE

Graduated from University with degree in 1907, after the usual summer vacation work in mines and mills of California and Nevada.

After graduation, I assisted in construction of two mills in Nevada, later acting as General Mill Foreman of the largest mill in that state, that of the Pittsburg-Silver Peak Company, at Blair. During same period, I designed the cyanide plant for the Empire Mine at Grass Valley, California. I left Blair to take part in the construction of the plant of Ray Consolidated Copper in Arizona.

Came to Canada in 1911 to install the Merrill Company equipment in the mill of Dome Mines Limited at South Porcupine, Ontario, later putting the plant into operation as General Mill Foreman. Left to take job as Shift Boss at McIntyre Porcupine Mines.

Was engaged as Mine Engineer by Porcupine Crown Mines at Timmins, became Assistant Manager, later leaving to manage Dome Lake Mines (later part of the Paymaster), but left Dome Lake to return to the Crown organization as Manager of Reward Mine in California, a mixed metal mine, during the first Great War.

Closed down the Reward at end of war, when metal prices deteriorated, and took on the post of Field Engineer for Crown Reserve Mining Company (the parent company), making examinations of various properties, but returned to the Porcupine Crown soon to re-open it. This work completed, went out again as Field Engineer.

Opened office in Timmins and carried on consulting practice for several years, abandoning this to act as Assistant Manager of the old Ankerite Mine, then owned and operated by Goldfields American Development Company, a subsidiary of New Consolidated Goldfields of South Africa.

Transferred to Field Engineer for Goldfields and later was sent to Venezuela to take part in extended examination of New Goldfields of Venezuela. When Goldfields took over financing and management here, remained as Mechanical Superintendent and then as Assistant Manager. During illness of General Manager, took over as Acting General Manager. During this period the working force was cut in half and production tripled.

Returned to Canada to open office again as a Consultant, directed opening of three small mines, built a hydro-electric plant and handled examinations and the funds of a group of French companies, having offices in Paris, wishing to secure Canadian mines or shares in Canadian mines.

With the outbreak of the last war, was invited to join the staff of the Department of Munitions and Supply (having become a naturalized Canadian) and served as Munitions Officer, involving manufacture of empty ammunition in sixty-three factories. Resigned on VE Day to return to mining.

Was engaged by companies sponsored by B. W. Newkirk, a Toronto financier, as a Consultant and Managing Director, serving until a few years ago, when I opened an office of my own.

H. W. D.

Closed this office shortly afterwards to retire to a farm which I had purchased, but this proved to be only semi-retirement, as I still accept and enjoy assignments from mining companies.

CERTIFICATE of EXPENDITURES

I, EARL SIDNEY CHARD, Accountant of GRAHAM BOUSQUET GOLD MINES LIMITED, have examined all statements of expenditures contained in this report and find them correct and in agreement with the books of the Company, subjected to audit, covering the period between May 1st and October 31st, 1957.

Signed ______________________
E. S. Chard

PERSONNEL EMPLOYED

CARL F. MARKERTH - Student with two years study in geology, experience of four summers with geological parties and geochemical investigation, good draughtsman and surveyor, has worked underground in mines as well.

RICHARD E. JONES - Professor of Geology at McMaster University, Hamilton, Ontario, holding degree of Master of Science and presently writing thesis for degree of Doctor. Has had considerable field experience of course.

ALLAN R. THOMPSON - Student with previous experience upon survey crew of road construction contractor, presently attending college in the State of Washington, but a native of British Columbia. School course in chemistry useful.

GEORGE A. BURDETT - Formerly Mine Superintendent for Skeena Silver Mines Limited. Capable miner, knowledge of diamond drilling, good sampling practise, good supervisor.

WILLIAM P. MURDOCH - Graduate with degree of Engineer of Mines from Michigan College of Mining & Technology, for many years Field Engineer for Hollinger Consolidated Gold Mines Limited, now Consultant for several companies.

HARRY W. DARLING - See Certificate with report.

H.W.D.

DISTRIBUTION OF TOTAL EXPENDITURES

ACCOUNT	PAID IN FIELD	HEAD OFFICE PAID	TOTAL AMOUNT
Travelling Expense	$ 130.75	$ 1,234.96	$ 1,365.71
Motor Transportation in Field	370.39		370.39
Food & Lodging	2,416.81	54.94	2,471.75
Telephone, Telegraph & Postage	74.46	2.81	77.27
Express, Freight & Trucking	195.32		195.32
Consumable Tools & Materials	88.27		88.27
Office Supplies	35.25		35.25
Assaying	495.09		495.09
Reagents for Geochemical Tests & Tools	1,251.09		1,251.09
Engineering	24.82	6,553.00	6,577.82
Draughting & Printing	172.77	5.25	178.02
Special Services	120.90		120.90
Salaries & Wages	182.40	6,429.25	6,611.65
Permits & Licenses	8.00	7.00	15.00
Mining Recorder Fees	37.50	39.00	76.50
Equipment Repairs	12.28		12.28
Storage of Equipment	60.00		60.00
Unclassified Sundries	17.68		17.68
Workmen's Compensation		451.97	451.97
Purchase Landrover plus B.C. Sales Tax		3,441.90	3,441.90
Insurance on Landrover		102.74	102.74
Total	$ 5,693.78	$ 18,322.82	$ 24,016.60

DIRECT COSTS OF GEOCHEMICAL SURVEY

Labor	$ 7,812.87
Chemical Reagents & Sampling Tools	1,251.09
Express on Chemicals and Tools	22.62
Sample Bags	11.54
Printed Forms for Recording Tests	9.50
Test Tubes	39.79
Draughting & Blueprinting	178.02
Total	$ 9,325.43

DIRECT COSTS OF GEOLOGICAL SURVEY

Labor	5,022.15
Assaying	495.09
Boxing Specimens	6.39
Manufacture Thin Sections	35.20
Draughting & Blueprinting	145.29
Total,	$ 5,703.82

H.W.T.

LABOR ACCOUNT - MAY 1st to OCTOBER 15th inc.

Gross Covered by Head Office before Deductions		Paid in the Field
May 1st to 31st	$ 562.00	$
June 1st to 15th	675.50	
June 16th to 30th	675.50	
July 1st to 15th	621.50	
July 16th to 31st	689.00	40.50
August 1st to 15th	837.50	
August 16th to 31st	851.00	27.00
September 1st to 15th	641.75	108.00
September 16th to 30th	675.50	6.90
October 1st to 15th	200.00	
	$ 6,429.25	$ 182.40
Engineers' Fees	6,553.00	
	$12,982.25	

Gross Total before deductions for income tax and unemployment insurance

$ 12,982.25
182.40
Total $ 13,164.65

Free board and lodging supplied cost $2,416.81 covering 646.5 man-days, which is $3.7383 per man-day, but only $1,973.01 is applicable to the 590 man-days performing work upon the DM Group of claims, which is $3.3441 per man-day. Striking out the cost of lodging, which was a variable, board actually cost $3.00 per man-day, while performing work upon the DM Group. Workmen's Compensation allows $2.50 per man-day, which figure will be used in following.

INDIVIDUAL EARNINGS FOR DISTRIBUTION

DARLING, Harry W. Engineer in Charge Geologist-Geochemist	168 days - Fees - $5,500.00 Board $420.00 - Total	$ 5,920.00	$35.238 per day
MARKERTH, Carl F. Assistant to Engineer & Geologist-Surveyor	Salary - 168 days $2,200.00 Board $420.00 - Total	2,620.00	$15.595 per day
JONES, Richard E. Chief Geologist Draughtsman	122 days - Fee - $2,400.00 Board $305.00 - Total	2,705.00	$22.172 per day
THOMPSON, Allan R. Sampler	96 days - Wages - $1,296.00 Board $240.00 - Total	1,536.00	$16.00 per day
BURDETT, George A. Sampler, Driller	52.5 days - Wages - 708.75 Board $131.25 - Total	840.00	$16.00 per day
MURDOCH, Wm. P. Consultant Engineer	40 days - Fee - Proportion 1,053.00 Board $100.00 - Total	1,153.00	$28.825 per day

Certified Correct Harry W. Darling
Harry W. Darling

LABOR DISTRIBUTION

EMPLOYEE Rate $	STAKING Days	STAKING $	GEOLOGICAL Days	GEOLOGICAL $	GEOCHEMICAL Days	GEOCHEMICAL $	SURVEYING Days	SURVEYING $	OTHER Days	OTHER $	TOTALS Days	TOTALS $
DARLING 35.238	1	35.238	16	563.808	130	4580.940	1	35.238	20	704.760	168	5919.984
MARKKETH 15.595	7	109.185	25	389.875	96	1497.120	20	311.900	20	311.900	168	2619.960
THOMPSON 16.000	2	32.000	8	128.000	67	1072.000	19	304.000			96	1536.000
JONES 22.172			112	2483.264			2	44.344	8	177.376	122	2704.984
BURDETT 16.000	7	112.000	13	208.000	21	336.000	11	176.000	½	8.000	52½	840.000
MURDOCH 28.825			32	922.400					8	230.600	40	1153.000
TOTALS	17	288.423	206	4695.347	314	7486.060	53	871.482	56½	1432.636	646½	14773.948
Allocation of SURVEYING	13	217.870	20	326.806	20	326.806						
REAL TOTALS DOLLARS	30	506.293	226	5022.153	334	7812.866			56½	1432.636	646½	14773.948

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GEOLOGICAL REPORT

on the

D. M. GROUP OF CLAIMS

TABLE OF CONTENTS

GEOLOGICAL REPORT

on the

D. M. GROUP OF CLAIMS

INTRODUCTION

This report consists of a brief description of the geology of the D. M. Group of claims which was mapped on a scale of one inch to 400 feet in the period between mid-June and early September 1957. The map may be found in the pocket at the back of the report.

LOCATION AND ACCESS

The D. M. Group of claims is made up of about 120 claims in a block of ground approximately three miles square lying about 9 to 12 miles west of Kamloops, British Columbia. Most of the claims lie in Tp. 19 R. 19, the intersection of the township and range lines, one separating Ranges 18 and 19, the other separating Townships 19 and 20 lies in the northeast quarter of the block of ground.

The claims are reached by the Trans-Canada Highway from either Kamloops or Savona, the highway crossing the property about 9 miles west of Kamloops. A suitable car or truck may be driven almost anywhere within the area, through the low sagebrush and sparse grass. A few thickly wooded areas, particularly in the southeast and southwest corners, are not so easy to travel in.

METHOD OF MAPPING

For the purpose of geological mapping, the whole of the block of ground covered by the claims was traversed as a map-area without regard to claim boundaries. A few previously staked claims lie in an irregularly shaped block at almost the centre of the D. M. Group, but all of this area was mapped.

Grid lines previously established for earlier geophysical and geochemical surveys were used to locate the position of outcrops and geological features. Traverses were made by one man travelling along the grid lines and locating points by pacing from marked pickets visible for 300 or 400 feet in the open country. The grid lines are 400 feet apart and trend about N. 30° E. They are picketed at intervals of 100 feet with wooden laths about 3 feet long, but many of the pickets had been dragged away by cattle, so that some parts of the grid were repaired by replacing pickets at points located by pacing. (Later checked by stadia survey H. W. D.)

The whole grid, together with the three base lines, is drawn on the accompanying geological map, although only the Centre Base Line is labelled with the co-ordinate system. Claim boundaries are not shown in the map, but the geology of any claim can be seen by superimposition of the claim map and geological map with a match between the co-ordinate systems.

TOPOGRAPHY

The area is characterized by rounded gravelly rocky knolls, many more than half a mile long, giving a local relief of a few hundred feet. Many of these knolls are either large drumlins or gravelly ridges forming a tail trending southeastward from the rock knolls. That the ridges indicate the direction of flow of glacial ice is confirmed by the observation of glacial stria in the same direction.

The drainage of the area appears related to a system of three lineaments trending in general N. 20° to 25° W., N. 60° W. and eastwest.

The largest depression in the area, however, bears no relationship to these lineaments. The large dry ravine in the northeast corner of the map area may be a glacial lake spillway, draining water northeastward to the trench occupied by Kamloops Lake.

Cherry Creek and a second stream about a mile to the north, tributary to Cherry Creek, occupy marked depressions which are not parallel. The course of Cherry Creek trends roughly N. 25° W., whereas the course of the tributary is more along N. 60° W. A lineament, marked by a series of depressions and dry stream courses, crosses the centre of the map area, trending about N. 20° W., and is roughly parallel to but about two miles east of the course of Cherry Creek. A less well-marked parallel lineament lies about a mile further east.

Many smaller dry water courses and depressions in the southeastern and eastern parts of the map area give several parallel lineaments with a trend of roughly N. 60° W., drainage being generally to the northwest. This trend is parallel to the direction of glacial flow, but both depend on structural control.

A well-marked irregular east-west lineament connects Pothook Lake to Hughes Lake, with drainage to the west. A less well-marked, but parallel lineament, lies half a mile to the north.

OUTCROPS

Most of the outcrops are on high ground, but some rock is exposed in gully bottoms. Outcrops generally are scattered small rocky knolls projecting from piles of glacial debris. Most of them are so deeply weathered and frost-shattered that it is difficult to expose a fresh surface with an ordinary hammer.

GENERAL GEOLOGY

The map area lies within the Nicola Map area described by Cockfield (1948), whose map shows that in the vicinity of the D. M. Group of claims volcanic rocks of Triassic age (Nicola volcanics) are intruded by the plutonic complex of the Iron Mask batholith of probably Jurassic age.

Unconformably overlying these older rocks is the Kamloops assemblage of volcanic and sedimentary rocks of Miocene age. The contact between the batholith and Nicola volcanic rocks trends northwestward across the property, the batholith lying to the northeast. The unconformity between these older rocks and the younger Kamloops rocks which bury them trends roughly east-west across the northern part of the property, Kamloops rocks lying to the north. The batholithic rocks are, therefore, confined in exposure to a triangular area in the eastern part of the property. Nevertheless, they very likely extend northwards and westwards beneath the cover of Kamloops rocks.

The more detailed mapping has added to this general picture of Cockfield's a group of rocks later in age then the batholith, but earlier than the overlying Kamloops rocks.

This additional sequence is made up of agglomerate and overlying brown-weathering basalt. The agglomerate contains fragments of syenite from the batholithic suite; and the brown basalt is cut by granite dykes which do not cut the Kamloops rocks. At one point, too, there is some evidence that the agglomerate unconformably overlies the Nicola rocks.

The agglomerate is cut by hornblende diorite or lamprophyre, some of which is found in association with batholithic rocks, but which seems to represent a later pulse of intrusive activity. Feldspar porphyry dykes and trachyte dykes cut the hornblende diorite and are, therefore, later still.

The geological relations are summarised in the following Table of Formations.

TABLE OF FORMATIONS

CENOZOIC (Miocene?)		
Kamloops Group	Kamloops volcanic rocks	Basalt and agglomerate
	Tranquille beds	Conglomerate sandstone and siltstone
	Unconformity	
LATE MESOZOIC or EARLY CENOZOIC		
Copper Creek intrusions?		Granite
	Intrusive contact	
Cretaceous or Tertiary volcanic rocks?		Brown weathering basalt
	Unconformity?	
Intrusive rocks later than Iron Mask batholith		Feldspar porphyry, quartz-feldspar, porphyry, trachyte, trachyte, felsite hornblende diorite pyroxenite and gabbro
	Intrusive rocks	
Cretaceous? volcanic rocks		Agglomerate
	Unconformity?	
MESOZOIC		
Iron Mask Batholith		Magnetite dykes syenite diorite gabbro
	Intrusive contact	
NICOLA GROUP (Triassic)	Volcanic rocks	Greenstone and red coloured fragmental rocks.
	Sedimentary rocks	Limestone and argillite.

MESOZOIC ROCKS

NICOLA GROUP

Rocks of the Nicola group are, according to Cockfield (1948), dominantly greenstones, which are easily recognized from little-altered later volcanic rocks. Agglomerate, breccia and tuff are also abundant in the Nicola group, according to Cockfield, but sedimentary rocks are not common, occurring only as thin lenses probably at several stratigraphic levels in the sequence. Limestone is the most abundant rock in the lenses, but is, in some cases, associated with argillite and tuff.

Sedimentary Rocks A few scattered outcrops of limestone and argillite occurring close to an imaginary line extended eastwards from Hughes Lake along S. 60° E. indicate that a narrow belt of sedimentary rocks extends through this part of the map area. Dips and way-up determinations show that the beds dip steeply to gently to the southwest with argillite overlying limestone, but exposures are so sparse that neither estimate of thickness nor ordering of the stratigraphic succession can be attempted.

Limestone is a dark grey to black rock, very fine grained, weathering brown to reddish brown.

Poorly preserved ammonite fragments were found in one outcrop near line 16 E. about 2100 feet south of Centre Base Line. A few carbonized fragments in the same rock might be fossils but could not be identified. The ammonites are identified by Dr. G. E. G. Westermann as Discotropites sp. (Tropitaceae) indicating an upper Triassic (Carnian) age for the Nicola group as suggested by McLearn (1953).

A finely banded greenish grey and brown siltstone or tuff overlies the limestone, but is interbedded with coarser gritty rocks that maybe tuffaceous.

Bedding in these rocks strikes 120° to 140° and dips are 60° to 70° southwest, but become much less steep rapidly to the southwest. Prominent jointing crosses the bedding, striking 025° with vertical dip.

Volcanic Rocks Volcanic rocks occur to the southwest of the belt of sedimentary rocks, which they apparently overlie if the dip continues to the southwest.

The volcanic rocks occupy about a third of the map area, mostly in the southwest corner. But, apart from the few good exposures in the cliffs southwest of Cherry Creek, the outcrops are few, small and sparsely scattered. A very small exposure of what may be Nicola greenstone occurs in the northeast corner of the map area, near an outcrop of diorite of the Iron Mask batholith.

Two distinct volcanic rocks are recognized, the one a red-stained agglomerate or tuff, and the other a moderately to well schisted greenstone. If the dip to the southwest continues to the southwest corner of the map area, the greenstone then overlies the red coloured rocks, which in turn overlie the sedimentary rocks.

Greenstone in the southwest corner of the map area is part of a larger area of Nicola greenstone exposed on Greenstone Mountain to the southwest as shown on Cockfield's (1948) map.

The red-stained rock is a very fine-grained greenish-grey to pink rock, much shattered and cut by carbonate stringers. The weathered surface is characteristically terra-cotta red. Apart from the cataclastic fragmentation, some enclosed fragments of slightly different colour or texture from the matrix suggest a pyroclastic origin for some of this rock.

Greenstone is a dull grey-green coloured rock of fine to medium grain size, in some places well schisted, in others moderately schisted. In some places the rock appears to be an altered volcanic rock, in others irregularly shaped inclusions suggest a pyroclastic origin.

Schistosity strikes, in general about N. 40° W. roughly parallel to the course of Cherry Creek, and suggests a possible major shear zone of this trend in the vicinity of Cherry Creek.

THE IRON MASK BATHOLITH

According to Cockfield (1948) the Iron Mask batholith is 12 miles long and roughly 2-1/2 miles wide, with the long axis trending northwest. Rocks similar to these found in the batholith occur further northwest, and it is possible that these areas of exposure show rocks of the same mass, which is continuous beneath the inconformable cover of later volcanic rocks.

Mathews (1947) recognized five types of rock in the Iron Mask batholith ranging in composition from ultrabasic to acidic. These five types are:

(i) the most abundant type, which is intermediate in composition, a gabbro or diorite.

(ii) a basic differentiate.

(iii) an alkaline differentiate.

(iv) hydrothermally altered rocks intermediate of alkaline in composition.

(v) red coloured rocks.

All of the rocks are deficient in quartz, potash feldspar is not abundant, but angite and magnetite are commonly found.

Rocks of the Iron Mask batholith occupy a roughly triangular area of slightly more than a quarter of the map area. The apex of the triangle lies slightly west of the centre of the map area, and the base of the triangle lies along the eastern boundary. The map area covers the northwestern tip of the area of exposure of the batholith described by Cockfield.

Three original rocks and two altered phases of the batholith are recognized. A narrow band of hornblende diorite occurring along the southwest side of the triangular area has been seperated from the batholithic rocks because it appears to be a later intrusion. The five types of rock recognised correspond only approximately to those recognized by Mathews. The unaltered or slightly altered rocks are gabbro, diorite and syenite, and are distributed in a rude layering from gabbro through diorite to syenite from southwest to northeast. Cockfield suggested that a basic differentiate occurs along the southwest margin of the batholith.

The two altered phases are an albitised phase, which is generally bleached, and a propylitised phase which is a dull grey-green colour and contains abundant chlorite and carbonate with sparse disseminated sulphides.

<u>Gabbro</u> A few small patches of darker rocks in the batholithic suite occur in the southeast corner of the map area. These rocks are medium grained and dark coloured, being composed largely of feldspar and pyroxene with accessory magnetite. They resemble the diorite closely, but contain more pyroxene and may represent a basic seggregation.

<u>Diorite</u> Diorite is best exposed on the north-facing slope of Sugarloaf Mountain, but good exposures also occur on the high ground in the northeast part of the map area. Scattered outcrops of diorite occur between these areas and further to the west.

Diorite is a fine grained to medium grained rock, grey to dark grey in colour, and composed of white fresh-looking plagioclase feldspar and pyroxene in subhedral crystals. Hornblende or biotite are locally abundant in place of pyroxene. Magnetite and apatite are commonly accessory and sulphides less commonly.

The rock is heterogeneous, varying in colour or grain size, or both, with in the space of a few feet. In some places large angular fragments of darker coarser grained diorite are separated by reticulated dyke-like bodies of lighter coloured diorite without clear contacts between the two.

Although diorite generally appears fresh, it shows alteration in many places. A slight alteration involving the mafic minerals is widespread, the pyroxene is dull green, and probably partly altered to chlorite. Two areas of more intense alteration are shown separately on the map. Near the old Pothook shaft the diorite is altered to a fine grained dull grey-green rock with abundant carbonate and sparse sulphides, the process possibly being that of propylitisation suggested by Cockfield. In an area southwest of Sugarloaf Mountain, the diorite is bleached and carbonate has been introduced, again with sparse sulphides. The process may have been that of albitisation.

<u>Syenite</u> Syenite occurs along the northern margin of the area of exposure of the batholithic rocks. It is a light pink to red weathering medium grained rock composed of feldspar and biotite or hornblende. Magnetite and sulphides may be accessory. The dark red variety is composed

of deep red feldspar laths 1 to 2 mm. long, which are commonly aligned in a sub-trachytic texture. Mafic minerals occur in dark green, dull, irregularly shaped masses which are probably largely chlorite. The light pink variety is composed of a mixture of white and pink feldspar with biotite and hornblende. The rock is medium grained, even grained and granitic in appearanse, but lacks quartz. There is continuous gradation by increase of mafic minerals of this rock into diorite.

Locally, however, the syenite can be seen to be intrusive into the diorite. Dykes of syenite cut the diorite in outcrops exposed along the gully bottom near line 4 E. at 2600 feet north of Centre Base Line. Contacts are sharp, but there is no chilling at the margin. Vague remenates of diorite in the syenite suggest some assimilation of the diorite by the syenite. Aplite and pegmatite stringers of pink feldspar also cut the diorite, and a segregation of pink pegmatite occurs near line 4 E. at 1400 feet north.

Along the north margin of the batholith, syenite is overlain unconformably by agglomerate which contains angular fragments of the syenite in a fine grained dark greenish brown matrix.

<u>Magnetite Dykes</u> Large dykes of magnetite, as much as 10 feet wide, occur in diorite at two places in the map area. The first of these is in the vicinity of line 16 E. at about 1800 feet north of Centre Base Line, the second near the east end of the North Base Line at line 52 E. about 400 feet north of the North Base Line. Smaller injections of magnetite occur in other places in both diorite and syenite.

The magnetite is massive and medium grained, containing minor amounts of pyroxene, calcite and apatite. In both localities several parallel veins lie within a few feet of each other, in the first locality veins being found over a length of 1700 feet.

The veins are probably injections of residual solutions left by the crystallising diorite.

LATE MESOZOIC OR EARLY CENOZOIC ROCKS

Cretaceous? Volcanic Rocks

Cockfield (1948) recognized, in the vicinity of Copper Creek, a series of volcanic and pyroclastic rocks younger than the batholithic rocks, yet older than the Kamloops group. These rocks are cut by the Copper Creek granite intrusions. Cockfield (1948) assigned a late Cretaceous or early Tertiary age to these rocks. Mathews (1947) found that a similar group of rocks were in contact with the Iron Mask batholith at its northeast end, and suggested the name Frederick formation for these rocks.

<u>Agglomerate</u> Agglomerate containing angular fragments of syenite occurs along the north margin of the Iron Mask batholith, and this agglomerate appears to underlie brown basalt to the north. Agglomerate is

exposed in a window extending northward to the ravine in the northeast corner of the map area. Agglomerate and tuff also occurs on high ground west and south of the area of batholithic rocks. This agglomerate may be contemporary with that north of the batholith. The best exposures are on the hill north of Hughes Lake.

Agglomerate consists of volcanic rock fragments, ranging in size from a fraction of an inch to on e or two feet across, set in a matrix of much finer fragments. Bedding is not recognizable at most places, possibly because the dip is not steep, the beds are thick, and bedding planes rarely exposed.

A trachytic andesite, dull grey-green or puple in colour, is the commonest fragment found north of Hughes Lake, but the parent rock was nowhere seen in place.

The stratigraphic position of the agglomerate suggests that it is earlier than the brown basalt. The agglomerate is also older than the hornblende diorite, for, on the hill north of Hughes Lake, agglomerate is cut by hornblende diorite, probably in the form of a sill dipping gently eastward. Veins carrying chalcopyrite, bornite, specular hematite and calcite cut both agglomerate and hornblende diorite.

<u>Intrusive rocks later than the Iron Mask Batholith</u>

<u>Pyroxenite and Gabbro</u> A narrow band of pyroxenite and gabbro, now altered to chlorite and serpentine, lies along the southwest margin of the Iron Mask Batholith. The band is about 300 feet wide, as nearly as can be judged from sparse exposures, and is perhaps continuous from the westward limit of the batholith to Pothook Lake. Farther east, however, the band becomes discontinuous. The westward portion of this band separates hornblende diorite from the batholithic rocks.

The pyroxenite or gabbro is a dark greenish-grey to greenish-black rock, composed almost entirely of chlorite or serpentine. In some places, however, pseudomorphs of the alteration products after pyroxene can be recognized.

The age and origin of this rock is uncertain. It may be a basic differentiate of the batholithic rocks, or a later injection.

Certainly this rock has been important in influencing the movement of the rocks under stress, for it has flowed readily and promoted brecciation of the neighbouring more competent rocks. In at least three places, angular fragments of diorite are found enclosed in a chlorite schist presumed to have been derived from the pyroxenite.

<u>Hornblende Diorite</u> Hornblende diorite occurs along a belt about 1000 feet wide at the southwest margin of the batholithic rocks. A narrow tongue of similar rock intrudes agglomerate near line 36 E. at 3100 feet south of Centre Base Line. Agglomerate on the hill north of Hughes Lake is intruded by sills of a finer grained rock containing similar hornblende phenocrysts, which is correlated with the hornblende diorite.

Hornblende diorite is a medium grained grey rock composed of bluish feldspar laths about 2 mm. long, and hornblende needles which are somewhat longer. The hornblende needles are commonly aligned in a fluidal structure. The rock weathers readily to give a limonitic stain, and the hornblende needles weather out to leave holes resembling pipes.

A dyke of trachytic feldspar porphyry cuts hornblende diorite on the hill north of Hughes Lake.

Veins and breccia zones carrying some chalcopyrite and bornite transect the hornblende diorite both in the area north of Hughes Lake and in the area south of the Pothook shaft, showing that the period of copper metallization is later than the intrusion of hornblende diorite.

Felsite Two small areas of fine-grained, rather waxy-looking, light coloured rocks occurring within the diorite of the Iron Mask batholith were mapped as felsite. These rocks are composed of fine-grained feldspar in a finer grained matrix and locally are epidotised. They are probably intrusive into the diorite.

Feldspar porphyry, quartz feldspar porphyry and trachyte.

Small bodies of intrusive feldspathic rocks occur at several points within the map area. Hornblende diorite north of Hughes Lake is cut by a trachytic feldspar porphyry. Both areas of felsite are cut by a quartz feldspar porphyry. This porphyry consists of euhedral quartz and feldspar crystals, about 2 mm. across in a fine-grained dark green matrix.

Cretaceous or Tertiary volcanic rocks

Brown weathering basalt A very fine grained, characteristically red-brown-weathering, grey basalt occurs in the northern part of the map area, along and to the north of the Trans-Canada Highway. Locally, this rock contains amygdules of chalcedony and calcite, suggesting a volcanic origin. The rock is probably a nearly horizontal flow, overlying the agglomerate. It is cut by granite dykes, which suggest that it is earlier than Kamloops.

Locally the rock is sheared, with a well developed vertical schistosity. At other places, slickensided surfaces with diverse attitudes are found, and, at still other places, carbonate breccia zones transect the rock. All this indicates involvement in earth movement, and strengthens the case for considering the brown weathering basalt to be earlier than Kamloops.

Small dykes of rather similar rock cut syenite along the northern margin of the batholithic rocks.

Copper Creek intrusions

Granite Two small dykes of granite about 20 feet wide occur in the northwest corner of the map area, where they cut brown basalt.

The granite is a medium grained pink rock composed of pink feldspar and glassy quartz. In thin section, it is seen to be composed of large grains of microcline, plagioclase and quartz in a fine grained groundmass of the same material.

This granite is considered to be correlatable with the Copper Creek intrusions described by Cockfield (1948).

CENOZOIC

Kamloops Group

Tranquille Beds. Thin beds of light brown siltstone and tuff overlying sandstone and conglomerate occur along the northwestern slope of the ravine in the northeast corner of the map area, where Cockfield (1948) shows outcrops of Tranquille rocks. The rocks are light in colour, and poorly cemented, the thin bedded members showing good bedding dipping 30° to the northeast.

Kamloops Volcanic Rocks Brown weathering rubbly basalts overlying the Tranquille beds in the northeast corner of the map area are considered to be Kamloops in age.

STRUCTURAL GEOLOGY

Folds

Steep dips of some of the Nicola rocks indicate that these rocks have been folded, but outcrops are so sparse that the structures cannot be worked out. Decrease of dip towards the southwest in the southwest part of the map area may indicate that a synclinal axis trending about N 60° W lies to the southwest and that the batholithic rocks may occupy the core of an anticline. Some exposures show that crumpling and small scale folding is to be expected locally. Plunge of axes on drag folds exposed in Nicola greenstone, just north of Cherry Creek, is 30° northwest. If this plunge is regional, and the batholith also plunges with the supposed anticline that it occupies, then the batholith may plunge beneath Nicola rocks to the northwest. Some rocks, considered to be of Nicola age, distributed about the apex of the triangular area of batholithic rocks also suggest this possibility. It is possible, then, that the batholithic rocks plunge at 30° northwestward beneath Nicola rocks and become rapidly deeply buried northwest of the present exposures, before they rise again to be exposed on the shores of Kamloops Lake further to the northwest.

Faults

A complicated system of faulting is indicated by a large number of shatter zones of diverse orientation in all rocks older than the Kamloops. Blocks, with slickensides of different orientations on many of the bounding surfaces, indicate either a widespread area of crushing, or an involved history of faulting of various ages.

Shatter zones and joints plotted on an equal area stereonet give a girdle about the periphery, which probably indicates a preference in recording near-vertical structures over structures with less dip. However, some highs are recognized within the girdle, and these correlate with the three chief directions of lineaments as follows:

Table 1

Attitude of joints and shatter zones compared with lineaments

Lineaments	Average of Joints and Shatter Zones	
	Strike	Dip
120°	130°	80° NE
155°	144°	80° SW
090°	100°	vertical
	060°	vertical

Of these, the roughly east-west set of joints and shatter zones is, within the batholithic rocks, most consistently associated with chalcopyrite mineralization, with the northeast trending set also, in some places, being so associated.

The relative ages of the faulting are almost impossible to work out. The lineaments trending N 25° W can be traced onto the Kamloops rocks and are possibly the result of post-Miocene faulting. Of the other two sets of lineaments, the east-west set can be traced onto the agglomerates north of Hughes Lake, but not onto the brown basalt.

The lineaments trending N 60° W are limited to the batholithic and pre-batholithic rocks. Part of them no doubt represent the "grain" of the country developed by the folding of the Nicola rocks.

Carbonate breccia zones

Carbonate breccia zones occur in the brown weathering basalt and all older rocks. The zones are dyke-like bodies, usually with sharp walls and steep dips, most of them being only a few feet wide. Many of the zones trend north to N 30° W although a few trend northeast. The zones are made up of angular altered fragments of wall rock, a fraction of an inch across, enclosed in brownish to reddish weathering fine grained carbonate which is ankeritic. Several outcrops in the western part of the map area indicate a possible large area of this brecciation.

Some of the zones, particularly northeast striking zones, carry some coarse grained disseminated chalcopyrite and bornite.

ECONOMIC GEOLOGY

Mineral Deposits

Concentration of both iron and copper minerals occurs at many places in the map area, but in most of these places the concentration is too sparse to give much promise of economic mining.

The iron minerals are both magnetite and hematite, with iron carbonates probably occurring in the carbonate breccia zones. Of these, magnetite, in the magnetic dykes, has attracted some interest, and a good deal of work has been done on the dykes. However, as the main showings do not occur in the D. M. Group, no more space will be given to discussing them.

Copper metallization is evidenced by sparsely disseminated chalcopyrite and its alteration product, malachite. These occur at many places in the map area, particularly in the rocks of the Iron Mask batholith.

Four different types of occurrence of chalcopyrite and bornite were noticed and are listed:

1. Fine-grained disseminations in igneous rocks, usually with some pyrite.
2. Deposits of fine-grained minerals along tiny fractures in closely jointed or "crackled" rock, particularly associated with brecciated and shattered zones.
3. As a replacement of the matrix in carbonate breccia zones.
4. In veins with calcite and, in some cases, specular hematite.

In many cases, alteration of primary minerals to malachite, extending to depths beyond the reach of the hammer, obscures the texture of primary deposition.

Exploration for copper and iron has continued intermittently in the area since the end of the nineteenth century. Many small showings have been opened by pits and trenches in many parts of the map area, but the amount of copper metallization exposed in many of these is economically insignificant. Most of the workings are so old that caving and weathering have obscured all signs of a mineral showing.

There is no report of any production from the area.

A brief description of workings from which information could be obtained follows. Description of the old Pothook workings is not included because these do not lie on the D.M. Group.

Description of Workings.

The workings are located with reference to the grid system, and the wall rock and mineralization briefly described.

<u>Location 1.</u>

L52W at 180 feet east of a point 2900 feet south of Centre Base Line.

A short trench 6 feet deep, driven in rock for 10 feet or so into the hillside, exposes a light green to dark green, brown weathering agglomerate containing rounded to sub-rounded fragments of porphyry and other rocks. A few shear fractures show brecciation and slickensides, and, at one point, a vein follows a zone of intense shearing.

The vein is made up of a number of calcite stringers up to 5 inches wide, but pinching and swelling, branching and rejoining over a maximum width of 17 inches. The general trend of the vein is along 105° with dip 70° N.

Coarse grained calcite is the chief vein mineral, but a little specular hematite and chalcopyrite occur in irregular patches two or three inches across. Chalcopyrite is sparsely scattered in altered wall rock for a foot on either side of the vein. Malachite is evident as a surface stain in many places.

Parts of the vein might, by visual estimation, give an assay 2 to 3% copper over a width of less than 2 feet. But this would be by no means an average grade for the whole vein.

A similar vein is exposed in a shaft, at least 30 feet deep to water, sunk vertically about 200 feet south of the trench. The wall rock is hornblende diorite, which is sheared and altered over a width of 1 foot, the shear zone striking about 110° and dipping 70° N. A few calcite stringers with patches of chalcopyrite, bornite and specular hematite occur on the shear zone.

From neither the shaft, nor the trench, can the veins be traced continuously over the outcrops on the hillside. A few small lenses of similar material are all that is found. So that the chances of finding a mineable vein in the immediate vicinity of these workings do not look good.

<u>Location 2.</u>

Between lines 16E and 28E and between the North Base Line and about 400 feet south of the North Base Line.

A reddish-brown, medium grained syenite with trachytic white feldspar laths is exposed in each of several pits and trenches, a shaft down at least 30 feet, and an adit driven towards the shaft.

Very fine grained pyrite and chalcopyrite are finely disseminated in the syenite, and also are deposited as thin films on tiny joint planes, most commonly on those striking N80°E dipping 80° southeast.

The syenite is closely jointed, with joints of diverse orientations, and weathers to a rubble of angular fragments less than 1 inch across. Many of these joints planes show malachite staining.

The shaft is sunk on a shatter zone 2 or 3 feet wide striking N60°W with near vertical dip. Much malachite and limonite stains the shatter zone, but no primary mineralization could be seen.

Widespread disseminated malachite throughout this small area indicates that most of the rock probably contains some copper, perhaps less than 0.5% in most parts of the area. But there is little evidence to suggest that richer portions would be found, except for a few places which might possibly give a little more than 1% over widths of 1 or 2 feet.

Location 3.

Line 56E at 400 feet north of Centre Base Line.

A shaft at least 20 feet deep to water is sunk vertically in fine grained rusty-weathered diorite which contains much disseminated fine grained and coarse grained pyrite. Two shatter zones cross at the trench, one striking 060°, the other 140° and both vertical. The shatter zones are made up of very closely spaced jointing over a width of 9 inches to 2 feet. Some malachite staining occurs on the walls of the shaft, but limonite staining is more abundant. Malachite occurs in thin seams and fractures in rocks on the dump, and a little coarse chalcopyrite and bornite was found in a calcite vein. From the appearance of the rocks at the shaft, this vein cannot be more than a few inches wide.

A small pit 400 feet northeast of the shaft shows local small masses of chalcopyrite a few inches across contained in fragments of bleached diorite enclosed in a chlorite matrix. Carbonate veins up to 4 inches wide occur in a shatter zone striking 100° and dipping vertically.

The breccia of diorite fragments in chlorite matrix no doubt results from fracturing of the brittle diorite as a result of flow of neighboring peridotite now replaced by the chlorite matrix.

The possibility of finding areas more richly impregnated with copper minerals in the area about the ultrabasic mass cannot be assessed on the geological evidence available.

CONCLUSIONS

Most of the ground favourable for prospecting for copper seems to lie in, or near, the triangular area of exposure of the Iron Mask batholith. Only a few small showings of copper metallization occur outside this area, and these do not give indication of becoming stronger in length or depth.

Within the batholith, the areas near the contacts seem to give the most promise, scattered and dispersed copper metallization being associated with fracturing and brecciation along both the north and south margins. The zone along the south margin is about 2000 feet wide and includes the old Pothook workings. Within this zone, diorite is much altered and locally fractured. The zone along the north margin is, perhaps, less than 1000 feet wide, and is occupied mainly by much-shattered but little-altered syenite.

Copper metallization appears to be associated mainly with east-west or northeast striking fractures. East-west lineaments pass to the north and south of the Pothook shaft, and a weak east-west lineament passes close to the workings on the North Base Line.

Fracturing of the diorite near readily flowing incompetent rocks has influenced deposition of copper minerals. The importance of this factor at the contact of the batholith with enclosing rocks cannot be assessed, for, within the map area, such contacts are covered by glacial debris which in many places must be over 100feet thick.

The age of the copper metallization seems to be at least later than the agglomerate, and may, therefore, be late Cretaceous or early Tertiary. The margins of the batholith are favourable, then, not because the batholith is the source rock, but because fracturing and brecciation of the batholithic rocks have provided loci of deposition.

If the batholith were the source rock, it might be possible that contact with limestone along the southeastern part of the southwest margin of the batholith might have resulted in contact pyrometosomatic deposits of magnetite and possibly copper. Faulting has, very likely, confused the relationships along this contact.

No assays are available for most of the showings, but, from visual estimation, it is doubtful that more than a fraction of 1% copper would be found over widths greater than a foot or so in the exposed areas.

About many of the showings, much little-fractured almost barren rock is exposed, to make it very doubtful that wide and well mineralized fracture or breccia zones might be found beneath overburden between outcrops.

R. E. J[signature]

Under direction of Harry V. Warren Nov. 30, 1957

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Cockfield, W. E. (1948) Geology and Mineral Deposits of Nicola Map-Area, British Columbia Geol. Surv. Canada, Mem. 249.

Mathews, W. H. (1947) Geology of the Iron Mask Batholith. Unpublished Thesis for the Degree of Master of Science, University of British Columbia.

McLearn, F. H. (1953) Correlation of the Triassic Formations of Canada. Bull. G.S.A. V. 64, pp. 1205-1228.

FORM NO. L42-811-P REPORT PAPER - GRAND & TOY LIMITED

<u>**CERTIFICATE**</u>

I, RICHARD E. JONES, of the City of Hamilton, County of Wellington, Province of Ontario, hereby certify

(1) That I am a practising geologist and reside at 19 Hyde Park Avenue, Hamilton, Ontario.

(2) That I am a graduate of Queen's University, Kingston, Ontario, with B.C. (Hons.) (1949) and M.A. (1953) degrees in geology and have been practising as a geologist for eight years as listed in the "Record of Experience" overleaf.

(3) That I have no direct or indirect interest whatsoever in the properties of the Company referred to in the Accompanying Report; nor do I expect to receive any interest.

(4) That the accompanying Report is based on personal examination and detailed mapping.

(5) That I have been a Sessional Lecturer in Geology on the Faculty at McMaster University in Hamilton for three years.

R. E. JONES

RECORD OF EXPERIENCE

1947	Summer Student Assistant Geological Survey of Nfld.
1948	" " " " " " "
1949	Summer Assistant Geologist - Preston East Dome Gold Mines Ltd.
1949-50	Winter Graduate Student Assistant - Queen's University
1950	Summer Assistant Geologist - Preston East Dome Gold Mines Ltd.
1950-51	Winter Instructor - Queen's University, Kingston, Ont.
1951	Summer Geologist (Party Chief) - Kennco Exploration Canada Ltd.
1951-52	Winter Graduate Student Assistant - University of Toronto
1952	Summer Senior Assistant - Ontario Department of Mines
1952-53	Winter Graduate Student Assistant - University of Toronto
1953	Summer Senior Assistant - Dr. F. G. Smith, Consultant Geologist
1953-54	Winter Instructor - Queen's University, Kingston.
1954	Summer Geologist (Party Chief) - Quebec Bureau of Mines
1954-55	Winter Sessional Lecturer - McMaster University, Hamilton
1955	Summer Geologist (Party Chief) - Quebec Bureau of Mines
1955-56	Winter Sessional Lecturer - McMaster University, Hamilton
1956	Summer Research grant - McMaster University, Hamilton
1956-57	Winter Sessional Lecturer - McMaster University, Hamilton


Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 192 MAP #1
D. M. GROUP
GRAHAM-BOUSQUET GOLD MINES LIMITED
KAMLOOPS, BRITISH COLUMBIA
COMPASS-TRANSIT AND STADIA SURVEY
OCTOBER - 1957
Report 192
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FEET
LEGEND AND NOTES
INDICATES PROBABLE LOCATION OF THE OUTLINE OF BATHOLITHIC INTRUSIVE.
ELECTRO-MAGNETIC CONDUCTOR FROM 1956 SURVEY.
NORTH ASTRONOMIC
DM 125
DM 126
DM 76
DM 74
DM 72
DM 78
DM 80
DM 92
DM 90
DM 88
DM 86
DM FR 7
DM 84
DM 82
DM 77
DM 75
DM 73
DM 71
DM 91
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DM 85
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DM 55
DM 56
DM 94
DM 122
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DM 44
DM 1
DM 17
DM 18
DM 33
AFTON FR
DM FR 1
DM 57
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DM FR 5
I.R. 1
I.R. 2
DM 2
DM 19
DM 20
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CG L 899
CLIFF MC
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GIFT MC
DM 59
DM FR 4
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DM 96
DM 3
DM 4
DM 93
POTHOOK
AFTON 1
LUCKY 2
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DM 22
DM 110
AFTON 5
AFTON 3
DM 120
DM 121
DM 5
DM 6
LUCKY 3
DM 46
DM 61
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DM FR 3
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DM 26
DM 113
DM 114
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DM 123
CONTACT?
DDH #2ca (1958)
Old Stone Mound


192
MAP 1
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DM 75
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SIFT MC
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LUCKY 2
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AFTON 5
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LUCKY 3
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AFTON 4
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DM 114
DM 35
DM 36
DM 45
DM 50
DM 65
DM 64
DM 124
DM 27
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DM 116
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DM 38
DM 47
DM 52
DM 67
DM 66
DM 99
DM 100
DM 39
DM 40
DM 70
CONTACT ?
CONTACT
Old Stone Mound

D. M. GROUP

GRAHAM-BOUSQUET GOLD MINES LIMITED

KAMLOOPS, BRITISH COLUMBIA

GEOCHEMICAL SURVEY

OCTOBER — 1957

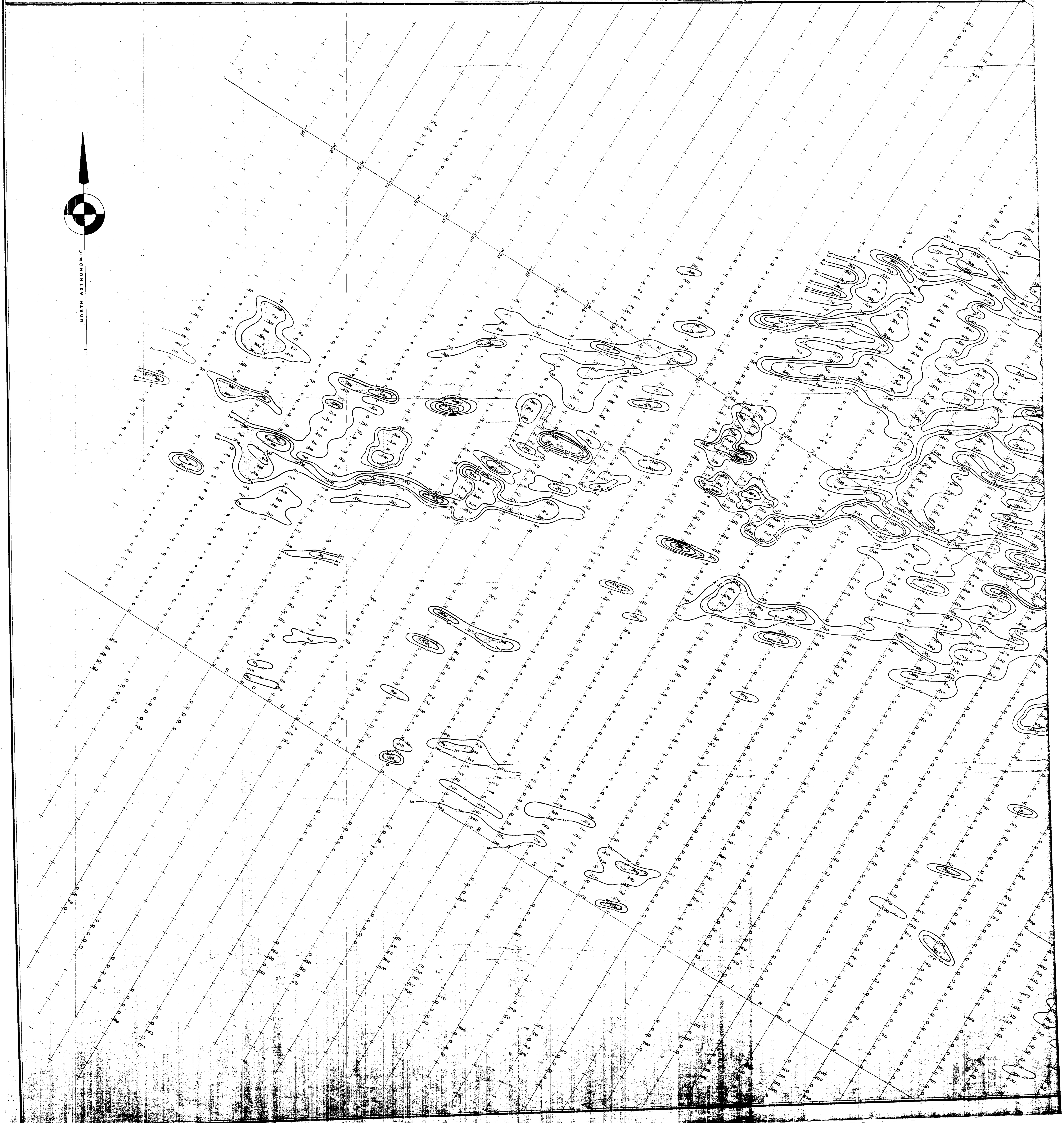
Report 192

0 1000 2000 FEET

LEGEND AND NOTES

METALLIC VALUES SHOWN IN PARTS PER MILLION
BACKGROUND VALUE — 150 PARTS PER MILLION
THRESHOLD VALUE — 300 PARTS PER MILLION

0 — 200 PARTS PER MILLION
200 — 300
300 — 500
500 — 800
800 — UP

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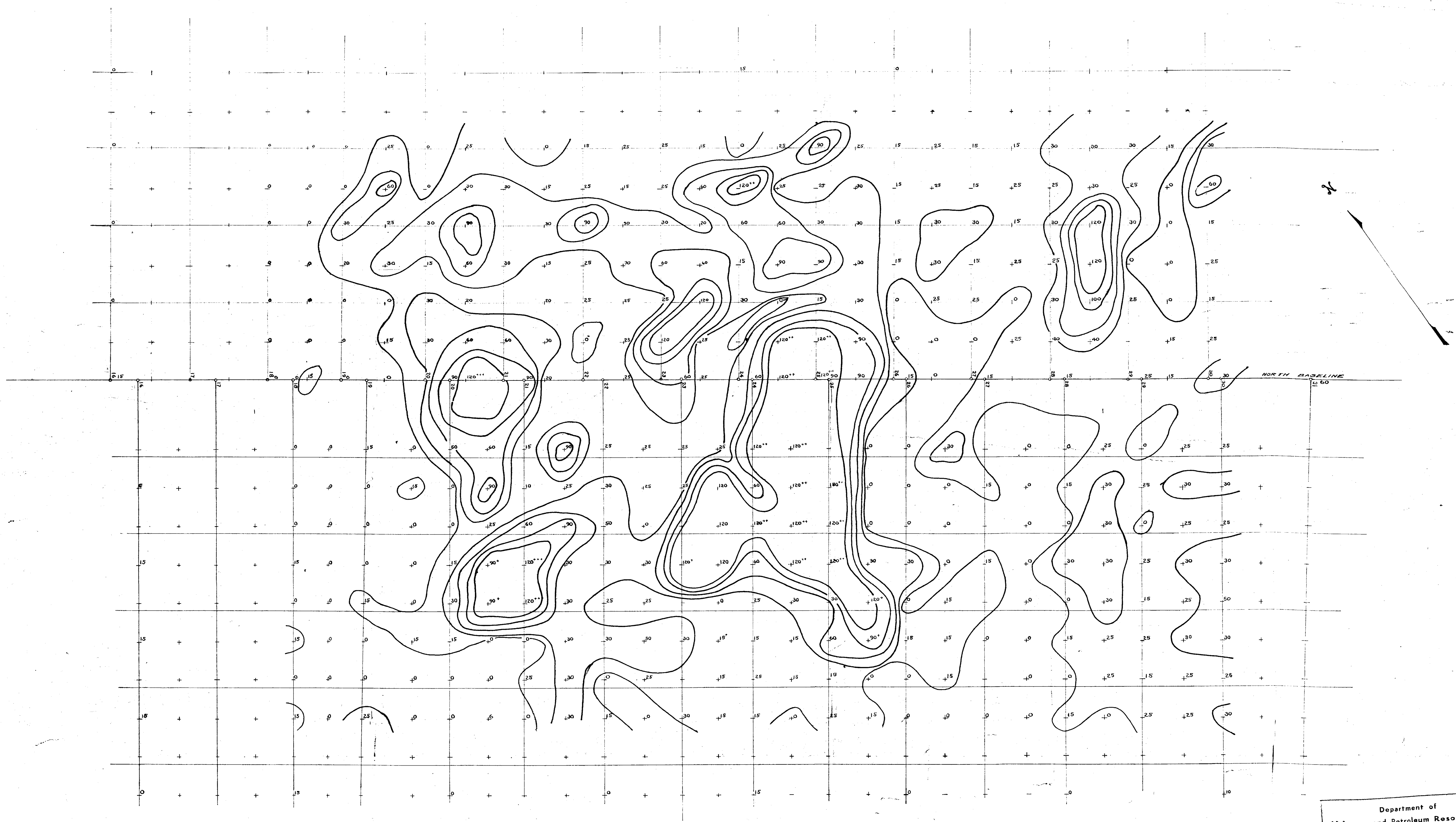
LEGEND AND NOTES
METALLIC VALUES SHOWN IN PARTS PER MILLION
BACKGROUND VALUE — 150 PARTS PER MILLION
THRESHOLD VALUE — 300 PARTS PER MILLION
0 — 200 PARTS PER MILLION
200 — 300
300 — 500
500 — 800
800 — UP
192
MAP 2


Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 192 MAP #3
Report 192
D. M. GROUP
GRAHAM-BOUSQUET GOLD MINES LIMITED
KAMLOOPS, BRITISH COLUMBIA
Geological Map
FEET
LEGEND
Geological
Sedimentary & volcanic rocks
Tertiary? Kamloops group
14 Kamloops volcanics
13 Tranquille beds
Pre Tertiary Cretaceous ?
11 Brown weathering basalt
6 Agglomerate
Triassic Nicola group
2 Sedimentary rocks
1 Volcanic rocks
Other rocks
16 Magnetite dykes
15 Carbonate breccia
Symbols
Strike & dip
Contact, seen, inferred
Plunge of lineation
Fault, seen, inferred
Intrusive rocks
Tertiary ?
12 Granite
Post Jurassic ?
10 a. quartz feldspar porphyry
b. feldspar porphyry
c. trachyte
9 Felsite
8 Hornblende diorite
7 Pyroxenite & gabbro
Jurassic Iron Mask batholith
5 Syenite
4 Diorite. a. propylitized
b. albitized
3 Gabbro
Mineral occurrence
Cp Chalcopyrite
M Malachite
P Pyrite
H Specular hematite
Topographical
Paved highway
Unpaved road
Power line
Pipe line
Building
Lake or pond
Swamp or dry lake bed
Flowing stream
Intermittent stream
Ravine
Cliff
Outcrop
Pit, trench
Shaft or deep pit
Adit
Dump
Cut or quarry
Trans-Canada Highway
NORTH ASTRONOMIC
Hughes Lake
Pothook shaft
fields
field
192


1000 2000 FEET
Symbols
Strike & dip
Contact, seen, inferred
Plunge of lineation
Fault, seen, inferred
Cp Chalcopyrite
M Malachite
P Pyrite
H Specular hematite
Adit
Dump
Cut or quarry
NORTH ASTRONOMIC
Trans-Canada Highway
Trans-Canada Highway
Hughes Lake
Pothook shaft
Pothook Lake
fields
field
fields
fields
Sugarloaf Mountain
192
MAP3
Geology by R.E. Jones 1957


E.M. ANOMALY
E.M. ANOMALY
NORTH BASELINE
adit
shaft
dump
GRAHAM-BOUSQUET GOLD MINES LIMITED
D-M CLAIM GROUP
KAMLOOPS, B.C.
PLAN OF SAMPLING OF OUTCROPS AND WORKINGS
OF
AREA - 24E - 60N
SCALE - 1 IN. = 50 FT.
NOTE - 0.35 DENOTES PERCENTAGE OF COPPER IN SAMPLE
Report 192
Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 192 MAP #4
October 30/57.
W.P. Murdoch P.Eng.
192
MAP 4



Report 192

GRAHAM-BOUSQUET GOLD MINES LIMITED

D-M CLAIM GROUP

KAMLOOPS, B.C.

PLAN OF SOIL SURVEY

OF

AREA-24 E-60 N.

SCALE-1 IN.=50 FT.

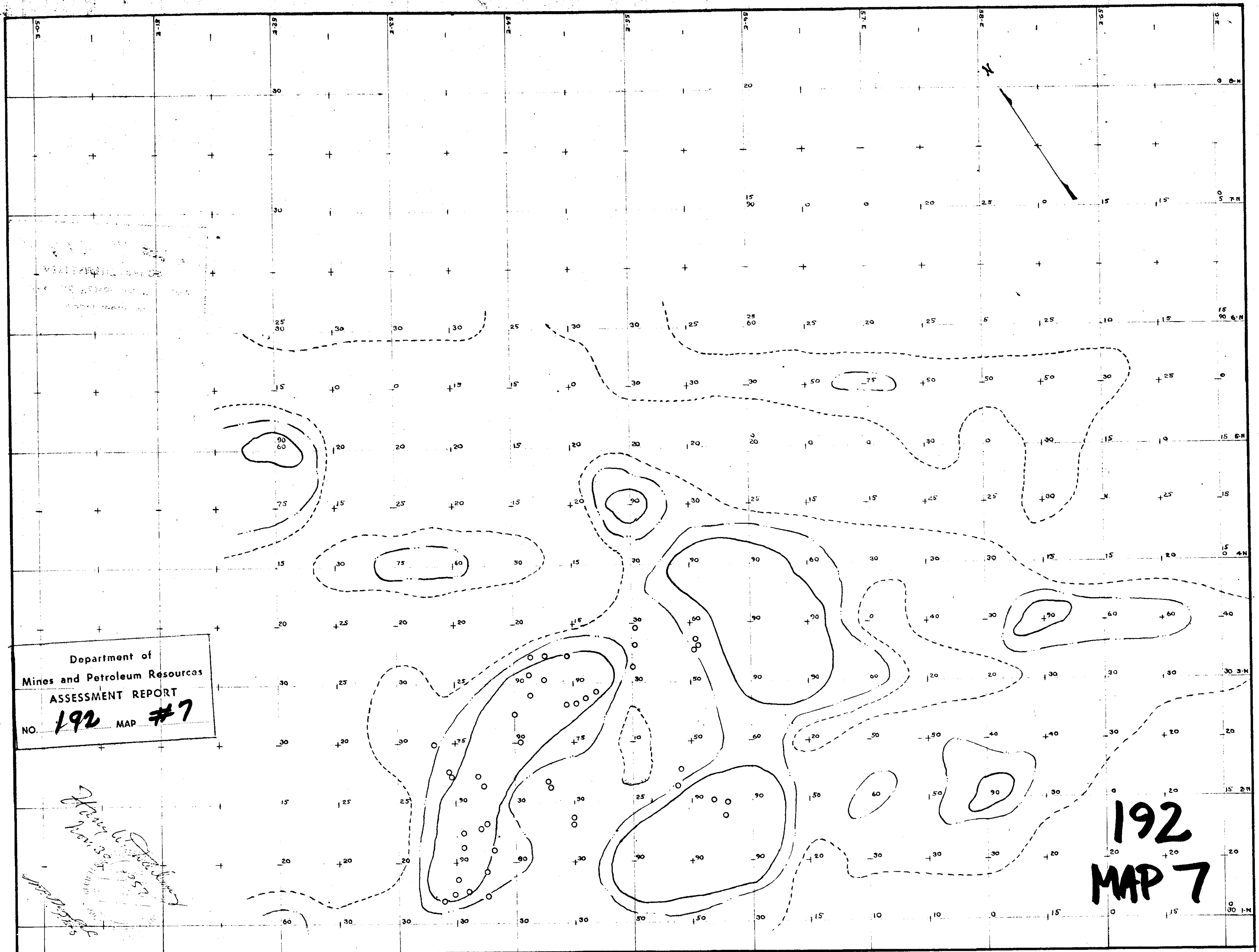
NOTE - FIGURES DENOTE PARTS COPPER PER 100,000

W. P. Murdock. P.Eng.
Oct. 30, 1957.

GRAHAM- BOUSQUET GOLD MINES LIMITED

ASSAY PLAN OF AREA 56E-4N

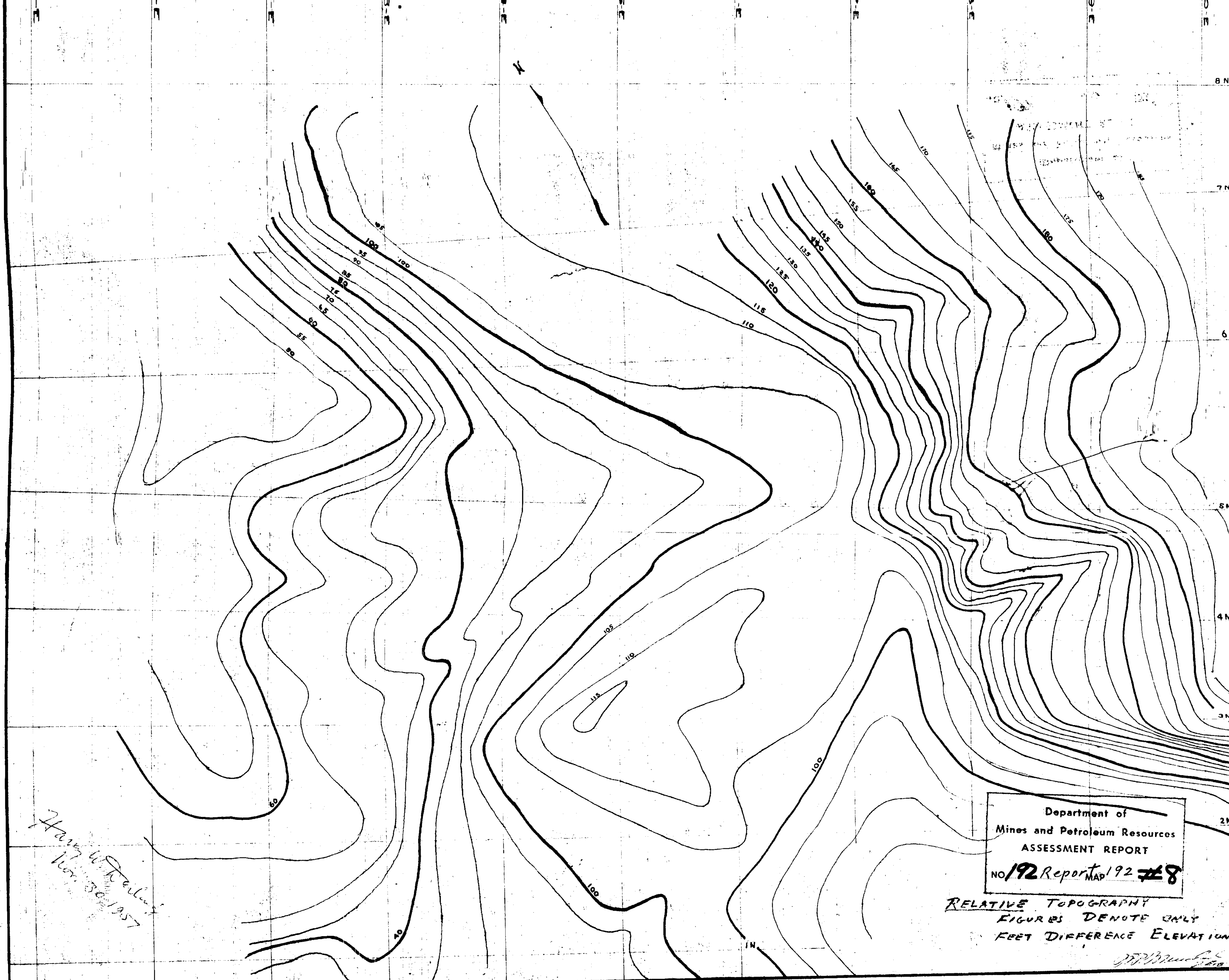
SCALE 1 IN.=50 FT.



NOTE :- FIGURES DENOTE PARTS COPPER PER 100,000
Scale - 1 in. = 50 ft.

GRAHAM-BOUSQUET GOLD MINES LIMITED *Report 192.*
D-M GROUP, KAMLOOPS, B.C.

AREA-56E-4N
PLAN OF SOIL SURVEY



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CONTOUR PLAN OF AREA-56E-4N.