MAR 19970010: CLEAR HILLS

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MARUM RESOURCES INC.

400 NATIONAL BANK BUILDING

407 - 8AVE. S.W.,

CALGARY, ALBERTA T2P1E5

ASSESSMENT WORK

METALLIC AND INDUSTRIAL MINERALS PERMITS NO. 9390100001 TO 9390100008

COVERING THE PERIOD

JANUARY 1, 1995

TO

DECEMBER 31, 1996

TABLE OF CONTENTS

Appendices

EXECUTIVE SUMMARY

Reconnaissance exploration of the Ironcap Project Clear Hills site is largely complete, the next step being to select a mine site, conduct a detailed field program in the area selected to be the opening cut in order to establish the extent of probable reserves and confirm and extend proven reserves of iron ore. Gold is present in small quantities everywhere in the prospect.

The Ironcap Project site is located north east of Worsley, Alberta. The Ironcap deposit caps the Clear Hills in townships 88 and 89, ranges 3 and 4 west of the 6th meridian and comprises 3,448 ha. The permit identification with Alberta Energy, Mineral Resources Division is Metallic and Industrial Minerals Permits No. 9390100001 through 9390100008.

The project was originally undertaken for exploration of the gold potential of the Bad Heart Formation. An intensive field program was mounted during 1995 and early 1996 to establish the lateral and vertical extent of finely disseminated gold in the Worsley Test Pit on the southern rim of the Clear Hills. Trenching was conducted to expose fresh surfaces. A large number of samples were processed and analyzed using acid leaching; size screening and fire assay; and caustic fusion techniques to assess the most efficient approach to recovering the fine gold.

During exploration it became apparent that while ubiquitous, the finely disseminated gold is present in quantities that are too small to be economically mined by themselves. The iron ore present is of considerable value, given the present strong world market for iron production feed stocks. The Company's current business plan concentrates on iron production, with gold being a byproduct.

Diamonds have also been reported. The source and provenance of diamonds within the Badheart Formation is being assessed.

Drilling was conducted in block A during 1995 The program failed to recover economically viable quantities of precious metals. Assessment operations ceased before the metals content of the underlying Kaskapau Formation contact could be explored.

RESERVES

Reserve estimates developed by earlier studies have been relied upon to provide a guide to further exploration and business planning, particularly with respect to iron ores. Very little prior work has been done on base and precious metals or industrial minerals and no exploration for gemstones has been reported.

The Badheart Formation below the iron formation is a dark gray to black shale that contains quite a wide range of metals in small but still greater than overall background levels of metals. Activation Laboratories Ltd. of Ancaster, Ontario conducted a neutron activation analysis of a blended 1 kg sample of iron formation. No reserve estimates on these metals based on a single small sample analysis would be appropriate of course, but indicated that further exploration for non ferric materials other than gold should be carried out.

IRON ORES

The Clear Hills deposit consists of a ferruginous oolite ore of the Minette type (Petruk, 1977). The iron content (30-35% metallic iron) is typical of this type of ore. Table 1. shows the quality of the ore with respect to other iron ores commercially traded. The high iron hematite ores dominated the world market until the early 1990's when most of these rich deposits were mined out. Some of these deposits are still being actively mined for lower grade ores (typically in the 30-35% range) or are owned by vertically integrated steel companies.

The Ironcap deposit has been the subject of quite detailed reserves estimates by officers of the Alberta Research Council, most recently by W.N. Hamilton in 1980. On the basis of surface exposures and drilling programs conducted at the site between 1959 and 1965, Hamilton assigned 167,600,000 tonnes as proven ore reserves. Including less well proven areas, the probable total reserves for the area are in the order of one billion tonnes or 1,000 years of production at 1,000,000 tonnes per year (Table 2.).

Table 2

Source: Hamilton (1980)

RESERVE TYPE	AMOUNT
Proved reserves	167,600,000 tonnes
Indicated reserves	627,760,000 tonnes
Resources:	186,000,000 tonnes
Total:	981,360,000 tonnes

GOLD

Low but higher than background

Table 1

Composition of Iron Formation Types (%)

Source: GSC (1970), Unesco (1973)

Location	Type	*Fe*	SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	TiO_2	Other
Clear Hills	**Minette**	***30.97***	**28.06**	**5.79**	**29.81**	**13.08**	**1.92**	**.18**	**21.16**
Knob Lake	Oxide	***33.97***	48.35	.48	45.98	2.33	.1	.01	2.89
Knob Lake	Silicate	***30.23***	49.41	.68	16.34	24.19	.1	.01	9.78
Wabana	Clinton	***51.79***	11.42	5.07	61.83	11	3.32	.015	7.35
Temagami	Oxide	***33.52***	47.9	0.9	31.7	14.6	1.45	.05	3.29
Drug, India	Hematite	***65-69***	.1-2.0						
Kursk, Russia	Silicate	***34.3***	44.76	1.94	28.31	17.77	1.97	0.19	5.06
Kursk, Russia	Magnetite	***34.59***	41.83	.92	33.21	14.66	1.9	0.21	7.27
Kursk, Russia	Hematite	***36.89***	40.39	.68	39.09	11.81	1.74	0.15	6.14
Morro do Urucoum, Brazil	Banded Hematite	***56.9***	11.40	.65	82.76		0.01	.02	5.16
Zhuantyube, Kazakhstan	Hematite	***55.14***	19.52	0.55	77.14	1.08			2.03
Hammersley, Australia	Pisolitic Limonite	***52-60***	4-10	1-3					

concentrations of native gold, silver, platinum and occasionally palladium are ubiquitous within the Badheart Formation and are associated with the iron formation. The platinum group metals appear in three size fractions:

- between 200 mesh (300 micrometers) and 1mm;
- between 40 micrometers and 200 mesh; and
- less than 2 micrometers.

Standard fire assay techniques only detect the largest particles ("nuggets") which are +200 mesh (>300 micrometers) in size. The concentration of gold present has proven difficult to establish reliably because of the extreme fineness of the particles present. A multiple stage gravity separation technique was developed to extract and concentrate the gold particles that appear as ultra fine particles with diameters in the order of 2 micrometers which appear to be the largest fraction. The particles range from high fineness gold through gold-silver alloys with silver contents up to 20 wt. %.

While the data are still sparse and must be treated with caution, it would appear that values of up to 0.085 ounces per ton of gold may be present in the coarsest fraction. Gravity concentrations grading up to 0.4 ounces per ton at a 6 to 1 concentration ratio have been produced. The overall average was 0.10 ounces per ton. Research was conducted on recovery of fine gold using a heavy liquids separation technique from the coarse grained fraction of the Bad Heart at the Worsley test pit. Values of up to 0.085 ounces per ton were obtained from fire assays of the concentrate produced from the experimental technique.

Qualitatively, the precious metals grades are highest in the northern part (Blocks B and C) of the permit area and lower in the south (Worsley, Block A). Block B fire assay results averaged 0.11 ounces per ton, with the range being 0.03 to 0.40 ounces per ton. Three reconnaissance samples from Block A ran 0.40, 0.06 and 0.20 ounces per ton.

In addition to the standard fire assay evaluation, an attempt was made to concentrate the gold using both acid leach and caustic fusion methods.

Using an average value of 0.1 ounces gold per ton of iron formation, the value of production may be as high as 0.1 X $350 = $35 per ton.

INTRODUCTION

Marum Resources Inc. wishes to develop its Ironcap property to produce iron for the western Canadian and world iron and steel industry. Proven reserves after preliminary exploration stand at 226,750,000 tonnes, representing over 100 years of production at 1,000,000 tonnes of pig iron per year. 1996 prices for pig iron on the international spot market were in the order of $162US/tonne.

Minor fine gold concentrations have been found associated with the iron ore. Assuming an average of 0.01 oz/tonne, gold production associated with the iron can be expected to be in the range of 35,000 oz/year. Gold prices have surged recently to $417US/oz in late 1995 but well

back to the $350/t range by late 1996. While uneconomic to produce alone, gold could be profitable as a side stream of iron ore production.

To develop the Ironcap, a capital investment of some $200,000,000Cdn will be required over a five year period, and will yield iron revenues of $223,500,000Cdn at full production. Gold revenues of $12,000,000Cdn can also be expected. Other commercially traded minerals are also present, but have not yet been thoroughly evaluated.

LOCATION AND ACCESS

Details regarding the location of that assessment work, including reference maps, and showing permit boundaries and numbers.

Preliminary exploration of the site is largely complete, the next step being to select a mine site, conduct a detailed field program to establish the extent of probable reserves and confirm and extend proven reserves of iron ore. The candidate site is located north east of Worsley, Alberta. The Ironcap deposit caps the Clear Hills (see map in Appendix 1) in townships 88 and 89, ranges 3 and 4 west of the 6th meridian and comprises 3,448 ha. The permit identification with Alberta Energy, Mineral Resources Division is Metallic and Industrial Minerals Permits No. 9390100001 through 9390100008.

The project was originally undertaken for exploration of the gold and diamond potential of the Bad Heart Formation, however during exploration it became apparent that the iron ore present is of considerable value.

PERMIT TABULATION

The above permits are listed in Appendix A.

PERMIT LIST	
PERMIT NUMBER	SIZE (HA)
9390100001	4,248
9390100002	7,832
9390100003	3,448
9390100004	6,296
9390100005	2,872
9390100006	16
9390100007	16
9390100008	16

WORK PERFORMED

During the period between January 1, 1995 and December 31, 1996, the Company continued exploration of the Clear Hills iron formation zone of the Badheart Formation through a program of outcrop examination and analysis; trenching and drilling it calls the Ironcap Project. A series of advanced analytical techniques and ore evaluation projects were performed as follows:

BULK SAMPLING BY TRENCHING (WORSLEY TEST PIT)

A bulk sampling program was conducted at the test pit located in LSD 16, sec. 33, Twp. 87 R7W6 under exploration licence No. 5105 issued by Alberta Environmental Protection, Client and Field Services Branch August 17, 1995.

The pit is about 30m wide, 50m long and the iron formation is about 30m thick. It was first excavated by Premier Steel Mills Ltd. In 1960 for a steel production trial conducted at Birmingham, Alabama using the R-N process (Samis and Gregory, 1962). During the 1995 Marum field operation, approximately 10 t of ore was produced and shipped to a processing facility near Ponoka where ore preparation and dressing experiments were conducted by Company staff with the objective of recovering fine gold. The excavation work was conducted using a back hoe and the produced ore was transported by flat bed truck in one tonne capacity fabric bags.

No reclamation work was performed, as the Company plans to re-open the pit during the 1997 field season.

PARTICLE SIZE/SIEVE ANALYSIS VERSUS GOLD RECOVERY

During September and October, 1995, Marum conducted research into determination of optimum crush size, leaching characteristics and concentration methods for the gold ore. Three particle sizes of gold are present: 200 mesh to 1mm ("nuggets"); 40 µm to 200 mesh; and -2 µm.

A multi-stage gravity separation technique using heavy liquids was used to extract the coarser fraction; and a cyanide leaching method was used for the very fine fractions. Only the coarse fraction was considered suitable for submission to fire assay, and 38 samples were recovered using the heavy media technique for that purpose.

IRON PRODUCTION

A blended sample was recovered from the bulk sample for submission to metallurgical studies at the Canada Centre for Mineral and Energy Technology (CANMET) laboratories in Ottawa (Appendix B).

FIRE ASSAY

38 samples of +200 mesh concentrate were submitted for fire assay during 1995. The samples averaged 0.10 ounces of gold per ton (opt), with the highest value at 0.40 opt and the lowest 0.03 opt. The highest grades were obtained from the coarsest grained ores, which were concentrated at a rate of 6:1.

CYANIDE AND ACID LEACH EXTRACTION EXPERIMENTATION

During May and June of 1995, a split set of samples was subjected to a normal fire assay; an acid leach and a caustic leach to assess the efficiency of recovery for each method. The amount of gold in the concentrate following fire assay was 6 ppb; after the acid leach was 8 ppb; and after a cyanide extraction was 4 ppb. Using a roast before the cyanide leach increased the gold content in the concentrate to 20 ppb.

A different sample was found to have 4 ppb of gold using a normal fire assay. The concentrate from an Aqua Regia wet ash leach assayed at 8 ppb gold.

SEDIMENTOLOGY AND SEDIMENTARY PETROLOGY

Company staff conducted a regional study of the Badheart Formation to establish sedimentation patterns both vertically and laterally within the deposit. Field work consisted of visiting, sampling and photographing outcrops; examining and logging drill cuttings and cores; and logging material properties in both the Swift Creek and Worsley test pits. Laboratory work included particle size

analysis; optical mineralogy and chemical characterization. The results were then combined with data obtained from the literature; mapped and regional trends identified in the Office.

DRILLING PROGRAM

In December, 1995, a ten hole program was completed in the southernmost permit area (9390100001) on the Running Lake Road 3.5 km north west of the Worsley Test Pit in section 27 township 87 range 7 west of the sixth meridian. The work was performed by D.W. Drilling of Grand Prairie, Alberta, under Permit to Operate Exploration Equipment No. 0685 issued by Alberta Environmental Protection, Client and Field Services Division. A six inch hollow core auger capable of recovering a reasonably undisturbed 3.5 inch cylindrical sample using split spoon technology.

The program was designed to test the gold content of the oxidized portion of the Badheart Formation rocks. Eight of the holes, which were between 50 and 60 feet in depth (Appendix C), intersected the target and the underlying marine mudstone unit.

REVIEW AND ANALYSIS OF LITERATURE

As reported last year, an exhaustive literature search provided a wealth of information on the sedimentology, mineralogy and economic geology of the Clear Hills Iron Deposit. Current awareness search continued through the assessment period on the sedimentology, stratigraphy, and occurrences of both iron minerals and finely disseminated noble metals in strata bound deposits. The search was expanded to include information on diamonds and diamond indicator minerals.

SCANNING ELECTRON MICROSCOPE (SEM) ANALYSIS

The Geological Survey of Canada conducted an exploratory study on the SEM characterization of ultra-fine noble metal particles in the 40 to -2 μm fraction of the Ironcap Project ores (Ballantyne, 1995). Techniques applied were backscatter (BSB); secondary image (SEI); and energy dispersive x-ray spectrometer (EDX) displays. The report is attached as Appendix D.

METALLURGY STUDY "PRELIMINARY EVALUATION OF CLEAR HILLS IRON ORE"

In order to properly assess the full economic potential of the deposit given market conditions for iron and steel today, the Company commissioned studies into the metallurgical properties of the iron formation minerals (Mikhail et al, 1996, Appendix B).

A three phase program of research was conducted on a 50 kg sample of Worsley test pit ore, consisting of:

- characterization of the ore as received;
- upgrading of the ore; and
- reduction/smelting of the concentrate.

The ore was characterized using x-ray diffraction analysis (XRD) for mineralogical identification of fine particles; thermal techniques including thermogravimetric analysis (TGA) for moisture content and other volatile material mass determination; differential thermal analysis (DTA) and Fourier Transform infra-red analysis (FTIR) for determination of chemical composition of volatile materials.

Upgrading studies included crushing and grinding to determine optimum iron liberation; high-intensity magnetic separation; roasting of concentrates; and dry screening. The presence of swelling clays (montmorillonite and nontronite) dictated dry grinding.

Reduction and smelting of the concentrates were conducted using a 100kw induction furnace with a 100 kg metal capacity, fitted with a silicon carbide crucible. A 3 inch thick graphite rod was added to the charge to assist with heating. Details of the methods and use of these techniques may be found in Appendix B.

RESULTS OBTAINED

Results from each of the study components obtained during the January 1, 1995 through December 31, 1996 period follow.

LITERATURE REVIEW

The geology of the site has been described by a number of authors, notably Bertram and Mellon (1975), Gravenor (1962), Kidd (1959) and Colborn (1958). Specialist studies commissioned by Marum Resources Inc. were Scott-Smith Petrology (1994), Graham Davies Geological Consultants (1994), Ballentyne (1995), and Mikhail et al (1996). The latter two authorities are published here for the first time.

STRATIGRAPHY

The deposit is usually referred to as the Clear Hills iron in the earth sciences literature, and is entirely contained as a facies within the Bad Heart Formation of the Smoky Group dark gray marine shales of Upper Cretaceous age. The beds are generally flat lying, although Gravenor notes a gentle dip to the south southwest at 10 feet to the mile (Gravenor, 1962). Outcrops are sparse and occur along the eastern margin of the Clear Hills and in creek valleys along the Notikewin River, which is the northern boundary of the deposit (Kidd, 1959). Scattered showings of oolitic sandstone have also been found in the northernmost part of the Clear Hills (Mellon et al, 1975).

The deposit is overlain unconformably by the Upper Cretaceous Wapiti Group continental deposits and glacial deposits where the Wapiti has been eroded away. There is no evidence for the presence of the Puskawskau Formation marine shale, which overlies the Bad Heart elsewhere (Mellon et al, 1975). Gravenor (1962) interpreted the base of the iron formation as unconformably overlying the Kaskapau Formation, as did Kidd (1959). The nature of the upper contact has not been described.

Hamilton (1980) describes the lithology as a dark brown and green to black, ferruginous oolite, forming a bed up to 10m thick. The ore bed is thickest in the north east and thins to zero to the southwest. The oolitic facies grades into siltstone and argillaceous sandstone at the feather edge. The overall area

of the iron bearing facies is 11,100 ha and is restricted to the summit area of the Clear Hills. The sedimentology of the iron beds has not been described in detail. It generally appears to be estuarian and possibly deltaic (Kidd, 1959).

STRUCTURAL GEOLOGY

Kidd (1959) describes the regional structure as homoclinal, with southwest dips of 20 to 25 feet per mile. Local folding is known, but of minor importance. He interpreted the dip on the iron bed as 8 feet per mile, to the southwest. The thickness of the iron bed varies from zero to 10m and forms a series of sandstone bodies that trend northwest, which are exposed along the flanks of the hills at elevations between 2,500 and 2,700 feet (Mellon et al, 1975).

MINERALOGY, PETROLOGY AND ECONOMIC GEOLOGY

The Ironcap deposit is composed of chamosite ooids, with associated iron minerals in the following proportions (Petruk, 1977):

Table 4
Ironcap Prospect - Economic Minerals

Mineral Type	Chemical Formula	Avg. Weight Per Cent
Goethite	($Fe_2O_3.H_2O$)	37.9%
Nontronite	($[Fe,Al]_2O_3.3SiO_2.nH_2O$)	39.0%
Ferruginous Opal	($[SiO_2+Fe_2O_3].nH_2O$)	9.4%
Siderite	($FeCO_3$)	10.8%

CHAMOSITE:

A mineral, a member of the chlorite group, composition approximately $\{Fe'',Mg,Al,Fe'''\}_6\{AlSi_8\}O_{10}\{OH\}_6$. Monoclinic. An important constituent of may oolitic Fe ores - "Dictionary of Geological Terms. Related minerals: The chlorites, delessite and thuringite, are similar to chamosite, but the former occurs in true spherulites in amygdaloidal rocks and the layer in schists. Greenalite, an iron silicate occurring in amorphous granules in ores of the Lake Superior region, also resembles chamosite.

Occurrence: chamosite is a prominent constituent of oolitic sedimentary iron ores that are prominent in the Jurassic of England, where they are usually known as ironstones and are commercially important low grade ores. According to Hallimond, they are for the most part of marine origin, but some are probably fresh water. The usual associates of chamosite are siderite, calcite collophane, pyrite and various detrital minerals. These chamositic ores are also found in Scotland, Lorraine, southern Sweden, Bohemia, and Newfoundland (Kerr, 1959).

NONTRONITE:

Nontronite is an iron-rich, dioctohedral montmorillonoid (also known as "smectites"), (van Olephen, 1963). The amount of iron varies from 0.0 to 2.0, with a modal value of 0.15 as Fe^{3+} . Montorillonoids are derived from volcanic material, normally weathered volcanic ash. They are distinguished from other clays by their two layered structure, which adsorbs water readily, causing them to swell up to twice its dry state volume. The iron is associated with the octahedral sheet.

Nontronite apparently forms under the same general environmental conditions as the low-iron montmorillonites. It is formed by hydrothermal alteration and as vein fillings. Basalt that has been subject to hydrothermal fluids will also form nontronite. Iron enters the octahedral sheet and replaces aluminum under reducing conditions by isomorphous substitution. Where reducing conditions remain, nontronite is sometimes associated with free aluminum and other amphoteric metals.

Montmorillonites in general also admit organic compounds of a polar or ionic character between the unit layers. The adsorption of the organic compounds leads to organo-complexes.

GOETHITE:

Goethite is a hydroxide of iron corresponding to the formula FeO(OH) crystallizing in the orthorhombic system. It occurs in prisms, but is often found in foliated or other massive forms. When observable, it shows one good cleavage parallel to the prism; fracture, uneven; hardness, 5-5.5, specific gravity, 3.3-4.3; luster adamantine to dull; colour; yellowish, reddish, brownish to nearly black; translucent to opaque. It is found associated with hematite and limonite, being perhaps in part an alteration product of the latter mineral. Goethite is used as an ore of iron. There are many European localities, including Bohemia, Saxon, Westphalia, and Cornwall. In the United States it is found in the hematite mines of the Lake Superior region and in Colorado. (Considine, 1983).

Occurrence: Goethite is one of the commonest minerals and is typically formed under oxidizing conditions as a weathering product of iron-bearing minerals. It also forms as a direct inorganic or biogenic precipitate form water and is widespread as a deposit in bogs and springs. Goethite with limonite forms the gossan or "iron hat" over metalliferous veins. Large quantities of goethite have been found as residual lateritic mantles resulting from the weathering of serpentine. Bog irons are formed in part by iron bacteria which absorb the iron from water and later deposit it as ferric hydroxide on the bottom of the pond. (Hurlbut, 1959) Goethite is the most prominent ore mineral in the Clear Hills Iron Formation.

SIDERITE:

A mineral carbonate of iron, $FeCO_3$. It is hexagonal with rhombohedral crystals, and also occurs in various massive forms. It has a rhombohedral cleavage; uneven fracture; is brittle; hardness, 3.75-4.25; specific gravity, 3.96; luster, vitreous to pearly; color, gray, yellowish or greenish gray, green reddish-brown and brown. Difficult to fuse, it becomes strongly magnetic when heated and forms a black, strongly magnetic residue. It is soluble in HCl.

Siderite is found as concetretionary masses in the sedimentary rocks; as a replacement mineral from the action of iron solutions upon limestones; and in metalliferous veins as a gangue mineral. It is relatively common. (Considine, 1983).

Occurrence: Siderite is frequently found as clay ironstone, impure by admixture with clay materials, in concretions with concentric layers. As black-band ore it is found, contaminated by carbonaceous material, in extensive stratified formations lying in shales and commonly associated with coal measures. These ores have been mined extensively in Great Britain in the past as the chief source of iron, but at present are mined only in North Staffordshire and Scotland. Clay ironstone is also abundant in he coal measures of western Pennsylvania and eastern Ohio, but it is not used to any great extent as an ore. Siderite is also formed by the replacement action of ferrous solutions upon limestones, and if such deposits are extensive they may be of economic value. The most notable occurrence of this type is in Styria, Austria, where siderite is mined on a large scale. Siderite, in its crystallized form, is a common vein mineral associated with various metallic ores containing silver minerals, pyrite, chalcopyrite, tetrahedrite, galena. When siderite predominates in such veins, it may be mined, as in southern Westphalia, Germany. (Hurlbut, 1959). Siderite is usually present in the Clear Hills Iron Formation as a secondary weathering material.

OPAL:

The microcrystaline form of cristabolite. Opal is a hydrous silica, $SiO_2.nH_2O$, with variable water content. It never appears in crystalline form, always as masses, vein fillings or as pseudomorphous replacements for wood, bone or shells, usually following burial by volcanic ash. Opaline silica appears in many forms: geyserite from geyser deposits, siliceous sinter (fiorite) from siliceous waters of hot springs, and diatomite (diatomaceous earth) from siliceous shells of diatoms and comparable microscopic species. It has a conchoidal fracture, hardness 5.5-6.5; specific gravity 2.1-2.3; luster, vitreous or greasy to dull; colour very variable, colorless, white, milky-blue, gray, red, yellow, green, brown, and black. Infusible. Insoluble. Reacts like quartz. Gives water upon intense ignition in a closed tube.

Often a beautiful play of colours may be observed in gem varieties. The colour play in opals is attributed to three different mechanisms: finely divided pigmentation of foreign material; light interference by open-spaced grid of cristabolite crystallization; and reflected light. It may well be that tow or all three causes may contribute to the color effect in any given opal specimen. Before a more complete understanding of opal color is established these phases seem to be of prime significance.

Opal is deposited at relatively low temperatures and may occur in the fissures of almost any type of rock. (Considine, 1983, and Hurlbutt, 1959). In the Clear Hills Iron Formation, opal is present as a cement which binds oolites together (Petruk, 1977b).

CRISTABOLITE:

Cristabolite is a quartz-like silica group mineral; of the tetragonal system; its chemical formula is SiO2; it is colorless; shows no cleavage; can be altered into quartz, tridymite; displays granular, tabular habit. It has a hardness of 7 and a specific gravity of 2.3; vitreous luster; and is stable only above 1470C. Cristabolite is infusible, but when heated to 200C inverts to the high temperature isometric form and becomes nearly transparent; on cooling, again inverts and assumes its initial white, translucent

appearance. Cristabolite, which is an abundant mineral, occurs in siliceous igneous (felsic, volcanic) rocks, both as a the lining of cavities and as an important constituent in the fine-grained ground mass. (Hurlbut, 1959).

PETROGRAPHY, PETROLOGY AND DIAGENESIS

The most obvious feature of the Ironcap ore body is its oolitic character. Four reports which were commissioned by Marum to describe ore body petrology in fine detail. Précis of those reports follow the general discussion.

Oolites are will rounded, sand-like particles, originally formed from calcite but sometimes subsequently altered to either dolomite or entirely silicified. The structure is typically concentric about a nucleus, and often with radial lines. Coarse grained oolites (D_{50}>1mm) are called pisolites.

The sedimentology of oolites have been the subject of debate for about 80 years. Two divergent opinions exist concerning their formation and diagenesis. One body of opinion (Holmes, 1978) believes they are formed by precipitation of calcite. The particles are agitated by waves and currents, causing them to be rolled around on the sea floor and coated with successive concentric layers. The wave action produces particle sorting, resulting in the quite uniform size distribution which is a characteristic of ooliths.

The other body of opinion, first synthesized by Grabau (1924) and more recently described in detail by Jones and Goodbody (1984), holds that oolids are formed from fecal pellets associated with bottom dwelling worms and crustaceans. The process described by Jones and Goodbody was observed in the Bimini Lagoon, and off Grand Cayman Island in the Caribbean. The morphology, composition and texture of the nuclei from these recent deposits suggest that they originated as pellets, probably from the burrowing shrimp *Callianassa.* Evidence, including the presence of spherulites in the ooid nuclei, suggests that bacteria may have played an important role in the initial lithification of the pellets and the subsequent development of oolitic films around the pellets. Many of the ooids observed are incorporated in the walls of *Ophimorpha,* a burrow system possibly formed by the shrimp *Callianassa.* Included in the wall structures of the *Ophimorpha* are double pellet structures. The setting of ooids in wall structures suggests that some of the ooids formed below the sediment-water interface.

Dunbar and Rodgers (1957) have reviewed the debate in detail and conclude the two mechanisms probably operate independently. They note that for a shallow water, high energy environment to be assigned to a particular oolite bed, the usual textures and bedding features of moving material should be present. For a quiet water, biological origin to be inferred, evidence of bioturbation should be present and small scale bedding features should be absent.

While the regional sedimentology of the Clear Hills Iron Formation is poorly understood, it is clear that the oolites are much too uniform to be fecal pellets. It is also significant that iron has been deposited preferentially in the oolites, suggesting they were formed by chemical precipitation.

The economic significance of the sedimentology of the Ironcap deposit lies in the relative homogeneity of the ore body. A quiet water, well bioturbated bed will be relatively uniform in mineralogy. A high energy, well graded deposit will display heterogeneous mineralogy. A heterogeneous environment will tend to localize heavy minerals in low energy zones or in beds representing the waning of a particular storm event. A homogeneous bed will be mined continuously

by high capacity equipment. A heterogeneous bed can be high graded by much smaller, more mobile equipment and a more intensive mining strategy.

PETROGRAPHY OF THE OOLITE BED: OPTICAL MINERALOGICAL ANALYSIS

A petrographic analysis was performed on three thin-sections from a single outcrop sample. The sample was an oxidized chamosite ooid glauconite peloid "ironstone" with a water-sensitive swelling clay matrix, which was not analyzed. The nuclei of most of the chamosite ooids were smaller chamosite fragments, but about 10 per cent of the ooids were nucleated on detrital quartz grains (both monocrystalline and polycrystalline types). Detrital feldspars, mainly orthoclase, also formed a few ooid nuclei. Quartz grains lacking chamosite envelopes were also present (Graham Davies Geological Consultants, 1994).

Interpretation

Chamosite is a complex hydrated Fe-Mg aluminosilicate that has precipitated at the sea floor directly on free, wave agitated nuclei. Later oxidation has altered much of the chamosite to iron oxides, probably including goethite and other varieties. During early diagenesis, chamosite ooids characteristically undergo mineralogical conversion and shrinkage. The latter is particularly apparent if the surrounding matrix has become cemented prior to shrinkage, so that it outlines a cast of the original grains. The newly created pore space formed by shrinkage commonly is infilled by calcite cement (the case with this sample), or by other digenetic minerals including authigenic clays.

Glauconite peloids, a common accessory of chamosite grainstones, form a small percentage of the present sample. They are recognized by their ovoid shape, desiccation fabrics, and microcrystaline clay texture. Glauconite peloids generally are a reliable indicator of a depositional environment with marine influence, either fully marine or estuarine-like. It should be noted, however, that berthierine peloids, very similar in texture to glauconite peloids, may be misidentified as glauconite, and are indicators of more brackish-water environments. Recrystallization and oxidation of peloids often obscures identification as originally glauconite or berthierine. The matrix of the chamosite ooids is a water sensitive swelling clay impregnated with iron oxides (nontronite), and containing a high habit. Locally, where the matrix is absent or has been replaced, patches of zoned iron oxide cements are present. In thin-section, the cements appear bright red in transmitted light; they may be hematite or related crystalline iron oxides.

The chamosite ooid ironstone facies identified in thin-section from the Bad Heart Formation is developed characteristically north of Hines Creek in the Clear Hills region of the Peace River area of west-central Alberta.

Environmentally, the chamosite ooid-glauconite peloid facies is interpreted to be the product of precipitation of Fe, Mg and K-bearing hydrous aluminosilicate at the seafloor or sediment-water interface in an overall marine setting (possible seasonally variable) under conditions of low sedimentation rates/low dilution by external siliciclastic sources. Modern analogues have been documented on the Holocene shelf in front of the Niger Delta of the north-eastern South Atlantic, with glauconite-dominant facies in deeper and colder outer shelf settings, and chamosite-rich facies in shallower and warmer shelf settings. In the Western Canada Sedimentary Basin setting for the Bad Heart ironstones, a similar intermediate shelf setting with condensed or low-sedimentation rate

conditions is suggested, shelfward of a source of fine detrital clays and associated Fe oxides (deltaic source to the east).

Chamosite ooid ironstones in other basinal settings (Sverdrup Basin, Canadian Arctic; Jurassic-Cretaceous, offshore east coast of Canada) commonly overlie unconformities, recording transgressive systems with low sedimentation rates (condensed section) -- whether there is a similar relationship to an unconformity in the Bad Heart formation is undefined.

Examination of the sections revealed no recognizable evidence for a volcaniclastic influence or source. The detrital siliciclastic grains are dominated by quartz, with only a few feldspars. Swelling clay matrix may reflect an altered ash fall, but there is no specific geological reason to support this possibility.

PETROGRAPHY OF THE OOLITE BED: OPTICAL MINERALOGICAL ANALYSIS (2) - HAND SAMPLES AND ROCK CHIPS

Macroscopic examination of a large hand sample of rock from the Ironcap property and five very small (<0.5mm) chips which were submitted separately in a small vial (Scott-Smith Petrology, 1994).

Macroscopic Examination

The large sample (A) was examined prior to sample preparation. It had an overall orange brown colour. The rock appeared altered. The sample was mainly fine grained with most constituents less than 0.25 mm in size. The rock appeared to be finely laminated. The sample did contain an occasional coarser pebble like clast which ranged in size up to 1.5cm. These clasts were not common and their nature is difficult to discern. They appeared to comprise similar fine grained altered material to the host, but individual constituents were difficult to discern. The host rock appeared to contain abundant clay minerals which may have formed the matrix to the coarser constituents. Quartz appeared to be an important constituent of the rock. No olivine or its pseudomorphs or any other mantle-derived minerals were observed. Some areas of the sample appeared to contain abundant ovoid oolith-like structures about 0.5mm in size. No mica or possible lamproilitic fragments were observed. There is no evidence to suggest that this sample was of volcanic origin. Rather, it seems more likely to the analyst that it was of sedimentary origin.

The large rock sample (A) was submitted to Vancouver Petrographics for the preparation of a series of polished slabs through the sample which were to be cut perpendicular to the lamination. Two thin sections were also prepared. It was considered that further thin sections should be made using carefully selected areas of any volcanic constituents that were observed on the polished slab.

Summary and Discussion

Sample A appears to have been a sedimentary rock composed of well sorted, predominantly angular grains of quartz, possible grains of glassy ash, rare feldspar and mica set in a matrix which appears to be dominated by clay minerals and iron oxides. The latter also replaces primary constituents in the rock as well as occurring as discontinuous subparallel secondary vein-like stringers throughout the rock. The latter probably give the sample its laminated appearance. There is no suggestion of sedimentary bedding. The rock is clast supported but not closely packed. This rock is an immature matrix-rich fine sandstone which contains ooliths and abundant iron oxides and the occasional rounded pebble. Iron

oxides may be sufficiently abundant to term this rock an ironstone. The pebbles appear to be sedimentary lithic clasts. The main rock may contain some common, but not abundant grains, of possible glassy ash. This interpretation is difficult to confirm in such small grains, particularly as no vesicles were observed. These could equally represent other constituents that could include collophane or others which have been replaced by secondary minerals. There is no evidence or reason to suggest that these grains, if volcanic, are of lamproitic or even lamprophyric origin. Balsaltic (sensu lato) and other ash types are much more common and may well occur in the sediments found in NW Alberta.

Chip C shows certain similarities to the main rock sample in the presence of abundant iron oxides and ooliths. The absence of quartz and the presence of other constituents, although totally replaced, are both very different from the main rock sample A. This shows that this chip may have undergone similar alteration to the main rock sample A but that it is not directly related to, or derived from, the large rock sample A. There is; no evidence that can be used to suggest a volcanic origin of any of the constituents of this rock. It is possible that some of the altered cuspate fragments could be glass shards but there is no real reason to make this suggestion as there are other more likely options. If they were glass shards they are unlikely to be of lamproitic origin. Such constituents have not been observed in lamproitic pyroclastiac material by. Scott-Smith Petrology

Chip D was a poorly sorted immature medium sandstone. This chip contained abundant quartz but was poorly sorted and the presence of rounded grains show that it was different to rock sample A. The nature of the matrix is also different and no iron oxides or ooliths were present. With both the primary and secondary nature of this rock being different to that of rock sample A and chips C and D, this sample was not obviously related to any of them. Also there is no evidence that suggests that any of the constituents in this very small chip had a volcanic origin.

In stark contrast to the rock sample and chips described so far, chips E, F and G were all similar relatively fresh porphyritic igneous rocks which are very likely to have derived from the same source. They were composed of phenocrysts of clinopyroxene and phlogopite set in a relatively coarse grained groundmass composed of similar clinopyroxene, phlogopite, probable sanidine, rare amphibole and minor amounts of another, possibly secondary, material. The latter was considered by the analyst as unlikely to be glass. The rosy colour of the amphibole was somewhat reminiscent of that found in lamproites. The zoning in the clinopyroxene, the colour and lack of twinning in the phlogopite, the twinning in the sanidine, the presence of probable spinel and the absence of leucite and priderierite distinguishes this rock from lamproites. All these features are typical of hypabissal minettes. There is no reason to suggest that this rock is a lamproite rather than the much more common rock type minette. In the very unlikely event of this rock sample being a lamproite it should be noted that it would be classified as a sanidine-clinopyroxene phlogopite lamproite and that it contained no olivine. Such rocks, to date, have not been shown to contain economic quantities of diamonds or to carry significant kimberlitic indicator minerals. Lamproites with such mineralogies are rare. Even those which are somewhat similar (e.g. Leucite Hills) show significant differences.

Conclusions

The large rock sample and two of the small chips appeared to comprise different sedimentary rock types. The alteration of one chip appeared to be similar to the large rock sample, but otherwise there was no evidence to show that these rocks are related. No observed features could confirm that any of the constituents of these rocks was volcanic in origin. Some minor constituents in the large rock samples could be of volcanic origin but other possibilities also exist. Even if these grains were shown

to be volcanic ash, there is no reason to suggest that they are related to any lamproite rather than much more common volcanic rock types.

In stark contrast to the main rock sample and the two chips described above, the other three chips were different coloured fresh porphyritic igneous rocks. They are classified as hypabissal minette. There is no evidence to suggest that they have any lamproitic affinities. There is also no reason to suggest that this sample is related to either the main rock sample or either of the other chips.

PETROGRAPHY OF THE OOLITE BED: OPTICAL MINERALOGICAL ANALYSIS (3) - THIN SECTIONS

Opinion: Richard T. Walker, P. Geol.

The material was described as coming from an oolitic sedimentary unit, having a small proportion of enigmatic granitoid clasts. The thin sections supplied support the interpretation of a oolitic lithology in which the majority of the ooliths are cored by alkali feldspar grains. This observation, coupled with lamprophyric/lamproitic inclusions supports the possibility that there may be a proximal source of igneous material (Dynamic Geological Consulting, 1994b).

PETROGRAPHY OF THE OOLITE BED: OPTICAL MINERALOGICAL ANALYSIS (4) - CONCENTRATES

Opinion: Richard T. Walker, P.Geol.

As requested (by Rick Boulay), a discussion of material examined in two samples supplied to Dynamic Exploration Ltd. by Marum Resources Inc. The first sample was identified as CH-1 (HCl and HF) and consisted of approximately one teaspoon of concentrate. The second sample was identified as CH1 (HCl) Coarse and consisted of approximately one tablespoon.

The material was described as coming from an oolitic sedimentary unit, having a small proportion of enigmatic granitoid clasts. The following interpretation documents my reasoning for considering oolite to be a misnomer. I believe the sample represents up to three separate and identifiable alkaline igneous phases, possible associated with (a) diatreme(s) of lamprophyric or lamproitic affinity.

Interpretation

The fact that matrix is still evident after treatment with HCl indicates that the matrix is comprised largely of silicates, carbonate is either absent or sub-ordinate. This is inconsistent with an "oolitic" origin unless substantial replacement has occurred. This possibility is considered more due to the lack of any indication of concentricity in the vast majority of the pellets examined. In addition, the abundant occurrence of igneous minerals suggests an igneous origin for this sample. Furthermore, the euhedral nature of biotite-phlogopite crystals as phenocrysts and in the matrix, and euhedral diopsides suggests a proximal source. The predominance of biotite-phlogopite crystals with slightly subordinate diopside suggests an alkalic composition similar to a lamprophyre or possibly a lamproite. The presence of two phases of biotite-phlogopite (phenocrysts and in groundmass) suggests the possibility of a madupitic lamproite.

Such an interpretation is consistent with the information available, both observable and reproducible in the concentrate and the reported presence of granitoid clasts. Such granitoid clasts would be difficult to reconcile with an oolitic package, as would the abundance of igneous material.

Furthermore, the pellets may represent igneous material re-worked in a sub-aqueous environment of limited extent. One possibility would be within a water filled crater associated with a diatreme. An iron-rich brine is the probable source of the hematitic rind developed on the mineral grains and fragments. In order for the extensive hematite rinds to be precipitated, a restricted volume of iron-rich brine is required. Alternatively, the samples may represent portions of a pyroclastic apron associated with a proximal vent or vents, again deposited within a restricted basin. Finally, the igneous material may have been altered in the subsurface by an iron-rich brine.

Recommendation

This deposit should be evaluated for diamond potential. Furthermore, with the possibility of a proximal source, platinum Group and Rare Earth Element potential should be considered. In addition, base and precious metals may be present.

Information available to the author indicates potential as an iron deposit, currently sub-economic. It may be that if this igneous material was sourced proximally then potential may exist for multiple commodities, making a mine feasible.

ORE MINERALOGY

The most thorough field and laboratory assessment of the Clear Hills Iron Bed (Ironcap) was done by W.N. Hamilton (1980), of the Alberta Research Council. The following paragraphs are from Report 1982-13.

MINERALOGY AND PETROGRAPHY

The Clear Hills ore is a minette-type oolitic ironstone, comprising densely packed ooliths, rounded rock fragments and angular grains of quartz and siderite in a soft earthy matrix. The ooliths consist of concentric layers of goethite and nontronite, commonly with a mineral grain nucleus. They constitute from 30 to 70 per cent of the rock mass, increasing upward from the base of the ore bed and averaging about 60 per cent for the whole.

The matrix consists of illite and nontronite imbedded in ferruginous opal cement. It averages about 25 per cent of the rock mass. Minor components of the oolite include rock fragments, quartz grains, siderite, and amorphous phosphate. Rock fragments occur commonly as well rounded "pebbles" up to 1 cm in size, composed of matrix-like ferruginous material. They constitute about 10 per cent of the rock. The quartz is found mainly as the cores of ooliths but also in the matrix. Siderite occurs as authigenic crystals in the matrix. Phosphate is confined to ooliths, as a diffuse impurity in the goethite and nontronite layers and rarely as grains in the cores.

ORE CHEMISTRY

Total iron (Fe) content in the Clear Hills deposit averages between 32 and 36 per cent. Silica (SiO_2) content is relatively high, between 25 and 30 per cent. Alumina (Al_2O_3) is low at around 5 per cent. Water content is high (15 per cent) due to the abundance of opal.

Iron content varies vertically within the ore bed. From minimum values at the base of around 25 per cent, it increases upward to around 40 per cent, reflecting the upward increase in ooliths (the main iron-bearing component).

The main ore minerals and the proportion of iron carried by each are as follows:

Goethite	($Fe_2O_3.H_2O$)	37.9%
Nontronite	($[Fe,Al]_2O_3.3SiO_2.nH_2O$)	39.0%
Ferruginous Opal	($[SiO_2+Fe_2O_3].nH_2O$)	9.4%
Siderite	($FeCO_3$)	10.8%

Total: 97.1% (of iron in ore bed)

ORE BENEFICIATION CHARACTERISTICS

W. Petruk (1977), has described the mineral character for the Clear Hills Iron deposit as a minette-type oolitic iron deposit in the Peace River district. It occurs as flat-lying ironstone beds up to 10.6m thick which contain 32-34 wt. % Fe in situ or 36-38 wt % after drying for 3 hours at 105C. The ironstone beds consist of ooliths, sideritic, and clastic material embedded in a clastic matrix and ferruginous cement. The ooliths consist of concentric layers of intimately intergrown goethite, nontronite, and amorphous phosphate around cores which are generally quartz. The material Petruk assessed showed that goethite contains 46-56% wt. % Fe (mean 49 wt. %) and about 1.6 wt. %P_2O_5, the nontronite contains about 36.7 wt % Fe and 0.8 wt. % P_2O_5, and the amorphous phosphate contains 24 wt % Fe and 15.4 - 35.0 wt. % P_2O_5. The clastic matrix and cement are largely a ferruginous opal that contains 24 wt. % Fe. About 44% of the Fe in the ironstone beds occurs as goethite, 35% as nontronite, 13% as ferruginous opal, and 8% as siderite. The ironstone beds in situ are greenish black, difficult to break, and have high water and ferrous iron contents. Upon exposure to atmospheric conditions the ferrous iron is apparently oxidized and causes the material to turn brown. Concurrent with oxidation, the adsorbed water escapes and causes shrinkage cracks in ferruginous opal.

In a later paper (William Petruk, D.M. Farrell, E.E. Laufer, R.J. Tremblay and P.G. Manning, 1977) characterized the clay mineralogy of the deposit.

Nontronite from the Peace River iron deposit in Alberta occurs as minute flakes in ooliths, and contains about 40 wt. % submicroscopic goethite. The nontronite composition, determined after leaching to remove the goethite, is Fe_2O_3 25.9, FeO 4.6, SiO_2 43.1, Al_2O_3 10.5, and H_2O 15.4 wt. %. Most flakes are amorphous to X-rays, but some contain zones (~0.2 micrometer in diameter) that are polycrystalline. Consequently, X-ray diffractometer tracings of powder mounts display a very weak peak at 4.5A. The "amorphous" flakes have the basic nontronite structure but the octahedral layers are distorted. Thus, peaks due to OH coordinated with cations in the octahedral layers are absent from

infrared patterns, the Mossbauer values for quadruple splitting of doublets due to Fe^{3+} are large, and the structure holds large amounts of interlayer water.

Ferruginous opal occurs as matrix between the ooliths in the Peace River deposit. The mineral contains about 10wt.% submicroscopic goethite, and in humid conditions absorbs large amounts of water which is expelled on drying. The composition of ferruginous opal, determined after leaching to remove the goethite, is Fe_2O_3 29.2, SiO_2 36.8, Al_2O_3 4.4, CaO 0.4, and H_2O 18.1 wt. %.

Peace River Nontronite

Peace River Nontronite accounts for about 30 wt.% of the material and for 38% of the iron in the Peace River deposit. The nontronite occurs as concentric layers in ooliths, and some contains discrete goethite inclusions 0.5 to 100 microns in diameter. The mineral crushes into very minute flakes. Riohrlich (1974) found that mineral flakes in ooliths are oriented tangential to the ooliths, and it is likely that the Peace River nontronite is similarly oriented.

In reflected light the Peace River nontronite in some oolith layers is dark gray, in others it is medium gray and in some it is light gray approaching that of goethite. Combined X-ray diffraction and ore microscope studies show that the Peace River nontronite consists of a mixture of submicroscopic goethite and nontronite. The variation in color under the ore microscope is due to the variable amounts of goethite and nontronite: the dark gray layers contain less goethite than the light gray layers.

Ferruginous Opal

Ferruginous Opal is the main constituent of the matrix and accounts for about 18 wt.% of the material in the deposit and for 10% of the iron. The mineral is pale yellow and isotropic in transmitted light. It absorbs water in humid conditions and expels it upon drying, causing shrinkage cracks which probably account for the ore becoming crumbly when exposed to dry atmospheric conditions. The ferruginous opal crushes into large rounded grains. The specific gravity of the mineral, determined with heavy liquids, is about 2.0.

Ferruginous opal is largely amorphous to X-ray diffraction, but J.T. Jubb, CANMET, found by electron transmission microscope studies of a ground ferruginous opal concentrate, which was treated to dissolve the goethite, that about 2 to 5% of the grains are hexagonal, a~=5A and c~= 25A. A similar hexagonal structure was obtained for an opal purchased from a mineral collector in Australia by A.E. Johnson. The indexed X-ray diffraction pattern for the Australian opal is given in Table 4 because the ASTM card file does not include an opal pattern.

Discussion

The data obtained in this study confirm that the main amorphous phases are nontronite in the ooliths and ferruginous opal in the matrix; both contain submicroscopic goethite. The nontronite is partly crystalline; manifestations of the structure can be recognized on X-ray diffraction patterns, and individual crystallized nontronite grains can be found with transmission electron diffraction. Infrared and Mossbauer studies show that the undeveloped part of the nontronite structure is the octahedral layers of cations coordinated to the OH groups. Grains with undeveloped layers appear to be faulted. The mineral structure is sufficiently developed, however, to hold large amounts of interlayer water.

Unlike most nontronites, that from Peace River contains some ferrous iron, and in this respect the mineral is like the ferroan nontronite from the Red Sea (Bischoff, 1972). Petruk (1977) postulated that nearly all the iron in nontronite in situ in the lower horizon of the Peace River deposit is ferrous, but upon exposure to the atmosphere it is progressively oxidized.

The ferruginous opal has the X-ray diffraction and infrared properties of opal, breaks into large pieces on drying, and is soft. It contains large amounts of iron and other impurities and holds large amounts of absorbed water. Some of the absorbed water escapes when the opal is heated to 105C, but much remains. Thermogravimetric analysis of the ore (Petruk, 1977) suggests that absorbed water continues to escape as the ore is heated to 600C. It is possible that the hardness of the mineral is related to the amount of absorbed water.

MARUM IN-HOUSE ANALYTICAL DATA

Appendix E is a compendium of assay data produced on behalf of Marum Resources Inc. by Terramin Research Labs Inc., Loring Laboratories Ltd. and Activation Laboratories Ltd.

Across 45 determinations, the average gold concentration in the iron formation in the Worsley test pit is 0.0049 oz/ton (standard deviation =0.0162, maximum concentration observed was 0.0886 oz/ton and the minimum was the detection limit of 0.0001 oz/ton. The average value assuming $350/oz is therefor $1.715/ton as mined. The maximum value would be $31.01.

SYNTHESIS: GEOLOGY OF THE IRONCAP

The following facts emerge from the literature and the consultant studies done for Marum:

1. The deposit is an oolite of marine origin.
2. The minerals forming the ore body are of volcanic or hydrothermal origin.
3. All of the iron minerals present are formed by secondary replacement, probably under reducing conditions. Free aluminum and gold have been observed in many samples.
4. The average gold values of a large data set are well below the economic threshold for mining.
5. In-situ iron below the zone of weathering is in the FeII form.

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AUTHOR

Richard A. Boulay, B.Sc., President of Marum Resources Inc. is the author of this report.

In 1967, Mr. Boulay graduated from Carleton University with a Bachelor of Science degree in geology. His subsequent 30 year career has included a diversity of projects in the international mining and mineral exploration industries. In the early 1970's he was employed as a mining investment analyst at a Toronto investment firm. This activity was followed by twelve years of international project financing with three international banks. Since 1985, Mr. Boulay has been involved in the startup and development of public companies in the mining, technology and financial industries.

MARUM RESOURCES INC.

1995/96 ASSESSMENT WORK - PERMITS 9390100001 THROUGH 9390100008

STATEMENT OF EXPENDITURES

EXPENSES

Work Performed by Marum Resources Inc.					
Geological Services		**Rate**	**Travel &**		
	Days	**/Day**	**ccom/Day**	**Total**	
[redacted] Geologist	65	$500		$32,500	
[redacted] Geologist	130	$500		$65,000	
Field & Lab Assistants	30	$200		$6,000	
				$0	
				$0	
				$0	
				$103,500	$103,500
General cost Allocations					
Technical Overhead & Infrastructure				$12,000	
Vehicle Rental	113	$80		$9,040	
Sample Storage				$4,800	
				$0	
				$25,840	$25,840
Marum Calgary Laboratory Cost Allocations					
		Rate			
	Days	**/Day**		**Total**	
Attrition & Grinding	35	$150		$5,250	
De-Sliming	30	$150		$4,500	
Table Concentration	30	$150		$4,500	
Crusher Rental	35	$50		$1,750	
Impactor Rental	35	$50		$1,750	
Gravity Table Rental	30	$50		$1,500	
Sample Shipping					
				$19,250	$19,250
Total Exploration Allocations					**$148,590**
Costs paid by Marum Cheques					$118,000
Total Exploration Expenditures					**$266,590**
			Total	Hectares	24,744.00
				Amount	$10
Applied to Permits 9390100001 through 9390100008					**$247,440**
				Excess	$19,150

DECLARATION

The undersigned, Richard A. Boulay, hereby declares that the above stated exploration expenditures were incurred in the diligent exploration of Metallic and Industrial Mineral Permits Nos. 939010001 though 9390100008 during the period January 1, 1995 through December 31, 1996 in accordance with the applicable regulations and in compliance with the applicable permitting requirements.

[redacted]

Richard A. Boulay, Calgary, June 9, 1997

Appendix A

Metallic and Industrial Minerals Permit Title Documentation

Marum Resources Inc.

Ironcap Project, Alberta
Metallic and Industrial Minerals Permit Title Documentation
April, 1997

Introduction

In anticipation of the development of the Ironcap Metallic and Industrial Minerals permits into a pig iron production project, Marum Resources undertook to formalize its title to the permits. This was achieved on March 10th, 1997. Marum holds a 100% interest in the permits, subject to certain contractual obligations to 423771 Alberta Ltd., a private company which is 25% owned by Marum.

Contents

Black and white sketch map of project area
Coloured map of project area
This page
Location map on township grid
(not included) Transfer Forms indicating Marum's 100% interest
(not included) Original Permits
(not included) March 10th, 1997, property agreement
(not included) Right of first refusal agreement between Marum and Bryant
(not included) Exploring for Minerals in Alberta booklet

List of Ironcap Permits

Permit No. 9390900001	4,248 hectares
Permit No. 9390900002	7,832 hectares
Permit No. 9390900003	3,448 hectares
Permit No. 9390900004	6,296 hectares
Permit No. 9390900005	2,872 hectares
Permit No. 9390900006	16 hectares
Permit No. 9390900007	16 hectares
Permit No. 9390900008	16 hectares
Total land position	**24,744 hectares**

History of the permits

Permits issued to 423771 Alberta Ltd. and Estabrook Construction Ltd. in 1990
Permits re-issued under new regulations in February 1994
Exploration Agreement between Marum and 423771 in June, 1994
Permits transferred to 695491 Alberta Limited in July, 1996
Permits transferred to 423771 Alberta Limited in March, 1997
Permits transferred to Marum Resources Inc. in March, 1997

Current title status and existing agreements

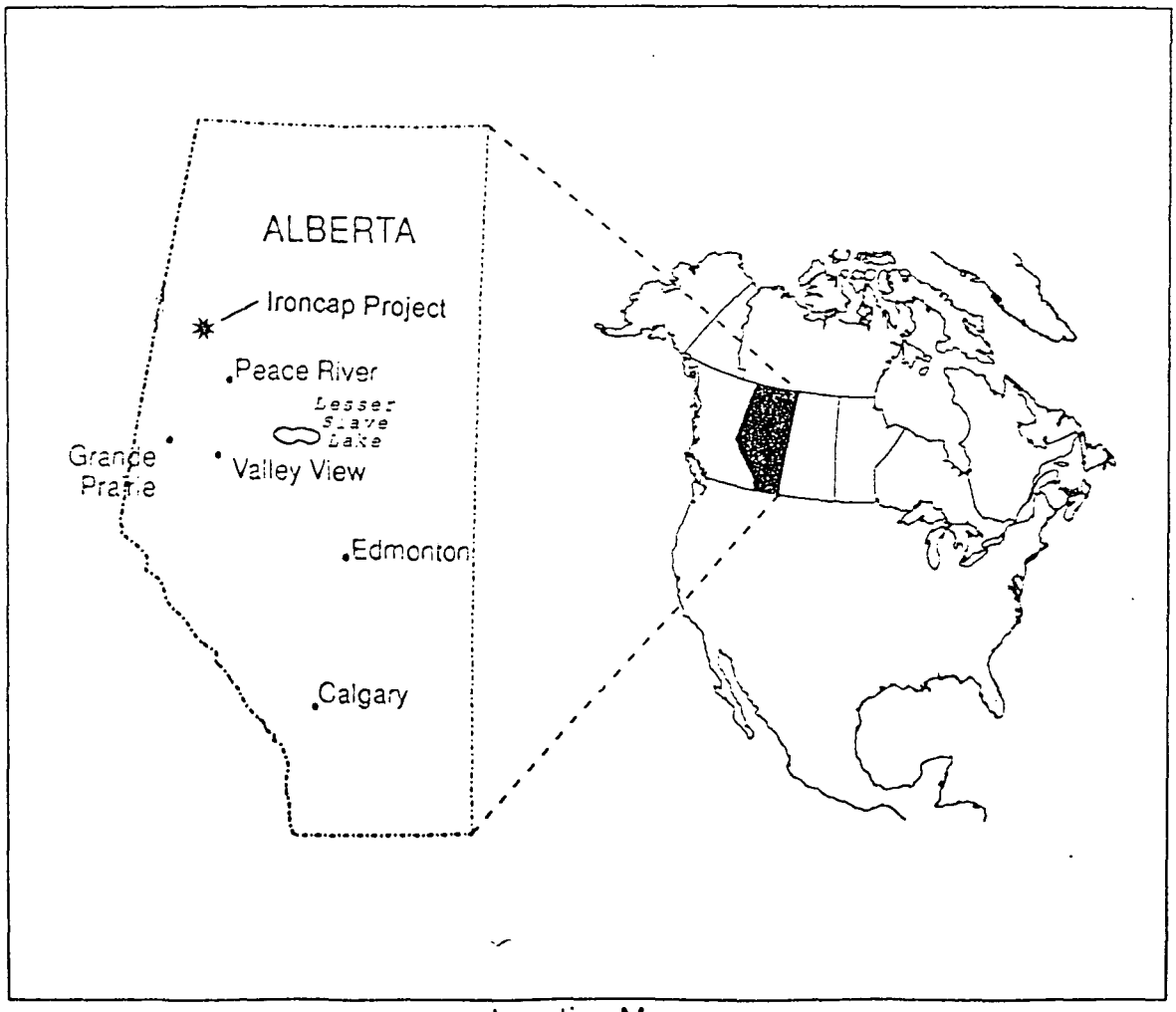
As at April, 1997 Marum was the registered holder of a 100% interest in the Ironcap permits. There exists an agreement between Marum and 423771 Alberta Ltd. The Marum-423771 agreement is outlined in a July, 1996 letter agreement and a March 10, 1997 formal agreement between Marum, 423771, 695491 Alberta Ltd. and shareholders of 423771. There is also an agreement between Marum and Thomas Bryant, a 423771 shareholder. The agreement between Marum and Bryant is a right of first refusal concerning the sale of 423771 shares by either Marum or Bryant.

As at April, 1997, Marum holds a 100% interest in the property subject to a 2% royalty due to 423771 Alberta Ltd. This royalty is convertible into a 30% working interest if 423771 elects to pay to Marum 1.5 times 30 percent of the development funds expended by Marum up to the time of exercise. Marum owns a 25% equity interest in 423771 and has a right of first refusal to purchase an additional 26% interest in the event that Thomas Bryant elects to sell his 423771 shares.

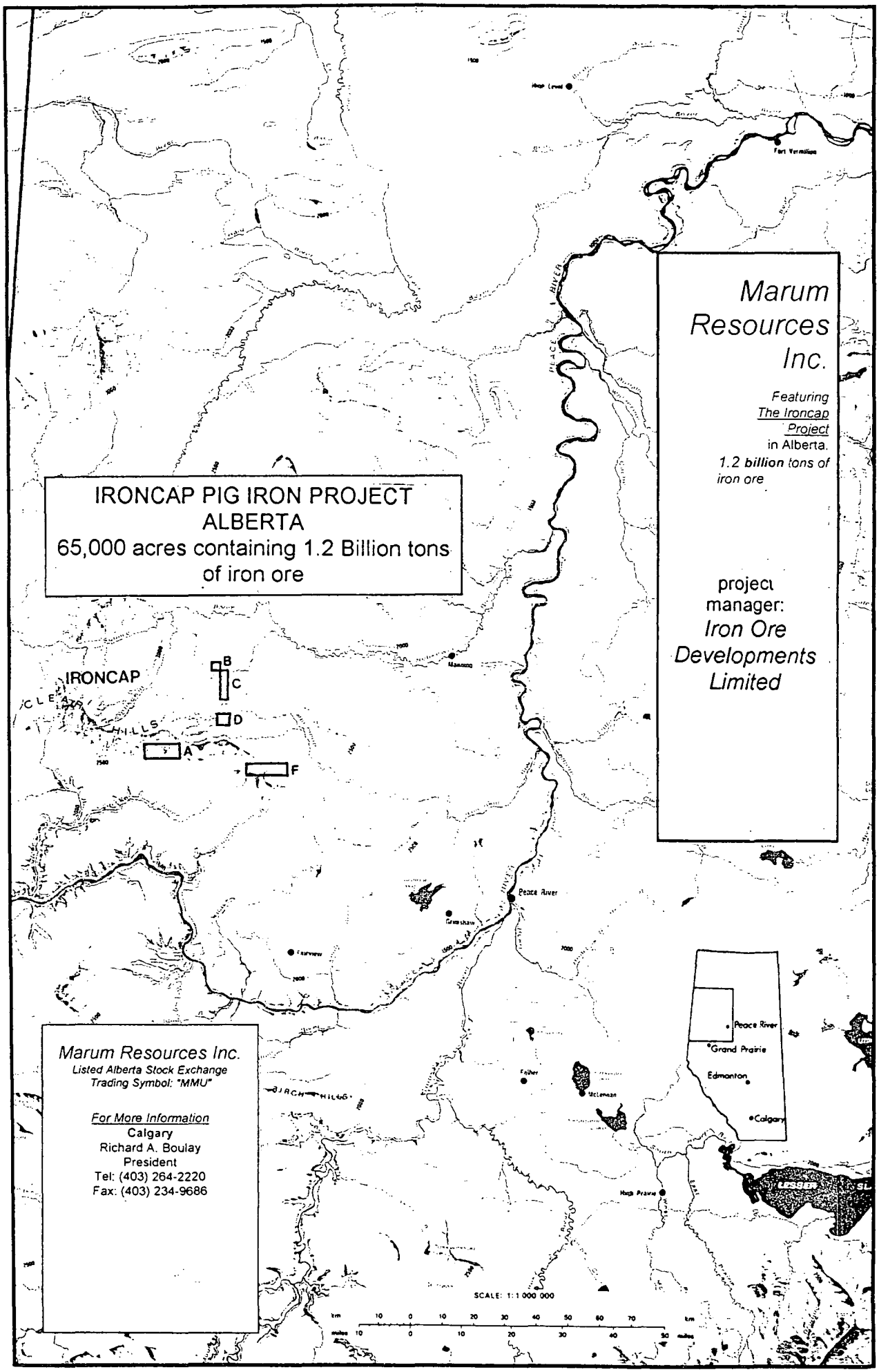
Marum Resources Inc.

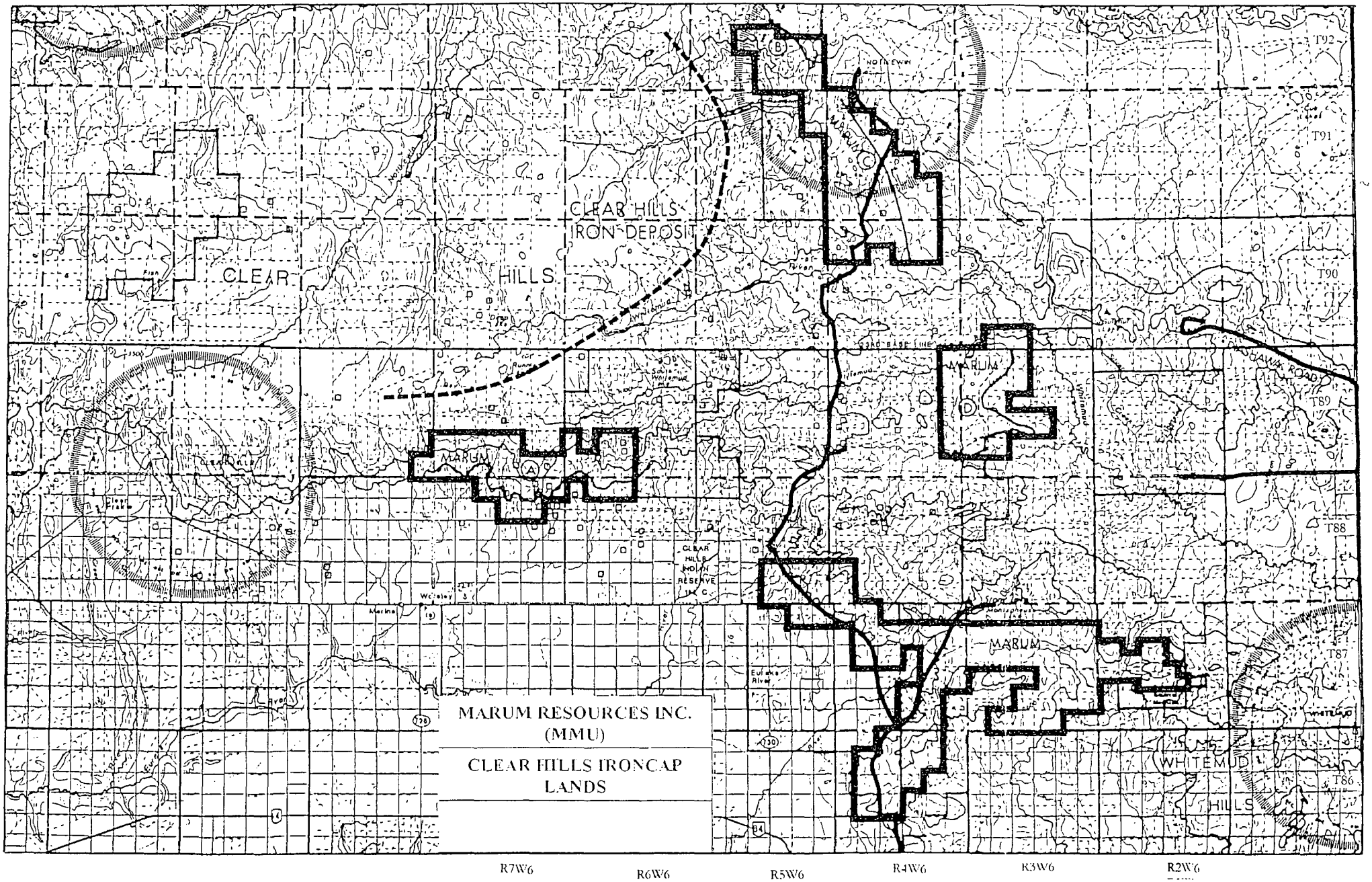
Metallic and Industrial Minerals Permit Title Documentation
Ironcap Project, Alberta
April, 1997

The Ironcap Project



Location Map


Marum Resources Inc.
Featuring The Ironcap Project in Alberta.
1.2 billion tons of iron ore
project manager:
Iron Ore Developments Limited
IRONCAP PIG IRON PROJECT
ALBERTA
65,000 acres containing 1.2 Billion tons of iron ore
IRONCAP
HILLS
A
B
C
D
F
Peace River
Grande Cache
Fairview
Fahler
McLennan
High Prairie
Fort Vermilion
Hay Level
Manning
PEACE RIVER
BIRCH HILLS
Peace River
Grand Prairie
Edmonton
Calgary
SCALE: 1:1 000 000
km 10 0 10 20 30 40 50 60 70 km
miles 10 0 10 20 30 40 50 miles
Marum Resources Inc.
Listed Alberta Stock Exchange
Trading Symbol: "MMU"
For More Information
Calgary
Richard A. Boulay
President
Tel: (403) 264-2220
Fax: (403) 234-9686



MARUM RESOURCES INC.
(MMU)

CLEAR HILLS IRONCAP
LANDS

Appendix B

Preliminary Evaluation of Clear Hills Iron Ore

Mikhail Report

Canada Centre for Mineral and Energy Technology

PRELIMINARY EVALUATION OF CLEAR HILLS IRON ORE

S.A. Mikhail, A.M. Turcotte, A.L. Putz,
S. Kuyucak, M.T. Shehata, P.J.A. Prud'homme,
and A. Demers

CANMET

Work performed for:
MARUM RESOURCES &
M.I. ENVIRONMENTAL SYSTEMS
Calgary, Alberta.

June 1996

Project No. 51252

CONFIDENTIAL

MINING AND MINERAL SCIENCES LABORATORIES
REPORT MMSL 96-41(CR)

PROJECT MANDATE

TITLE: Preliminary Evaluation of Clear Hills Iron Ore (MMSL 51252) **[CONFIDENTIAL]**

PROJECT TEAM: Shaheer A. Mikhail (Project Leader)
Anne-Marie Turcotte — Selçuk. Kuyucak (MTL)
Angela L. Putz — Mahmoud T. Shehata (MTL)
Pierre J.A. Prud'homme — André Demers (MTL)

DESCRIPTION: A project to determine the feasibility of forming pig iron from the Clear Hills iron ore deposit of Alberta.

OBJECTIVES:
1. To characterize the ore sample using thermal, chemical and XRD analyses.
2. To upgrade the ore using simple ore dressing techniques.
3. To test the feasibility of melting the concentrate, with a flux and a reducing agent, to form pig iron.

CLIENT: Marum Resources Inc., 400-407 8th Avenue S.W., Calgary, Alberta T2P 1E5. (Tom Sneddon, MT Environmental Inc., 20 Citadel Cr. N.W., Calgary, Alberta, T3G 3V1).

CONSTRAINTS:
Time: 6 weeks **Starting Date:** April 22, 1996 **Cost**: Estimated $13K.
Performance: Terms and Conditions are specified in the original contract.
Resources:
a) Personnel, equipment and material resources are shared with other core and revenue-generating projects.
b) Shortage of technical support staff in some areas.
c) Limitations on travel and capital budgets.

SPECIAL AUTHORITIES:
a) Management for assignment of personnel, approval of expenditures, travel and contracts.
b) No special security requirements are anticipated.

REPORTING: Verbal reporting on the progress to MT Environmental and a brief final report at the end of the project.

KEY ASSUMPTIONS:
- The sample is representative of the ore deposit.
- A reasonable upgrade of the iron in the sample will be achieved.

WORK PLAN

Characterization of ore as received:

1. XRD
2. Thermal characterization (TG/DTA/FTIR).
3. Chemical Analysis

Upgrading of the ore:

1. Attrition grinding to 65 mesh (about 0.2 mm) and screening to remove the fines.
2. High-intensity magnetic separation to remove the silica and concentrate the iron.
3. Heating in air to 600°C to upgrade the solids by removing the H_2O and CO_2 (preliminary thermal analysis indicated that, on heating this material to 600°C, a weight loss of about 15% due to dehydroxylation of goethite and decomposition of carbonate(s) takes place)

Reduction/smelting of the concentrate:

1. Based on the chemical analysis of the concentrate, the amounts of graphite and lime additions are calculated.
2. Mixing of the charge and melting in an induction furnace.
3. Sampling the melt and the slag for characterization.

Services: Thermal and chemical analyses, XRD and scanning electron microscopy.

PROCEDURES AND RESULTS

Characterization of the Ore as Received:

A sample from Clear Hills iron ore deposit was examined by X-ray diffraction (XRD) and thermal and chemical analyses. The sample, brown in colour, was received in the form of powder of different particle sizes with lumps of up to 5 cm in diameter. A fairly large proportion of the ore was in the form of fine particles and the lumps were fairly friable. Because of the large amount of fines, the losses during dry grinding, screening, magnetic separation and smelting are expected to be high.

1. XRD

X-ray diffraction analysis indicated that the ore contained mainly goethite (FeOOH) with minor amounts of quartz and trace amounts of muscovite $KAl_2(AlSi_3)O_{10}(OH)_2$ or another mica-type material. Components of less than a few percentage may not be detected by XRD.

2. Thermal analysis (TG/DTA/FTIR)

Thermal analysis is a group of techniques in which some physical property of a substance and/or its reaction product(s) is measured as a function of temperature or time while the substance is subjected to a controlled temperature program in a certain atmosphere. In the present work, thermal analysis was carried out using simultaneous thermogravimetry (TG) and differential thermal analysis (DTA). Fourier transform infrared analysis (FTIR) was also used simultaneously with TG and DTA to identify gaseous species evolved during the heating or cooling of the sample.

The results of the thermal analysis, Figure 1, indicated that, on heating in air, the ore loses about 15% of its mass below 600°C as shown in the TG diagram. This mass loss is accompanied by endothermic effects on the DTA curve and by the evolution of H_2O and CO_2 as shown on the FTIR gas-evolution diagram. The evolved H_2O indicated a loss of adsorbed water as well as a dehydroxylation of goethite to form hematite. The evolution of CO_2 indicated the presence of trace amounts of carbonates, e.g. siderite. The first indication of melting was detected at 1430°C on the DTA curve and, on cooling, the first crystallization appeared at 1456°C.

The smelting/reduction process was simulated by mixing the ore, as received, with carbon and limestone in equal amounts and heating the mixture in air in the thermal analyzer. The results are shown in Figure 2. The TG curve indicated a total mass loss of about 50%, most of which occurred in the temperature range 500-900°C, accompanied by a large exothermic peak (on the DTA curve). The mass loss was mainly due to the combustion of the carbon (exothermic) and the decomposition of the limestone (endothermic) in the mixture. The melting of this sample

commenced at about 1225°C, which is significantly lower than the melting temperature of the ore alone. The first crystallization was detected on the cooling curve at about 1355°C.

The results of the thermal analysis experiments at this stage provided important information for the subsequent smelting/reduction tests.

3. Chemical analysis

The chemical analysis indicated that the ore sample contained 33.6% total iron, 23.5% SiO_2, 5.7% Al_2O_3, 1.4% CaO, 1.3% P_2O_5, 0.8% MgO, 0.7% K_2O and 18.8% LOI. Only trace amounts of S, Mn, Na were detected. From the total iron results it is evident that this is a relatively low-grade iron ore.

Upgrading of the Ore:

From a mineralogical characterization study by Petruk, Klymowsky and Hayslip (1977) [1] of the oolitic iron ore of Peace River, Alberta, it was determined that high-intensity magnetic separation was reasonably effective in upgrading the ore and that the best size for the oolith liberation is -65 mesh (<210 mm). Only slightly higher concentrate grades and recoveries were achieved for the -100 mesh (<150 μm) material. Since the objective of this preliminary work was only to upgrade the ore using simple ore dressing techniques, the ore was first crushed to <2 mm in a Denver Jaw Crusher and further crushed to -65 mesh in a Denver Roll Crusher. The resultant material was dry screened to -65+325 mesh on a Rotex Screener. The +65 mesh fraction was pulverized using a McCool Pulverizer and rescreened. The -325 mesh product was not used. High-intensity magnetic separation of the -65+325 mesh material was carried out using a Stearns Cross Ring Magnetic Separator. Due to dry screening, the particles appeared to be coated with a fine iron-ore dust. The Stearns magnetic separator was set at 3 amps / 7000 gauss to produce an approximate 80% magnetic / 20% non-magnetic split. No attempts were made to optimize the separator's parameters.

Based on the results of the thermal analysis, it was also decided to heat (roast) the concentrate to 600°C to remove contained H_2O and CO_2 before the melting tests. This was done in a fluid bed reactor with a relatively high pressure air flow. The resultant reddish brown powder was identified by XRD as mainly hematite with minor amounts of quartz.

The results of the chemical analysis of the ore before and after different stages of upgrading are summarized in Table 1. It can be seen from these results that the upgrading of the ore was not substantial. It must be kept in mind, however, that only simple upgrading techniques were used and no optimization of any of the upgrading stages was attempted.

Table 1: Chemical analysis of the material at different stages, (%).

	As received ore	After grinding and screening	After grinding, screening and mag. separation	After grinding, screening, mag. sep. and roasting
Total Fe	**33.60**	**34.30**	**34.60**	**40.00**
SiO_2	**23.50**	**23.30**	**22.90**	**28.30**
Al_2O_3	**5.70**	**5.50**	**5.40**	**6.90**
CaO	**1.40**	**2.10**	**1.80**	**2.40**
MgO	**0.80**	**0.83**	**0.83**	**1.10**
P_2O_5	**1.30**	**1.80**	**1.60**	**1.90**
K_2O	**0.70**	**0.67**	**0.65**	**0.80**
LOI	**18.80**	**17.20**	**17.40**	**3.17**

Reduction/smelting of the Concentrate:

The smelting experiments were carried out in a 100 kW, 100 kg steel capacity, coreless induction furnace. The furnace was fitted with a bilge type silicon carbide crucible, 6" i.d. on top, 10" high with a1" wall thickness (5 litre working volume). The silicon carbide crucible was selected because it is self suscepting (i.e. it heats up under induction field). The heating was also assisted by placing a 3"-thick graphite rod in the charge.

The concentrate had 40% iron in the form of hematite; making up 57% of the concentrate. The remaining 43% would be mostly slag-making constituents (see Table 1) with some volatiles. The concentrate was mixed with sufficient graphite as reductant, and lime to adjust the basicity. The amount of graphite was calculated from the stoichiometry of the reaction:

$$Fe_2O_3 + 3\,C = 2\,Fe + 3\,CO$$

In the absence of losses, each kilogram of concentrate (570 g of Fe_2O_3) should consume 0.128 kg graphite, as reductant, and yield 0.4 kg iron. The resulting iron would also dissolve about 4% carbon (0.016 kg graphite). Assuming a 40% loss of graphite to atmospheric oxidation, the final carbon mass balance will be as follows:

C as reductant	32% of Fe units	0.128 kg
C_{Fe}	4% "	0.016 kg
C losses	40% of total C input	0.093 kg
Total graphite charged per kg of concentrate		0.238 kg

Lime was added to adjust the basicity of the slag. The slag basicity may be defined as:

$$\frac{CaO + MgO + MnO}{SiO_2 + Al_2O_3 + P_2O_5}$$

Typically, a basicity of 0.9-1 would be desirable in a blast furnace for effective desulfurization and, at the same time, a fluid slag. In the present work, however, a basicity of 0.4-0.5 was thought to be sufficient under the present experimental conditions. About 0.125 kg lime was, therefore, added (in addition to the amounts present in the concentrate) per each kg of concentrate.

The starting materials were mixed and placed in the crucible at room temperature. As the temperature increased and the reduction started, fingers of blue flames caused by the combustion of carbon monoxide were visible at the surface of the charge. At the end of the heat, the slag was scooped out and the molten metal was cast in a graphite mold, specially assembled for this process.

Melt I: In this test, 4 kg of roasted (heated to 600°C) concentrate was mixed with about 1 kg of graphite (1-2 mm particle size) and 500 g of lime (CaO powder). The produced molten metal was cast in the graphite mold. The metal yield was 0.63 kg, which was significantly less than the calculated yield of about 1.6 kg. This was probably due a significant loss fine particles through dusting and of metallic iron to the slag.

Melt II: In the second test, 8 kg of roasted concentrate was mixed with 3 kg of graphite (50% higher in ratio than that used in Melt I) and 1 kg of lime were used. The excess graphite was added to further enhance the reduction and, perhaps, to increase the metallic yield. The molten metal was cast in the graphite mold and the metal yield in this test was about 1.2 kg, again, significantly less than the calculated yield of about 3.2 kg.

Melt III: The third test was done because the yield in the first test was too small and to examine the feasibility of reduction/smelting the non-roasted concentrate. As mentioned earlier, and as shown in Figure 1, this material exhibited about 15% mass loss when heated to 600°C. Six kg of concentrate, together with 1.5 kg of graphite and 500g of lime, were used in this test. The metal yield was 0.44 kg, indicating more losses than that which occurred in the first two tests.

Characterization of the Products:

Scanning electron microscopy of the metal:

The metallic product generated in the three tests were examined by scanning electron microscopy (SEM) and energy dispersive X-ray (EDX) microanalysis system. The samples (labelled #1, #2 and #3), were mounted in a conventional metallographic mount and were subjected to the conventional grinding and polishing procedure. The results are presented in

Figures 3, 4 and 5, where each Figure contains an SEM photomicrograph and two EDX spectra (one for the overall microscopic field giving the overall composition and the other is a spectrum taken from the dark phase that appears to be graphite flakes). The samples appear to contain at least 90% iron (perhaps >95% in sample #2), with some Si in solution. The dark flakes are mostly carbon (graphite) with some concentration of P and Si. In addition, a trace of oxygen was detected in sample #3, which may indicate the presence of very small amounts of iron oxide. (grey particles in the photomicrograph of Figure 5)

Chemical analysis of slag:

A summary of the chemical analysis of the slags generated during the three reduction/smelting tests is shown in Table 2.

Table 2: Chemical analysis of the slags, (%).

	Slag of Melt I	Slag of Melt II	Slag of Melt III
Total Fe	13.7	24.1	21.3
C	17.0	17.0	19.0
SiO_2	39.2	33.5	31.8
Al_2O_3	9.5	8.8	8.9
CaO	16.4	12.7	10.3
MgO	1.3	1.2	1.1

CONCLUSIONS AND RECOMMENDATIONS

This preliminary qualitative study indicated that the reduction/smelting of the Clear Hills iron ore to produce metallic iron is technically feasible. Due to the physical and chemical nature of the ore, however, high material losses and low metallic yield are expected. No optimization of any of the tests performed in this study was attempted and a significant amount of work is required if the whole process is to be optimized. It is recommended that future R&D include the following tasks:

- detailed mineralogical characterization of the ore
- variable atmosphere thermal analysis
- optimization of the upgrading process based on the mineralogical characterization
- reduction roasting using CO/CO_2 or H_2 on a bench scale (TA)
- optimization of the reduction/smelting process (study of the different parameters)
- detailed SEM study of the metallic iron and the slag

REFERENCES

1. Petruk, W., Klymowsky, B.I. and Hayslip, G.O., CIM Bulletin, October 1977.

ACKNOWLEDGEMENTS

The authors would like to thank Dr. W. Petruk for his valuable advice and the staff of the Chemical Laboratory, Pierrette King of the Environment Laboratory and Paul Carrière and Mike Beaulne of the Mineralogy group of MMSL for their assistance in this study. The help of the Foundry staff and of Bernard Casault of MTL is very much appreciated.

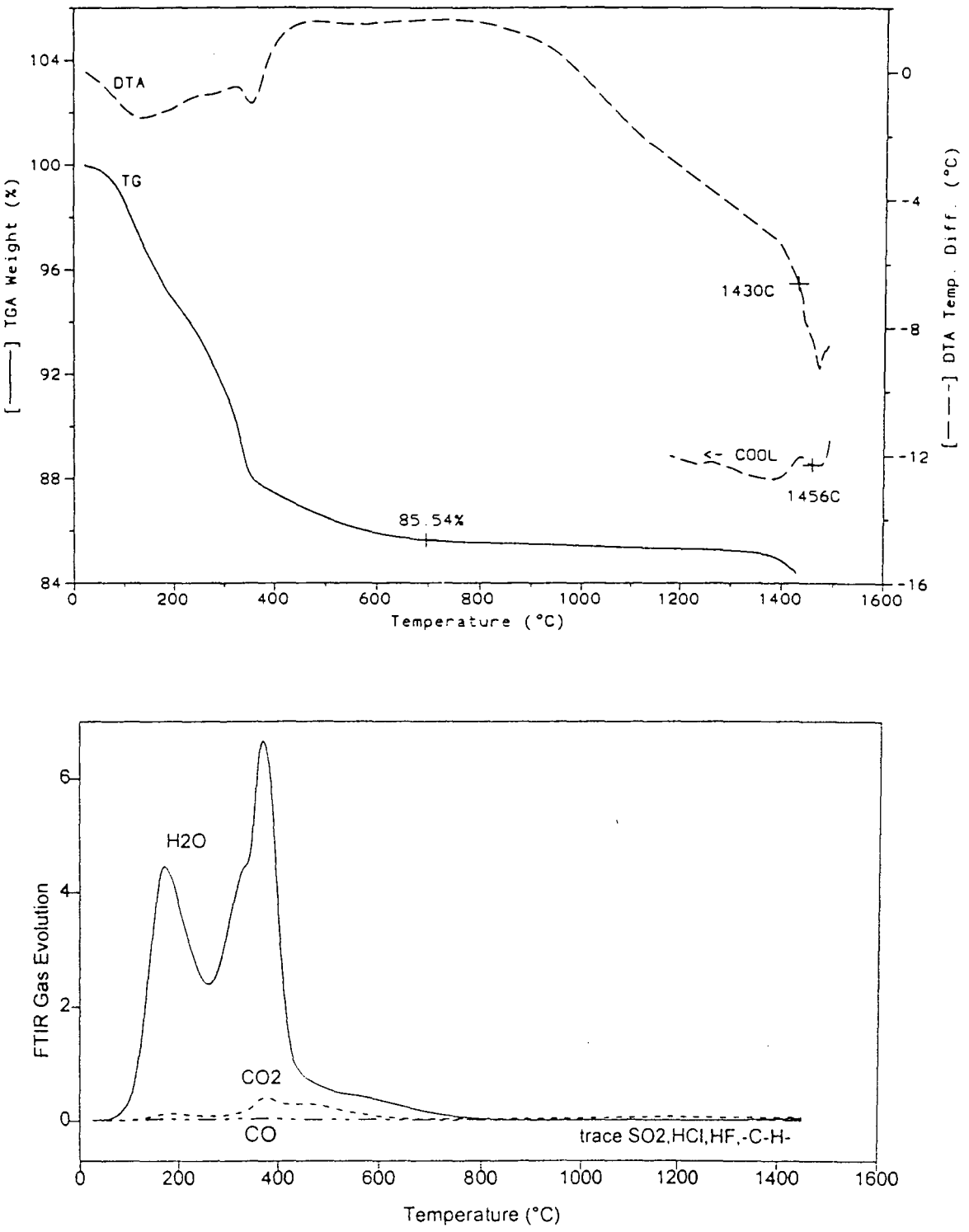


Figure 1: TG/DTA/FTIR curves for Clear Hills iron ore sample in air.

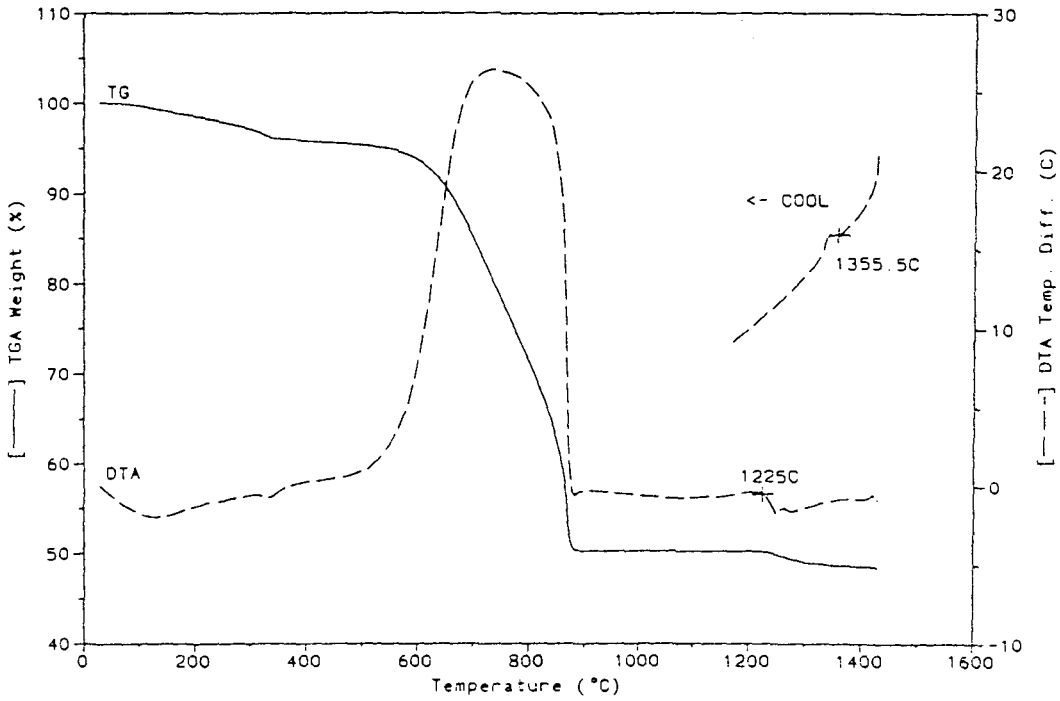


Figure 2: TG/DTA diagram for Clear Hills iron ore sample, mixed with graphite and limestone, in air.

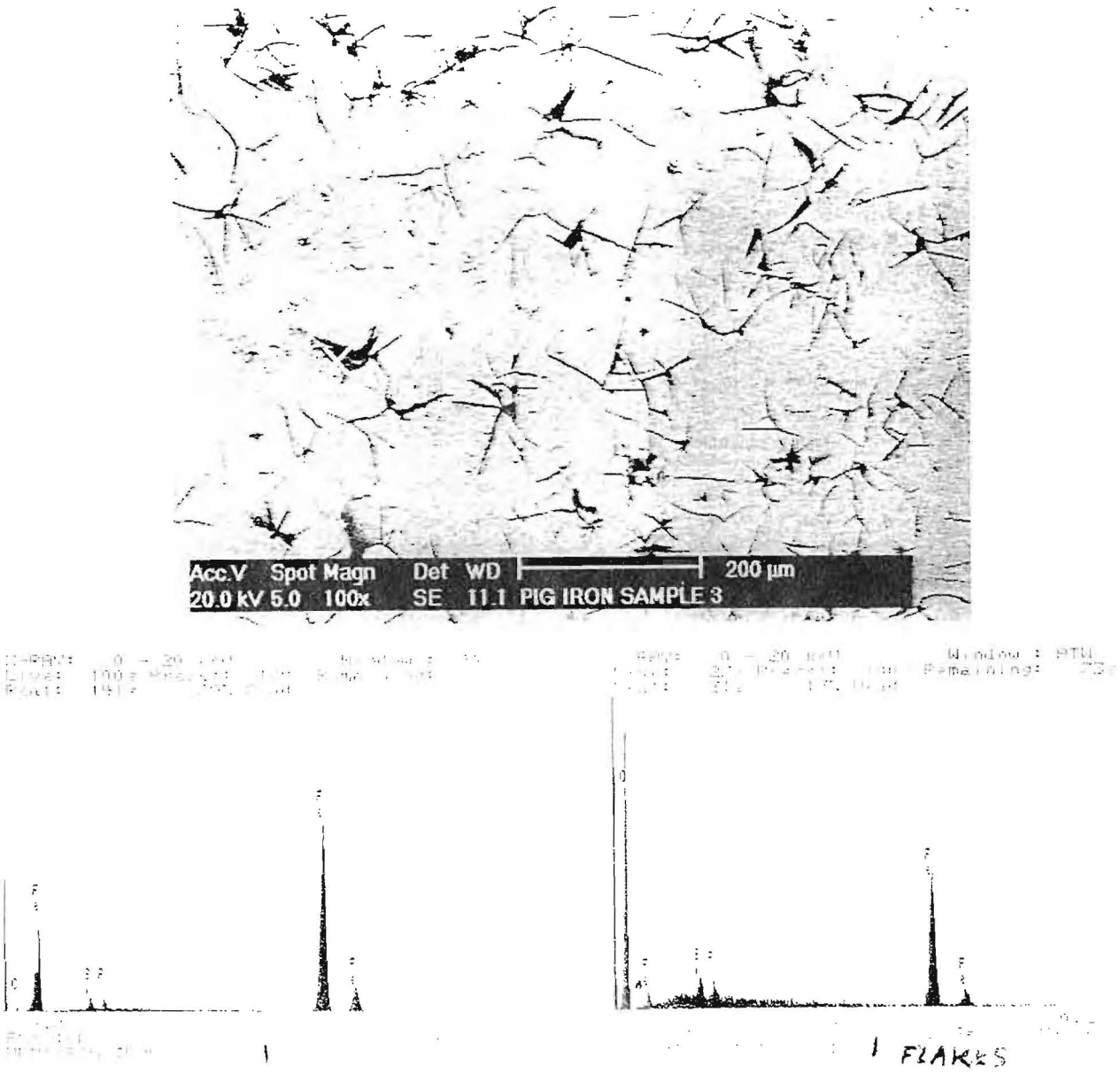


FIGURE 3. SEM Photomicrographs of sample #1 showing a general view of the pig iron microstructure. The EDX spectrum at bottom left represents the overall composition in whole microscopic field, the second spectrum (bottom right) is taken from the dark phase that appears mostly like graphite flakes.

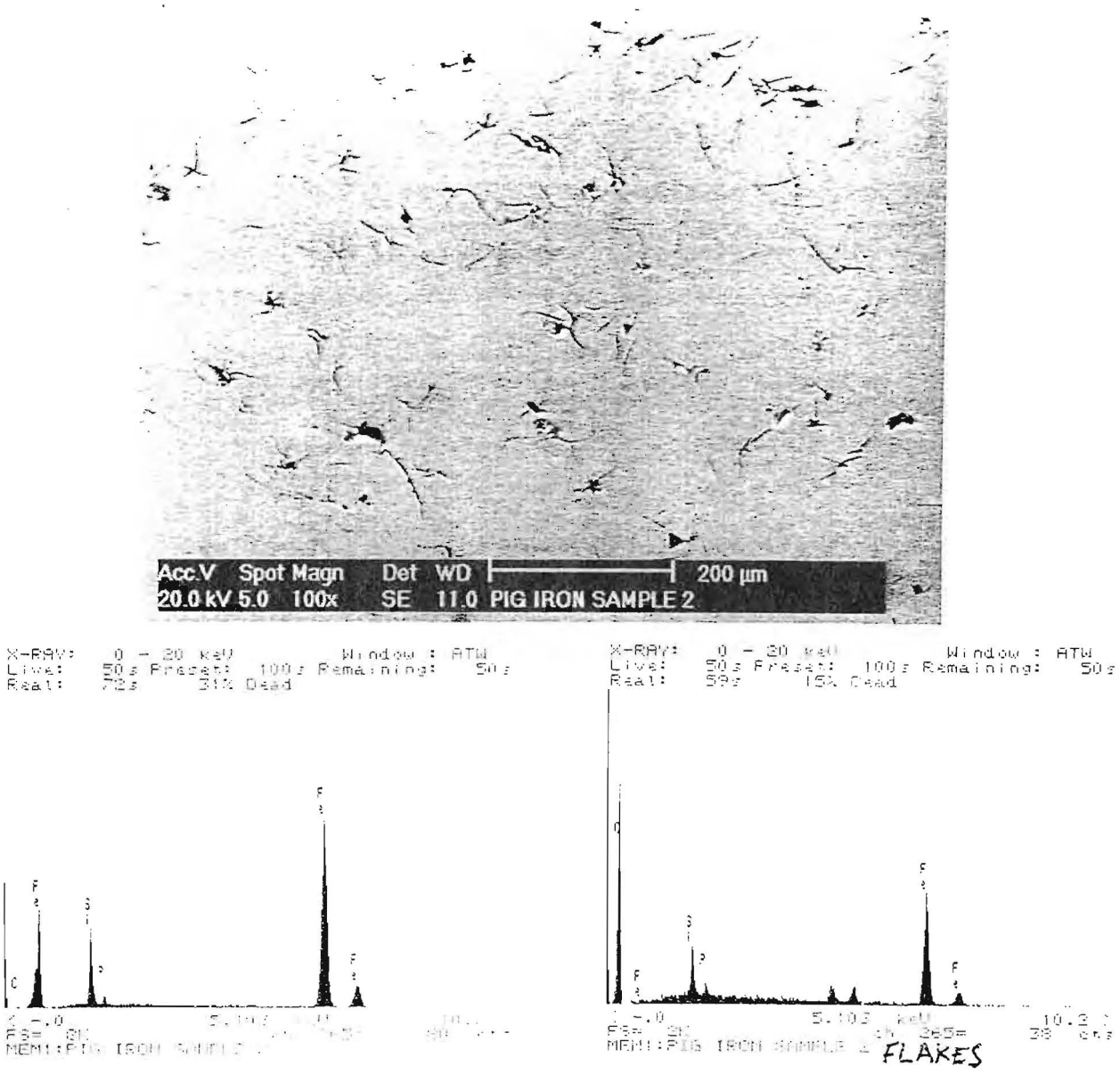


FIGURE 4. SEM Photomicrographs of sample #2 showing a general view of the pig iron microstructure. The EDX spectrum at bottom left represents the overall composition in whole microscopic field. the second spectrum (bottom right) is taken from the dark phase that appears mostly like graphite flakes.

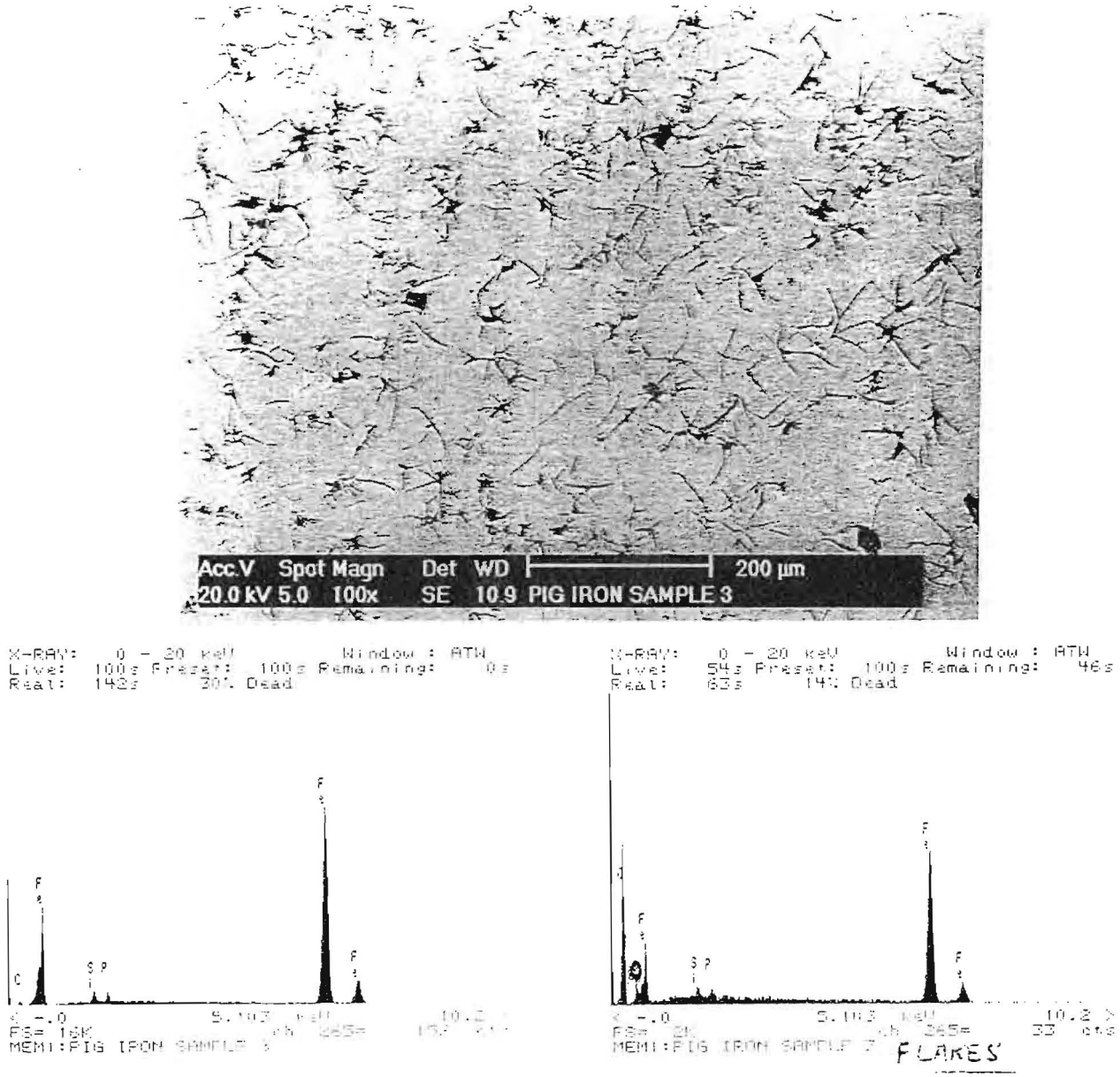


FIGURE 5. SEM Photomicrographs of sample #3 showing a general view of the pig iron microstructure. The EDX spectrum at bottom left represents the overall composition in whole microscopic field, the second spectrum (bottom right) is taken from the dark phase that appears mostly like graphite flakes.

Appendix C

Drill Logs

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: NSSTN-1

LOCATION: On the north - south cutline 3.5 km. north west of Worsley pit on the Running Lake Road. 50 m. from south interrsect with road.

SITE DESCRIPTION: Relativly flat with drop off to valley on the south end. North end rises gradually towards station 9 and then a rapid rise in elevation to the top of a small hill and then dropping off into valley to the north.

RELATIVE ELEVATION: 8' 6" lower than stn3.

LOG (in feet from surface):

0 - 10 brown fine grained glacial material no sample
10 - 19 blue shale no sample
19 - 20 blue shale - clasts (quartz?) sample NSSTN1 19 - 20
20 - 40 blue shale no sample
40 - 45 blue shale sample NSSTN1 40 - 45
45 - 70 blue shale no sample
70 HOLE END

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: NSSTN2

LOCATION: 100 METERS NORTH OF THE LINE INTERSECT WITH RUNNING LAKE ROAD.

SITE DESCRIPTION: FLAT GROUND WITH GENTAL SLOPE TO THE NORTH

RELATIVE ELEVATION: SITE IS 3 FEET HIGHER THAN SITE 1 AND 3 FEET LOWER THAN SITE 3.

LOG:		
	0 - 8	NO SAMPLE
	8 -12' 6"	TRANSITIONAL GLACIAL TO OOLITIC IRONCAP LOOKS LIKE TOP OF FORMATION TORN UP BY GLACIAL ACTION.
	12' 6" -15	IRONCAP - RICH OOLITIC
	15 - 17	IRONCAP - OOLITIC WITH SOME MUDSTONE
	17 - 21	IRONCAP BUFF BROWN LESS OOLITIC
	21 - 22	TRANSITIONAL IRONCAP TO BLUE SHALE
	22 - 25	TRANSITIONAL BUT WITH WHAT APPEAR TO BE WHITE AND YELLOW (IRONSTAINED ?) SALT CRYSTALS
	25 - 26	BLUE SHALE - LARGE PYRITE CRYSTALS FAIRLY COMMON
	26 - 30	BLUE SHALE MINOR LARGE PYRITE HOLE END

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: NSSTN3

LOCATION: 150 METERS NORTH OF THE LINE INTERSECT WITH RUNNING LAKE ROAD.

SITE DESCRIPTION: FLAT GROUND

RELATIVE ELEVATION: SITE IS 8 1/2 FEET HIGHER THAN SITE 1 AND 3 FEET HIGHER THAN SITE 5.

LOG:	0 - 9	NO SAMPLE
	9 -12' 6"	TRANSITIONAL GLACIAL TO OOLITIC IRONCAP LOOKS LIKE TOP OF FORMATION TORN UP BY GLACIAL ACTION.
	12' 6" -15'6"	IRONCAP - RICH OOLITIC
	15' 6" - 17	IRONCAP - OOLITIC WITH SOME MUDSTONE
	17 - 20	IRONCAP - HARD WITH COURSE MUDSTONE
	20 - 24	IRONCAP BUFF BROWN LESS OOLITIC
	24 - 25	BLUE SHALE WITH SOME MINOR PYRITE
	25 - 26	BLUE SHALE - PYRITIC
	26 - 29	BLUE SHALE - MINOR PYRITE BUT LARGE PYRITE CRYSTALS AND COLLECTIONS OF CRYSTALS
	29 - 30	BLUE SHALE - PYRITIC
	30 - 31	BLUE SHALE - SOME PYRITE
	31 - 32	BLUE SHALE - PYRITIC
	32 - 35	BLUE SHALE - QUITE PLASTIC - SOME MINOR PYRITE
		HOLE END

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: NSSTN4

LOCATION: 200 METERS NORTH OF THE LINE INTERSECT WITH RUNNING LAKE ROAD.

SITE DESCRIPTION: FLAT GROUND IN A SMALL AREA THAT LOOKS LIKE IT IS WETLAND IN SUMMER - LOWER THAN MOST OTHER SITES.

RELATIVE ELEVATION: SITE IS 6 FEET LOWEER THAN SITE 7 AND 2 FEET LOWER THAN SITE 2

LOG:	0 - 14	NO SAMPLE - GLACIAL MATERIAL - FINE GRAINED
	14 - 16	IRONCAP WITH MUDSTONE
	16 - 17	IRONCAP - RICH MUDSTONE
	17 - 21	IRONCAP RICH OOLITIC
	21 - 22	IRONCAP - BLUE SHALE COMBO
	22 - 23	BLUE SHALE - PLASTIC
	23 - 25	BLUE SHALE - CRUMBLY - PYRITIC
	25 - 27	BLUE SHALE - PLASTIC - NO PYRITE SEEN
	27 - 40	BLUE SHALE - LESS PLASTIC WITH MINOR LARGE PYRITE
		HOLE END

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: NSSTN4A

LOCATION: 200 METERS NORTH OF THE LINE INTERSECT WITH RUNNING LAKE ROAD.

SITE DESCRIPTION: FLAT GROUND IN A SMALL AREA THAT LOOKS LIKE IT IS WETLAND IN SUMMER - LOWER THAN MOST OTHER SITES. TWO FEET FROM HOLE NSSTN4.
*****DRILLED TO OBTAIN LARGER PYRITE SAMPLE.

RELATIVE ELEVATION: SITE IS 6 FEET LOWEER THAN SITE 7 AND 2 FEET LOWER THAN SITE 2

LOG:	0 - 23	NO SAMPLE
	23 - 25	BLUE SHALE - CRUMBLY - PYRITIC
		HOLE END

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: NSSTN5

LOCATION: On the north - south cutline 3.5 km. north west of Worsley pit on the Running Lake Road. 250 m. from south interrsect with road.

SITE DESCRIPTION: Relativly flat with drop off to valley on the south end. North end rises gradually towards station 9 and then a rapid rise in elevation to the top of a small hill and then dropping off into valley to the north.

RELATIVE ELEVATION: 10' higher than site 1

LOG (in feet from surface):

0 - 12' 6" fine grained brown glacial material no sample
SAMPLES TAKEN FROM THIS POINT -designated by NSSTN5 (plus depth)
12' 6" - 14' - ironcap
14' - 14' 6" ironcap fine mudstone
14' 6" - 15 ironcap grey clayey inclusions
15' - 15'10" ironcap oolitic with few stones
15'10" - 17'8" ironcap homogenous oolitic
17'8"- 19' ironcap - hard less oolitic
19'-19'6" ironcap with some mudstone
19'6"- 19'10" ironcap less oolitic - plastic texture
19'10"- 20' ironcap with mudstone
20' - 20'10" ironcap - hard crumbly with some mudstone
20'10" - 21'4" ironstained blue shale
21"4" - 22' ironcap? clayey mix
22' - 22'10 ironstain blue clay - shale
22'10" - 23'1" dry crumbly blue shale
23'1" - 23'3" very plastic blue clay-shale
23'3" - 23'9" dry crumbly blue shale
23'9" - 24'7" pyritic blue shale
24'7" - 24'8" pyritic blue shale - hard -crumbly
HOLE END

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: NSSTN5A

LOCATION: On the north - south cutline 3.5 km. north west of Worsley pit on the Running Lake Road. 250 m. from south interrsect with road.
Two feet from Station 5.

SITE DESCRIPTION: Relativly flat with drop off to valley on the south end. North end rises gradually towards station 9 and then a rapid rise in elevation to the top of a small hill and then dropping off into valley to the north.

RELATIVE ELEVATION: 10' higher than site 1

LOG:
0' - 12'7" Glacial material - fine brown clayey sand with some stones - look like quartzite a few pieces of coal.
12'7" - 17'6" - ironcap dense oolitic
17'6" - 18'6" - iron stained blue shale
18'6" - 21'2" - " "
21'2" - 21'4" - crumbly blue shale
21'4" - 22'8" - plastic blue shale
22'8" - 29' - blue shale some pyrite layers
Hole end

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: NSSTN7

LOCATION: 350 METERS NORTH OF THE LINE INTERSECT WITH RUNNING LAKE ROAD.

SITE DESCRIPTION: FLAT GROUND VERY GENTAL SLOPE TO THE NORTH

RELATIVE ELEVATION: SITE IS 4' HIGHER THAN SITE 5.

LOG: This hole used to recon depths for more detailed sample
9' - intersect of top of ironcap
9' - 25' - ironcap dense oolite grading to poor oolite in the bottom two feet
25' - intersect of top of blue shale

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: NSSTN7A

LOCATION: 350 METERS NORTH OF THE LINE INTERSECT WITH RUNNING LAKE ROAD. TWO FEET FROM STN7.

SITE DESCRIPTION: FLAT GROUND VERY GENTAL SLOPE TO THE NORTH

RELATIVE ELEVATION: SITE IS 4' HIGHER THAN SITE 5.

LOG: This hole was sampled using hollow auger and long split spoon sample tube.
0'-7' - no sample
7' - 8'4" - dark brown clayey material
8'4" - 11'3" - ironcap dense oolite
11'3" - 12'1" - ironcap with mudstone
12'1" - 28' - no sample
28' - 28'8" - pyritic blue shale
28'8" - 29 - very hard less pyrite blue shale
hole end could not penetrate with split spoon

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: NSSTN9

LOCATION: 450 METERS NORTH OF THE LINE INTERSECT WITH RUNNING LAKE ROAD.

SITE DESCRIPTION: FLAT GROUND AT EDGE OF SMALL HILL TO THE NORTH.

RELATIVE ELEVATION: SITE IS 4' HIGHER THAN SITE 7.

LOG:	0 - 11	NO SAMPLE - GLACIAL MATERIAL - FINE GRAINED
	11 - 16	IRONCAP WITH MUDSTONE
	16 - 20	IRONCAP RICH OOLITIC
	20 - 29' 6"	IRONCAP - BLUE SHALE COMBO
	29' 6" - 31	BLUE SHALE - CRUMBLY - PYRITIC
	31 - 33	PLASTIC BLUE SHALE NO PYRITE IMMEDIATELY VISABLE
	33 - 35	BLUE SHALE - CRUMBLY - PYRITIC
	35 - 37	BLUE SHALE - PLASTIC - NO OBVIOUS PYRITE
	37 - 40	BLUE SHALE - CRUMBLY - PYRITIC
	40 - 55	BLUE SHALE - SEMI PLASTIC - NO OBVIOUS PYRITE
		HOLE END

IRONCAP DRILLING PROJECT
DEC.1995
DRILL LOG

SITE: EW LINE STNA

LOCATION: 90 m. from the west intersect of the cutline north of the Worsley pit.

SITE DESCRIPTION: Side of hill that rises steeply from the intersect

RELATIVE ELEVATION: 60 feet higher than road at the intersect

LOG (in feet from surface):

0 - 8 fine glacial material no sample
8 - 10 blue shale no sample
10 - 15 blue shale sample EWSTNA10 - 15
15 - 20 blue shale sample EWSTNA15 -20
20 - 30 blue shale
30 HOLE END

Appendix D

Scanning Electron Microscopy

Ballantyne Report

Geological Survey of Canada

Natural Resources Canada | Ressources naturelles Canada
Geological Survey of Canada Sector | Secteur de la Commission géologique du Canada
601 Booth Street
Ottawa, Ontario
K1A 0E8

May 31, 1995

Richard Boulay
President
Marum Resources Inc.
4606 5th Street S.W.
Calgary, Alberta
T2S 2E5

Dear Richard,

Thank you for the confidential compilation of reports for Ironcap and 49th Parallel properties and the HMC picks.

I enclose the scanning electron microscope (SEM) maps of the two stubs created from these picks and

1) BSB (backscatter display) see top line right of thermal image and a close-up SEI (secondary image) see top left of thermal image of each grain to best depict surface topography

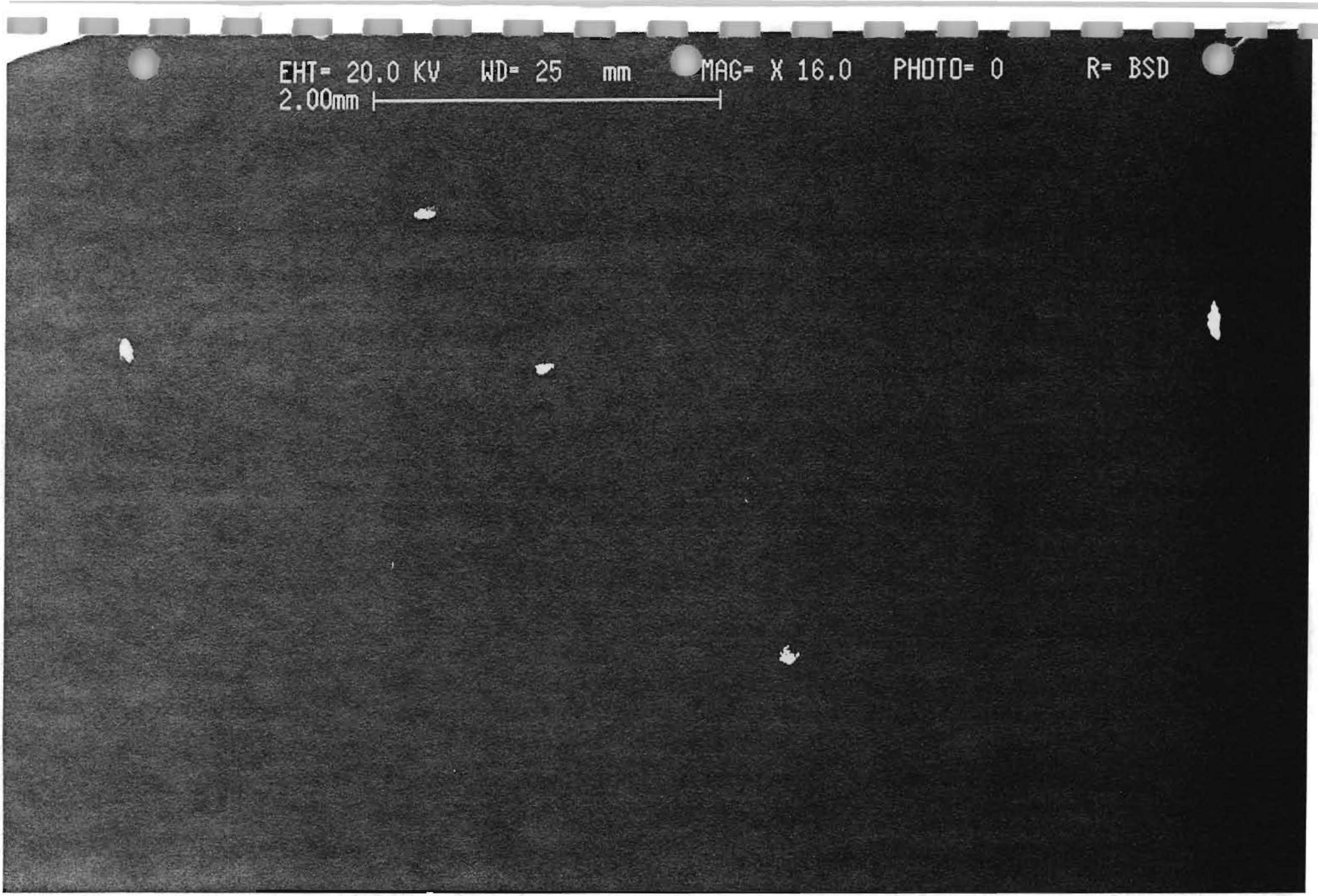
2) Measurements of the grain in microns

3) Composition of grain as determined by E.D.S. (energy dispersive x-ray spectrometer) on a surface point(s) on the grain. The grain composition when both elements are as major constituents are separated by a semi-colon. If Au gold only is shown it means that at more than one spot on the grains surface EDS measurements were taken and no Ag silver was detected. If trace Ag is found it is marked in brackets.

   I enclose some SEM stubs and carbon tape so that in future picking and mounting you can avoid glue from the mounting container. Some of the very black material adhering to the gold in BSD images is glue from the oil drill core cutting box.

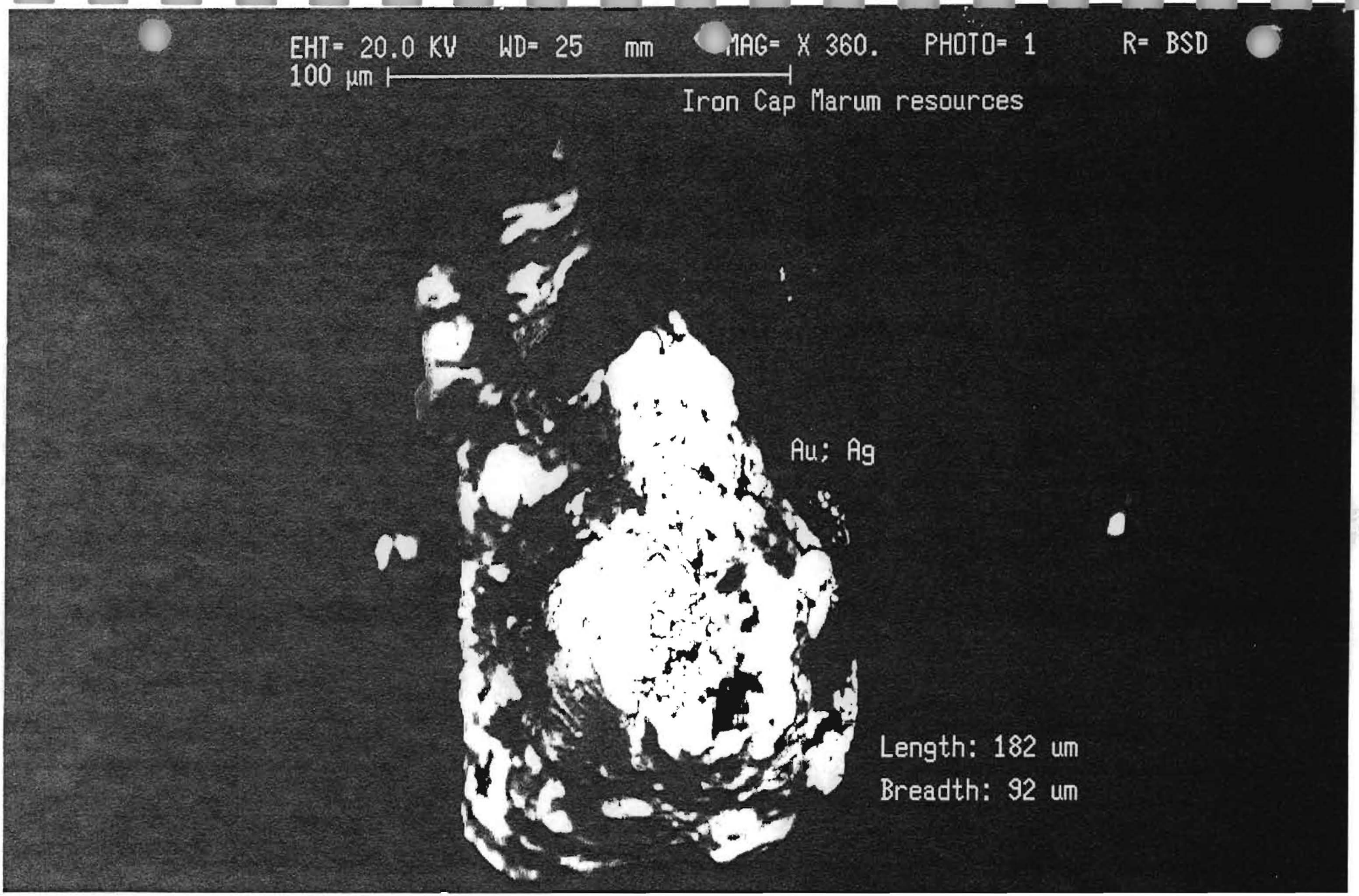
4) On the top line of each image at the PHOTO Label the number refers to the grain's stub number as recorded on the thermal image map of all the grains on the stub.

Discussion: The grains range from high fineness gold (Au) to Au (trace silver) probably less than 5 weight percent to Au; Ag with silver contents which may reach over ~~A~~ 20% weight percent Ag i.e.



Stub 1

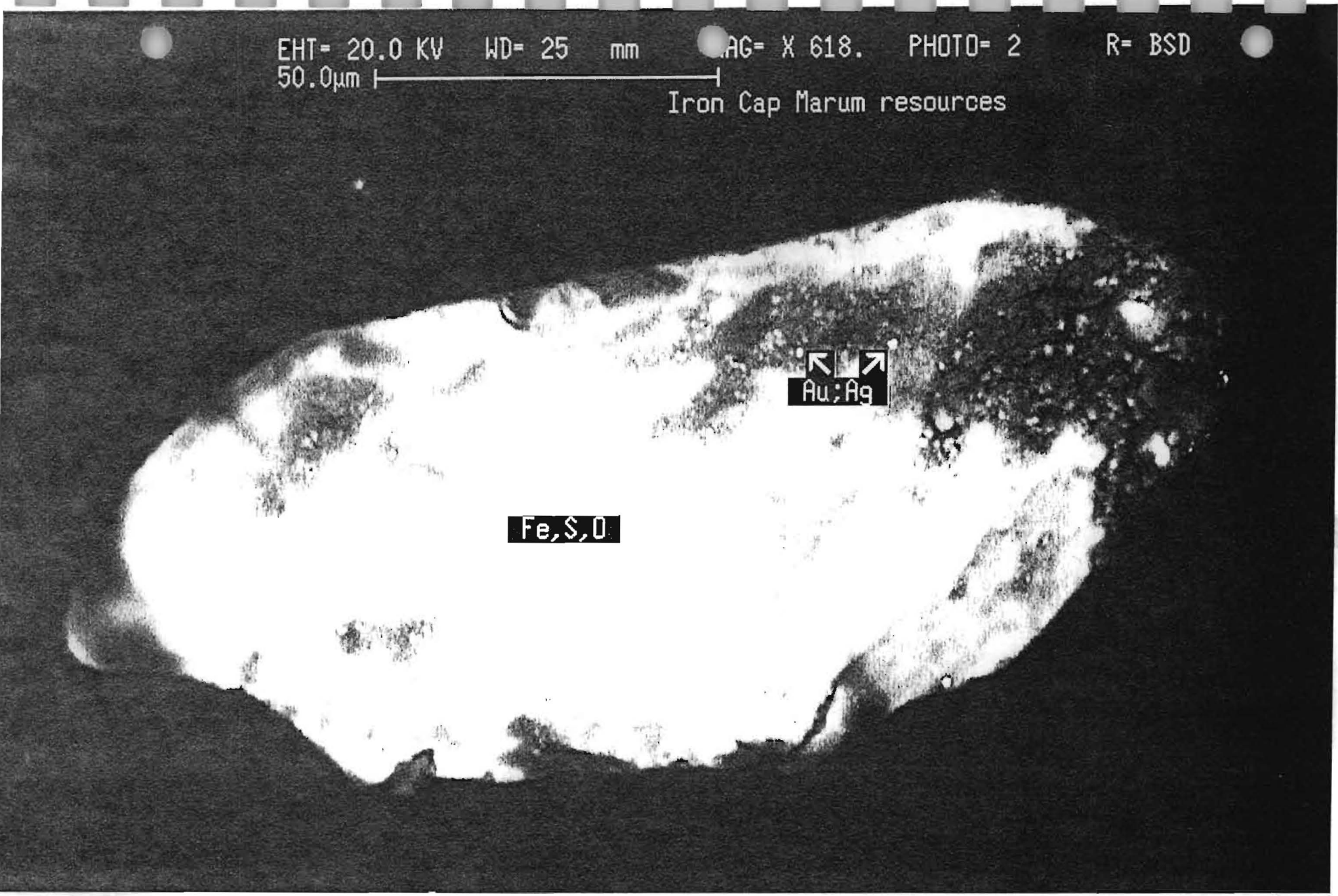
IRON CAP



25059501.TIF

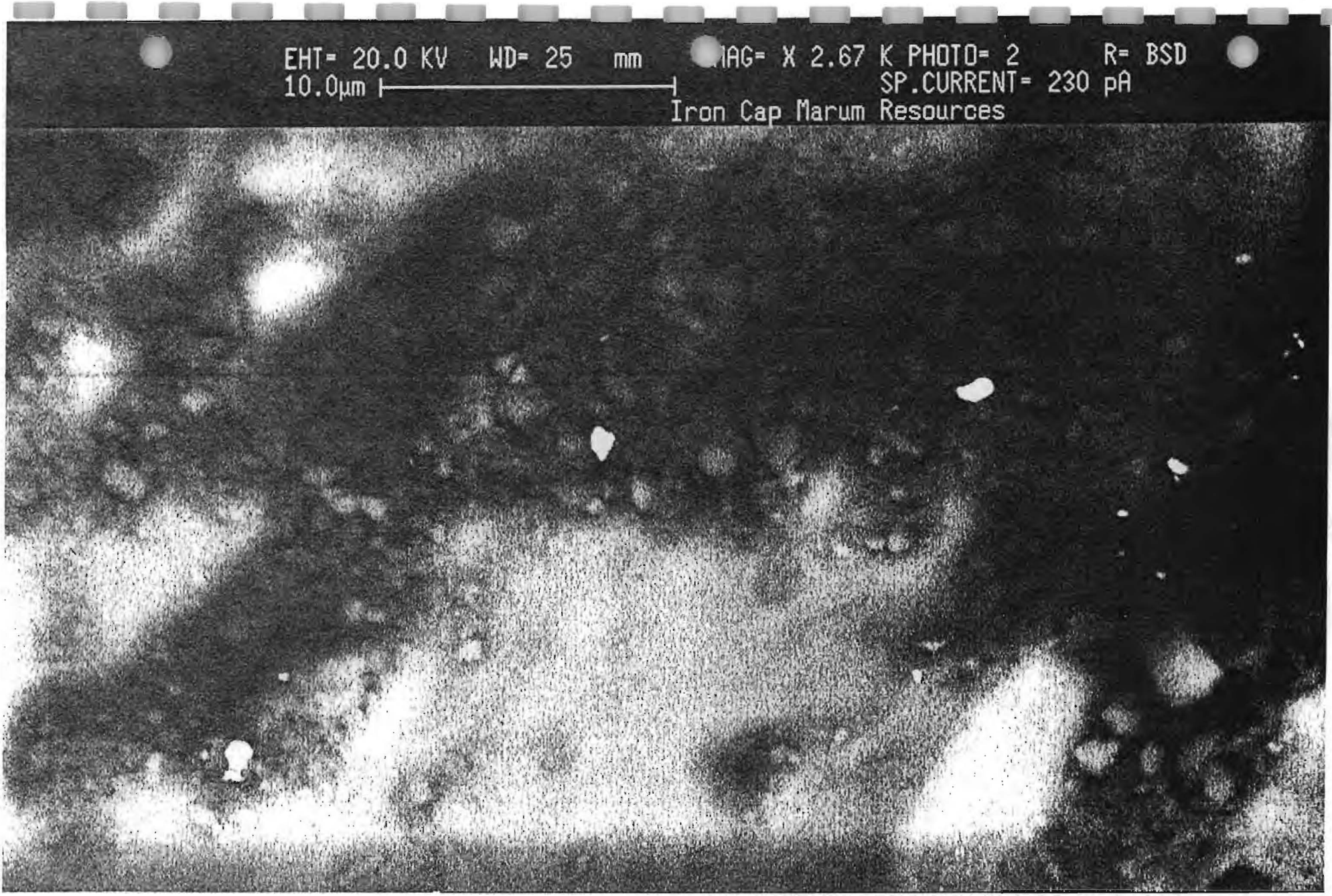
25059505.TIF

Stub 1, grain B1

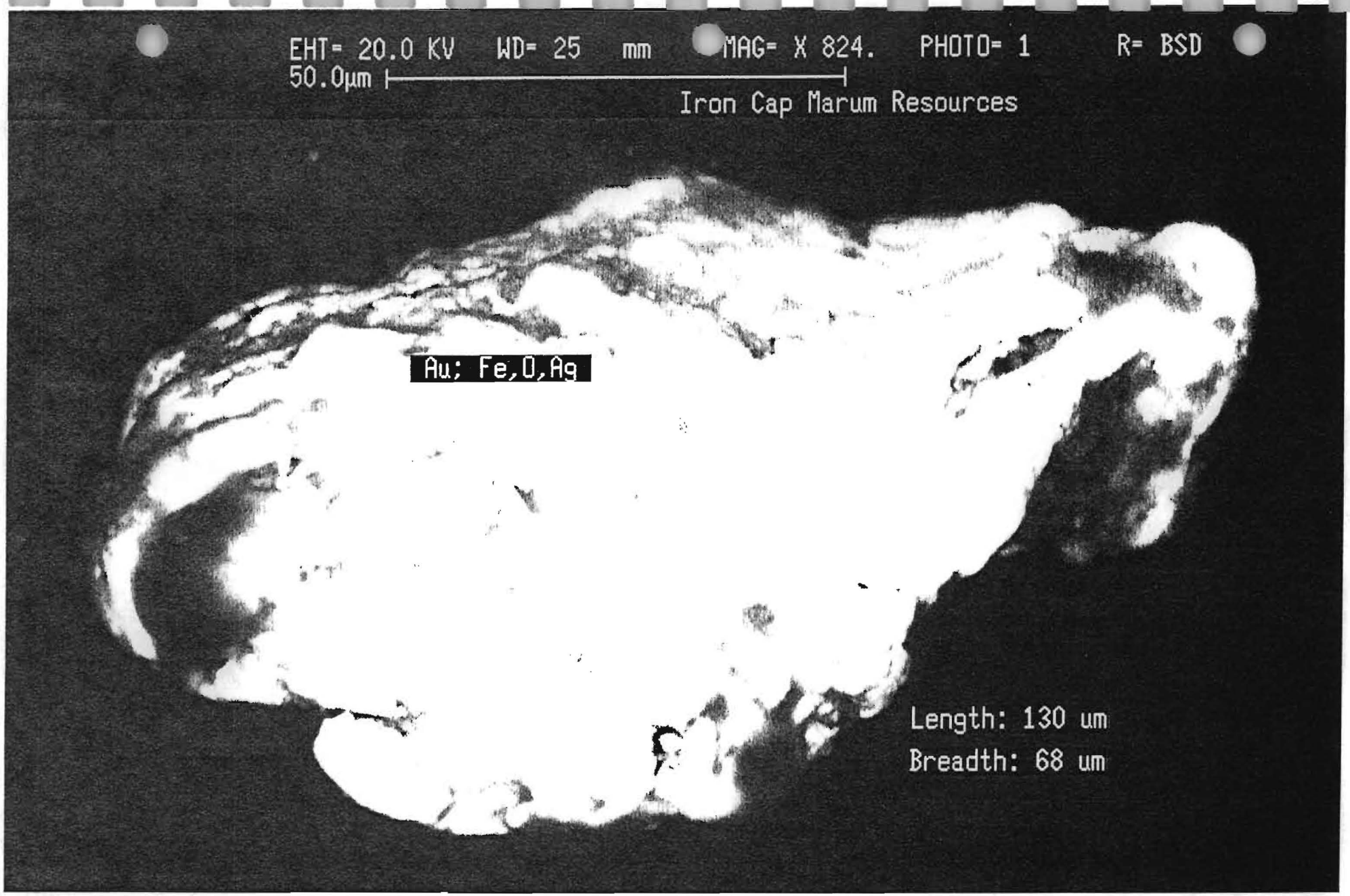


25059502.TIF

Stub 1, grain 2



Stub 1. Grain 2

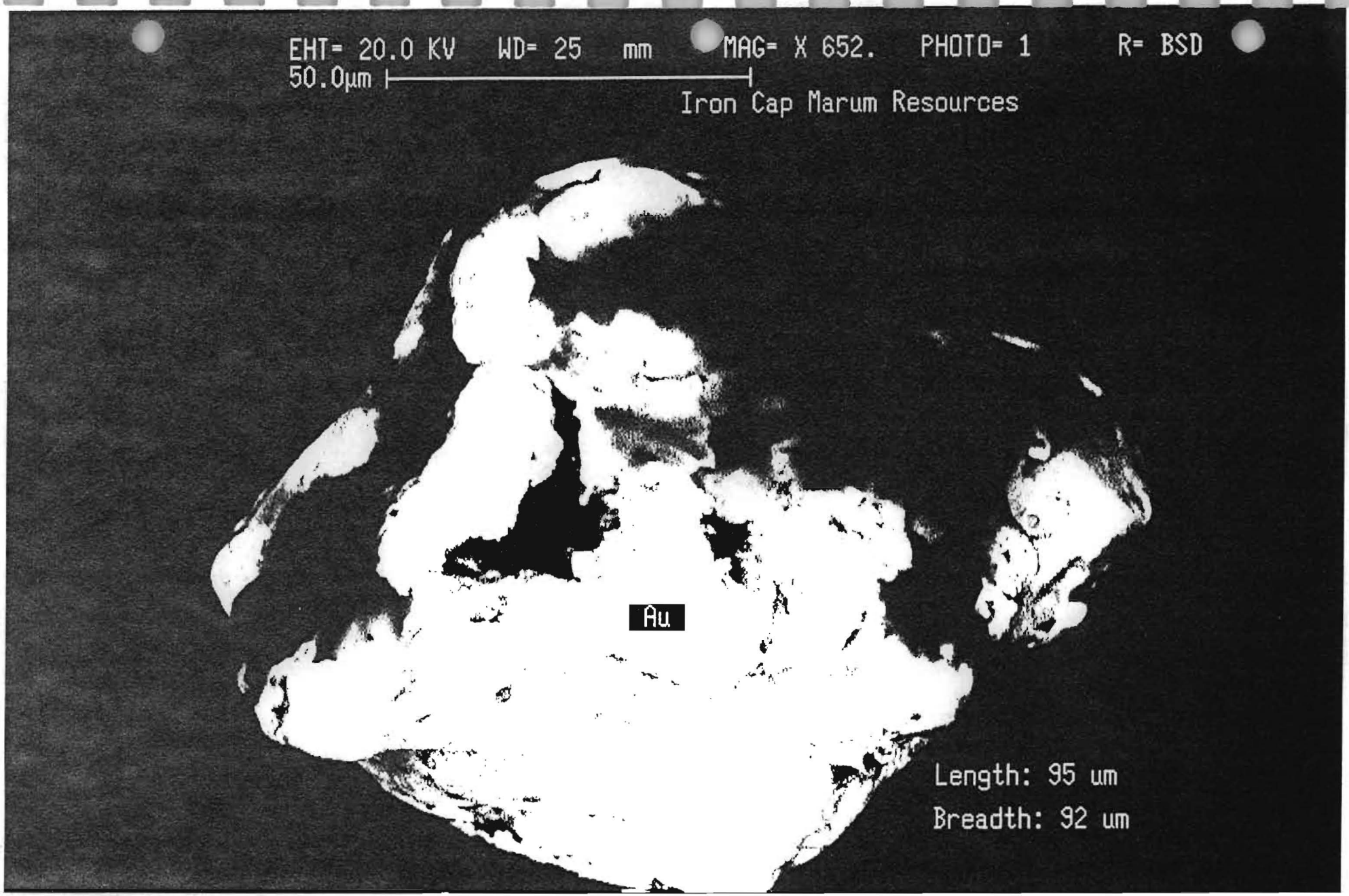


25059503 T.F

Stub 1, Grain 3

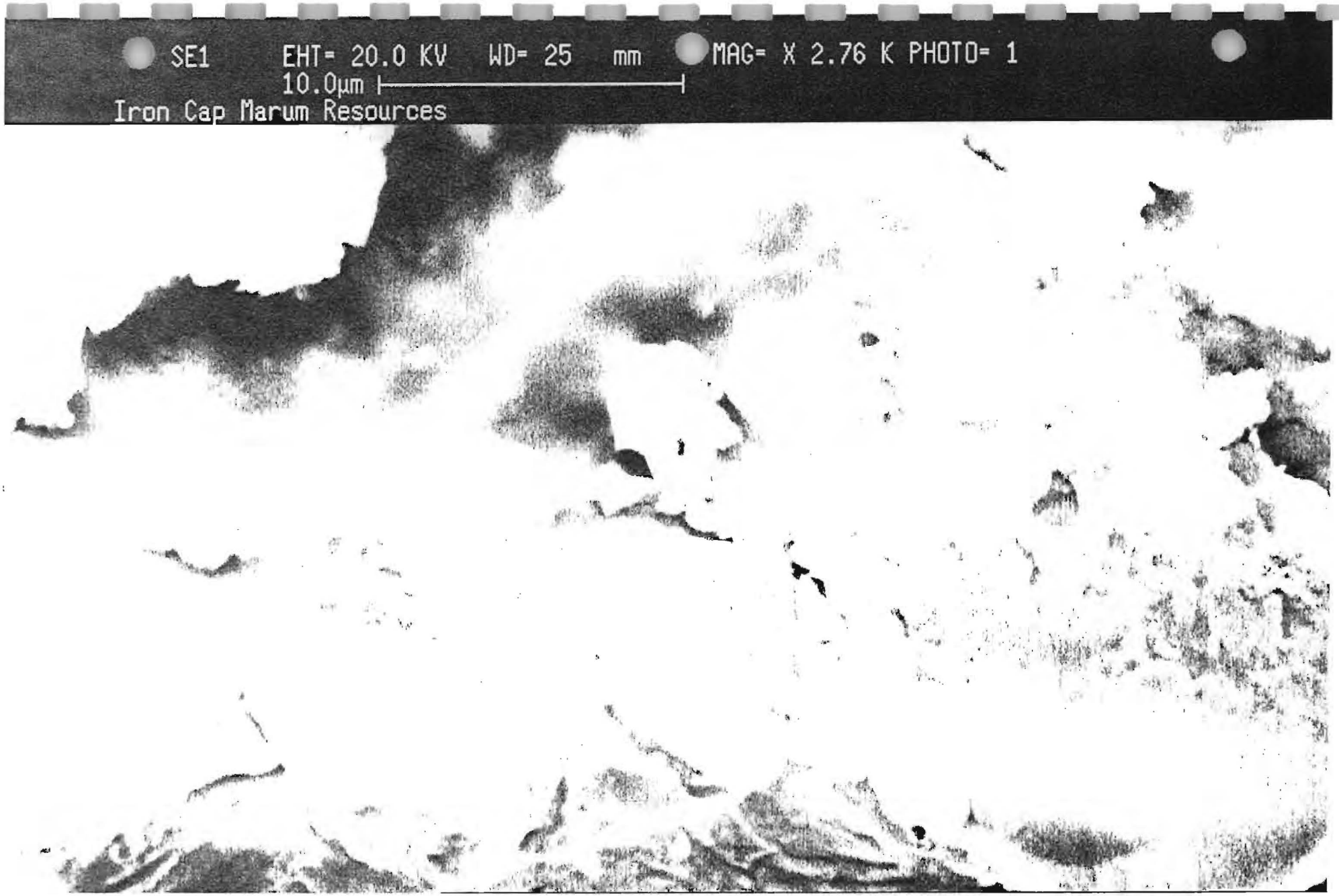
25059504.TIF

Stub1, grain 3.



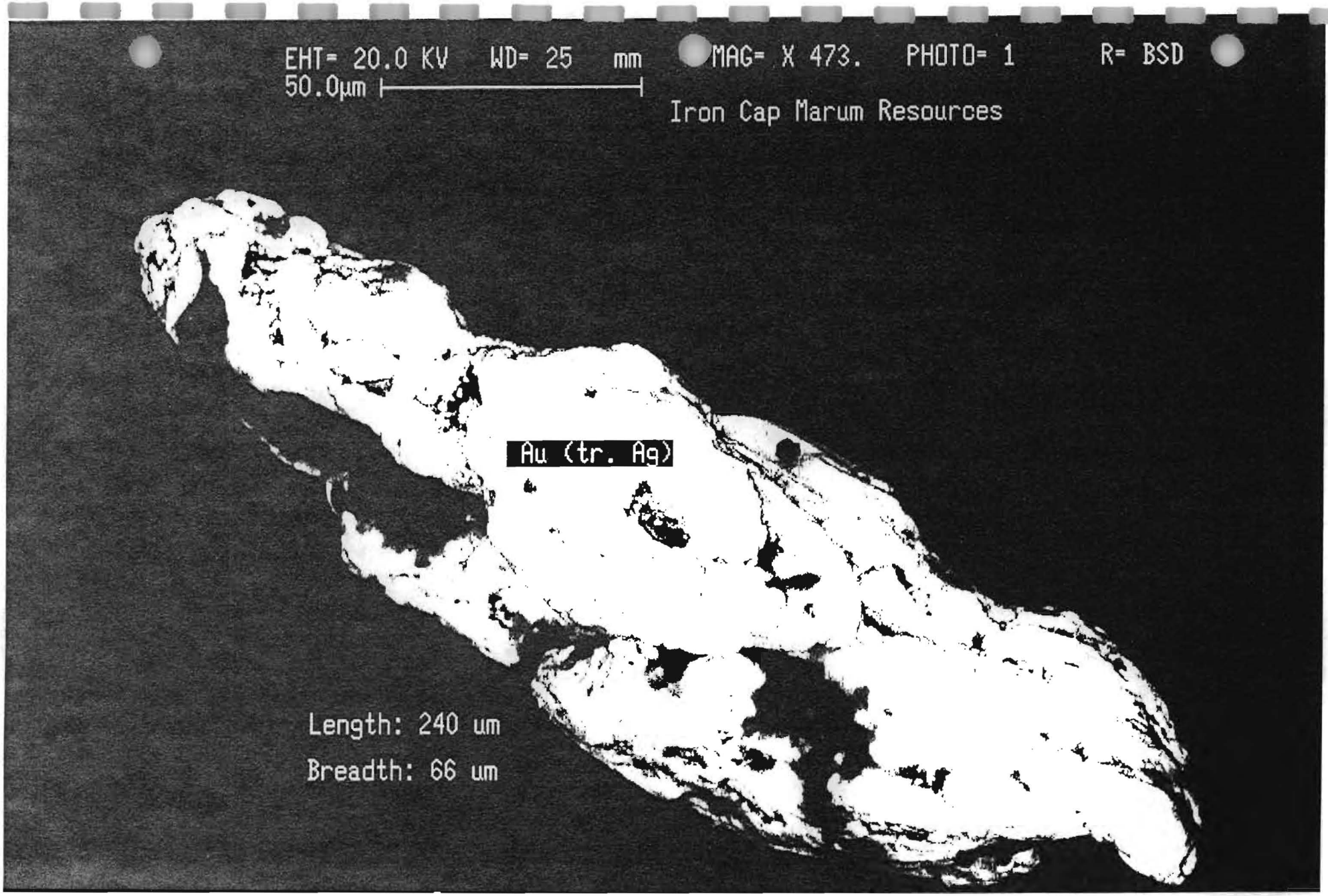
25059507.TIF

Stub 1, Grain 4



2505506.TIF

Stub 1, Grain 4



2505950 8. TIF

Stub 1, Grain 5

25059509.TIF

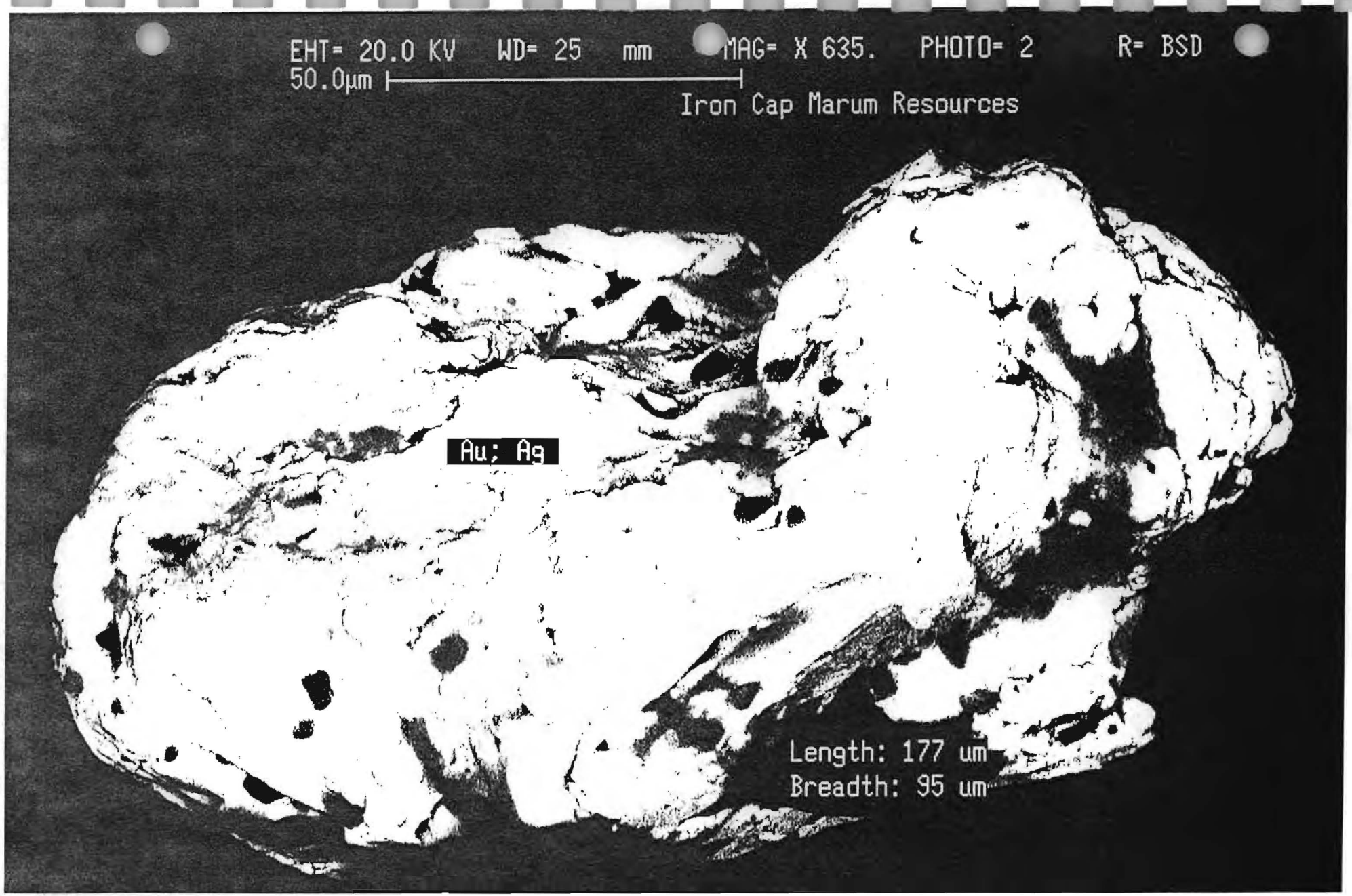
stub 1, grain 5

250995 10. TIF

Sub 1, Grain 5

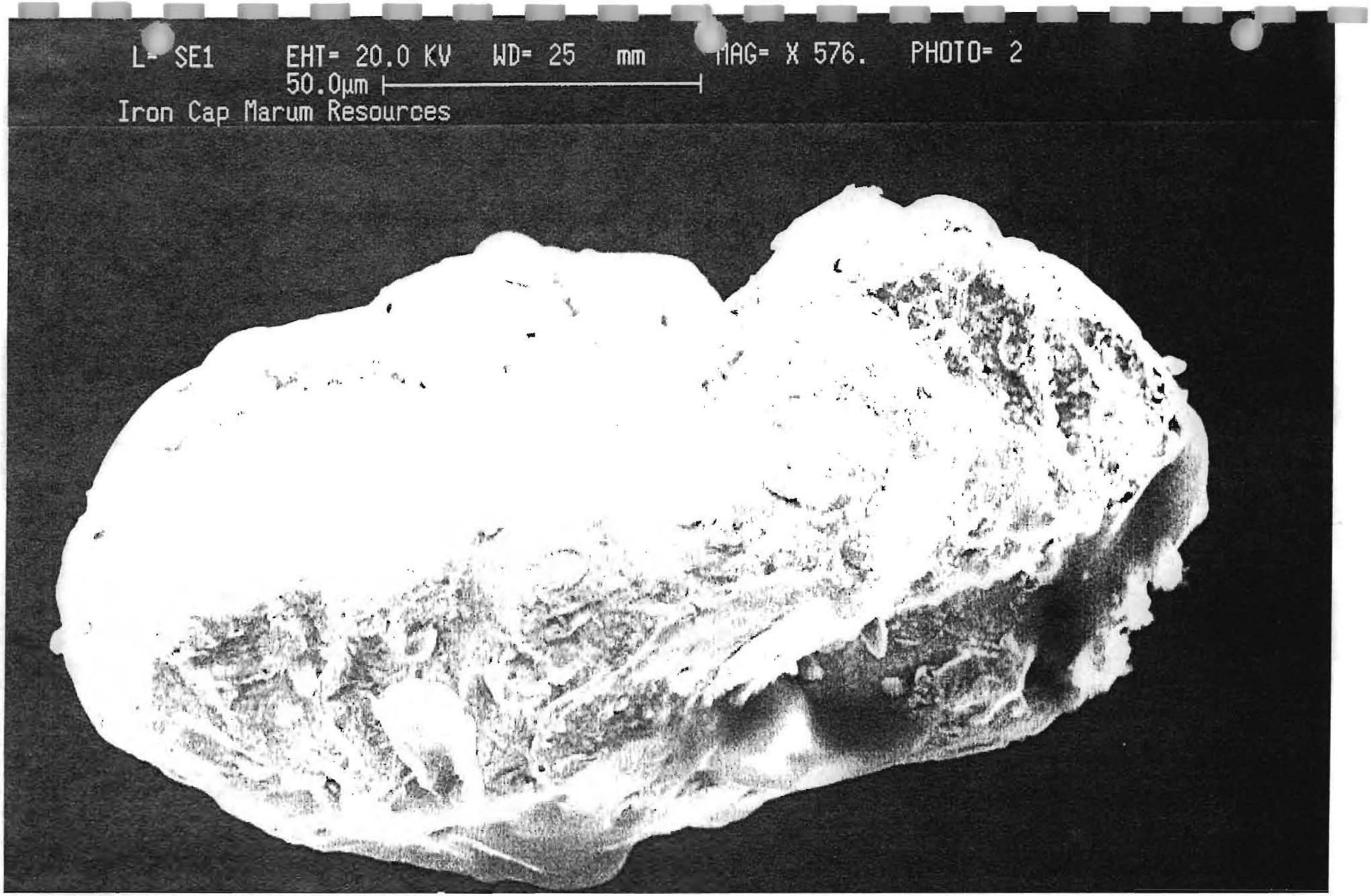

EHT= 20.0 KV WD= 53 mm MAG= X 7.47 PHOTO= 2 R= BSD
5.00mm
Iron Cap Marum Resources

Stub 2



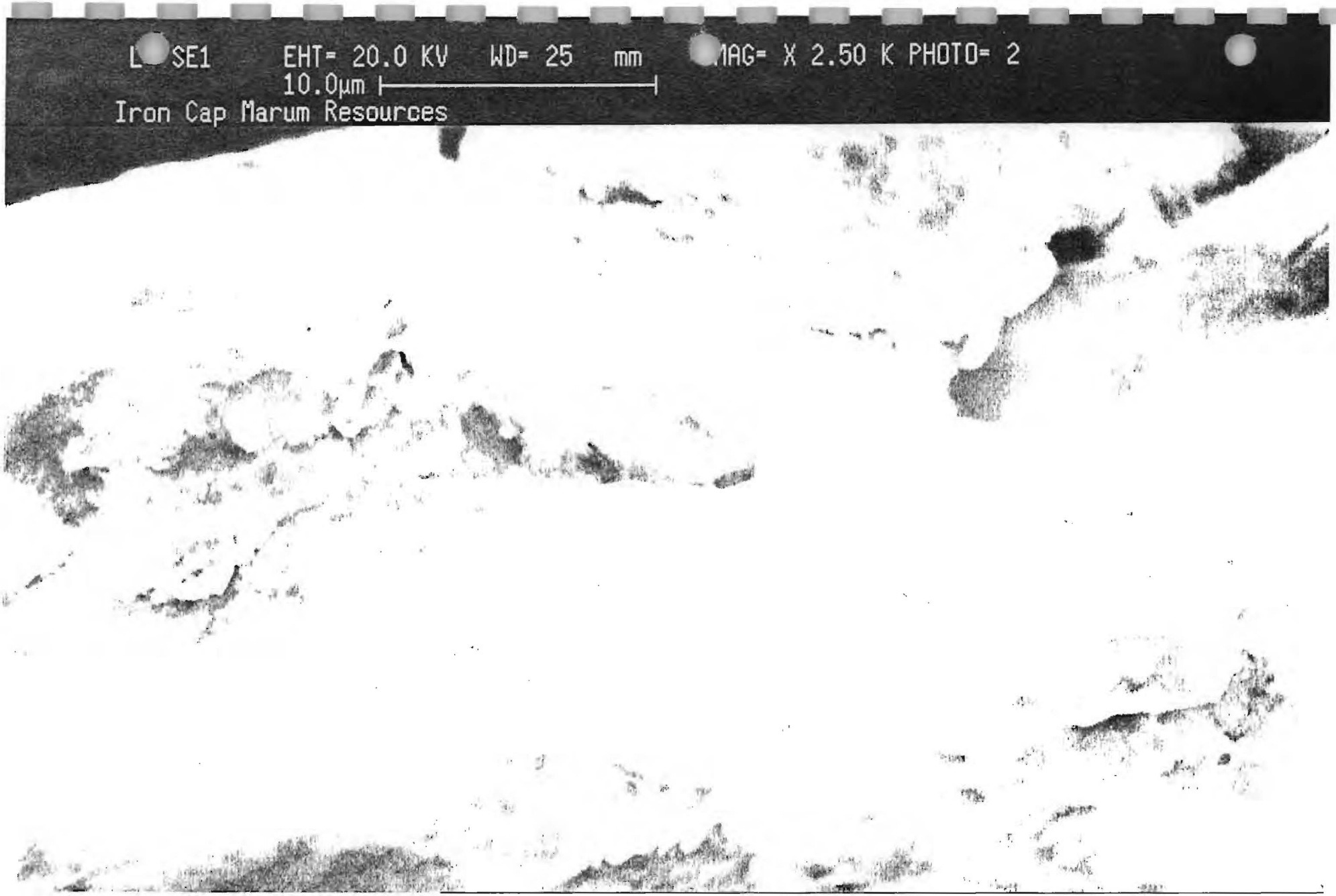
25059513 T.F

stub 2, Grain 1



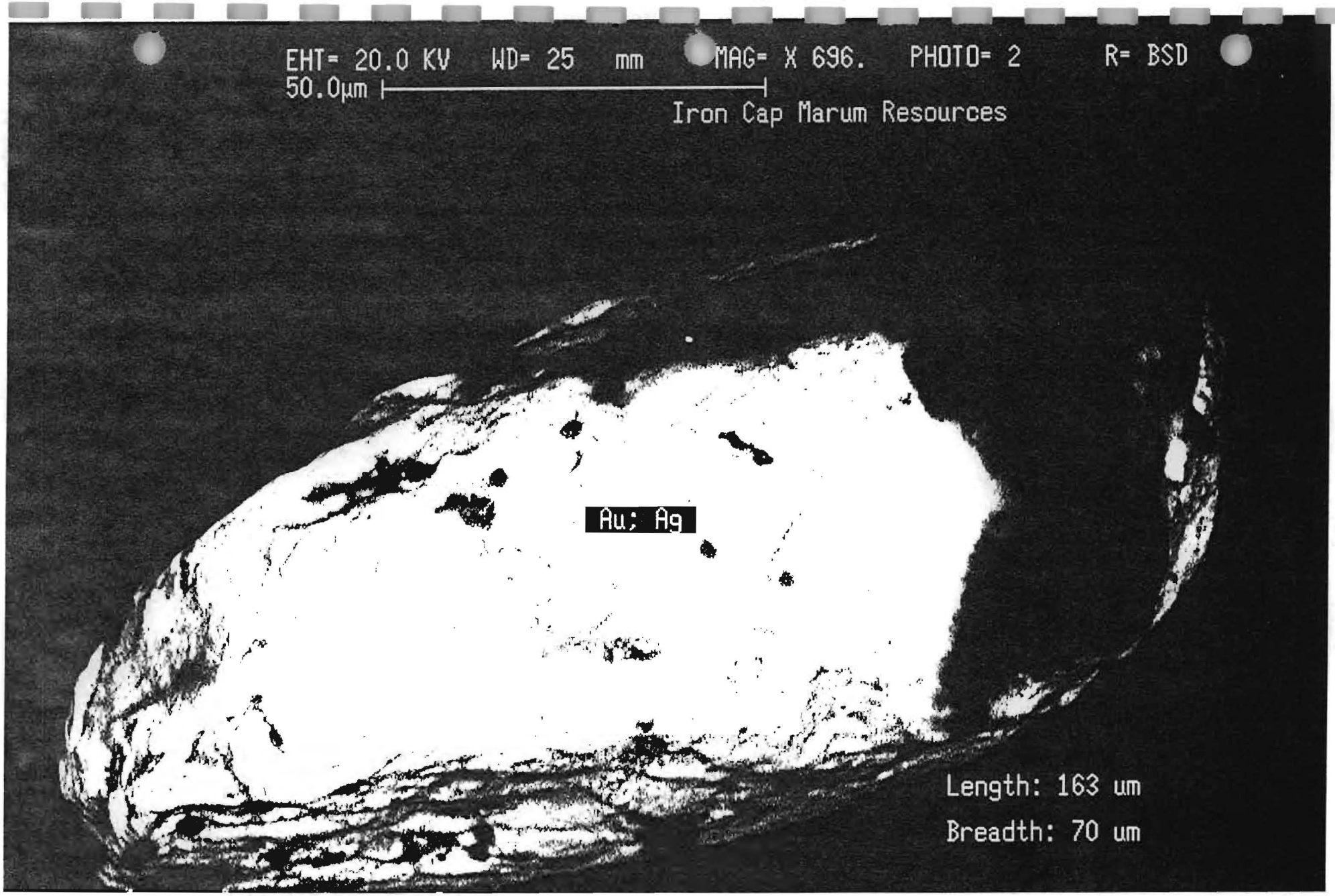
25055511.TIF

Stub 2, grain 1



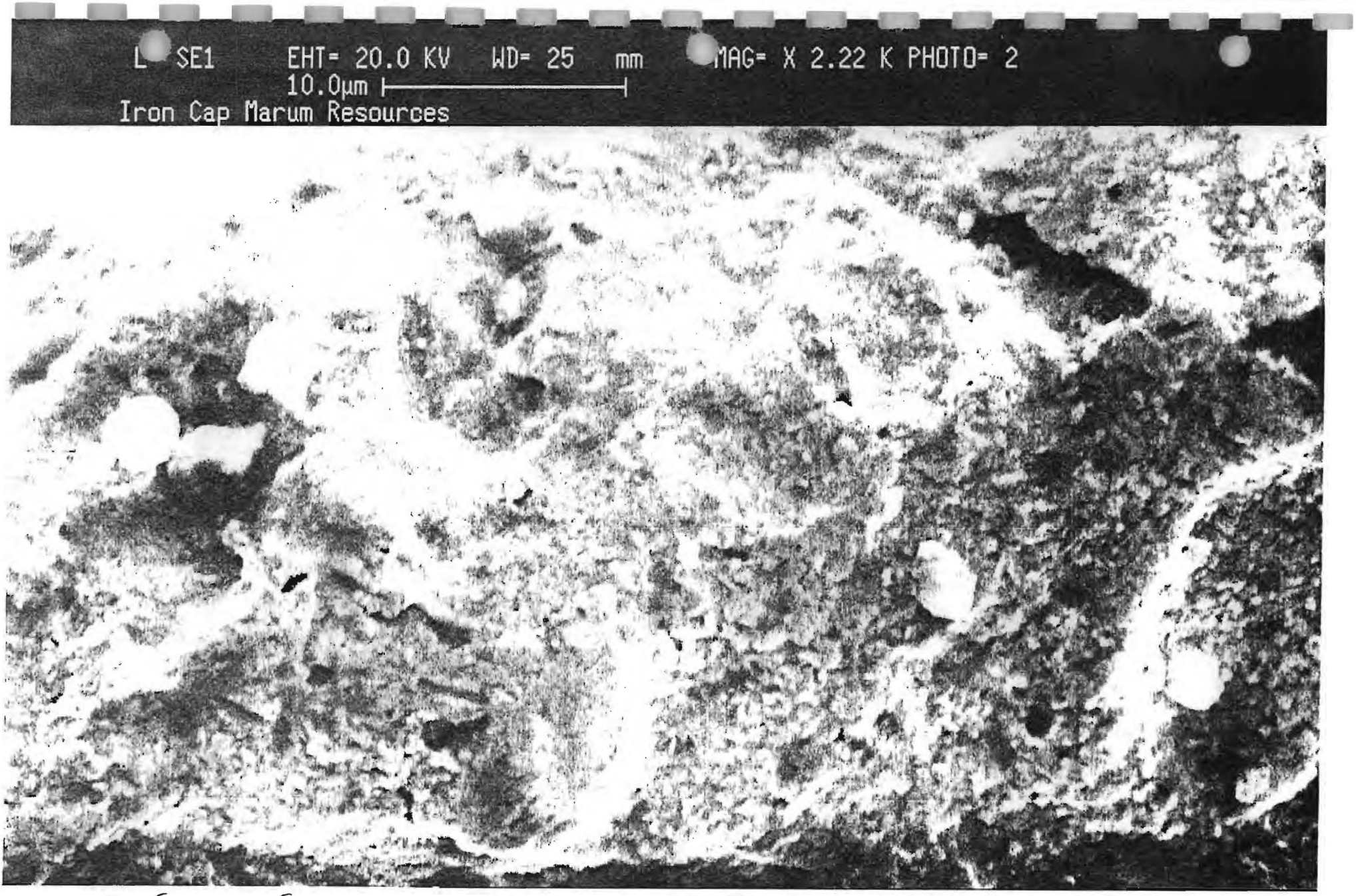
25059512.TIF

Stub 2, grain 1



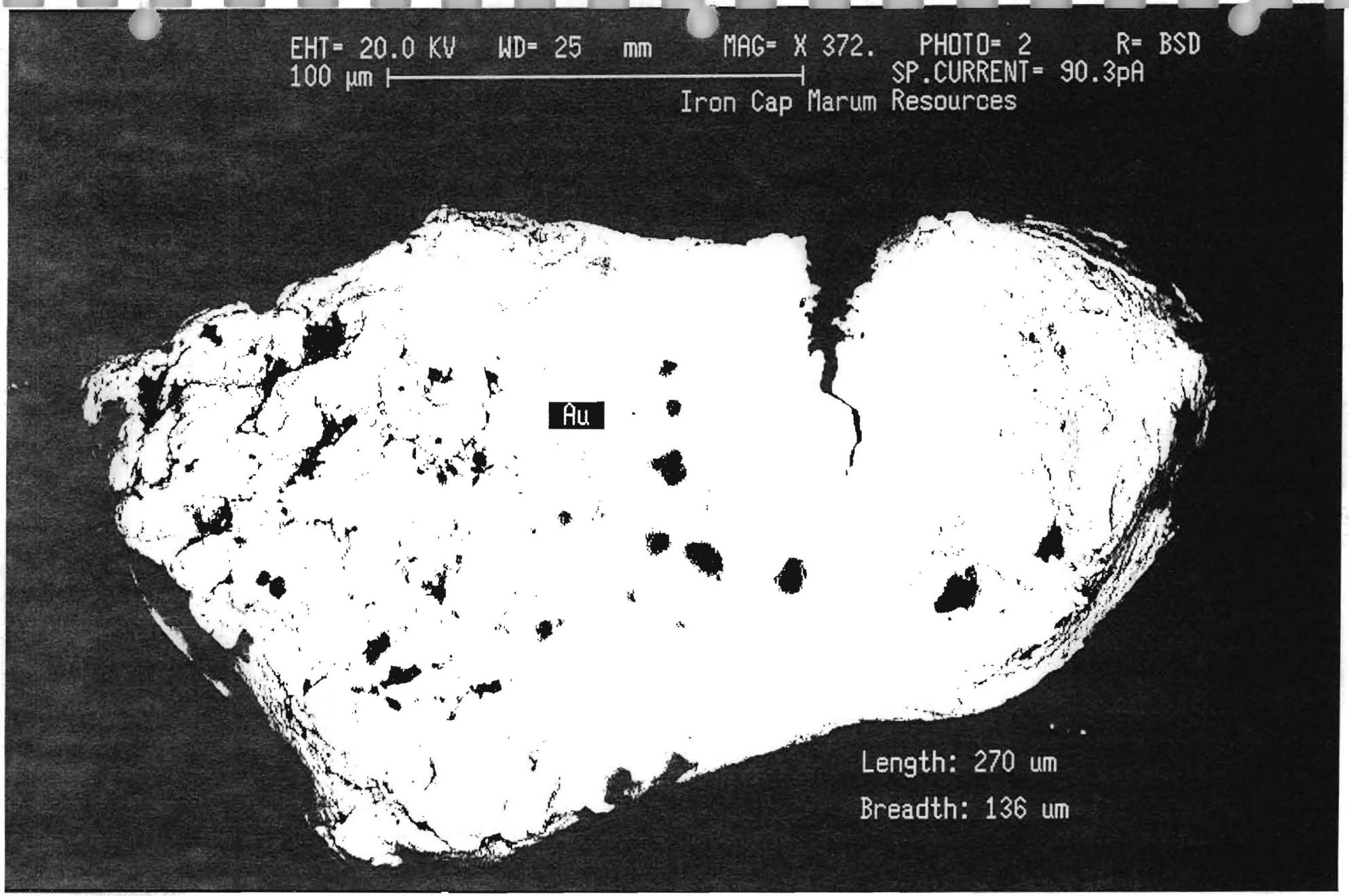
25059515.TIF

stub 2, grain 2



250SS514.TIF

Stub 2, grain 2

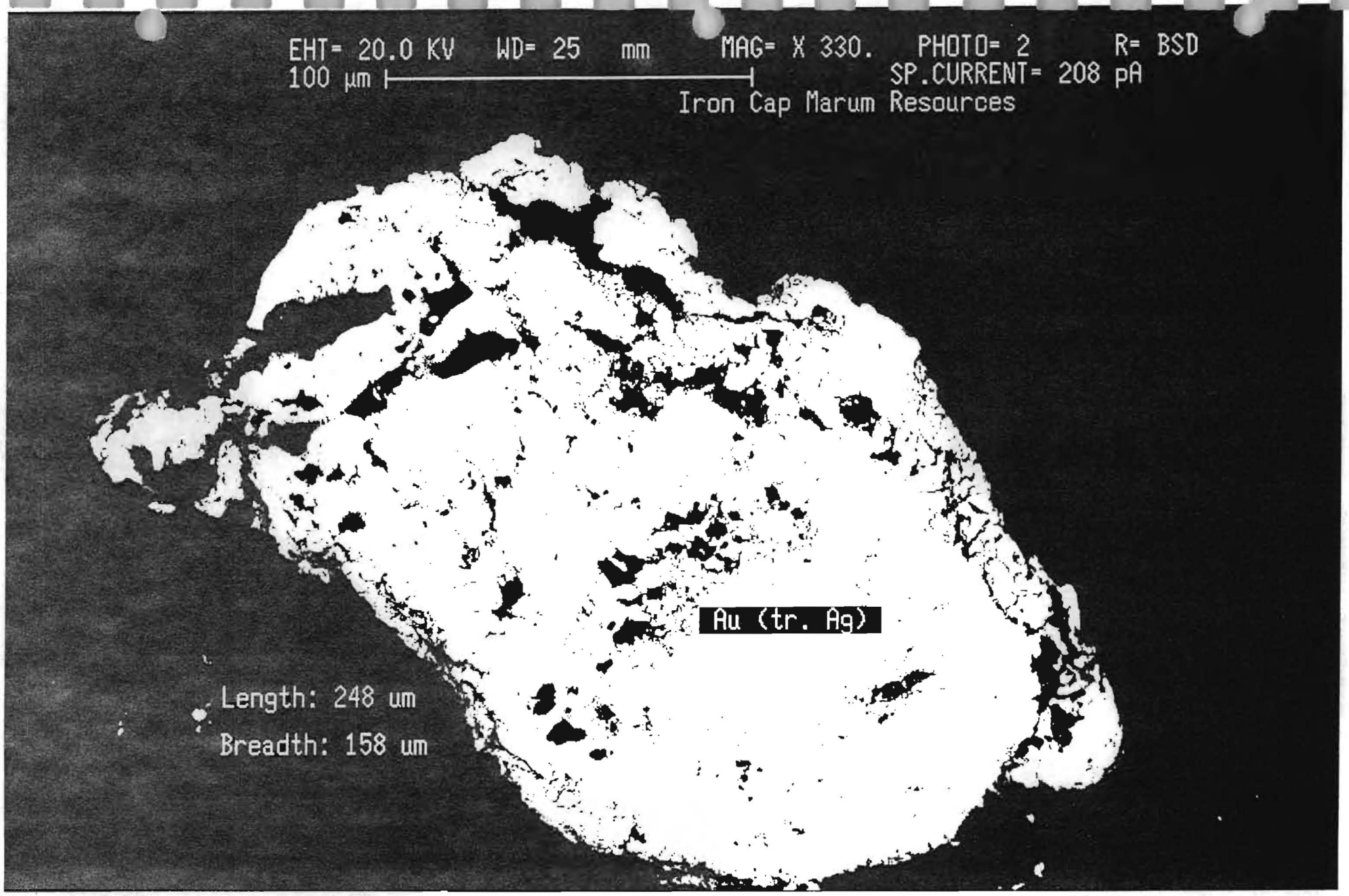


25059516.TIF

Stub 2, Grain 3

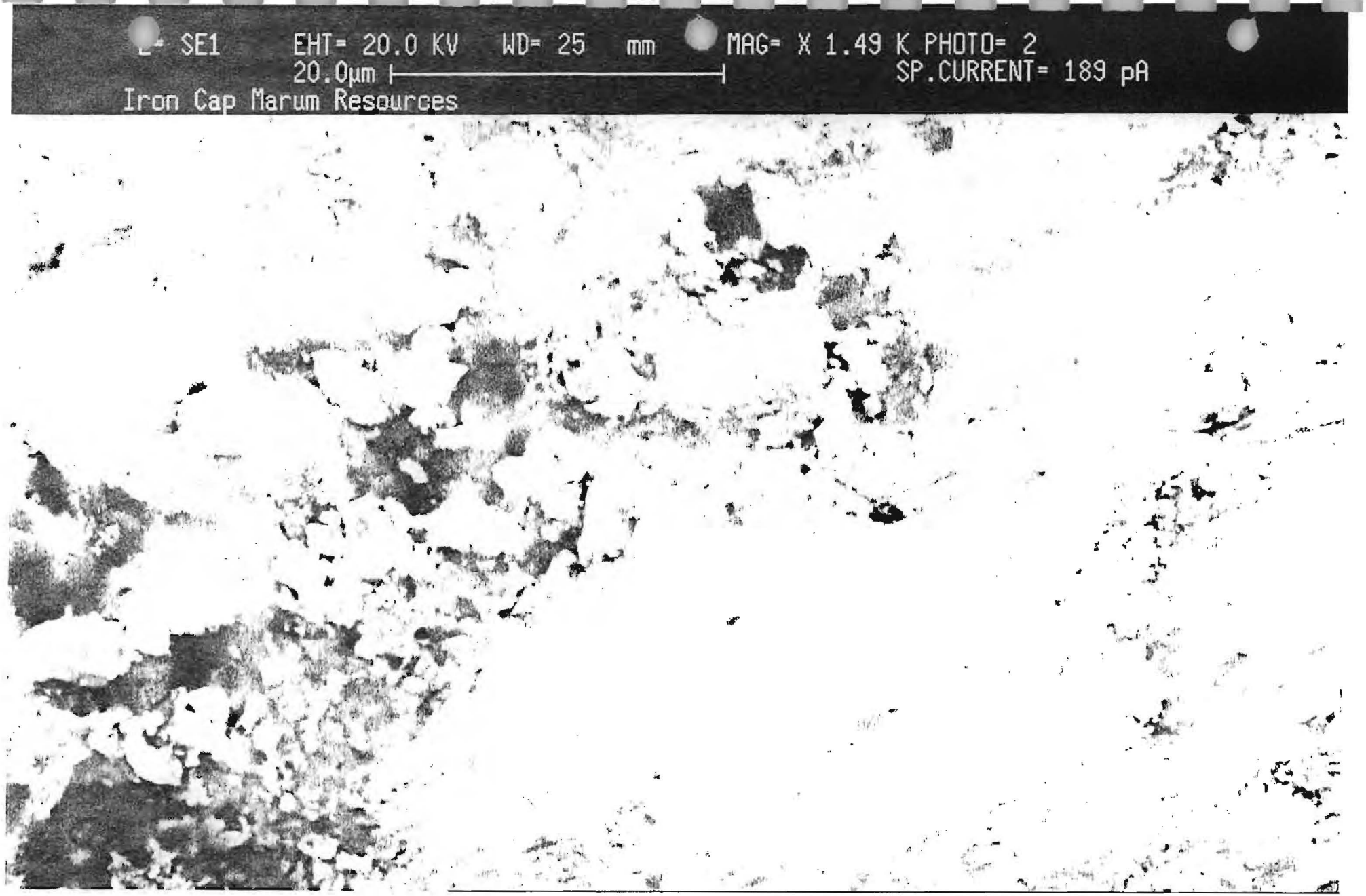
250595 17. TIF

STUB 2. grain 3



250595 18. TIF

STUB 2. grain 4



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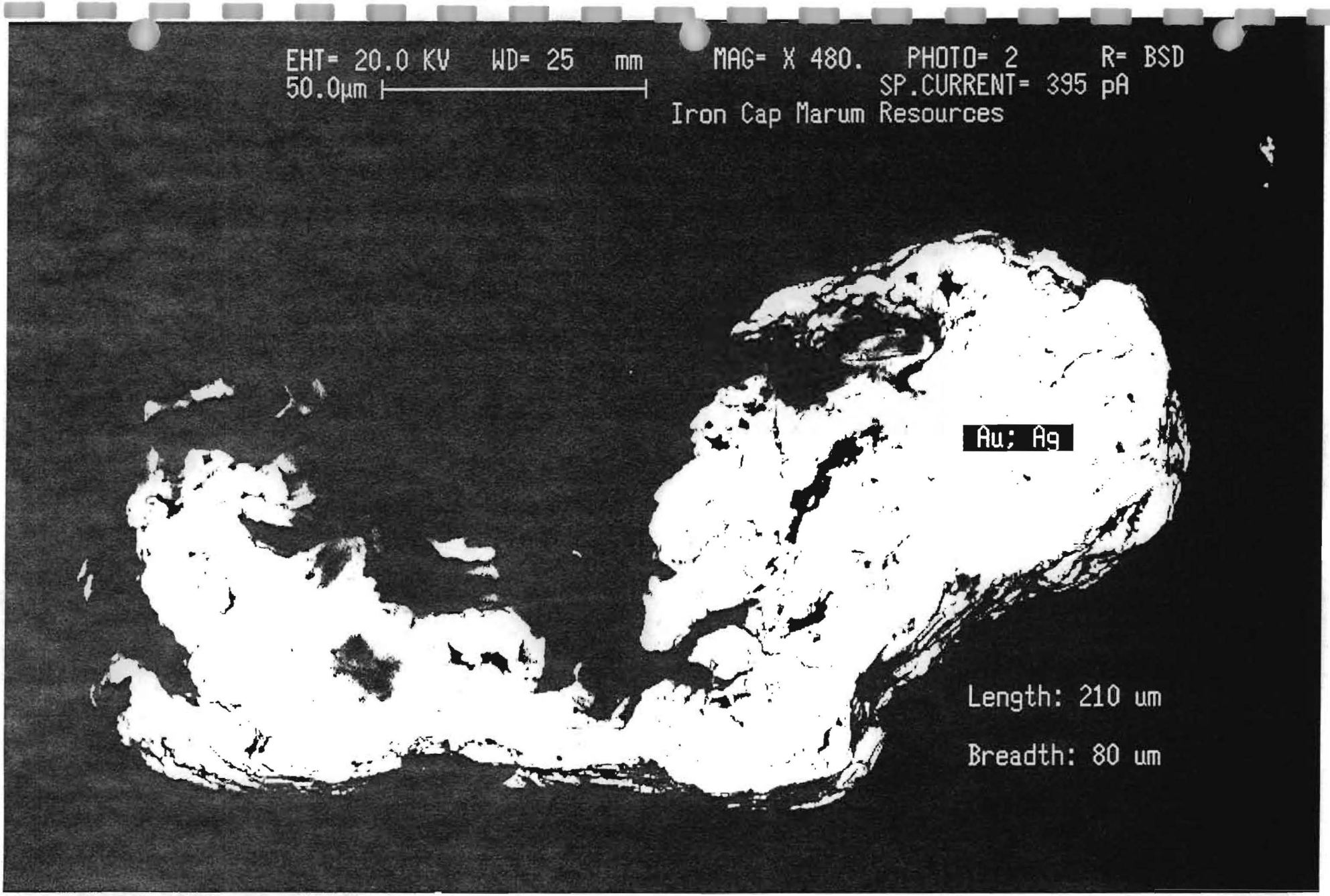
Stub 2 Grain 4

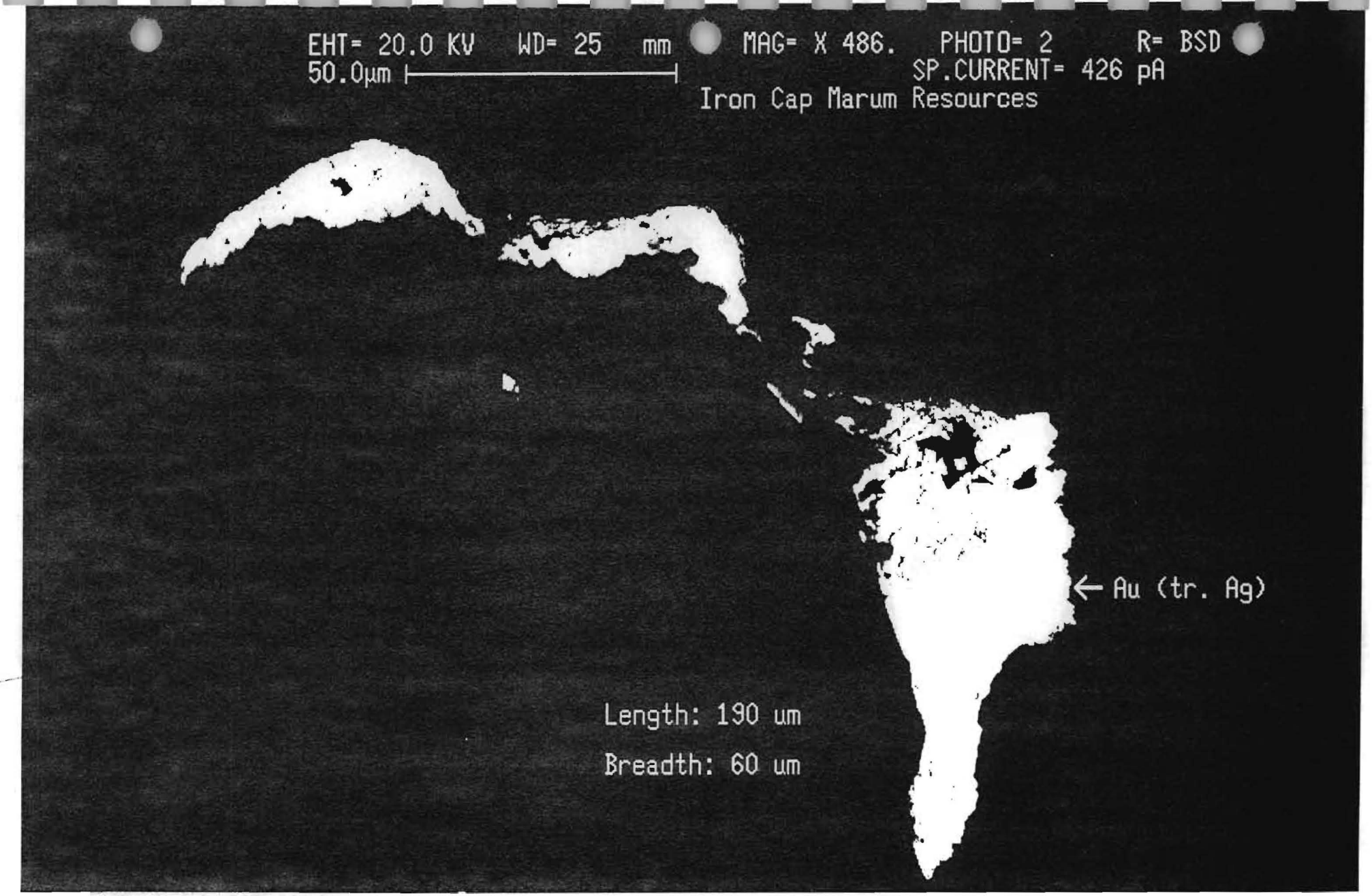


25059520.TIF

Stub 2 grain 5

250595 21.TIF

Stub 2 Grain 5



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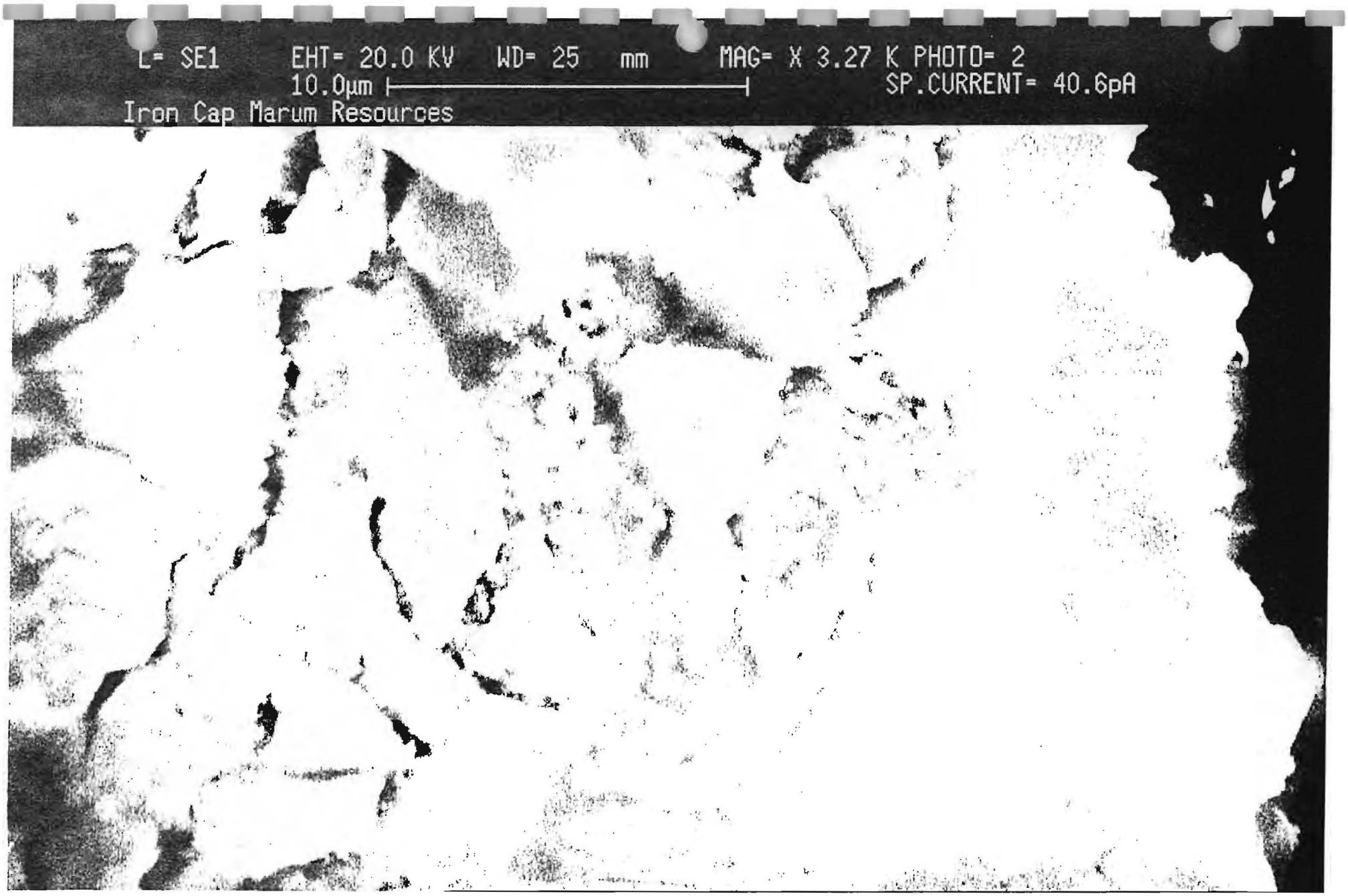
Stub 2. Grain 6



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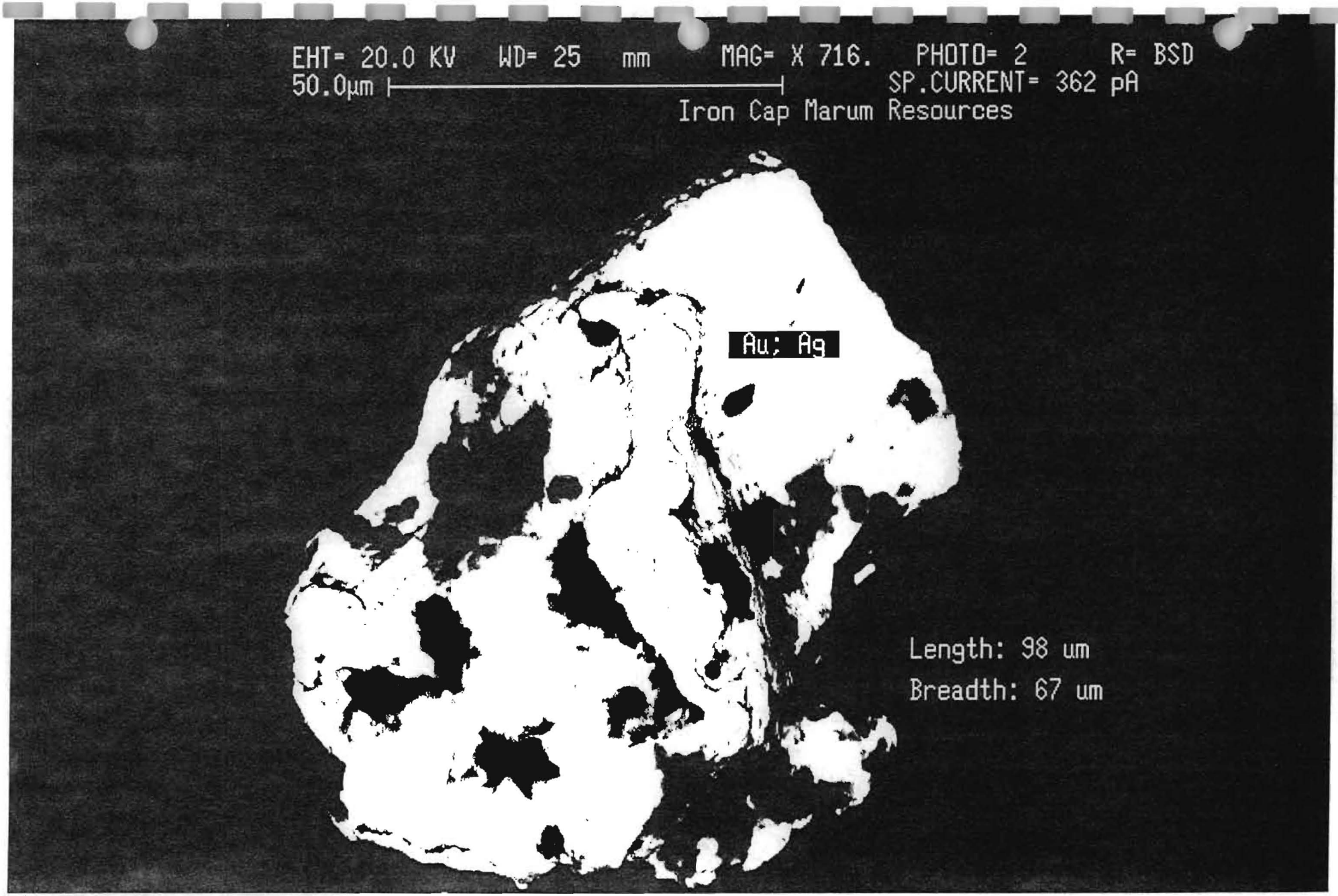
Stub 2 Grain 6



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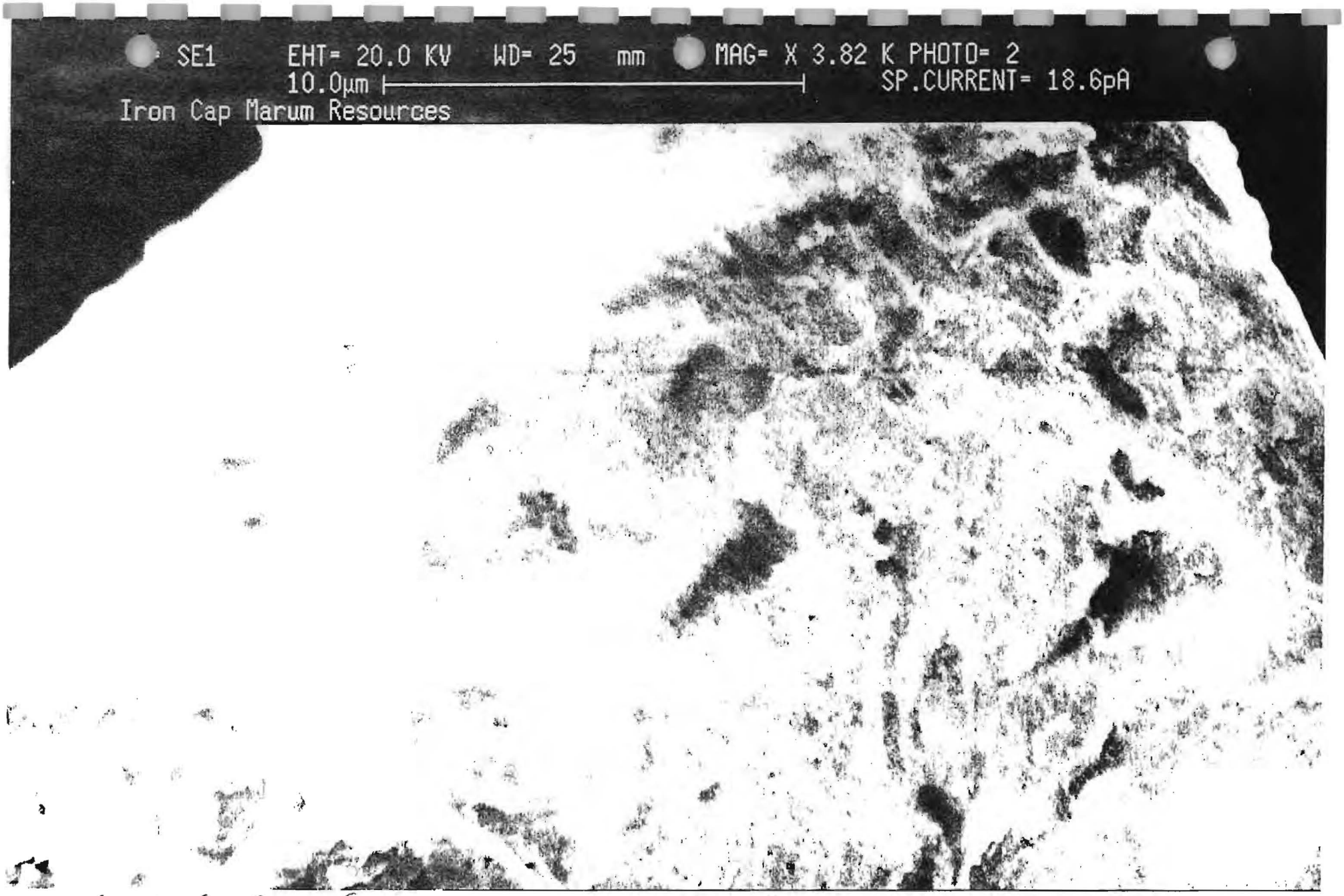
Stub 2 Grain 7



25059525.TIF

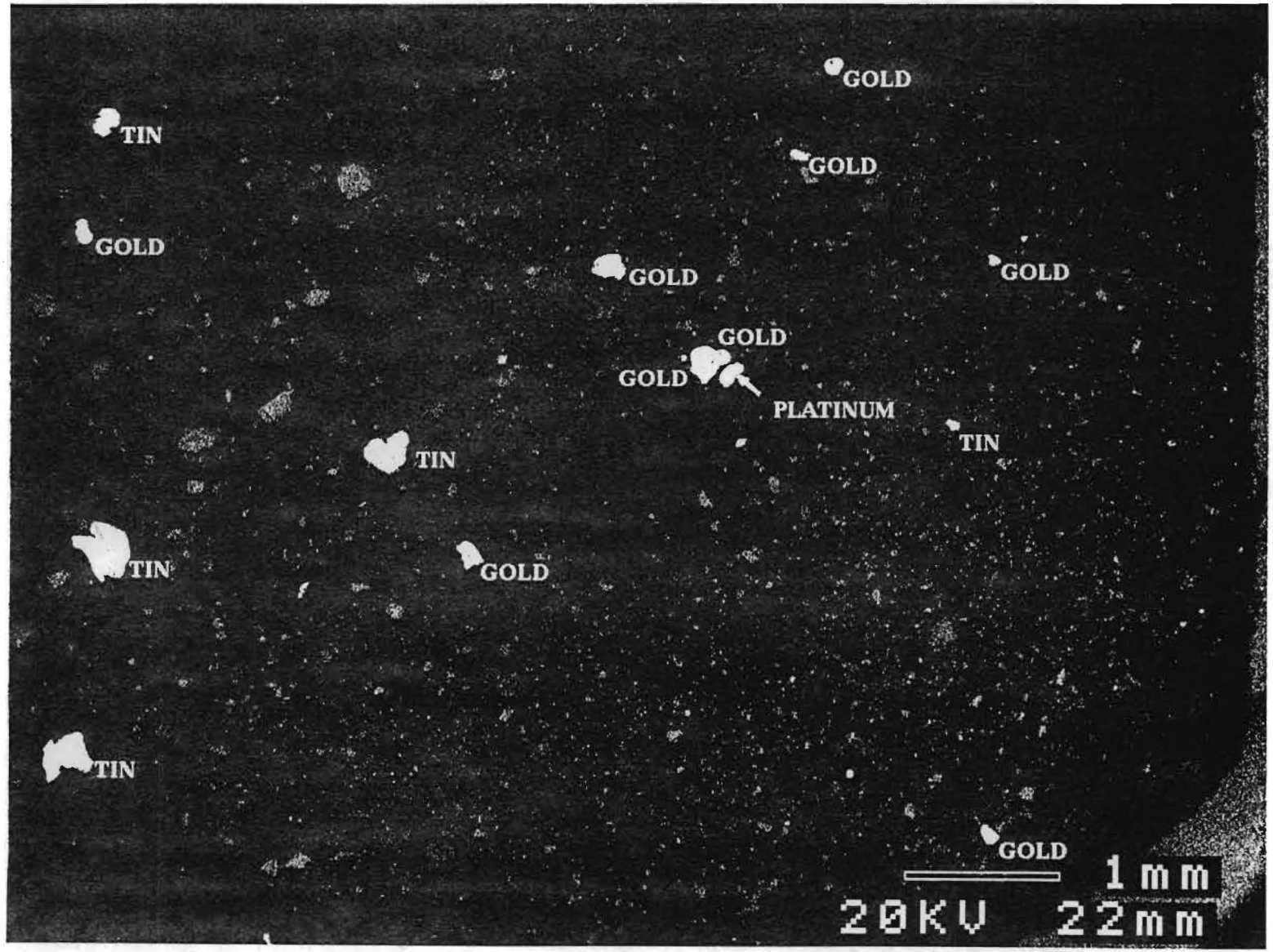
Stub 2 grain 7

TITLE: BACKSCATTERED IMAGE

DATE: 05/30/95 TIME: 14:02:01

MAG: X15 ACC VOLT: 20KV WD: 22mm

COMMENT:



TITLE: TRIO WITH PLATINUM

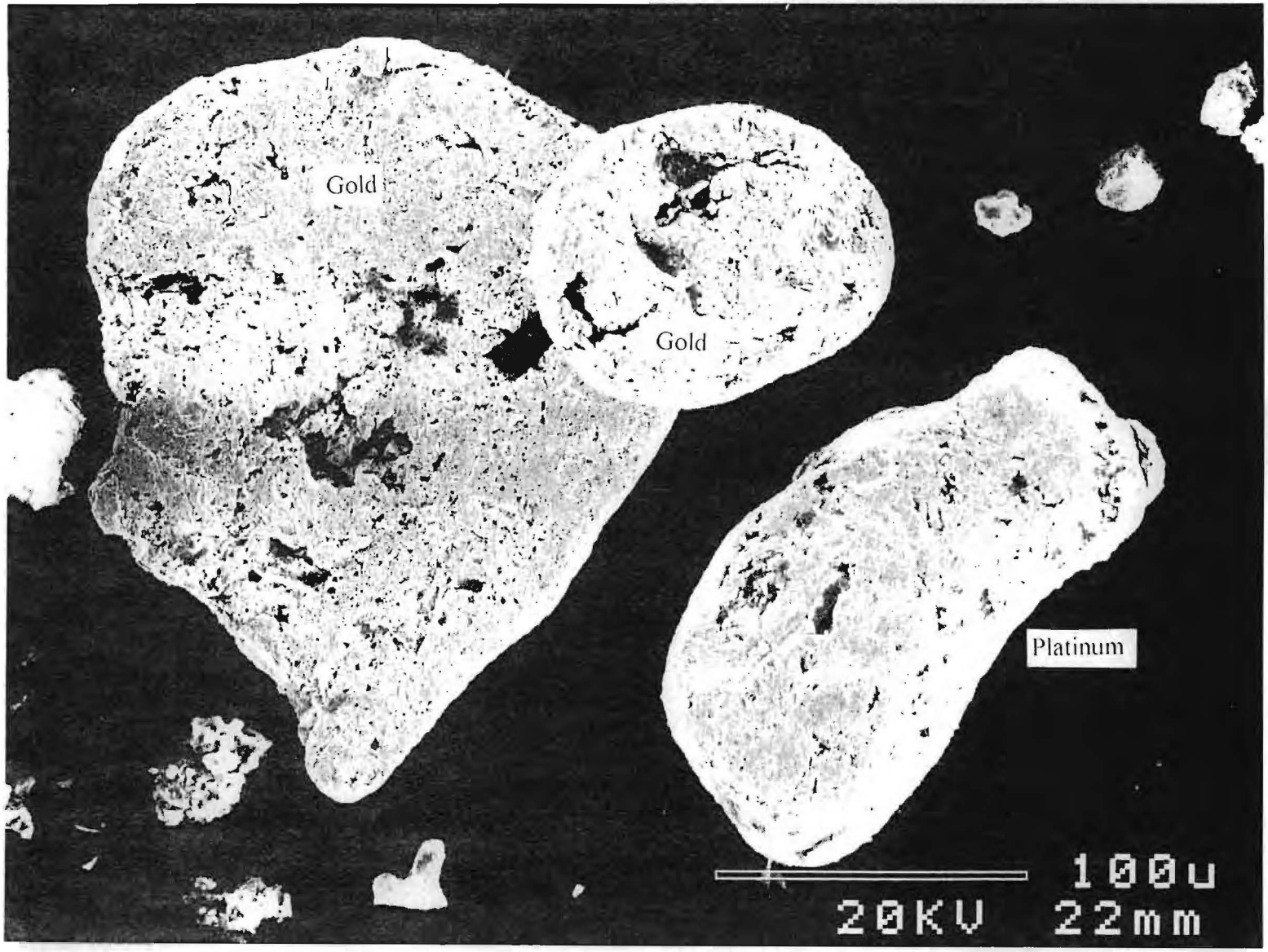
DATE: 05/30/95 TIME: 13:49:11

MAG: X300 ACC VOLT: 20KV WD: 22mm

COMMENT: STUB 3

Marum Resources Inc.
Ironcap Gold Project

Scanning Electron Microscope Image
of Selected Metallic Grains



TITLE: GOLD STRIATED

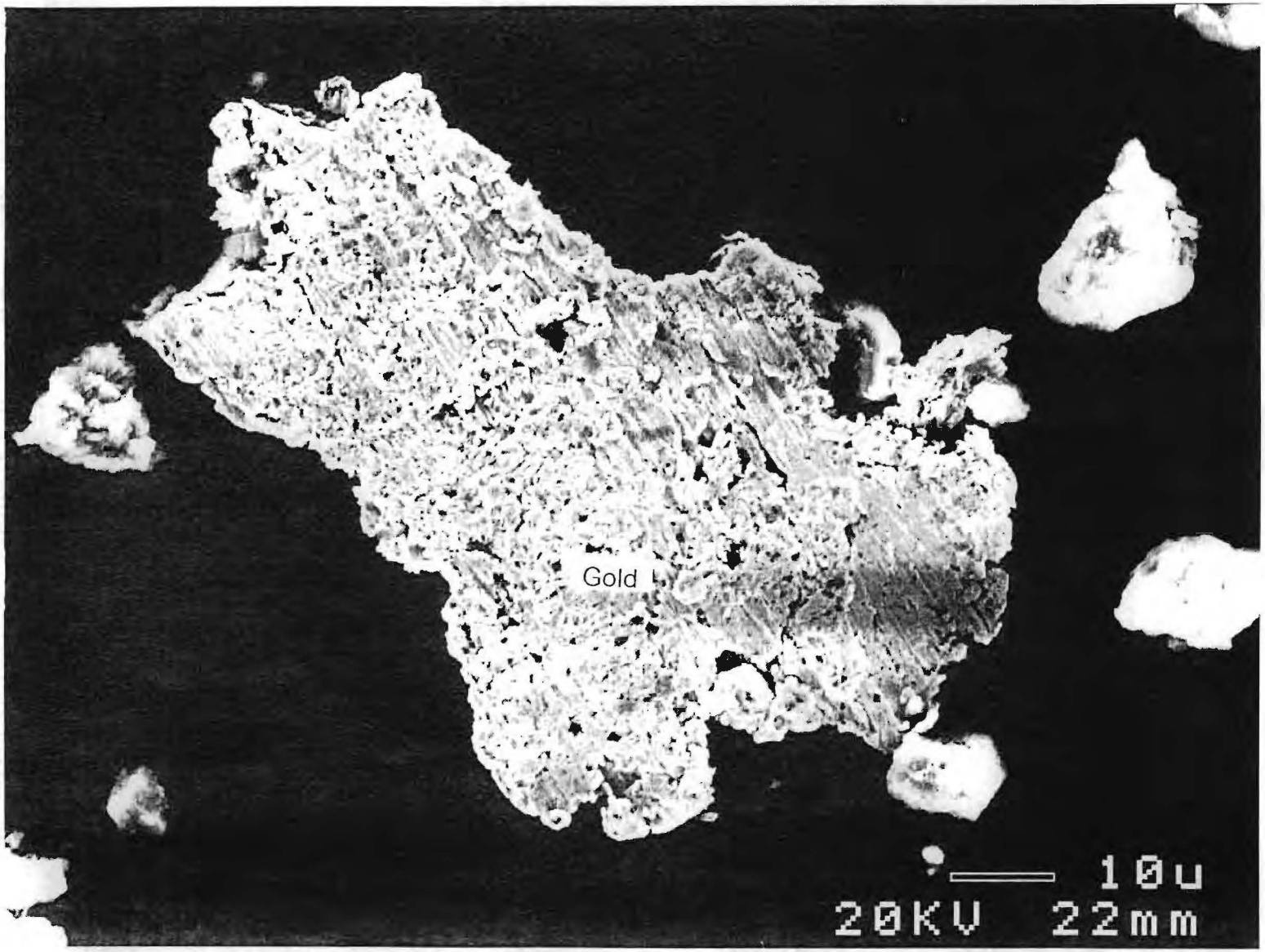
DATE: 05/30/95 TIME: 13:59:12

MAG: X1,000 ACC VOLT: 20KV WD: 22mm

COMMENT:

Marum Resources Inc.
Ironcap Gold Project

Scanning Electron Microscope Image
of Selected Metallic Grains

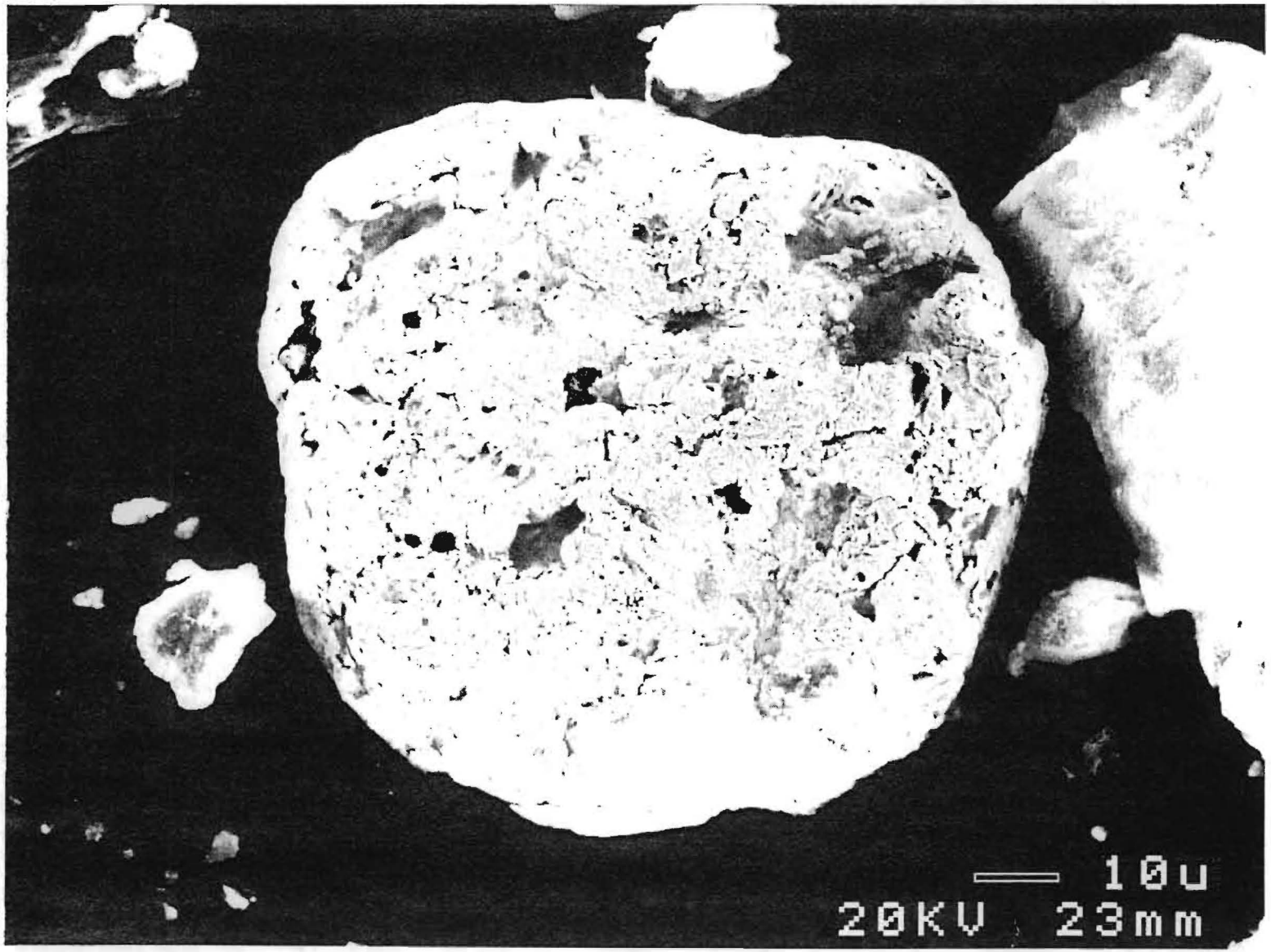


TITLE:

DATE: 05/30/95 TIME: 13:29:36

MAG: X800 ACC VOLT: 20KV WD: 23mm

COMMENT:

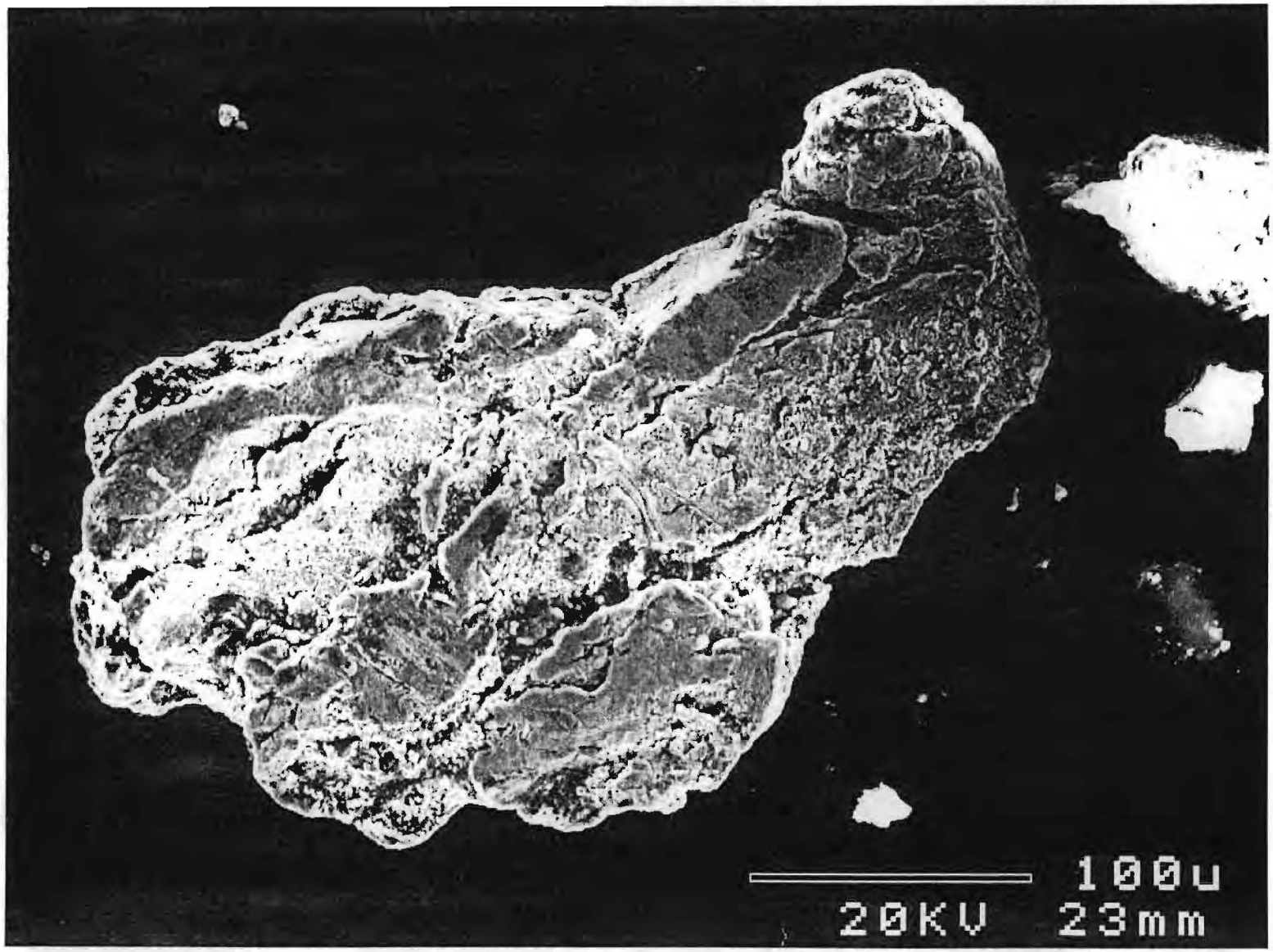


TITLE: TIN 2

DATE: 05/30/95 TIME: 13:42:46

MAG: X270 ACC VOLT: 20KV WD: 23mm

COMMENT: STUB 3

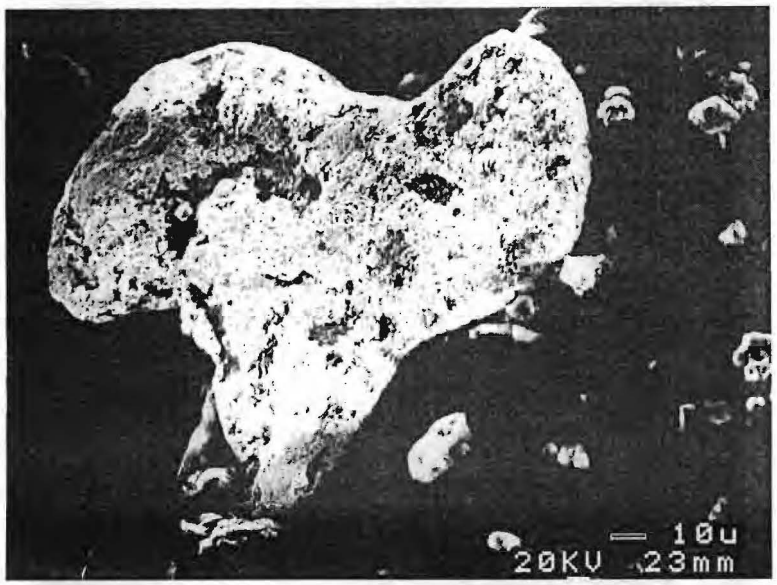


TITLE: GI

DATE: 05/ TIME: 13:11:56

MAG: X550 ACC VOLT: 20KV WD: 23mm

COMMENT:

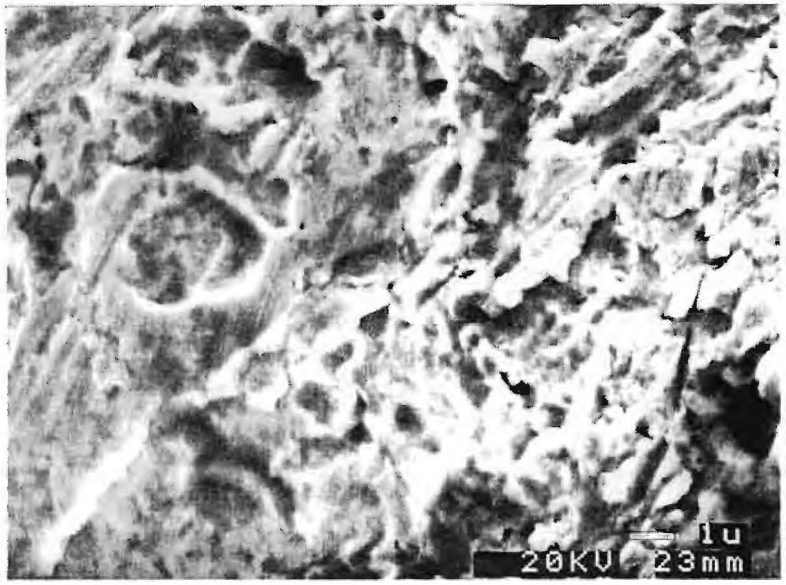


TITLE:

DATE: 05/30/95 TIME: 13:15:23

MAG: X7,000 ACC VOLT: 20KV WD: 23mm

COMMENT:

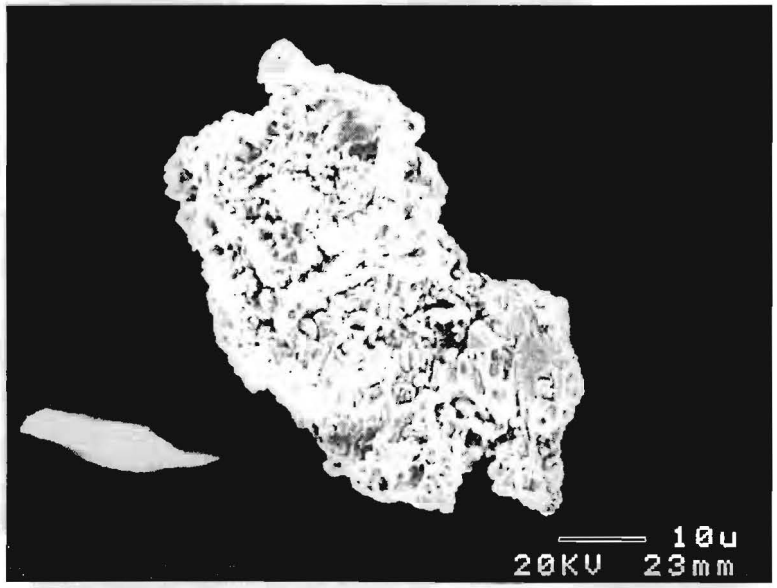


TITLE: TUNGSTEN

DATE: 05/30/95 TIME: 13:24:46

MAG: X1,400 ACC VOLT: 20KV WD: 23mm

COMMENT:



TITLE:

DATE: 05/30/95 TIME: 13:29:36

MAG: X800 ACC VOLT: 20KV WD: 23mm

COMMENT:

Appendix E

Analytical Data

Rick,

Since most of the minerals of gold are soluble in a 15% nitric a preleach to leach situation may be of assistance.
IE:

-15% nitric preleach of 3 assay tons of ore under ultrasonic bombardment

- convert nitic to chloro - nitric acid (1 part nitric, 4 parts hydrochloric, 5 parts water) - this is a form of aqua-regia.

- convert acid to hydrochloric through evaporation - this leaves the gold as a gold chloride in solution.

- AA of solution if not too much iron otherwise precipitate and fire.

LAB WORK IN PROGRESS
OCT. 12 1995

IRONCAP

1.Fusions of R1:
- fuse with Sodium Hydroxide
- dissolve cooled fusion mix in water
- filter on 10 micron filter
- minus 10 micron solution - correct Ph and cyanide leach - precip and fire assay.
- plus 10 micron - leach with 15% nitric - convert nitric to aqua regia and leach - boil off nitric and precip - fire assay precip - may be able to direct AA this solution.

2. Table 1/2 of dry R1 sample on new table.
- split sample with 1/2 reserved
- screen on 325 mesh
- table plus fraction
- clean cons and look for gold

3. Tetra brome of Crater #1 sample of screened and washed material
- sinks examined and then fused
- insol picked

4. Rimrock 3
- course crush
- 300 gram sample to fusion and pick of insol
- rest of pail to milling - tetra brome
- pick of sinks
- fuse sinks and pick final insol

5. Roadside
- course crush 1/2 of pail
- 300 gram sample to fusion
- rest of 1/2 sample to milling and tetra brome
- pick of sinks
- fuse sinks and pick insol

6. #43
- 50 lb sample of minus 13 crush
- table on new table
- tetra brome of high-grade - cons - mids
- sinks split in 1/2 ands one half directly examined while other half to sodium hydroxide fusion
- fused insol examined for desirable minerals and to see if there is a colour change of some grains.

August 1, 1993

Ironcap Samples

Cantin 1	Worsley backhoe pit bottom of shale
Cantin 2	Worsley backhoe pit middle of shale
Cantin 3	Worsley backhoe pit top of shale
Jim1	Worlsey pit - "3 ft from bottom of 12 foot pit cut.
Jim2	Worsley pit - "upper iron, top 2 ft of pit cut

August 1, 1993

Ironcap Samples

Cantin 1	Worsley backhoe pit bottom of shale
Cantin 2	Worsley backhoe pit middle of shale
Cantin 3	Worsley backhoe pit top of shale
Jim1	Worlsey pit - "3 ft from bottom of 12 foot pit cut.
Jim2	Worsley pit - "upper iron, top 2 ft of pit cut

TERRAMIN RESEARCH LABS LTD.

14, 2235 - 30th Avenue N.E., Calgary, Alberta T2E 7C7

Phone : (403) 250-9460 FAX : (403) 291-7064

LAB REPORT No. _____

CLIENT PROJECT _____

CLIENT P.O. _____

REPORT TO : Marcum _____ and : _____

INVOICE TO : _____ DATE SHIPPED : _____

No. PIECES IN SHIPMENT : _____

VIA : _____

TOTAL No. SAMPLES : _____

SAMPLE NUMBERS	NO.	TYPE	ANALYSES REQUIRED
Fristoe Creek TO		rock	Crush + pulv.
Fristoe TO		✓	
Fine Mudstone TO		✓	
Coarse Mudstone TO		✓	
Brown Oolitic Mudst. TO		✓	Duplicate FA for Au
Brown Oolitic Top TO		✓	
SANDSTONE TO		✓	
~~CONGLOMERATE~~ TO GONGO-1			Gently Mill to separate pebbles from cement
TO			triplicate FA on pebbles
TO			and/or cement.
TO			
TO			

PREPARATION REQUIRED OR COMMENTS : _____

COARSE REJECTS and OVERSIZE SOILS ARE DISCARDED UNLESS OTHERWISE SPECIFIED BELLOW

Store 30 days then discard ☐ Store 30 days then return C.O.D. ☐ Store 1 yr. @ $1.00/sample and return ☐ discard ☐

Complete sample documentation helps us to give you faster service.

Rec'd Aug 23/95

SAMPLE LIST

RSTC-1	1/2 OF CON FROM 22 POUND RAW SAMPLE
RSTC-2	OTHER HALF OF ABOVE
RSTC-3	MAGNETICS REMOVED FROM ABOVE TWO SAMPLES
RSCC-1	CENTRIFUGE CON FROM 50 POUND RAW
RSCC-2	CENTRIFUGE CON FROM 50 POUND RAW
RSN-1	MINUS 100 MESH NUKED
RSR-1	MINUS 100 MESH RAW
RSTC-4	TABLE CON FROM 10 POUND RAW SAMPLE
RSN-2	CHUNK OF RAW ORE SPLIT IN HALF THIS HALF NUKED
RSR-2	OTHER HALF OF THIS CHUNK LEFT RAW
RSN-3	NUKED
RSN-4	NUKED
RSCC-3	CON FROM CENTRIFUGE 25 POUNDS
RSCC-3A	CENTRIFUGE OF SLIMES FRACTION FROM 50 POUNDS

Rec'd Aug 29/95

TERRA MIN INSTRUCTIONS

STANDARD ASSAY ON ALL OF ABOVE SAMPLES

FROM ONE OF OUR SAMPLES THAT HAS A CRUSHED PORTION ON HAND AND THAT WE HAVE SOME BASELINE DATA ON:

FUSION OF RAW ORE WITHOUT FLUX IN GAS FURNACE - RECRUSH AND ASSAY WITH STANDARD SILVER INQUART AS SILVER SOLUTION

FUSION OF RAW ORE WITHOUT FLUX IN GAS FURNACE - RECRUSH AND ASSAY WITH MASSIVE SILVER INQUART AS SILVER SOLUTION - UP TO ONE GRAM SILVER - TRY 1/4 AND 1/2 GRAM FIRST

FUSION OF RAW ORE AND NO FLUX WITH SILVER AS SILVER SOLUTION ADDED AT THIS STAGE AS MASSIVE INQUART - RECRUSH AND ASSAY WITH NO INQUART ADDED AT SECOND FUSION.

TRY TWO OF EACH OF ABOVE.

PROCESSING FLOWSHEET FOR IRONCAP SAMPLES AT TERRA MIN LABS

1. Raw rock sample is crushed to 1/8 inch in law crusher.
2. Rock digested in Sodium Hydroxide Fusion - furnace temperature 700 C.
3. Fusion mixture poured into iron mold and allowed to cool.
4. Cooled fusion is broken up and then dissolved in hot water.
5. The liquid and solids remaining are poured through an 80 mesh screen. Oversize is examined for "nugget gold" and then fire assayed.
7. The material that passes the 80 mesh sieve will be fine, ultra fine and perhaps micro metallic gold in basic Ph water. This liquid will be Ph corrected and then cyanide will be added to take all metallic gold into solution.
8. The liquid will be filtered and the gold dropped out of the cyanide with zinc and then fire assayed. We may also be able to read the gold numbers directly from the solution with AA.
9. All data tabulated and then back calculated to original sample.

FUSION OF RAW ORE

This process is under investigation as a means to break down various compounds in the ore that may act as interference to a fire assay. The fusion is done under reducing atmosphere to aid in reducing various metal compounds to metal. There is also the hope that the silicas in the ore will be reduced to a simple silica glass that will not preg rob from a cyanide solution through adsorption of metals or retention of liquid at the filtering stage.

1. A sample of raw ore is first weighed and a calculation of dry weight is made based on moisture content.

2. Sample is placed in a crucible and fired at a temperature sufficient to liquefy the sample. In practice the sample is a semi liquid as it is so thick.

3. Observations of crucibles after fusion have shown significant attack of the crucible wall with some agent in the ore eating into and wetting the crucible. There is some concern that there could be losses of precious metals to the crucible so after firing the crucible is allowed to cool with the fusion left in it.

4. Once the fused material is cool the crucible wall that is above the fusion is broken away leaving the lower part of the crucible intact.

5. The remainder of the crucible along with the fusion is crushed to a very fine powder and subjected to bottle roll cyanide.

6. After filtering and precipitation by zinc the precipitated metals are fire assayed.

7. Because there will be losses of weight in the ore due to moisture losses, ignition of some elements etc. and there will be a gain in weight due to the retained crucible the calculation of values will have to be based on the raw ore going in with all recovered gold being back calculated to the weight at the beginning of the fusion.

Rec'd Sept 4/95

PROCESSING FLOWSHEET FOR IRONCAP SAMPLES AT TERRA MIN LABS

1. Raw rock sample is crushed to 1/8 inch in law crusher.
2. Rock digested in Sodium Hydroxide Fusion - furnace temperature 700 C.
3. Fusion mixture poured into iron mold and allowed to cool.
4. Cooled fusion is broken up and then dissolved in hot water.
5. The liquid and solids remaining are poured through a sieve stack. (50, 100, 150, 200, 325 mesh)
6. Each sieve size is examined for "nugget gold" and then fire assayed. We may try fire assay on each sieve size or to better insure a detectable limit we may combine them after examination.
7. The material that passes the smallest mesh size is essentially liquid with ultra fine and perhaps micro metallic gold. There is also a possibility of gold in a water soluble form. This liquid will be Ph corrected and then cyanide will be added to take all metallic gold into solution.
8. The liquid will be filtered and the gold dropped out of the cyanide with zinc and then fire assayed. We may also be able to read the gold numbers directly from the solution with AA.
9. All data tabulated and then back calculated to original sample.

RICK

3 samples after fusion

FS-1 88 gr. of ore

FS-2 105 gr. of ore

FS-3 160 gr. of ore
3 JARS TO HOLD ALL.

EACH SHOULD BE CRUSHED FINE AND THEN CYANIDE.

MAY WANT TO HOLD BACK ONE ASSAY TON OR SO FOR FOLLOW-UP ON EACH SAMPLE.

WILL DISCUSS# WITH LEN.

[redacted]

IRONCA – TOM's prep sample → Gold solution spike
1/2 AT — 0.0010 — negative but small

blank spike same
permit

— net numbers
.0031 – when mixed house standard
.006 = standard

2 de-slimed samples 0.0009 + 0.0053

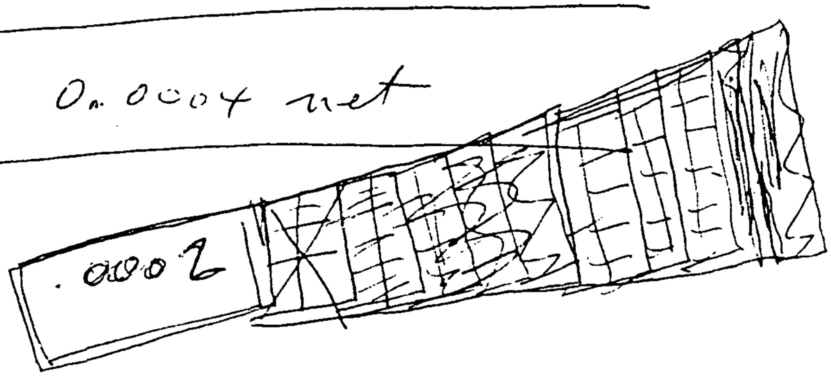
EHMAN 300 .0016
AC method 0010
Copper charge .0020

no copper blank charge.

Worsley
1 AT
2 x 1/2 AT
2 x 1/4 AT
1 AT (hand-deslimed)
} 0.0001

1/2 x AU16 conc. 0.0004 net

Ni assay of mat.



Appendix F

Terramin Laboratories Documents

Marum Resources Inc.

4606 5th Street SW, Calgary, Alberta, T2S 2E5
Alberta Stock Exchange Symbol -- "MMU" Tel: (403) 243-9500 Fax: (403) 243-9517

June 12, 1995

Instructions toTerramin

Please find enclosed the following samples to be processed as indicated.

TP1, TP2, TP3, TP4, TP5 - to be dried and fire assayed. Report on original dry sample weight and the weight of gold in the bead.

TR1, TR2 and - split to one assay ton and fire assay for gold.

Please fax the results to me.

Yours truly,
MARUM RESOURCES INC.

Richard A. Boulay, President

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.

Richard A. Boulay

Date: November 15, 1994

Job No: 94-180

Project:

P.O. No:

14 Rock

Signed: [redacted]

14-2235 30th Avenue N.E., Calgary, Alberta,T2E 7C7
Phone (403) 250-9460 Fax (403) 291-7064

Job#: 94-180

Project:

Sample Number	Au ppb	Ag ppm	Pt ppb
BB- 1	2	0.03	< 20
2	2	0.01	< 20
3	2	0.02	< 20
94-RB- 22	28	0.16	< 20
23	2	0.05	< 20
24	4	0.04	< 20
31	2	0.01	< 20
32	66	0.21	40
41	2	0.14	< 20
42	2	0.04	< 20
43-1	1080	0.20	< 20
43-2	4	0.03	< 20
43-3	4	0.03	< 20
45	2	0.01	< 20

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Richard A. Boulay

Date: 9-May-95

Job No: 95-057

Project: BH Samples

P.O. No:

4 Precipitates

Signed: _____

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-057

Client: Marum Resources
Project:

Sample Number	Au ppb	Pt ppb	Pd ppb
BH- 39	74	< 20	6
40	24	< 20	6
41	60	< 20	8
42	66	< 20	10

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Rick Boulay

Date: June 20, 1995

Job No: 95-071

Project: Iron Cap

P.O. No:

7 Concentrates

Signed: [redacted]

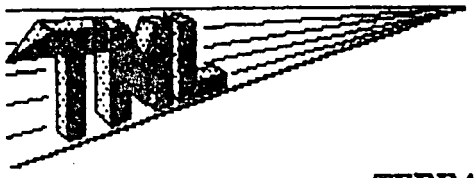
14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-071

Client: Marum Resources
Project: Iron Cap

Sample Number	Dry Wt. gm	Au mg
TP- 1	15.07	0.0013
TP- 2	14.97	0.0007
TP- 3	16.90	0.0011
TP- 4	15.93	0.0006
TP- 5	17.45	0.0024
TR- 1	28.68	0.0056
TR- 2	27.89	0.0012



TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Rick Boulay

Date: June 20, 1995

Job No: 95-065

Project:

P.O. No:

1 Rock - Acid Leach & CN Leach

Signed: [redacted]

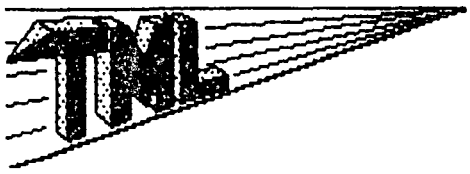
14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-065

Client: Marum Resources Inc.

		Au ppb
Reconstituted rock sample from size fractions	Normal Assay	6
•	Hydrochloric acid leach to remove Sn & Fe and	
	assay solution	8
	assay residue	2
•	Roast sample & assay	2
•	CN extraction of s sample	
	assay solution	4
	assay residue	2
•	Roast sample and CN extration and	
	assay solution	2
	assay residue	20
•	Panned sample from 30 g down to 12.5 g	12
•	Panned sample from 30 g down to 15.8 g	6
•	Panned smple from 30 g down to 6 g	6



TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Rick Boulay

Date: June 20, 1995

Job No: 95-069

Project:

P.O. No:

1 Rock - Leach & Pan

Signed: [redacted]

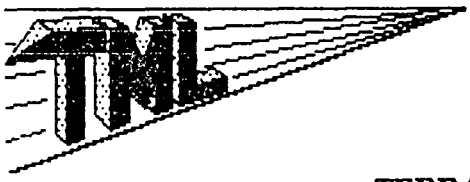
14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-089

Client: Marum Resources Inc.

		Au ppb
Iron Cap 95-001	Normal Assay	4
"	1 AT panned down to 15 g	8
"	1 AT panned down to 7.4 g	8
"	Aqua Regia wet ash and assay	8



TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Rick Boulay

Date: July 24, 1995

Job No: 95-083

Project: Iron Cap

Gold Fire Assays

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-083

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Au oz/ton	Sample Wt. Assayed gm
Iron Cap	0.0008	14.5
	0.0011	14.5
	0.0012	7.25
	0.0008	7.25
	0.0008	7.25
	0.0184	7.25
	0.0014	29.0
	0.0007	29.0
	0.0015	29.0
	0.0013	29.0
	0.0022	7.25
	0.0014	7.25
	0.0014	7.25
	0.0016	7.25
	0.0010	14.5
	0.0048	14.5
C.W.Ammen Method#2	0.0008	14.5
LWP Siliceous Ore Flux	0.0005	14.5
Computer Method	0.0015	17.5
Computer Method	0.0013	17.5
Tom's Computer	0.0008	17.5
Tom's Computer	0.0013	17.5
Copper Charge	0.0010	14.5
Deslimed	0.0009	29.0
Deslimed	0.0053	29.0
Scorified	<.0001	3.0
Scorified	0.0155	3.0
Scorified	0.0019	3.0
1 AT + .0062 oz/t spike	0.0099	29.0
1 AT + .0044 oz/t spike	0.0075	29.0
1/2 AT + .01 mg spike	0.0088 mg	14.5
Reassay of Matte	0.0002	14.5
Cu no Pb assay	no button	14.5

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-083

Client: Marum Resources Inc.
Project: Iron Cap

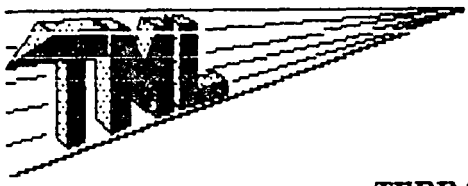
Sample Number	Au oz/ton	Sample Wt. Assayed gm
Worsley #1 red	0.0001	29.0
	0.0001	14.5
	0.0001	14.5
	0.0001	7.25
	0.0001	7.25
	0.0001	29.0
	0.0001	14.5
	0.0001	14.5
	0.0001	7.25
	0.0001	7.25
Deslimed	0.0001	29.0
1 AT + .0060 oz/t spike	0.0064	29.0
1 AT + .0060 oz/t spike	0.0055	29.0
Wet Ash	0.0001	29.0
Worsley #2	0.0001	29.0
	<.0001	14.5
	0.0001	14.5
	0.0020	7.25
	0.0004	7.25
1 AT + .0060 oz/t spike	0.0065	29.0
Wet Ash	0.0001	29.0

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-083

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Au oz/ton	Sample Wt. Assayed gm
Rambling Creek	0.0001	29.0
	0.0004	14.5
	0.0001	14.5
	0.0002	7.25
	0.0002	7.25
	0.0001	29.0
	0.0001	14.5
	0.0001	14.5
	0.0001	7.25
	0.0012	7.25
Computer Method	0.0002	17.5
Computer Method	0.0002	17.5
Computer Method	0.0002	17.5
Computer Method	0.0002	17.5
Deslimed	0.0001	17.5
Deslimed	0.0001	29.0
Deslimed	0.0001	29.0
1 AT + .0064 oz/t spike	0.0055	29.0
1 AT + .0060 oz/t spike	0.0060	29.0
Wet Ash	0.0001	29.0
+100 mesh	0.0004	14.5
+100 mesh	0.0002	14.5
Stoney Lake	0.0002	29.0
	<.0001	14.5
	0.0001	14.5
	<.0001	7.25
	0.0001	7.25
1 AT + .0060 oz/t spike	0.0063	29.0
Wet Ash	0.0002	29.0



TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Rick Boulay

Date: July 24, 1995

Job No: 95-096

Project: Iron Cap

Gold Fire Assays

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-096-1

Client: Marum Resources Inc.
Project: Iron Cap

Table Assay

Sample Number	Au oz/ton	Weight gm
Worsley #1 red		
Concentrate	0.274	8.03
Midlings	0.0024	48.26
Tailings	0.0035	1300
-325 mesh	0.0003	1870
Total Au	0.0023	3200
Worsley #2		
Concentrate	0.110	2.16
Tailings	0.0005	905
-325 mesh	0.0005	2093
Total Au	0.0007	3000
Rambling Creek		
Concentrate	0.109	1.69
Tailings (unweathered)	0.0003	1600
-325 mesh	0.0003	1974
Total Au	0.0004	3575

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-096-2

Client: **Marum Resources Inc.**
Project:

Sample Number			
T2 RB (Diamond/Zircon	5 grains		
	4 ZrSi	(Zircon)	
	1 SiMg(FeAlCr)	(Kyanite)	
T2 RB (Diamond/Spinel)	8 grains		
	5 CrFe(AlMgSi)	(Chromite)	Note: Chromium is 2:1 or
	2 CrFe(AlMgSiZn)	(Chromite)	better than Iron
	1 CrFe(AlMgSiTi)	(Chromite)	
Iron Cap (Au check)	18 grains		
	2 Al	(Aluminum)	
	3 Sn	(Tin)	
	6 FeS	(Pyrite)	
	2 FeCuS	Chalcopyrite)	
	2 FeCr	(Chrome Spinel)	
	3 FeSi	(Iron Silicates)	
Worsley #1 Au checks	7 grains		
	1 Au	(Gold)	
	1 Al	Aluminum)	
	5 FeS	(Pyrite)	
Rambling Ck Au checks	3 grains		
	1 Au	(Gold)	
	2 PbS	(Galena)	
Worsley #2 Au checks	2 grains		
	1 Au	(Gold)	
	1 FeCuS(Zn)	(Chalcopyrite - picked while tabling)	

TERRAMIN RESEARCH LABS Ltd.

Job No: 96-096-1

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Table Assay Au oz/ton	Weight gm
Worsley #1 red		
Concentrate	0.274	8.03
Midlings	0.0024	48.26
Tailings	0.0035	1300
-325 mesh	0.0003	1870
Total Au	0.0023	3200
Worsley #2		
Concentrate	0.110	2.16
Tailings	0.0005	905
-325 mesh	0.0005	2093
Total Au	0.0007	3000
Rambling Creek		
Concentrate	0.109	1.69
Tailings (unweathered)	0.0003	1600
-325 mesh	0.0003	1974
Total Au	0.0004	3575

ESTABLISHED VALUES BY FIRE ASSAY.
CAN MAKE AN OBVIOUS CON OF .1 TO .5 OZS PER TON.

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Rick Boulay

Date: Aug. 11, 1995

Job No: 95-115

Project: Cantin (from Worsley Pit)

5 Samples

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-115

Client: Marum Resources Inc.
Project: Cantin Samples

Sample Number	Fire Assay Au ppb	CN Leach (roasted) Au ppb
Cantin-1	4	< 10
Cantin-1	4	< 10
Cantin-2	4	< 10
Cantin-2	2	< 10
Cantin-3	8	< 10
Cantin-3	6	< 10
Jim-1	4	< 10
Jim-1	4	< 10
Jim-2	4	< 10
Jim-2	4	< 10

(from Wonsky pit)

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Rick Boulay

Date: Aug. 11, 1995

Job No: 95-118

Project: Iron Cap

7 Samples

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-118

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Fire Assay Au ppb
FeStone crush	1912
FeStone crush	3080
Dense Oolite Top	20
Dense Oolite Top	16
Sandstone	16
Sandstone	8
Coarse Mudstone	4
Coarse Mudstone	12
Fine Mudstone	8
Fine Mudstone	8
Dense Oolite Middle	8
Dense Oolite Middle	12
FeStone	16
FeStone	16
Congo-1 +10 pebbles	14
Congo-1 +10 pebbles	16
Congo-1 +10 pebbles	20
Congo-1 -10 cement	12
Congo-1 -10 cement	6
Congo-1 -10 cement	12

TML

TERRAMIN RESEARCH LABS LTD.

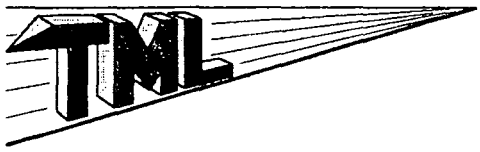
BOARD # [illegible] KP

JOB # [illegible] - 118

Page 1/2

	Client No.	Plot #		Wt				Au ppb							
	IRONCAP														
1	FESTONE CRUSH	141		12.5			478	1912		.056					
2	" "	142					770	3080		.090					
3	DENSE OOLITE TOP	143					5	20							
4	" " "	144					4	16							
5	SANDSTONE	145	UP				4	16							
6	"	146					2	8							
7	COARSE MUDSTONE	147					1	4							
8	" "	148					3	12							
9	FINE MUDSTONE	149					2	8							
10	" "	150	UP				2	8							
1	DENSE OOLITE MIDDLE	151					2	8							
2	" " "	152					3	12							
3	FESTONE	153					4	16							
4	"	154					4	16							
15	BLANK	155		—			0								
6							(4)								
7															
8															
9															
0															

To Get oz/t = ppb × 0.0000291667



TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Aug. 30, 1995

Job No: 95-132

Project:

1 Concentrate

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-132 **Client:** **Marum Resources Inc.**
Project:

Sample Number	Wt g	Au mg	Au oz/ton	Ag mg	Ag oz/ton	Pt mg	Pt oz/ton
IC-Con-01	29.87	1.27	1.24	0.20	0.195	0.0005	0.0005
Original 10 lbs			0.008		0.0013		0.000003

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Sept. 8, 1995

Job No: 95-143

Project: Rambling Creek & Worsley

16 Samples

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-143 **Client:** Marum Resources Inc.

Sample Number		Sample Wt gm	Au mg	Au oz/ton
RSCC-	1	47.50	0.0380	
	2	24.13	0.0004	
	3	17.00	0.0114	
	3A	4.14	0.0002	
RSN-	1	104.30	0.0041	
	2	39.51	0.0003	
	3	54.42	0.0012	
	4	74.07	0.0013	
RSR-	1	87.02	0.0020	
	2	47.77	0.0005	
RSTC-	1	78.96	0.1540	
	2	76.39	0.1440	
	3	4.01	0.0074	
	4	30.43	0.1750	
Rambling Ck				0.0005
Worsley #2				0.0001

P:02
TML
TERRAMIN RESEARCH LABS LTD.
TEL:403-291-7064
TERRAMIN LABS
SEP-01-95 12:09

MARWOOD

JOB 5-143

Page

	Client No.	Sample wt. g.	Au mg	
1	RSCC - 1	47.50	.048	
2	- 2	24.13	.0002	
3	- 3	17.00	.011	
4	- 3A	4.14	.0002	
5	RSN - 1	104.30	.001	
6	- 2	39.51	.0001	
7	- 3	54.42	.0009	
8	- 4	74.07	.0032	
9	RSR - 1	87.02	.0026	
0	- 2	47.77	.0001	
1	RSTC - 1	78.96	.222	
2	- 2	76.39	.198	
3	- 3	4.01	.0074	
4	- 4	30.43	.235	10lb
5				
6				
7				
8				
9				
0				

MARUM

P:03

TML

TERRAMIN RESEARCH LABS LTD.

JOB # 95-143

Page

Fire Assay of Sintered Samples

	Client No.	Au oz/ton
1	RABBLING CREEK	.0005
2	WORSLEY #2	.0001
3		
4		
5		
6		
7		
8		
9		
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
0		

TEL:403-291-7064

TERRAMIN LABS

SEP-01-95 12:09

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Sept. 14, 1995

Job No: 95-146

Project: Worsley & Rambling Creek

2 Gold analyses in duplicate

Signed: _____

Invoice 4009
$401.25

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: **95-146** **Client:** **Marum Resources Inc.**

Sample Number	Sample Wt gm	+2 u Au ppb	+2 u Au oz/ton	-2 u Au ppb	-2 u Au oz/ton
Worsley #2	29.0	205	0.0060	644	0.0187
Worsley #2	29.0	4	0.0001	46	0.0014
Rambling Ck	29.0	5	0.0001	127	0.0036
Rambling Ck	29.0	5	0.0001	53	0.0015

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-146 **Client:** Marum Resources Inc.

Sample Number	Sample Wt gm	+2 u Au ppb	+2 u Au oz/ton	-2 u Au ppb	-2 u Au oz/ton
Worsley #2	29.0	205	0.0060	644	0.0187
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TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Sept. 11, 1995

Job No: 95-149

Project: Ironcap

4 Samples

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95- 149 **Client: Marum Resources Inc.**

Sample Number	Weight gm	Au mg
Batch 2	14.78	0.0051
WPBL- 1	61.39	0.0043
WPBL- 2	57.57	0.0017
WPBL- 3	79.39	0.0135

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Sept. 25, 1995

Job No: 95-150

Project: Worsley

5 Samples

Signed: [redacted]

Invoice 4010

$353.10

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: **95- 150** **Client:** **Marum Resources Inc.**

Sample Number	Weight gm	+200 m Au ppb	+200 m Au oz/ton	Fe ppt Au ppb	Fe ppt Au oz/ton	Zn ppt Au ppb	Zn ppt Au oz/ton
Worsley Top	20	2	0.0001	10	0.0003	54	0.0016
Worsley Top	20	44	0.0013	12	0.0003	24	0.0007
Worsley Top	20	6	0.0002	6	0.0002	158	0.0046
Worsley Top	20	6	0.0002	8	0.0002	42	0.0012
Worsley Bottom	50	2	0.0001	2	0.0001	10	0.0003

TERRAMIN RESEARCH LABS Ltd.

Job No: 95- 150 **Client:** Marum Resources Inc.

Sample Number	Weight gm	+200 m Au ppb	+200 m Au oz/ton	Fe ppt Au ppb	Fe ppt Au oz/ton	Zn ppt Au ppb	Zn ppt Au oz/ton
Worsley Top	20	2	0.0001	10	0.0003	54	0.0016
Worsley Top	20	44	0.0013	12	0.0003	24	0.0007
Worsley Top	20	6	0.0002	6	0.0002	158	0.0046
Worsley Top	20	6	0.0002	8	0.0002	42	0.0012
Worsley Bottom	50	2	0.0001	2	0.0001	10	0.0003

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Sept. 19, 1995

Job No: 95-156

Project:

Magnetic Separations & CN Leaches

Signed: [redacted]

Invoice # 4005
$112.35

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-156 **Client: Marum Resources**

Sample Number		Weight gm	Au ppb	Tot Wt gm
Worsley	Mag-con	3.82	40	120
	non-mag con	5.78	44	
	para-mag	12.5	8	
		Hot CN Leach		
FS-	1	1 AT	< 40	
	2	1 AT	80	
	3	1 AT	40	

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-156

Client: Marum Resources

Sample Number		Weight gm	Au ppb	Tot Wt gm
Worsley	Mag-con	3.82	40	120
	non-mag con	5.78	44	
	para-mag	12.5	8	
		Hot CN Leach		
FS-	1	1 AT	< 40	
	2	1 AT	80	
	3	1 AT	40	

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Sept. 25, 1995

Job No: 95-158

Project: Worsley

14 Gold analyses

Invoice # 4011

$ 205.44

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: **95- 158** **Client:** **Marum Resources Inc.**

Sample Number	Standard Fire Assay Au ppb
S2 LA Shale	12
S2 LA Shale	56
S2 L1	16
S2 L1	12
S2 L2 Carbon	12
S2 L2 Carbon	12
S2 L2 Fest	12
S2 L2 Fest	20
S3 Fest	12
S3 Fest	40
S3 Ironclay	16
S3 Ironclay	16

	Ultrasonic CN Leach Au ppb after 1 day	Au ppb after 2 days
Worsley #2	40	40
Worsley Bottom	< 40	< 40

TERRAMIN RESEARCH LABS Ltd.

Job No: 95- 158 **Client:** Marum Resources Inc.

Sample Number	Standard Fire Assay Au ppb
S2 LA Shale	12
S2 LA Shale	56
S2 L1	16
S2 L1	12
S2 L2 Carbon	12
S2 L2 Carbon	12
S2 L2 Fest	12
S2 L2 Fest	20
S3 Fest	12
S3 Fest	40
S3 Ironclay	16
S3 Ironclay	16

	Ultrasonic CN Leach Au ppb after 1 day	Au ppb after 2 days
Worsley #2	40	40
Worsley Bottom	< 40	< 40

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Oct. 20, 1995

Job No: 95-173

Project: Iron Cap

4 Samples

Invoice # 4030

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-173

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number		Au ppb
Congo - 2		2
Rotopan - Con	W Lower A	2
Rotopan - Con	W Lower B	2
Rotopan - Con	W2 Upper A	2

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Oct. 20, 1995

Job No: 95-178 # 4031

Project: Iron Cap

Bromine Leach Tests

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Client: Marum Resources Inc.
Project: Iron Cap

Job No: 95-178

Report

16 Bromine leach tests (8 acid formulas and 8 base formulas) were conducted on replicate 29 gm (1 AT) samples. Gold was determined by atomic absorption on the filtered solution of each test. The filtered residue from one acid formula F-1-A and from one base formula F-1-B was also fire assayed for gold.

The reported gold values for these tests may not be representative of the gold content of the sample, but may rather be due to interference in the atomic absorption reading resulting from the very high salt content and the high dilution factor.

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-178

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Au ppb
F 1 A	120
F 2 A	< 40
F 3 A	< 40
F 4 A	160
F 5 A	< 40
F 6 A	< 40
F 7 A	240
F 8 A	120
F 1 B	80
F 2 B	< 40
F 3 B	< 40
F 4 B	200
F 5 B	< 40
F 6 B	< 40
F 7 B	240
F 8 B	120

Sample Number	Au ppb
MMU-R-1 Formula 1A	6
MMU-R-1 Formula 1B	4

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Oct. 20, 1995

Job No: 95-179 #4032

Project: Iron Cap

4 Bottle Roll + Fire Assays

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-179

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Residue Au ppb	Solution Au ppb
MMU-R-1	1	2
MMU-R-1	1	1
MMU-R-1	1	1
MMU-R-1	1	1

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Oct. 24, 1995

Job No: 95-186 #4034

Project: Iron Cap

Particle Size Testing

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

Job No: 95-186

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Weight		+200 mesh Au ppb	+200 mesh Au oz/ton	-200 mesh+2u Au ppb	-200 mesh+2u Au oz/ton	-2 u Au ppb	-2 u Au oz/ton	Total Au ppb	Total Au oz/ton
Table Con Top	203.4	g	1	<.0001	29	0.0008	50	0.0015	80	0.0023
Original Weight	12.3	kg								
Table Con Bottom	33.48	g	4	.0001	32	0.0009	28	0.0008	64	0.0019
Original Weight	4.5	kg								

	Weight		Au mg	Au ppb	Au oz/ton
Top Con	29.86	g	0.0208	695	0.0200
Tail	12.0	kg	0.1600	13	0.0004
NaOH	203.4	g	0.0163	80	0.0023
Total	12.3	kg	0.2011	16	0.0005
Bottom Con	3.48	g	0.0106	3046	0.0890
Tail	4.5	kg	0.0600	13	0.0004
NaOH	33.48	g	0.0021	64	0.0019
Total	4.5	kg	0.0727	16	0.0005

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Oct. 24, 1995

Job No: 95-198 #4035

Project: Iron Cap

Testing on MMU-R-1

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-198

Client: Marum Resources Inc.
Project Iron Cap

Sample Number		Weight g	+200 mesh ppb	+200 mesh oz/ton	-200mesh+2u ppb	-200mesh+2u oz/ton	-2 u ppb	-2 u oz/ton	Total Au ppb	Total Au oz/ton
MMU-R-1	1	30	5	0.0001	183	0.0053	36	0.0010	224	0.0064
MMU-R-1	2	30	5	0.0001	43	0.0013	23	0.0007	71	0.0021
MMU-R-1	3	30	5	0.0001	5	0.0001	75	0.0022	85	0.0024
MMU-R-1	4	30	3	0.0001	8	0.0002	28	0.0008	39	0.0011
MMU-R-1	5	30	10	0.0003	13	0.0004	26	0.0008	49	0.0015
MMU-R-1	6	25	10	0.0003	30	0.0009	76	0.0022	116	0.0033

Nitre Ratios	Weight g	Au ppb
1.5 - 1	29	2
1.5 - 1	29	4
1.5 - 1	29	4
1 - 1	29	4
1 - 1	29	2
1 - 1	29	6
2 -1	29	2
2 -1	29	2
2 -1	29	4
HF fusions	15	16
HF fusions	15	10

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Oct. 25, 1995

Job No: 95-204 #4039

Project: Iron Cap

R-1 and SR-1 Testing

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-204

Client: Marum Resources Inc.
Project Iron Cap

Sample Number		Weight gm	Au mg	Au ppb	Au oz/ton
SRA	1A Con 1	0.06	0.0080	134000	3.90
SRA	1A Con 2	3.71	0.0650	17520	0.510
SRA	Tail	1017	0.0610	60	0.0017
SRA	Total	1021	0.1340	131	0.0038
SRA	1B Con	3.06	0.0292	9542	0.278
SRA	Tail	324	0.0410	127	0.0036
SRA	Total	327	0.0702	214	0.0062

Sample Number		Au oz/ton
R-1		0.00012
R-1		0.00012
R-1	+50 ug	0.095
R-1	+50 ug	0.093
SR-1		0.00012
SR-1		0.00018
Au 16		0.00610
Blank	+50 ug	0.094
Blank		0

Sample SR-1

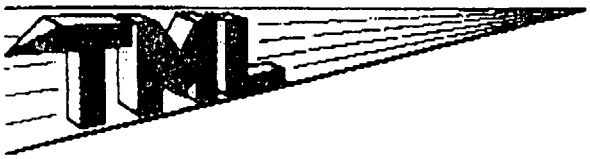
Grain	Chemical Composition	ID
1	Au	Gold
2	Fe Mg (Si S Ca)	Iron Filing
3	Au	Gold
4	Fe (Si Al)	Iron Filing
5	Fe (Si Al)	Iron Filing
6	Cu Zn (Fe S Si)	Bronze
7	Si Zr (Al)	Zircon
8	Si Zr	Zircon
9	Cu Zn (Fe S)	Bronze

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-204

Client: Marum Resources Inc.
Project Iron Cap

Sample Number		Pt ppb	Pd ppb
R-1		< 40	< 20
R-1		< 40	< 20
R-1	+50 ug Au	< 40	< 20
R-1	+50 ug Au	< 40	< 20
SR-1		< 40	< 20
SR-1		< 40	< 20
SR-1A	Con 1	40	4170
SR-1A	Con 2	< 40	70
SR-1A	Tail	< 40	< 20
SR-1B	Con	< 40	80
SR-1B	Tail	< 40	< 20
Top	Con	< 40	< 20
Top	Tail	< 40	< 20
Bottom	Con	< 40	280
Bottom	Tail	< 40	< 20



TERRAMIN RESEARCH LABS LTD.

14, 2235 - 30 Avenue NE, Calgary, Alberta, T2E 7C7
Phone (403) 250-9460
Toll Free (800) 363-0962
FAX (403) 291-7064

06 March 1996

Job No: 95-204

Sample No: SR-1

Report on analysis of mineral grains submitted to R.L Barnett Geological Consulting for Electron Microprobe analysis.

Two clear, uncoloured grains were isolated from Sample No. SR-1 and submitted for mineral identification. These were confirmed by the Electron Mocroprobe as diamonds.

Dimensions of the grain:

Grain 1: 0.40 mm x 0.35 mm x 0.20 mm

Grain 2: 0.30 mm x 0.25 mm x 0.30 mm

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Nov. 10, 1995

Job No: 95-206

Project: Iron Cap

P.O. No:

2 Table Gold Assay

Invoice # 4062

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-206

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Weight gm	Au mg	Au ppb	Au oz/ton
R-2 Con	11.16	0.054	4840	0.1410
R-2 Tails	12200	1.012	83	0.0024
Total	12200	1.066	87	0.0025
R-3 Con	17.66	0.0058	331	0.0096
R-3 Tails	9500	0.57	60	0.0017
Total	9500	0.5758	60	0.0017

TML

TERRAMIN RESEARCH LABS LTD.

BOND #

JOB # 21-5

Page 1 1

	Client No.	Pot #		Wt	1-100	Au mg	Au g/t		Au ppb		Au oz/t				
1	R-2 CON			11.16	x10 105	54.00	.054		4840		0.141				
2	TAILS		(5)	12,200	25	1012.60	1.012		83		.0024				
3	TOTAL			12,200		1066.60	1.066		87		.0025				
4															
5	R-3 CON			17.66	117	5.55	.0058		331		.0096				
6	TAILS		(5)	9500	18	520.00	.570		60		.0017				
7	TOTAL			9560		575.55	.576		60		.0017				
8															
9	R-4 CON			108.62	x10 272	293.5	.294		2702		.0786				
0	TAILS		(5)	12660	5	201.6	.202		16		.0005				
1	TOTAL			12700		495.1	.495		40		.0012				
2	RETABLE CON/PULV RETABLE MIDS														
3	Au-16				115				230						
4	BLANK			↑	(2)		↑		↑		↑				
5															
6															
7															
8															
9															
0															

TERRAMIN RESEARCH LABS LTD.

JOB # 706

Page 1/1

	Client No.			WT	1-100	Au µg	Au mg		Au ppb		Au oz/t					
1	R-2 CON			11.16	x10 108	54.00	.054		4840		0.141					
2	TAILS			12,200	25	1012.6	1.012		83		.0024					
3	TOTAL			12,200		1066.6	1.066		87		.0025					
4																
5	R-3 CON			17.66	117	5.85	.0058		331		.0096					
6	TAILS			9500	15	5700			66		.0017					
7	TOTAL			9506		575.85	.576		60		.0017					
8																
9	R-4 CON (fine material)			108.62	x10 587	293.5	.294		2702		.0786					
0	2nd TABLE CON			10.81	486	112.4	.112		2248		.0654					
1	TAILS		(15)	11206	5	186.7	.187		16		.0005	←				
2	REPULP CON			22.65	260	13.0	.013		574		.0167					
3	TAILS		(15)	1325	4	17.7	.018		14		.0004					
4	TOTAL			12700		623.3	.624		50		.0014					
5																
6				↑			↑		↑		↑					
7																
8																
9																
0																

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Nov. 10, 1995

Job No: 95-214

Project: Iron Cap

P.O. No:

6	Table Gold Assay
22	Standard Fire Assay

Signed: [redacted]

Invoice # 4064 ~~4274~~

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-214

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number		Au ppb	
1	+200	27	
1	-200	12	
2	+200	24	
2	-200	16	
3	+200	11	
3	-200	19	
4	-200	18	
4	-200	17	
5	+200	14	
5	-200	16	
6	+200	18	
6	-200	16	
7	+200	19	
7	-200	15	
8	+200	19	
8	-200	9	
9	+200	19	
9	-200	15	
10	+200	50	
10	-200	18	
R-1	+200	30	using ultrasonic cleaner
R-1	-200	105	using ultrasonic cleaner

TERRAMIN RESEARCH LABS Ltd.

Job No: **95-214**

Client: **Marum Resources Inc.**
Project: **Iron Cap**

Sample Number		Weight gm	Au mg	Au ppb	Au oz/ton
T-1	Con	35.4	0.0036	101	0.0029
T-1	Tails	4965	0.0165	3	<.0001
T-1	Total	5000	0.0201	4	0.0001
T-2	Con	88.46	0.0118	133	0.0038
T-2	Tails	4912	0.0817	16	0.0005
T-2	Total	5000	0.0935	19	0.0005
T-3	Con	266.4	0.0024	9	0.0003
T-3	Tails	4734	0.0316	7	0.0002
T-3	Total	5000	0.0340	7	0.0002
T-4	Con	60.96	0.0046	76	0.0022
T-4	Tails	4940	0.0494	10	0.0003
T-4	Total	5000	0.0540	11	0.0003
T-5	Con	7.75	0.0306	612	0.0178
T-5	Acid Tail	5000	0.0500	10	0.0003
T-5	Std Tail	5000	0.0150	3	0.0001
T-5	Total	5000	0.0956	19	0.0005
T-6	Con	26.28	0.0004	13	0.0004
T-6	Tails	4974	0.0032	7	0.0002
T-6	Total	5000	0.0036	7	0.0002

TML TERRAMIN RESEARCH LABS LTD.

Page

	Client No.	WT		mg		ppb	oz/t
1	T-1 CON	35.40		3.60	.0036	101	.0029
2	TAILS	4965	(.5)	16.55	.0165	3	.0001
3	TOTAL	5000			.0201	4	.0001
4							
5	T-2 CON	88.46		11.30	.0118	133	.0038
6	TAILS	4912	(.5)	81.66	.0817	16	.0005
7	TOTAL	5000			.0935	19	.0005
8							
9	T-3 CON	266.40		2.35	.0024	9	.0003
0	TAILS	4734	(.5)	31.55	.0316	7	.0002
1	TOTAL	5000			.0340	7	.0002
2							
3	T-4 CON	60.96		4.65	.0046	76	.0012
4	TAILS	4940	(.5)	99.40	.0494	10	.0003
5	TOTAL	5000			.0540	11	.0003
6							
7	T-6 CON	26.26		.35	.0004	13	.0004
8	TAILS	4974	(.5)	33.16	.0332	7	.0002
9	TOTAL	5000			.0336	7	.0002
0							

TML

TERRAMIN RESEARCH LABS LTD.

MULTIPLE SCREEN FIRE ASSAYS OF MMU-R-1

JOB # F-214

Page 1

	Client No.	Au PPB
1	1 +200	27
2	-200	12
3	2 +200	24
4	-200	16
5	3 +200	11
6	-200	19
7	4 +200	18
8	-200	17
9	5 +200	14
0	-200	16
1	6 +200	18
2	-200	16
3	7 +200	19
4	-200	15
5	8 +200	19
6	-200	9
7	9 +200	19
8	-200	15
9	10 +200	20
0	-200	18

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Nov. 10, 1995

Job No: 95-222

Project: Iron Cap

P.O. No:

2	Table Gold Assay
12	Standard Fire Assay
12	Acid Leach

Signed: [redacted]

Invoice # 4067

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95- 222

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Wt. g.	Au mg.	Au ppb	Au oz/ton
Fe Stone Crush Con	93.81	1.576	16800	0.489
Fe Stone Crush Tails	456	0.099	218	0.0063
Fe Stone Crush Total	550	1.675	3045	0.0886
H.E. Hard Cons	10.48	0.0126	1201	0.0349
H.E. Hard Tails	4490	0.1197	27	0.0008
H.E. Hard Total	4500	0.1323	29	0.0008

TERRAMIN RESEARCH LABS Ltd.

Job No: 95- 222

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Au ppb
R-1 1A	2
R-1 1A	2
R-2 2A	2
R-2 2A	2
R-1 3A	2
R-1 3A	2
R-1 1B	2
R-1 1B	2
R-1 2B	2
R-1 2B	2
R-1 3B	2
R-1 3B	2

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Nov. 22, 1995

Job No: 95-235

Project: Iron Cap

P.O. No:

4	Samples for Table Assay - Gold
5	Standard Gold Assay

Invoice # 4081

$262.15

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95- 235

Client: Marum Resources
Project:

Sample Number	Wt g	Au ppb	Au oz/ton
Rambling Creek Con	20.17	1708	0.0497
Rambling Creek Tails	1580	20	0.0006
Rambling Creek Total	1600	42	0.0012
Stony Lake Con	20.73	1727	0.0503
Stony Lake Tails	1530	23	0.0007
Stony Lake Total	1550	46	0.0013
Stony 3 Con	31.55	4880	0.1420
Stony 3 Tails	4170	227	0.0066
Stony 3 Total	4200	263	0.0076
Fe Stone Crush Con	71.87	531	0.0154
Fe Stone Crush Tails	230	137	0.0040
Fe Stone Crush Total	301	230	0.0067

Note: Previous reported data in Job 95-222
for Fe Stone Crush Tails was 218 ppb Au

TERRAMIN RESEARCH LABS LTD.

JOB #

Page

	Client No.		WT		Au mg		Au ppb	Au oz/t
1	KAMBLING Cr Con		20.17		34.45		1708	.0497
2	TAIL		1600		32		20	.0006
3	TOTAL		1600		66.45		42	.0012
4								
5	STONY LK CON		20.73		35.8		1727	.0503
6	TAILS		1550				23	.0007
7	TOTAL		1550		71.97		46	.0013
8								
9	STONY 3 CENTER CON		31.55		154.0		4880	.1420
0	TAIL		4200		952		227	.0066
1	TOTAL		4200		1106		263	.0076
2								
3	Fe STONY CRUSH CON		71.87		[illegible]		531	.0154
4	TAIL		230		31.43		137	.0040
5	TOTAL		301		69.58		230	.0067
6	* PREVIOUSLY REPORTED TAILS ON Fe STONY CRUSH AT 218 ppb Re. 95-222							
7								
8								
9								
0								

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Nov. 22, 1995

Job No: 95-224

Project: Iron Cap

P.O. No:

5 Samples for Table Assay - Gold

Invoice # 4080

214.00

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 224

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Wt. g.	Au mg.	Au ppb	Au oz/ton
R-4 1st Con	108.62	0.294	2702	0.0786
R-4 2nd Con	10.81	0.024	2248	0.0654
R-4 3rd Con	18.91	0.030	1600	0.0464
R-4 Tails	11200	0.187	16	0.0005
R-4 4th Con	204.3	0.055	272	0.0079
R-4 Repulv Con	22.65	0.013	574	0.0167
R-4 Tails of Repulv Con	1325	0.018	14	0.0004
Total	12700	0.624	50	0.0014

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-206

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Weight gm	Au mg	Au ppb	Au oz/ton
R-2 Con	11.16	0.054	4840	0.1410
R-2 Tails	12200	1.012	83	0.0024
Total	12200	1.066	87	0.0025
R-3 Con	17.66	0.0058	331	0.0096
R-3 Tails	9500	0.57	60	0.0017
Total	9500	0.5758	60	0.0017

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-214

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number		Au ppb	
1	+200	27	
1	-200	12	
2	+200	24	
2	-200	16	
3	+200	11	
3	-200	19	
4	-200	18	
4	-200	17	
5	+200	14	
5	-200	16	
6	+200	18	
6	-200	16	
7	+200	19	
7	-200	15	
8	+200	19	
8	-200	9	
9	+200	19	
9	-200	15	
10	+200	50	
10	-200	18	
R-1	+200	30	using ultrasonic cleaner
R-1	-200	105	using ultrasonic cleaner

TERRAMIN RESEARCH LABS Ltd.

Job No: 96-214

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number		Weight gm	Au mg	Au ppb	Au oz/ton
T-1	Con	35.4	0.0036	101	0.0029
T-1	Tails	4965	0.0165	3	<.0001
T-1	Total	5000	0.0201	4	0.0001
T-2	Con	88.46	0.0118	133	0.0038
T-2	Tails	4912	0.0817	16	0.0005
T-2	Total	5000	0.0935	19	0.0005
T-3	Con	266.4	0.0024	9	0.0003
T-3	Tails	4734	0.0316	7	0.0002
T-3	Total	5000	0.0340	7	0.0002
T-4	Con	60.96	0.0046	76	0.0022
T-4	Tails	4940	0.0494	10	0.0003
T-4	Total	5000	0.0540	11	0.0003
T-5	Con	7.75	0.0306	612	0.0178
T-5	Acid Tail	5000	0 0500	10	0.0003
T-5	Std Tail	5000	0.0150	3	0.0001
T-5	Total	5000	0.0956	19	0.0005
T-6	Con	26.28	0.0004	13	0.0004
T-6	Tails	4874	0.0032	7	0.0002
T-6	Total	5000	0.0036	7	0.0002

TERRAMIN RESEARCH LABS Ltd.

Job No: 95- 222

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Wt. g.	Au mg.	Au ppb	Au oz/ton
Fe Stone Crush Con	93.81	1.576	16800	0.489
Fe Stone Crush Tails	456	0.099	218	0.0063
Fe Stone Crush Total	550	1.675	3045	0.0886
H.E. Hard Cons	10.48	0.0126	1201	0.0349
H.E. Hard Tails	4490	0.1197	27	0.0008
H.E. Hard Total	4500	0.1323	29	0.0008

TERRAMIN RESEARCH LABS Ltd.

Job No: 95- 222

Client: Marum Resources Inc.
Project: Iron Cap

Sample Number	Au ppb
R-1 1A	2
R-1 1A	2
R-2 2A	2
R-2 2A	2
R-1 3A	2
R-1 3A	2
R-1 1B	2
R-1 1B	2
R-1 2B	2
R-1 2B	2
R-1 3B	2
R-1 3B	2

TERRAMIN RESEARCH LABS Ltd.

Job No: 224

Client: Marum Resources Inc.
Project: Iron Cap

	Sample Number	Wt. g.	Au mg.	Au ppb	Au oz/ton
R-4 1st Con		108.62	0.294	2702	0.0786
R-4 2nd Con		10.81	0.112	2248	0.0654
R-4 3rd Con		18.91	0.030	1600	0.0464
R-4 Tails		11200	0.187	16	0.0005
R-4 Repulv Con		22.65	0.013	574	0.0167
R-4 Tails		1325	0.018	14	0.0004
	Total	12700	0.624	50	0.0014

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Dec. 6, 1995

Job No: 95-240

Project:

P.O. No:

Acid Soluble Iron

#4087
#41.73

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: **95-240**

Client: **Marum Resources**
Project:

Sample Number		Fe %
R-1 unroasted	3N HCl	33.0
R-1 roasted	3N HCl	32.9
R-1 unroasted	0.12N HCl	0.1380
R-1 unroasted	0.06N HCl	0.0272

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5 Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Dec. 6, 1995

Job No: 95-244

Project:

P.O. No:

7 Standard Fire Assay
1 Table Assay

H 4088
$ 155.15

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-244

Client: Marum Resources
Project:

Sample Number	Au ppb
Coal	15
GB Creek	3
Ironstone #2	180
QuestMark #1	6
1st Sandstone	13
1st Shale	6
2nd Shale	10

Sample Number		Weight g	Au ppb	Au oz/ton
Ironstone #2	Con	73.97	11295	0.329
Ironstone #2	Tail	6326	7	0.0002
Ironstone #2	Total	6400	137	0.0040

TERRAMIN RESEARCH LABS LTD.

ANALYTICAL REPORT

Marum Resources Inc.
4606 - 5th Street S.W.
Calgary, Alberta
T2S 2E5

Richard Boulay

Date: Dec. 22. 1995

Job No: 95-246

Project:

P.O. No:

4 Bulk Assays

Invoice # 4099

Signed: [redacted]

14, 2235 30th Avenue N.E., Calgary, AB, T2E 7C7
Phone: (403)250-9460 Fax: (403)291-7064

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-246

Client: Marum Resources
Project:

Sample Number	Au ppb
R-1	< 2
R-2	< 2
W-Red	< 2
Fe Stone Crush	1108

Sample Number	Solid Residue %	Fe %	Fe_2O_3 %	Total %
R-1	57.8	24.4	36.3	94.0
R-1	58.5	24.4	36.3	94.8
Worsley	59.4	28.8	41.2	100.6
Fe Stone Crush	36.4	38.1	54.5	90.9

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-250

Client: Marum Resources Inc.
Project: Iron Cap

Date: Jan. 31, 1996

Iron Cap.

Sample Number	SiO_2 %	Al_2O_3 %	CaO %	MgO %	Na_2O %	K_2O %	Fe_2O_3 %	MnO %	TiO_2 %	LOI %	Total %
Unroasted +60	32.7	7.7	4.225	1.378	0.181	0.713	54.05	0.130	0.30	0.0	101.45
Unroasted -60	34.4	7.4	3.819	1.333	0.262	0.803	62.92	0.137	0.23	0.0	111.31
Roasted +60	33.4	7.6	4.141	1.353	0.191	0.722	56.49	0.137	0.28	0.0	104.24
Roasted -60	34.2	7.2	3.693	1.313	0.174	0.750	63.35	0.139	0.23	0.0	111.05
Original R-1	24.2	5.5	2.434	0.832	0.092	0.593	46.33	0.112	0.15	0.0	80.19
Roasted R-1	30.4	6.4	2.952	0.985	0.117	0.731	55.48	0.130	0.20	0.0	97.40

4126 — #385.20

[redacted]

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-252

Client: Marum Resources Inc.
Project: Iron Cap

Date: Jan. 31, 1996

Iron cap?

Sample Number		Au ppb	Au oz/ton	Ag ppm	Ag oz/ton
NS7A 28'-28' 8"	Tails	28	0.0008	0.10	0.003
NS7A 28'-28' 8"	Con	1102	0.032	0.36	0.010
NS7A 28'-28' 8"	Total	93	0.0027	0.12	0.004

Sample Number	Cu ppm	Pb ppm	Zn ppm	Ni ppm
NS7A 28'-28' 8"	19	16	139	28

4127 — 52.70

[redacted]

TERRAMIN RESEARCH LABS Ltd.

Job No: 95-255

Client: Marum Resources Inc.
Project:

Sample Number	from ft	to ft	Au ppb	Cu ppm	Pb ppm	Zn ppm	Ni ppm
NS 9	11	15	6				
NS 9	15	16	20				
NS 9	16	20	6				
NS 9	25	29.6	6	12	18	290	31
NS 9	29.6	31	2	19	12	145	25
NS 9	31	33	2	19	14	187	29
NS 9	33	35	2	21	12	152	27
NS 9	35	37	2	22	13	118	30
NS 9	37	40	14	22	13	117	30
NS 9	40	45	10	19	12	104	27
NS 9	45	50	2	20	10	105	27
NS 9	50	55	10	20	12	113	28

TERRAMIN RESEARCH LABS Ltd.

Job No: 96-002-B

Client: Marum Resources Inc.
Project: Keystock

Date: Jan. 31, 1996

Iron cap.

Sample Number		Au ppb
KS-95-1	-60 m	2

Sample Number	Cu ppm	Pb ppm	Zn ppm	Ni ppm
NS7A 28'-28' 8"	19	16	139	28

412 ppb

11.77

[redacted]

Appendix G

Loring Laboratories Documents

Marum Resources Inc.

4606 5th Street SW, Calgary, Alberta, T2S 2E5
Alberta Stock Exchange Symbol -- "MMU" Tel: (403) 243-9500 Fax: (403) 243-9517

June 12, 1995

Instructions to Loring Laboratories

Please find enclosed the following samples to be processed as indicated.

LP1, LP2, LP3, LP4, LP5 - to be dried and fire assayed. Report on original dry sample weight and the weight of gold in the bead.

LRCP1, LRCP2, LRCP3 - to be dried and fire assayed. Report on original dry sample weight and the weight of gold in the bead.

LR1, LR2 and
LRCR1, LRCR2, LDEVR1 and
LDEVR2, LDEVR3 - split to one assay ton and fire assay for gold.

LMEP and LMER - multi-element analysis plus telluride

If you have any questions please call Tom Bryant at 403-963-0610.

Please fax the results to me and to Ron Owens.

You are hereby authorized, until further notice, to freely discuss with or send any Marum work or results to either Ron Owens or Tom Bryant.

Yours truly,
MARUM RESOURCES INC.

Richard A. Boulay, President

Marum Resources Inc.

Suite 400, 407 8 Avenue SW, Calgary, Alberta, Canada, T2S 2E5
Tel: (403) 243-9500 Fax: (403) 243-9517

September 25, 1995

To: Loring Laboratories

Fire Assay Instructions

Please find enclosed the following samples:

Rotopan - Con - W - Lower - A

Rotopan - Con - W - Lower - B

Rotopan - Con - W2 - Upper - A

Fire assay for gold, using the entire sample even if there is more than one assay ton per sample.

Report dry sample weight, milligrams of gold and ounces per ton.

Fax results to the number listed above.

Yours truly,
Marum Resources Inc.

Richard A. Boulay
President

Three Samples prepared on September 21, 1995
prepared by Rick Boulay

Raw Samples

W2- pulverized and minus 100 sieved sample from top of Bad Heart Fm at Worsley Pit. 1,000 grams were weighed and bagged

Sample of lower Bad heart from Worsley pit excavation, pulverized, not screened. Two 1,000 gram amounts were weighed and bagged.

The three 1,000 gam samples were Roto-panned and the slimes were discarded. The resulting de-slimed samples were dried and split with one-half processed by Terramin and the other half by Loring.

Samples

Rotopan - Con - W - Lower - A (1 vial)

Rotopan - Con - W - Lower - B (1 vial)

Rotopan - Con - W2 - Upper - A (1 of 2 and 2 of 2 vials)

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay
cc: T. Bryant - Edmonton

File No. 36533
Date June 16, 1994
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
# 1	11
# 1	761
# 1	7
# 1	20
# 1	6
# 1	<5
# 1	20
# 1	8
# 1	14
# 1	<5

After HCl Treatment

# 1	163
# 1	11
# 1	85
# 1	6
# 1	<5
# 1	14

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

Rejects retained one month.
Pulps retained one month unless specific arrangements are made in advance.

[redacted]
Assayer

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay
cc: T. Bryant - Edmonton

File No. 36533
Date June 16, 1994
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
# 1	640
# 1	360
Slag	5
Slag	10
Coarse Gold Analysis	
-150	8
-150	6950
-150	13
-150	37
-150	9
-150	12
+150	14
Cyanide Leach Test	
# 1	19
Residue	33
Residue	31
# 1	<5

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

[redacted]
Assayer

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay
cc: T. Bryant - Edmonton

File No. 36533
Date June 16, 1994
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.

Microscopic Examination of Sample After HCl and HF Treatment

No Gold Visible

Microscopic Examination of 300 Gram Sample After Panning and HCl and HF Treatment

No Gold Visible

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

[redacted]
Assayer

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay

File No. 36533-1
Date June 20, 1994
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD	% By Weight
-150 Mesh Pulp	57	89.76
-150 Mesh	14	
+150 Mesh	<5	10.24
-150 Mesh Pulp	18	90.09
-150 Mesh	32	
+150 Mesh	<5	9.91
-150 Mesh Pulp	8	90.00
-150 Mesh	16	
+150 Mesh	<5	10.00

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay

File No. 36533-1
Date June 20, 1994
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD	% By Weight
-150 Mesh Pulp	57	89.76
-150 Mesh	14	
+150 Mesh	<5	10.24
-150 Mesh Pulp	18	90.09
-150 Mesh	32	
+150 Mesh	<5	9.91
-150 Mesh Pulp	8	90.00
-150 Mesh	16	
+150 Mesh	<5	10.00

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

ejects retained one month.
ulps retained one month
unless specific arrangements
are made in advance.

To: MARUM RESOURCES,
205, 525 - 11th Avenue S.W.,
Calgary, Alberta T2R 0C9

ATTN: Rick Boulay

File No. 36586
Date May 19, 1994
Samples Rock

MAY 30 1994

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
"Assay Analysis"	
Z-75A	<5
Z-75B	400
T-56A	13
T-56B	430

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

[redacted]
Assayer

To: MARUM RESOURCES,
205, 525 - 11th Avenue S.W.,
Calgary, Alberta T2R 0C9

ATTN: Rick Boulay

File No. 36586
Date May 19, 1994
Samples Rock

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
"Assay Analysis"	
Z-75A	<5
Z-75B	400
T-56A	13
T-56B	430

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

[redacted]
Assayer

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay

File No. 36629
Date August 5, 1994
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
"Assay Analysis"	
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CN Leach # 1	<5
CN Leach # 2	<5

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month unless specific arrangements are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay

File No. 36629
Date August 5, 1994
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
"Assay Analysis"	
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CH-2	<5
CN Leach # 1	<5
CN Leach # 2	<5

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month unless specific arrangements are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay

File No. 36645
Date June 15, 1994
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
"Assay Analysis"	
CH-3 CONS	169
	5
	9
	44
	11
CH1-MIDS	<5
	17
	10
	<5
	<5

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

jects retained one month.
ulps retained one month
unless specific arrangements
are made in advance.

To:, MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay

File No. 36645
Date June 15, 1994
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
"Assay Analysis"	
CH-3 CONS	169
	5
	9
	44
	11
CH1-MIDS	<5
	17
	10
	<5
	<5

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

To: YUKALTA RESOURCES INC.,
201, 5201 - 52nd Avenue,
Ponoka, Alberta T4J 1H6

TTN: Row Owens

cc: A. Lewis

File No.

Date May 11, 1995

Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	Milligrams Gold	Sample Weight (grams)
CONCENTRATE	0.43 / 10 lb sample 2000 lbs ÷ 10 = 200 .43 X 200 = 86 mgs X .017 cents/mg. = $1.46 / ton of H.O.	79.401 2.72 A.T. .43 ÷ 2.72 = .158 X $526 = $83.15 per ton of concentrate.

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]

Assayer

Rejects retained one month.
Pulps retained one month unless specific arrangements are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay

File No. 37391
Date May 29, 1995
Samples Conc

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	Dry Weight Grams	Gold Milligrams	Platinum Milligrams
K 1	17.930	0.057	<0.002
1	1.167	0.018	<0.002
2	3.259	0.015	<0.002
3	3.204	0.023	<0.002
4	4.296	0.018	<0.002
5	5.200	0.093	<0.002

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

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lps retained one month
unless specific arrangements
are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5

ATTN: Rick Boulay

File No. 37391
Date May 29, 1995
Samples Conc

Certificate of Assay
LORING LABORATORIES LTD.

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2	3.259	0.015	<0.002
3	3.204	0.023	<0.002
4	4.296	0.018	<0.002
5	5.200	0.093	<0.002

Sample assays from Upper Bad Heart taken from Worsley Pit

Protocol: Sample is dried and crushed with a hammer applied to sample contained in a plastic bag. The sample is ground to -100 mesh using a ceramic mortar and pestle.
One assay-ton (approx. 29 grams) is measured into a small gold pan. Water and a wetting agent is added. The sample is then manually de-slimed The wet sample is put into a sealed plastic contained and submitted to a laboratory for fire assay. The lab is asked to supply the dry weight of the sample and the milligrams of gold. Each milligram equates to one ounce per ton.

I hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
cc: Ron Owens - Ponoka
Tom Bryant - Stony Plain

File No. 37413
Date June 6, 1995
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	Milligrams Gold	Sample Weight Grams
ST. LK. RD	0.058	8.655
RAM CR. PIT	0.390	7.027
RLR	0.151	4.998
-100 A	0.065	12.603
-100 B	0.014	12.221
-100 C	0.018	12.283

Sample assays from Upper Bad Heart taken from Worsley Pit

Protocol: Sample is dried and crushed with a hammer applied to sample contained in a plastic bag. The sample is ground to -100 mesh using a ceramic mortar and pestle.
One assay-ton (approx. 29 grams) is measured into a small gold pan. Water and a wetting agent is added. The sample is then manually de-slimed The wet sample is put into a sealed plastic contained and submitted to a laboratory for fire assay. The lab is asked to supply the dry weight of the sample and the milligrams of gold. Each milligram equates to one ounce per ton.

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

Rejects retained one month.
Pulps retained one month unless specific arrangements are made in advance.

[redacted]
Assayer

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
cc: Ron Owens - Ponoka
Tom Bryant - Stony Plain

File No. 37413
Date June 6, 1995
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	Milligrams Gold	Sample Weight Grams
ST. LK. RD SE	0.058	8.655
RAM CR. PIT N	0.390	7.027
RLR Ramsay Lake Road (N wall)	0.151	4.998
-100 A } in Ramsay Pit	0.065	12.603
-100 B } destroyed	0.014	12.221
-100 C } - not panned	0.018	12.283

oz/ton

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
cc: Ron Owens
Tom Bryant

File No. 37444
Date June 20, 1995
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	Milligrams Gold	Sample Weight grams
"Assay Analysis"		
LP 1	0.007	12.885
LP 2	<0.001	13.373
LP 3	0.001	14.202
LP 4	0.002	13.136
LP 5	0.002	13.380
LRCP 1	<0.001	17.522
LRCP 2	<0.001	18.858
LRCP 3	<0.001	17.648
LR 1	0.002	29.121
LR 2	0.002	28.836
LRCR 1	<0.001	-
LRCR 2	0.002	-
LDEVR 1	0.002	-
LDEVR 2	0.001	-
LDEVR 3	<0.001	-

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

Rejects retained one month.
Pulps retained one month unless specific arrangements are made in advance.

[redacted]
Assayer

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
c: Ron Owens
Tom Bryant

File No. 37444
Date June 20, 1995
Samples

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	Milligrams Gold	Sample Weight grams
"Assay Analysis"		
LP 1	0.007	12.885
LP 2	<0.001	13.373
LP 3	0.001	14.202
LP 4	0.002	13.136
LP 5	0.002	13.380
LRCP 1	<0.001	17.522
LRCP 2	<0.001	18.858
LRCP 3	<0.001	17.648
LR 1	0.002	29.121
LR 2	0.002	28.836
LRCR 1	<0.001	-
LRCR 2	0.002	-
LDEVR 1	0.002	-
LDEVR 2	0.001	-
LDEVR 3	<0.001	-

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

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lps retained one month
unless specific arrangements
are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
cc: Tom Bryant
Ron Owens

File No. 37474
Date June 30, 1995
Samples Conc

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	Sample Wt Grams	Au mg
"Assay Analysis"		
WP -1	15.308	0.007
WP -2	16.998	0.003
WP -3	19.386	0.003
WP -4	12.848	0.003
WP -5	16.044	0.001
WP -6	13.652	0.012
RLR-1	18.131	0.009
RLR-2	16.009	0.016
RLR-3	18.913	0.004

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

ejects retained one month.
ulps retained one month
nless specific arrangements
are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
c: Tom Bryant
Ron Owens

File No. 37474
Date June 30, 1995
Samples Conc

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	Sample Wt Grams	Au mg
"Assay Analysis"		
WP -1	15.308	0.007
WP -2	16.998	0.003
WP -3	19.386	0.003
WP -4	12.848	0.003
WP -5	16.044	0.001
WP -6	13.652	0.012
RLR-1	18.131	0.009
RLR-2	16.009	0.016
RLR-3	18.913	0.004

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

TOTAL P.01

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
c: Tom Bryant
Ron Owens

File No. 37474
Date June 30, 1995
Samples Conc

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LORING LABORATORIES LTD.

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WP -4	12.848	0.003
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WP -6	13.652	0.012
RLR-1	18.131	0.009
RLR-2	16.009	0.016
RLR-3	18.913	0.004

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

TOTAL P.01

To: MARUM RESOURCES INC.,
4606 -- 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
c: Tom Bryant
Ron Owens

File No. 37474
Date June 30, 1995
Samples Conc

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LORING LABORATORIES LTD.

SAMPLE NO.	Sample Wt Grams	Au mg
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WP -1	15.308	0.007
WP -2	16.998	0.003
WP -3	19.386	0.003
WP -4	12.848	0.003
WP -5	16.044	0.001
WP -6	13.652	0.012
RLR-1	18.131	0.009
RLR-2	16.009	0.016
RLR-3	18.913	0.004

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month
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To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
cc: R. Owens
T. Bryant

File No. 37502
Date July 13, 1995
Samples Pulp

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
Geochemical Analysis	
Worsley Red # 1	<5
Worsley Red # 2	8
CR. Pit	<5
Stony Lake Red # 2	8

Invoice 37502
$142.80

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

Rejects retained one month.
Pulps retained one month
unless specific arrangements
are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
cc: R. Owens
T. Bryant

File No. 37502
Date July 13, 1995
Samples Pulp

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
chemical Analysis	
Worsley Red # 1	<5
Worsley Red # 2	8
CR. Pit	<5
Stony Lake Red # 2	8

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

jects retained one month.
ips retained one month
unless specific arrangements
are made in advance.

To: MARUM RESOURCES INC.,
4606 - 5th Street S.W.,
Calgary, Alberta T2S 2E5
ATTN: Rick Boulay
c: R. Owens
T. Bryant

File No. 37502
Date July 13, 1995
Samples Pulp

Certificate of Assay
LORING LABORATORIES LTD.

SAMPLE NO.	PPB GOLD
ochemical Analysis	
Worsley Red # 1	<5
Worsley Red # 2	8
CR. Pit	<5
Stony Lake Red # 2	8

I Hereby Certify that the above results are those assays made by me upon the herein described samples....

[redacted]
Assayer

jects retained one month.
lps retained one month
unless specific arrangements
are made in advance.

Appendix H

Activation Laboratories Documents

ACTLABS

ACTIVATION LABORATORIES LTD

Invoice No.: 8812
Work Order: 9014
Invoice Date: 06-OCT-95
Date Submitted: 22-SEP-95
Your Reference: LETTER
Account Number: M013

MARUM RESOURCES INC
SUITE 400, 407 8 AVENUE SW
CALGARY, ALBERTA
T2S 2E5
ATT:R. BOULAY

CERTIFICATE OF ANALYSIS

INAA package, elements and detection limits: 1 KG SAMPLE SIZE

AU	5.	PPB	AG	5.	PPM	AS	2.	PPM	BA	100.	PPM
BR	1.	PPM	CA	1.	%	CO	5.	PPM	CR	10.	PPM
CS	2.	PPM	FE	0.02	%	HF	1.	PPM	HG	1.	PPM
IR	5.	PPB	MO	5.	PPM	NA	500.	PPM	NI	50.	PPM
RB	30.	PPM	SB	0.2	PPM	SC	0.1	PPM	SE	5.	PPM
SN	0.01	%	SR	0.05	%	TA	1.	PPM	TH	0.5	PPM
U	0.5	PPM	W	4.	PPM	ZN	50.	PPM	LA	1.	PPM
CE	3.	PPM	ND	5.	PPM	SM	0.1	PPM	EU	0.2	PPM
TB	0.5	PPM	YB	0.05	PPM	LU	0.05	PPM			

CERTIFIED BY :

[redacted]

DR. ERIC L. HOFFMAN

1336 SANDHILL DRIVE, ANCASTER, ONTARIO, CANADA L9G 4V5 • TEL: 905-648-9611 • FAX: 905-648-9613

ACTLABS

ACTIVATION LABORATORIES LTD

Invoice No.: 8812
Work Order: 9014
Invoice Date: 06-OCT-95
Date Submitted: 22-SEP-95
Your Reference: LETTER
Account Number: M013

MARUM RESOURCES INC
SUITE 400, 407 8 AVENUE SW
CALGARY, ALBERTA
T2S 2E5
ATT:R. BOULAY

CERTIFICATE OF ANALYSIS

INAA package, elements and detection limits: 1 KG SAMPLE SIZE

AU	5.	PPB	AG	5.	PPM	AS	2.	PPM	BA	100.	PPM
BR	1.	PPM	CA	1.	%	CO	5.	PPM	CR	10.	PPM
CS	2.	PPM	FE	0.02	%	HF	1.	PPM	HG	1.	PPM
IR	5.	PPB	MO	5.	PPM	NA	500.	PPM	NI	50.	PPM
RB	30.	PPM	SB	0.2	PPM	SC	0.1	PPM	SE	5.	PPM
SN	0.01	%	SR	0.05	%	TA	1.	PPM	TH	0.5	PPM
U	0.5	PPM	W	4.	PPM	ZN	50.	PPM	LA	1.	PPM
CE	3.	PPM	ND	5.	PPM	SM	0.1	PPM	EU	0.2	PPM
TB	0.5	PPM	YB	0.05	PPM	LU	0.05	PPM			

CERTIFIED BY :

[redacted]

DR. ERIC L. HOFFMAN

1336 SANDHILL DRIVE, ANCASTER, ONTARIO, CANADA L9G 4V5 • TEL: 905-648-9611 • FAX: 905-648-9613

ACTLABS

ACTIVATION LABORATORIES LTD

Invoice No.: 8312
Work Order: 9014
Invoice Date: 06-OCT-95
Date Submitted: 22-SEP-95
Your Reference: LETTER
Account Number: M013

MARUM RESOURCES INC
SUITE 400, 407 8 AVENUE SW
CALGARY, ALBERTA
T2S 2E5
ATT:R. BOULAY

CERTIFICATE OF ANALYSIS

INAA package, elements and detection limits: 1 KG SAMPLE SIZE

AU	5.	PPB	AG	5.	PPM	AS	2.	PPM	BA	100.	PPM
BR	1.	PPM	CA	1.	%	CO	5.	PPM	CR	10.	PPM
CS	2.	PPM	FE	0.02	%	HF	1.	PPM	HG	1.	PPM
IR	5.	PPB	MO	5.	PPM	NA	500.	PPM	NI	50.	PPM
RB	30.	PPM	SB	0.2	PPM	SC	0.1	PPM	SE	5.	PPM
SN	0.01	%	SR	0.05	%	TA	1.	PPM	TH	0.5	PPM
U	0.5	PPM	W	4.	PPM	ZN	50.	PPM	LA	1.	PPM
CE	3.	PPM	ND	5.	PPM	SM	0.1	PPM	EU	0.2	PPM
TB	0.5	PPM	YB	0.05	PPM	LU	0.05	PPM			

CERTIFIED BY

[redacted]

DR. ERIC L. HOFFMAN

Activation Laboratories Ltd. Work Order: 8649 Report: 8525

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
LMEP	31	<5	260	610	2.4	<1	49	140	<1	35.5	3	<1	<5	7	0.18	<57	25	7.8	13	<3	<0.01	<0.05	<0.5	11
LMER	83	<5	260	560	2.6	<1	61	170	2	35.4	3	<1	<5	6	0.06	<63	59	8.6	14	<3	<0.01	<0.05	<0.5	13

LMEP – Pannned

LMER – Raw

Activation Laboratories Ltd. Work Order: 8649 Report: 8525

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
LMEP	5.1	6	510	28.7	53	26	12	2.7	2.2	4.4	0.69	1.853
LMER	6.0	6	560	30.7	59	43	13	3.2	2.3	4.6	0.66	1.457

Activation Laboratories Ltd. Work Order: 8649 Report: 8525B

Sample description	CU PPM	PB PPM	ZN PPM	AG PPM	NI PPM	MN PPM	SR PPM	CD PPM	BI PPM	V PPM	CA %	P %	MG %	TI %	AL %	K %	Y PPM	BE PPM	TE PPM
LMEP	12.	40.	491.	1.0	67.	949.	121.	1.2	<5.	975.	1.42	0.796	0.54	0.08	2.60	0.43	58.	12.	2.5
LMER	15.	39.	504.	1.1	72.	1042.	123.	1.1	<5.	1060.	1.53	0.808	0.58	0.09	2.93	0.49	59.	13.	2.4

Activation Laboratories Ltd. Work Order: 9014 Report: 8812

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
BH-U	7	<5	220	630	3	<2	52	150	4	35.4	2	<1	<5	<5	0.07	<51	<30	8.0	13	<5	<0.03	<0.05	<1	14
BH-L	<5	<5	100	760	<1	3	55	140	3	31.2	2	<1	<5	15	0.08	<52	86	6.0	12	<5	<0.03	<0.05	<1	13

Activation Laboratories Ltd. Work Order: 9014 Report: 8812

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
BH-U	6.9	7	557	32	64	28	8.6	3.1	1.9	4.4	0.75	1002
BH-L	3.8	<4	445	28	58	26	7.3	2.7	1.4	3.6	0.75	1005

Activation Laboratories Ltd. Work Order: 9014 Report: 8812

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
BH-U	7	<5	220	630	3	<2	52	150	4	35.4	2	<1	<5	<5	0.07	<51	<30	8.0	13	<5	<0.03	<0.05	<1	14
BH-L	<5	<5	100	760	<1	3	55	140	3	31.2	2	<1	<5	15	0.08	<52	86	6.0	12	<5	<0.03	<0.05	<1	13

Activation Laboratories Ltd. Work Order: 9014 Report: 8812

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
BH-U	6.9	7	557	32	64	28	8.6	3.1	1.9	4.4	0.75	1002
BH-L	3.8	<4	445	28	58	26	7.3	2.7	1.4	3.6	0.75	1005

Activation Laboratories Ltd. Work Order: 9014 Report: 9812

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
BB-U	7	<5	220	630	3	<2	52	150	4	35.4	2	<1	<5	<5	0.07	<51	<30	8.0	13	<5	<0.03	<0.05	<1	14
BB-L	<5	<5	100	760	<1	3	55	140	3	31.2	2	<1	<5	15	0.08	<52	86	6.0	12	<5	<0.03	<0.05	<1	13

Activation Laboratories Ltd. Work Order: 9014 Report: 8312

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
DB-U	6.9	7	557	32	64	28	8.6	3.1	1.9	4.4	0.75	1002
DB-L	3.8	<4	445	28	58	26	7.3	2.7	1.4	3.6	0.75	1005