CONTINUING TENURE APPLICATION AREA
EXPLORATION LICENCE 4/61
SAVAGE RIVER, TASMANIA

1. STATUS OF
THE MAGNESITE PROJECT:
MAIN CREEK AND BOWRY CREEK
DEPOSITS

VOLUME 1

BY

C.H.C.SHANNON

8-2-1988

SAVAGE RESOURCES LIMITED

Incorporated in Tasmania

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SUMMARY

The complex and uncertain nature of the magnesite processing and marketing situation is discussed as a background to the work on the deposit to date, with the subject being expanded upon in Appendix 2. The reluctance of Savage Resources to invest heavily during recent years is linked to a dismal outlook in the world market, but there are indications that production on a smaller scale, and of a highly developed end product may be becoming viable.

Some incidental discoveries in the processing research interact with the definition of the resource both in bringing into the processable category some relatively high iron magnesites and also some of the higher dolomite portions.

The magnesia that is extractable in the preferred version of the carbonic acid leach process comes from that part of the MgO content that is contained in the magnesite mineral. The richer magnesite rock containing 80-90% $MgCO_3$ in magnesite is the commenest rock type in the Magnesite member, the grade 66-80% less than half as abundant whereas the grade 50-66% is scarce.

Some stratigraphic adjustments to the drillhole correlations have been made to take account of evidence from an ochre search costean near MC 12. Revised assay tables are appended.

A new set of maps is in preparation inteded to show a collation of all the mapping work in the area. The old drillholes on the Long plain South deposit are positioned and new data on the Bowry Creek section is presented.

Field work has been minimal in the last two years but there have been advances in geological concepts . These include refinements of stratigraphic detail, the stratigraphic control of crystalline talc development in the 7/8 stratigraphic zone and the concept, as yet too new for testing of Carlin Style gold in the siliceous portions of the deposit.

Feasability of the magnesia production option depends far more on factors downstream from the mining side (most of which is outside the scope of this report). The previous assessment of reserves as adequate to the point of overkill continues in this report.

Plans for a major drilling program are presented.

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1.0 Introduction

Work on the magnesite project has been proceeding under the constraint imposed by a very poor market outlook for magnesia products. The principal problem is that in the largest market; refractories for steel making, the newer technology using the basic oxygen furnace consumes much less magnesia than the older open hearth furnace to which the world magnesite industry was geared, and as the new furnaces come in, the usage per tonne of steel produced is declining while world steel production is static. Overcapacity in the world industry and shakeouts of producers are still prevailing although not as seriously as in 1983. In these circumstances, and after the Mines Department interpretation of retention area requirements seemed unattainable it was decided to take the other option of leasing the relevent ground at the expiry of EL 4/61, and to concentrate effort on other prospects.

The depressed state of the steel industry has also blocked a trend to the use of higher performance refractories which minimize downtime. Our hopes of marketing a high grade product produced by our patented version of the carbonic acid leach process have for the moment been stymied.

This trend may be coming to an end, so that some further drilling of the deposit to locate an optimal site for mining now seems justified. Even so the original concept (1980) of going for 100,000 tonnes/year of high grade MgO product seems too big for the available market. Options for other magnesia products have become more hopeful and magnesium metal may be an option. This use has different quality limits.

2.0 Review of the magnesite project.

2.1 Magnesia for refractories

Quite early in the investigation of the Main Creek deposit it became clear that it was not a good material for refractories without beneficiation, and that the iron content in solid solution in the magnesite mineral would restrict any physically beneficiated end product to the crowded, low value end of the market, and would be unlikely to compete successfully in the Australian market.

It is not that the deposit is particularly high in iron by the standards normal for a macrocrystalline style deposit; the western portion is rather low in iron by these standards. It is conceivable that a range of products matching those of Magnesita SA of Brazil (Coope), ref. (27) could be produced from the Main Creek deposit, but the best of the large scale deposits in Liaoning province, Manchuria, China are capable of producing a significantly better magnesia in terms of iron content. Duncan (1986), ref.(32). The Australian market is adequately supplied by microcrystalline style magnesite deposits which are typically low in iron. This situation prevailed even before the world's largest microcrystalline magnesite deposits turned up in Central Queensland. Clarke (1987) ref. (25).

It is possible that the unusually low content of aluminium and of boron found in the Main Creek deposit would make the end product perform better than its iron content would indicate, but to establish an entry to the market a premium line is essential and the effort put into the development of the carbon dioxide leach process is aimed at bettering the top quality brine/seawater magnesias.

2.2 Progress of investigations

The deposit has been investigated on a narrowly targeted basis because the major limiting factor has usually been obvious. From the time the first two drillholes were completed and assayed it was understood that quantity was adequate to supply any realistic production (c.120,000 tonnes/vertical metre in the 200m strike length between the creek section and MC 1 alone, i.e. 12 m.t. over 100m depth), so long as the quality defects could be rectified. The raw material is not suitable for refractory MgO without beneficiation, silica (as quartz or talc) and calcia (as dolomite) being quite high although alumina is very low; see Edyvean,(1977) ref. (34). Certain minor elements (boron, sodium) proved to be present in minimal quantities ; see Frost (1984) ref. (40). The problem of quartz/dolomite impurity appeared amenable to photometric sorting, at least where the dolomite was distinctly grey in contrast to the white magnesite. Beggs (1981) ref. (3), Ore Sorters Ltd. correspondence. In the western portion of the deposit there is little colour difference between the dolomite rich phase and the remainder so the optical sorter might not work consistently. But the problem of iron contained in solid solution in the magnesite is serious and has had to be approached by developing a carbonic acid leach process specifically designed for this deposit, in studies commissioned by I.M.I. from the C.S.I.R.O. directed by John Canterford (see refs. 5 to 24 inclusive).

2.3 Geological control on samples used for process development work.

The material used in most of the laboratory tests has come from either MC1 and MC2 core or the Main Creek surface section, selected without reference to the detailed stratigraphy discovered later on, but also without keeping record of core intervals and measured section notes from which a good reconstruction could be made. All is not lost however since there are consistent chemical trends in the deposit which provide a check for attempts at reconstruction. A later series of samples were selected from known interval of the MC 28 drillhole, see ref.(20).

The initial laboratory work was done with a series of 5 samples selected from the drill core pulps preserved by the Mines Department laboratory, left over from the splits sent for assays; (see assay tables for MC 1 and MC 2, also drillhole sections). The text of the first progress report preserves some information (Canterford and Everson IRR 1028, (1979), ref. (9), p8-9. MAG 1 was selected from the dolomitic zone from the top of both drillholes; this is certainly the dolomite interval 0/1; MAG 5 was selected from other dolomitic/siliceous material in the two holes. This would have included the dolomitic zone about marker 2, and also the one at c.185m in MC 2. At a corresponding distance below marker 1 there is a thick cluster of greenschists, marker 4. These break points provide a convenient division of the remaining core into thirds for each drillhole, and it is suggested that the top thirds went into MAG 2, the middles into MAG 3 and the bottoms into MAG 4. The assays show high iron, low acid insolubles in MAG 2, and low iron in MAG 4 which is compatible with the detailed assay tables.

From the (lost, annotated?) original assay tables the expected compositions were calculated as follows:

TABLE 1

	MgO	CaO
MAG 1	26	23
MAG 2	44	2
MAG 3	41	4
MAG 4	42	4
MAG 5	37	10

After amalgamation, assays from the bulk samples were as follows:

TABLE 2

	Mg	Ca	Fe	CO3	acid insols.
MAG 1	12.4	17.3	0.90	63.0	8.23
MAG 2	25.2	2.06	1.79	70.5	0.83
MAG 3	23.3	3.49	1.74	67.5	5.45
MAG 4	25.2	2.61	1.18	69.5	1.58
MAG 5	21.6	6.02	1.33	66.0	5.74

Later, a series of samples were taken from the Main Creek surface outcrop between what has since been called marker 1 outcrop and the inferred position of marker 5 (determined from subsequent mapping). The section was pegged at 25m intervals, 0-175m, and 7 samples were to be collected, but in 2 cases a pair of samples were bulked together, most probably 0-25 with 25-50 and 50-75 with 75-100 . Records of which ones were lost. But at least the chemical signature of the sequence confirms that the samples are in order E to W. The assays are as follows:

TABLE 3

	MgO	CaO	FeO	CO2	SiO2
3801	43.11	3.62	2.20	50.93	0.73
3802	41.95	4.46	2.12	48.36	1.59
3803	42.61	4.36	0.99	49.83	0.91
3804	41.78	4.98	1.01	51.03	1.18
3805	43.43	2.67	0.71	51.44	2.07

A bulk sample was prepared from splits of these samples which responded to CO2 leach processing well and was closely comparable in behaviour to the MAG 3 sample used as the basic workhorse for most of the experiments, ref (5) p6.

It also indicates that practically all the process experimentation has been using material that is unneccessarily difficult in terms of iron content; It corresponds to and attempt to process a blend of the central and eastern thirds of the deposit with the better quality western third excluded. Conversely it means thatin this area the whole deposit can be utilized, bar the obvious silica/dolomite zones

2.4 Beneficiation after the 700 deg.C calcination stage.

The rock has a 2-phase texture with marked segregation into dolomite/silica rich and magnesite rich phases with the magnesite in isolated bodies 2-10cm across, in a net of the more coarsely grained dolomite. The feature is very obvious in photos of the calcine e.g. in Canterford, MCC 518, p14, ref.(5). After calcining at 700 deg.C the magnesite phase is red-brown while the dolomite/silica remains white. The magnesite mineral is decompcsed whereas the dolomite still contains carbonate. The red magnesia calcine disintegrates to a dust on sieving, the other minerals remain as coherent, larger pieces so putting the raw calcine through a nest of sieves and rejecting the oversize provides a remarkably effective beneficiation: "High magnesia crude calcines prepared from the bulk ore samples provided for most studies to date have too high an iron content to produce SRM 3 magnesia. However recent preliminary tests indicate that, provided the raw magnesite contains <2% Fe2O3, then calcination and selective screening alone can yeild a product meeting SRM 3 specifications." Canterford (1983) ref.(5), p.19. The SRM 3 specification is controlled by its MgO limit of 94%. A 2% "Fe2O3" magnesite calcines to a 4% Fe2O3 magnesia leaving just 2% space for all other contaminants.

Dr Canterford (pers. comm.) has confirmed this point. It implies that a product approaching 96% MgO with 2% Fe2O3 and 2% (CaO+SiO2) could be produced from the c.1% "Fe2O3" portions of the deposit. Magnesias with worse chemistry are traded internationally but it would not compete with the Kunwarawa magnesia.

In an industrial situation all feed to the leach process would be beneficiated to this order, so future test work should use screened feed. The test work using the carefully blended and unbeneficiated calcines are not representative of the real industrial situation. Abundant dolomite/dolime appears to restrict the amount of Mg^{++} that can be got into solution.

In this regard the performance of sample MC 28/51 is especially interesting (Canterford et al, MCC 546, (1984) ref. (20). It comes from natural high MgO - low CaO magnesite rock with exceptionally high iron, c.4% "Fe2O3", and apart from this the specimen which comes closest to the type of beneficiated MgO rich feed contemplated for future experiments, ref. (5) p32. In the 2% solids run it performed very well to yield a 0.15% Fe2O3 notional end product, and did so with a leachate Mg^{++} concentration of 9.6g/l; the highest yet obtained in conjunction with acceptible iron content, and thus the most efficient for industrial purposes.

2.5 Product quality data

The most useful test product assays are in Canterford and Moorees (1983) ref.(18) and Canterford et al (1984) ref (20). Unfortunately full analyses were not published and much data and the end product samples themselves were dumped when the project was terminated at C.S.I.R.O. The deficiencies are in CaO and SiO2 contents. Fe2O3 and MgO values are given comprehensively and a set of B2O3 results indicating 2 to 10 ppm levels is referred to in (18) p13. There is a good possibility that the data still exists in the C.S.I.R.O. in Dr Canterford's work files.

2.6 Implications for future work.

The later results show clearly enough the concepts to develop in the processing work and the time has come when a pilot plant is to be commissioned. The agreement with Denehurst will probably mean the plant will be in Melbourne initially although the existence of a potential market for c.400 tonnes/year of $500-00/tonne grade MgO (A.P.P.M. information) would be an advantage favouring Burnie. Unfortunately A.P.P.M. do not a use caustic calcined magnesia process.

Since the processing can handle magnesite rock with 4% "Fe2O3", and unwanted dolomite, quartz and talc can be screened out after calcining all the carbonate rock >50% magnesite is suitable for feed for the CO2 leaching circuit. The resource is around 1200*200*200 cubic metres in the drilled area, going by the inferred surface limits of the deposit which are well enough known and allowing for greenschists and low magnesite zones in the c.300m strike width. At a density of 3.2 this gives a rounded 150,000,000 tonnes for a rough estimate of the resource over 200m vertical extent.

The determinant of grade is the proportion of MgO present as magnesite, (that is excluding MgO in dolomite or silicates). Iron can now be dismissed as a limiting factor since no substantial interval exceeds the iron content of the MC 28/51 test. Once dolomitic intervals are excluded the variation of the remainder of the carbonates is nearly all within 80% + or - 10% $MgCO_3$ as shown in the following table.

TABLE 4

Bore	metres true thickness of carbonate with $MgCO_3$ in magnesite					
	80-90%	66-80%	50-66%	<50%	Non-carbs	strike width
MC 27	37	36	40	5	87	280
MC 28	0	18	0	38	25	300
MC 1	115	40	0	42	25	360
MC 2	130	47	0	30	33	330

There are further reserves at Bowry Creek and both north and south of the drilled area. The resource is an order of magnitude larger than is needed to start a mine and further work on establishing reserves, as such, cannot be justified.

Nevertheless some more material is needed for test work and some should come from drillholes. There is value in proving up 10,000,000 tonnes in an area well situated for a quarry, particularly west of MC 28. A test quarry and haul road will be needed.

3.0 Costing the carbonic acid leach process

3.1 Energy

Energy use for magnesia production is quite variable, from 6m BTU/ton for some single firing natural magnesias to 52m BTU/ton for top grade seawater magnesia. The energy requirement also depends on the type of kiln (Duncan and McCracken, 1981) ref. (33). The prospect of excessive energy requirement has been a criticism of the CO_2 leach process, and is linked to complaint that the main cost factor in high grade MgO is fuel oil. The following dicussion identifies cost factors which can be matched with known industrial situations.

A tonne of fuel oil contains energy equivalent to 10 million kilocals or 45 million BTU's. Fuel oil currently costs c. $A250-00/tonne (information from Savage River Mines). The total energy cost estimated for the Canterford CO_2 process is 1.0 tonnes fuel oil equivalent per tonne of product (ref. 58) which compares favourably with Magnohrom's 1.2 tonnes per tonne product (ref. 32), but is still rather high in comparison with other estimates of energy uses in natural and synthetic magnesias.

Energy at lower cost may be attainable by using coal. The comparatively new technology of the circulating fluid bed with concurrent desulphurization, either with gasification (80% efficient) or with direct combustion (information from Lurgi Aust.). The local Cornwall coal costs c. $A10-00/tonne for an energy of 4,400,000 kilocals/tonne, (possibly at Cornwall). Calcination at 900 degrees C. costs half of the calcining plus clinkering fuel cost of $4,000,000-00 for c.400,000 tonnes of product. (Information from Goliath Cement). Transport cost has to be allowed for also, Bringing the coal alternative to c. $85-00/1 tonne fuel oil equivalent.

3.2 Mining costs

Mining cost at Savage River is at present (January 1988) an abnormal c.$A34-00/tonne of pellets produced but it should be c.$A29-00 and is higher than expected because of numerous problems. (Savage River Mines).

About 17 mt of material is moved to produce c.6 mt of crusher feed (ore) to make c.2.5 mt of the pellet product valued at $A30-00/tonne.

3.3 Transport costs

Transport costs for Brown Plains to Burnie by trucks running empty on return have been calculated from data used for the Corinna sand project (Brambles, Cominex) and come out at c.$19-00/tonne, (likely to fall to $16-00/tonne once the Hampshire to Fingerpost link is open).

3.4 Capital servicing

The estimated capital cost for a notional 100,000 tonne/year high grade MgO plant, using the Canterford CO2 leach process came out at $A128,000,000 (mid 1985 dollars) in the Wright Engineers computer program (ref 58) Some cost factors are presumed to be borne by the state in the estimate. Assuming an annual interest and redemption cost of 15% of the capital gives c.$190-00/tonne of product/year.

3.5 Processing plant operation

The workforce costs are included in the administration, mining and transport estimates but apparently not in the leach process costs. As a very rough estimate, a labor input equivalent to some 50 workers at c.$30,000-00/year/worker adds $A15-00/tonne of product.

3.6 "Total cost of production"

So a rough cost of production from these cost inputs comes out at c.$500-00/tonne of MgO, possibly reducable to $325/tonne using coal. A potentially large additional input is the energy and administration cost of the metallugical operation. Recent prices for seawater magnesias are pound sterling equivalents of $A425-00 to $A875-00 There would seem to be scope for profit in the enterprise.

3.7 Cost factors of other plants

An alternative costing approach is a direct comparison with the seawater process. From Duncan and McCracken (1981) ref 33: "In many cases the calcining cost constitutes from 50 to 75% of the total calcined product value.- -To produce one ton of seawater magnesia requires about 300 tons of seawater and approximately 1.5 tons of dry calcined dolomite.- -The typical energy required for a two-stage synthetic magnesite (sic) production is normally on the order of 20 million BTU per ton of product."

The Canterford process would use 1.5 tonnes of carefully calcined magnesite rock, about 80% magnesite and use 60 tonnes of water per tonne of product, but requires CO2 input in pressurized circuits with agitation.

3.8 Cost versus quality: Some veiwpoints

Several recent writers comment that the relative energy inputs favour the better quality natural magnesias for most refractory applications, e.g. Duncan (1986) ref (34) "At one point about 85% of the magnesia requirements was met through the production of synthetic magnesia. This continued until the early 1970's when there was a sharp increase in energy costs. Since the production of synthetic magnesias was using about four times the energy that was required when utilising a natural magnesite, a re-evaluation took place. A product where 75% of the production cost was energy, was not acceptable as the steel industry could not absorb this increased cost.

"A recent introduction is chemically pure magnesia. Magnohrom of Yugoslavia has a commercial plant producing 99% plus MgO.- -The process requires large amounts of energy, equivalent to 1.2 tons of heavy fuel oil per ton of product. With the energy level of 12*10m kilocals/ton it is a very expensive product for the refractory industry.- -Another chemical treatment- -which has no commercial plants is the Sulmag process- -The costs of these processes are relatively high and the purity of the product would suggest uses other than refractories."

There are authorities who consider limited market possibilities also apply to the top quality brine process material, e.g. Jeschke and Koltermann, (1983) ref (46) "For magnesia bricks and monolithics, substantial amounts of natural magnesite is still used (from Spain, Austria, North Korea, Czechoslovakia). Higher grade material comes from Greece and top grades from sea-water and brines, with the low boron 99% MgO material from the Dead Sea brines being the best technically but only in very few cases is it economical."

Nevertheless, *some progress* is being made in the placement of developed high purity magnesias, not just the Dead Sea periclase and Magnohrom works but also the chloride process of Veitscher Magnesitwerke (Austria), *now being expanded* to 7,000 tonnes/year, (Dickson, 1987) ref (31).

The use of North Korean magnesite in Europe is of interest since the SRM 3 grade is roughly comparable (ref 32)

The Dead Sea periclase has an Fe_2O_3 specification of 0.14%.

3.9 New criteria for quality

Martinek (1986) ref (47) expects a better future for the pure magnesias. "During the decade of the 80's sintered magnesias will become purer (99+% MgO) and denser (3.45-3.50 bulk specific gravity). Emphasis will be on very high CaO/SiO_2 ratios and all purpose grades. With silicates decreasing to low levels, silicate mineralogy, as it relates to interactions with other raw materials, will become of less importance."

This would indicate a market for the easier Canterford process product with 0.5% Fe_2O_3, but near zero silica and CaO. Much juggling of magnesias attempts to offset unwanted SiO_2 by mopping it up with an excess of lime.

Developments are also taking place in attempts to increase crystallite size of the magnesia product. Moertl (1986) ref. (48) describes an experiment in which iron content was deliberately increased to promote crystallite size. The growth wanted occurred but at the expense of more serious problems developing instead, however it is conceivable that a higher-iron version the Canterford process end result, being lower in all other impurities but especially in SiO_2 could provide the wanted effect without the unwanted ones.

4.0 Hydromagnesite

the intermediate product of the leach process is hydromagnesite which is a white powder which may prove usable in paper filler or coating pigment applications. Prices of the order of $180-200 apply to good fillers and up to $300 for coating pigments (information from Marafield). The intermediate product is less costly to produce because of its bulk (2.32*MgO) and its production dispenses with the high temperature calcination stage responsible for a quarter of the energy use. Notional production costs become $190 with oil and $145 with coal.

5.0 Leach residue

The processing of the magnesite mineral removes the CO2 then the Mg with the object of leaving behind the iron oxide, essentially an artificial version of the process leading to the natural ochres, residual talc and silica sand of the weathering residue, but with partially calcined carbonate present. It may prove possible to extract some or all of these as by products from the leach residue.

6.0 Magnesium metal production.

In contrast to modern magnesia refractory specifications, in Mg metal processes higher iron content magnesite rock is acceptable and even welcome up to a moderate limit. Some processes (Pidgeon process, electrolytic reduction) are sensitive to sodium but the values from spot samples of Na c.20-40 ppm up to 105 ppm are satisfactory. (There are some higher values linked to greenschist contaminants and possibly feldspar bearing veins.) See ref.(35), Frost, MCC 597 (1984)

6.1 Electrolytic reduction

The SRM 3 style of physically beneficiated calcine would appear chemically suitable start point for a feed for a magnesium smelter. The physical character may be a problem. Advice from MPLC is that for their process briquetted calcines have not worked.

6.2 MPLC process

The MPLC process is based on magnesite rock feed, the point of the process is tosave energy by going from magnesite rock to molten anhydrous MgCl in one step. The process is still experimental and the impurity tolerances are not fully defined. The MPLC company has expressed interest in the Main Creek deposit based on their assessment of data in ref (35), with particular interest in the data from MC 1, 755' to 933' .

In the context of an office discussion (Archer,1987), ref. (1), and in later contacts somewhat contradictory specifications of their required magnesite rock feed emerged:

1).- The MgCO3 content should exceed 93%.
2).- The ideal ratio of Mg ions to Ca ions for the MPLC process is 17:1.

3).- Silica is not of vital concern except in that it is more material to move through the system.

4).- Some iron is useful.

5).- Figures given as a guide to impurity tolerance were as follows:

CaO <2.0%
SiO2 <1.0%- 1.5%
Al2O3 <1.0%
Fe2O3 <2.5%

Cu < 5 ppm
N < 5 ppm
B < 5 ppm
Sn <20 ppm
Pb <20 ppm

6).- Quantity required: 12.5 million tonnes.

(A 93% $MgCO_3$ with Mg:Ca of 17:1 has a CaO content of 3.66% which conflicts with the 2% CaO limit given.)

A pure Mg/Ca/Fe carbonate rock with 93% $MgCO_3$ component and Mg:Ca of 17:1 contains 5.5% $CaCO_3$ and 1.4% $FeCO_3$. For $MgCO_3$ content >94.5% the ratio cannot be maintained.

For the Main Creek deposit the minerals present are a ferroan magnesite and magnesia rich, slightly ferroan dolomite this notional carbonate would approximate closely to 90% magnesite, 10% dolomite of the Main Creek varieties.

In the following table the equivalent oxide proportions of the "ideal magnesite" are compared with the bulk samples roughly eqivalent to the 755'-993' interval in drillhole MC 1, which was rated as mot interesting:

TABLE 5

	MgO	CaO	FeO	"Fe2O3"	CO2	SiO2
1	44.5	3.66	1.36	1.49	50.48	0.0
2	43.57	4.12	1.06	1.18	50.41	1.54
3	42.27	5.45	0.99	1.11	49.78	1.07
4	42.45	3.65	1.52	1.69	50.97	1.58
5	42.6	3.82	0.86	0.96	51.26	2.07

notes:

1) notional 100% carbonate;

2) 4y to 5 stratigraphic interval, in MC 1 DDH, 770' to 936' = 234.9-285.3m.

3) Part of the corresponding interval in MC 2 DDH, 611' to 782' = 186.2-238.4m.

CaO <2.0%
SiO2 <1.0%- 1.5%
Al2O3 <1.0%
Fe2O3 <2.5%

Cu < 5 ppm
N < 5 ppm
B < 5 ppm
Sn <20 ppm
Pb <20 ppm

6).- Quantity required: 12.5 million tonnes.

(A 93% MgCO3 with Mg:Ca of 17:1 has a CaO content of 3.66% which conflicts with the 2% CaO limit given.)

A pure Mg/Ca/Fe carbonate rock with 93% MgCO3 component and Mg:Ca of 17:1 contains 5.5% CaCO3 and 1.4% FeCO3. For MgCO3 content >94.5% the ratio cannot be maintained.

For the Main Creek deposit the minerals present are a ferroan magnesite and magnesia rich, slightly ferroan dolomite this notional carbonate would approximate closely to 90% magnesite, 10% dolomite of the Main Creek varieties.

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notes:

1) notional 100% carbonate;

2) 4y to 5 stratigraphic interval, in MC 1 DDH, 770' to 936' = 234.9-285.3m.

3) Part of the corresponding interval in MC 2 DDH, 611' to 782' = 186.2-238.4m.

4) CSIRO sample MAG 4, a bulk sample attributed to the lower thirds of both MC 1 and MC 2, including the 4y to 5 interval but excluding some high silica/dolomite intervals.

5) average of CSIRO samples 3804 and 3805 (which span 50m of the 4y to 5 interval in the Main Creek surface outcrop).

The interval that interested MPLC was 755'-993' in drillhole MC 1. The table includes all the assays available for large, systematic samples covering that interval over 300m strike length.

In the assay tables show the only long interval that comes close to specification is 761'-782', (marker 5), 787.5'-843' from MC 2. It meets the Mg, Al, Fe, and SiO2 requirements. There are several shorter intervals that match this quality but a modest level of beneficiation operating on the ore in lump form, such as the photometric ore sorting process of Ore Sorters Ltd, would seem likely to bring most of the deposit up to the mark in Mg content.

Recently MPLC were contacted again and a different set of specifications given (K. Jones, pers. comm.):

1).- $MgCO_3$ >94% (i.e. MgO >44.94; Mg >27.10)

2).- CaO + SiO_2 <3.5% (the less the better - removal is a nuisance)

3).- Fe_2O_3 + Al_2O_3 no limit (except as it affects the $MgCO_3$ space; removal is easy. However, the higher iron content portions of the Main Creek body may be outside the range of their data.)

4).- Na no limit - Na is added in the process for removing Ca.

5).They have tried using bricquetted MgO but have not had success since the bricquettes disintegrate too soon. (By implication the feed has to be in lump form, and strong enough to hold together during the chlorination stage).

6).The Arthur River magnesite has a problem with variation.

7).Quantity required: 5 million tonnes.

This set of specifications is actually easier to comply with than the other since the dolomite can be removed without worry over upsetting the ratio requirement. It also brings into consideration the iron rich, low CaO, low SiO_2 magnesites between the E margin and marker 2. Several of the individual samples from this interval in MC 27 pass but longer intervals do not for example, 33-36m: 93.4% MgO and 42-58: 92.1 MgO, another good interval is the vicinity of marker 5 in MC 2,

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761'-782': 95.9% MgO and 787'-843': 94.4% MgO.

It would appear that a feed suitable for Mg metal production could be obtained by the optical sorter route, beginning with the near miss material.

The 2-phase texture of the rock with its marked segregation into dolomite/silica rich and magnesite rich phases is made use of in beneficiating crude magnesia, but cannot be used if the feed must remain essentially carbonate. But an experiment could be tried to discover if a heat treatment short of full calcination of the magnesite phase can still induce the rock to split preferentially along the phase boundaries. The colour change in the magnesite phase would be expected to help an optical ore sorter.

6.3 Exploration drilling implications

The ideal for MPLC is a body of rock suitable for use without beneficiation. Such a body may exist within the 0/2 or 4y/6 beds. The 0/2 bed in MC 27 is better than its $MgCO_3$ content indicates since the CaO and SiO_2 levels normally implied by 94% $MgCO_3$ are above what is actually present in this high iron magnesite. Accordingly the general drilling program is to be adjusted to include the 0/2 interval in the holes north and south of MC 27.

7.0 Overburden investigations

The overburden covering the magnesite rock is relatively thick. It has been examined by means of an abortive bulldozer costean program, abandoned quickly once it became clear that the cover was too thick for this approach, then two airblast drilling programs with rather poor results and by an experimental Wacker device program which was successful. The commen overburden thckness is 10-20m and sometimes considerably greater and it is likely that deep penetration of weathering takes place along major joints. Previously the weathering residues making up most of the overburden were deemed another big problem but since the ochre component has been recognized as an asset the ochre search can support the investigation.

8.0 Drilling program, 1983

The second diamond drilling program was intended to prove up minable magnesite in an area better situated for exploitation than the valley of Main Creek, where the creek would have to be diverted to make the bulk of the deposit accessible.

Unsuspected problems were revealed. Bore MC 27 showed that greenschist interbeds had increased nearly 50%, iron content was higher and parts of the carbonate more dolomitic than in MC 1 and MC 2, although the rock in the eastern carbonate zone was high in iron but very low in dolomite and showed textures with minimal recrystallization. Bore MC 28 failed to reach target but showed lots of recrystallization textures which correspond to high dolomite and high iron contents relative to the corresponding interval in the other bores, also there are veins, minor calcite, and talc in the carbonate in some of these areas. All appear to relate to the vein event. Apart from the zones affected by this phenomenon the bores correlate quite well, but since it is there rather more bores would be needed to tie down quality variation with confidence.

9.0 Work proposal for the magnesite deposits, Main Creek - Bowry Creek 1988-1989

9.1 Processing and marketing

The priority aim should be to determine the feasibility of actually marketing any of the magnesite and derived products which could be made from the Main Creek magnesite resource, some possibilities being apparently limited by the competition, but any penetration of the market requires a capacity to produce examples of the materials to be traded. These will have to be provided from a new plant since the C.S.I.R.O. plant no longer exists. A permanent pilot plant is essential and it is to be hoped that once the agreement with Denehurst is finalized they will soon be providing one.

The plant must still be provided with feed to run on and some of this should be provided from drillhole samples supplemented with a supply from a test quarry. The most attractive test quarry site would be at 467991.

Despite the great increase in the tolerance of inferior magnesite rock revealed by Canterford's later experiments, which imply that magnesite proportions down to 50% can be handled quite well there is still a potentially important saving in keeping the amount of waste that has to go through a calcination process before being separated down to a minimum.

9.2 Framework of investigation

The present level of evaluation of the deposit is far from satisfactory. The zone with the best potential for quarrying has no drillhole control, the overburden situation has not been tested effectively and there are surface outcrops that have yet to be completely sampled and mapped. A useful and comparatively cheap program would cover the mapping and surface sampling of the outcrop (large samples for the pilot plant) Wacker device and/or Gemco rig sampling of the overburden, and ideally completion of the two most critical drillholes. The bores put down so far are in sites compatible with a 200m profile spacing from the MC 2 section, beyond which Main Creek runs into the deposit and the MC 27 section, where the greenschists expand to the point where they are a nuisance relative to the conditions expected further south. All seven sections should be completed eventually but for the present the main problem is the saddle area, ideally situated for a major quarry but with no drillhole and residual deposits at surface that may mean the magnesite is of poor quality. The alternative quarry site at the Zig Zag which is assured of good quality magnesite but which has limited reserves above the level of Main Creek and would eventually impinge on the magnesite karst outcrop: a feature of sufficient rarity and scientific interest to warrent an attempt to preserve it.

10.0 Magnesite deposit work program

10.1 Surface Sampling.

Comprehensive surface sampling is proposed for the known outcrops for which few samples are available. In particular the creek section of Bowry Creek, and also crek outcrops W and N of MC 27.

10.2 Overburden assessment.

(To be integrated with the ochre project.) Tracks which expose the residual deposits should be constructed for each drillhole. Next (after detailed mapping) determination of depth to carbonate should be made with the Wacker device or Gemco.

10.3 Drilling program.

Drillhole coverage of the has been proceeding with planned coverage at roughly 200m intervals between detetermined sections. Seven such sections are envisaged between the 990N section begun by MC 2 and the 002N section completed by MC 27. The emphasis on the portion most favourably situated for mining is the reason for priority on completing the 990N and 996N (MC 28) sections to be followed by the 994N and 998N sections.

10.4 Preliminary Track work

Some upgrading will be needed since there is too much fallen timber on the track to permit a skid mounted rig to pass over it. Some proposed holes holes need short access tracks preparation.

10.5 Drill holes

A. (profile 996N) 270m bore to be drilled from the W side of the deposit back towards existing drillhole MC 28 which was abandoned short of target. This would complete the section across the deposit in the area best sited for a major quarry. Site preparation is needed here.

B. (profile 990N) 180m bore to be drilled from a prepared site on the 6/7 greenschist marker to the W. margin of the deposit thus completing the section begun by MC 2 which terminates in magnesite beyond marker 6 but well short of the inferred position of the W. edge of the deposit.

C. (profile 994) 450m bore to be drilled from an existing prepared site with outcrop to indicate that it is just on the eastern margin of the deposit. A hole here provides information from the base of the 180m escarpment

D. (profile 998) 450m bore to be drilled from 200m N of MC 28. A short access track and site preparation is needed here.
E. (profile 992) 240m bore to complete the section begun by MC 1 and to provide overlap through to marker 4. The proposed western margin road needs to be built before the site is accessible.

F. (profile 968) 310m bore to explore the Bowry Creek lens in the higher ground South of the area for which the creek section itself provides good information.

10.6 Budget

Track and site work.

Dozer location	$500-00
3 * 10hour dozer days at $70	$2100-00
	$2600-00

Drilling

Drillhole at site A, 270m

Dozer location + skidding in of rig and sloop	$1200-00
20m roller bit drilling	$700-00
30m HQ size drilling	$2000-00
220m NQ	$12320-00
	$16220-00

Drillhole at site B,180m

Dozer location + skidding in of rig and sloop	$1200-00
20m roller bit drilling	$700-00
20m HQ size drilling	$1330-00
140m NQ	$7840-00
	$11070-00

Drillhole at site C, 450m

Dozer location + skidding in of rig and sloop	$1200-00
20m roller bit drilling	$700-00
30m HQ size drilling	$2000-00
220m NQ	$12320-00
180m BQ	$11080-00
	$27300-00

Drillhole at site D, 4500m

Dozer location + skidding in of rig and sloop	$1200-00
20m roller bit drilling	$700-00
30m HQ size drilling	$2000-00
220m NQ	$12320-00
180M BQ	$11080-00
	$27300-00

Drillhole at site E, 240m

Dozer location + skidding in of rig and sloop	$1200-00
20m roller bit drilling	$700-00
20m HQ size drilling	$1330-00
210m NQ	$11760-00
	14990-00

Drillhole at site F, 310m

Dozer location + skidding in of rig and sloop	$1200-00
20m roller bit drilling	$700-00
20m HQ size drilling	$1330-00
270m NQ	$15120-00
	$17350-00

Drillhole at site E, 210m

Dozer location + skidding in of rig and sloop	$1200-00
20m roller bit drilling	$700-00
20m HQ size drilling	$1330-00
170m NQ	$9520-00
	$11750-00

Total Drilling	$128580-00
Assays	$15000-00
C.S.I.R.O. Mineralogy	$15000-00
Core store and laboratory	$20000-00
Haul road	$36000-00
Quarry preparation	$20000-00
Total for program	$234800-00

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APPENDIX 1

ANNOTATED ASSAY TABLES FOR THE MAIN CREEK MAGNESITE DEPOSIT

The following tables integrate the total available data on boron and sodium content with the older chemical analyses.

TABLE 1 **Bore No 1, Main Creek;** analysis results from Tas. Dept. Mines Laboratory, Launceston; for CaO, MgO, Al2O3, Fe, SiO2; B2O3 levels are caculated from data for B in Frost, (1981) ref (36) and for Na in Frost, (1984) ref (40). There are no data for Na and B2O3 for the remaining drillholes

Fe results converted to notional "Fe2O3"for convenience in estimating magnesia equivalent (Fe is actually as FeO in magnesite). Marker bed interpretation H. Shannon.

Sample Interval from-to	int.(ft)	CaO %	MgO %	Al2O3 %	Fe2O3 %	SiO2 %	B2O3 %	Na %
10' - 20'	10	29	21	trace	1.3	2.3	0.00116	0.015
20' - 30'	10	26	23	tr	1.0	1.6	0.00045	
30' - 40'	10	28	22	tr	1.3	1.4		
40' - 50'	10	27	22	tr	1.9	2.7		
50' - 60'	10	25	24	tr	3.0	1.3		
60' - 70'	10	8	33	tr	3.4	8.9	0.00026	0.0097
70' - 80'	10	22	27	nil	2.0	1.8		
80' - 90'	10	25	24	nil	2.0	3.2		
90' -100'	10	25	23	nil	1.6	3.8	0.00029	0.0089
100' -110'	10	35	29	nil	3.1	1.0		
110' -120'	10*	13	27	4.0	3.6	9.8		0.016
* incl. 4' non-carbs; marker 1.								
120' -130'	10*	12	23	5.6	5.9	18.7		0.018
* incl. 6' non-carbs; marker 1.								
130' -134'6	4.5	15	33	nil	3.6	2.3		
134'6-186'	51.5	no samples; poor recovery, ochres? sinkhole breccia fill?						

Sample Interval from-to	int.(ft)	CaO %	MgO %	Al2O3 %	Fe %	SiO2 %	B2O3 %	Na %
186' -196'	10	4	36	tr	3.3	16.7		
196' -210'	14	4	40	tr	2.7	5.3		0.0024
210' -221'	11	3	44	nil	3.9	0.5		
221' -230'	9	4	43	tr	3.6	0.3	0.00142	0.0077
230' -258'	28 no samples; poor recovery includes minor greenschist, ochres?							
258' -270'	12	3	41	nil	2.7	5.0	0.00151	0.0037
270' -282'	12	8	39	tr	3.1	1.5		
282' -292'	10	9	38	nil	3.1	2.6		
292' -304'6	12.5	2	42	tr	2.6	7.9		
304'6-314'	9.5	3	40	nil	2.7	7.4		0.0050
314' -323'	9	4	40	nil	2.3	5.6		
323' -333'	10	4	42	nil	2.6	2.2		
333' -343'	10	3	41	nil	3.0	8.3		
343' -353'	10	3	42	nil	2.9	3.8		0.0033
353' -363'	10	3	42	nil	2.9	3.8		
363' -373'	10	3	40	nil	2.6	7.0		
373' -383'	10	2	42	nil	2.4	2.7	0.00039	
383' -393'6	10.5	5	40	nil	2.4	4.2		
393'6-399'6	6	7	36	0.2	3.0	4.5		
399'6-410' no samples; marker 2a.								
408								0.022
410' -420'	10	7	40	tr	2.9	0.7		

chemical boundary, marker 2.

Sample Interval from-to	int.(ft)	CaO %	MgO %	Al2O3 %	Fe %	SiO2 %	B2O3 %	Na %
420' -430'	10	20	24	nil	1.1	13.6		
430' -440'	10	25	18	nil	0.9	15.5		
440' -450'	10	23	24	nil	0.9	6.5		
450' -460'	10	23	21	nil	0.9	14.7		0.036
460' -470'	10	19	25	nil	0.9	13.6		
470' -480'	10	16	30	nil	1.1	7.7		
Chemical boundary, position of marker 3a?								
480' -490'	10	7	40	nil	1.6	2.0		
490' -500'	10	5	41	nil	1.6	3.9		
500' -511'	11	4	43	nil	1.6	1.2	0.00029	0.0039
511' -521'	10	3	44	nil	1.7	0.2		
521' -531'	10	5	43	nil	1.6	0.1		
531' -541'	10	3	43	nil	2.4	1.9		
541' -551'*	10	5	39	1.4	3.0	4.2		
* incl. 1' non-carbs, 548'-549'; marker 3.								
551' -561'	10	4	43	nil	2.1	1.0	0.00010	0.0060
561' -571'	10	3	44	nil	2.0	1.0		
571' -581'	10	3	44	nil	2.0	0.5	0.00048	
581' -591'	10	3	44	nil	2.0	0.8		
591' -601'	10	10	37	nil	1.7	3.0		
601' -611'	10	12	37	nil	1.7	1.0	0.01224	0.0084
611' -623'	12	2	45	nil	2.0	0.8	0.00039	
623' -634'	11	2	45	nil	1.9	1.3		
634' -646'	12	4	41	nil	1.9	4.3		0.0055

Sample Interval from-to	int.(ft)	CaO %	MgO %	Al2O3 %	Fe %	SiO2 %	B2O3 %	Na %
646' -651'	5	10	34	0.3	1.9	7.8	0.07600	
651' -674'	23 no samples; marker 4.							
674' -685'6	11.5	6	39	0.3	1.9	5.1		
685'6-688'6	3 no samples; marker 4z.							
688'6-699'6	11	4	41	nil	1.4	4.6		
699'6-709'6	10	4	43	nil	1.7	2.5	0.00190	0.0052
709'6-719'6	10	9	35	nil	1.4	9.6		0.0087
719'6-729'6	10	2	44	nil	1.4	0.1		
729 6-739'6	10	3	44	nil	1.4	0.2		
739'6-749'6	10	3	44	nil	1.4	0.8		
749'6-758'	8.5	4	43	nil	1.7	0.6		0.0030
758' -766'9	8.75	4	43	nil	2.0	1.6		
766'9-769'6	2.75 no sample; marker 4y.							
769'6-780'	10.5	4	40	0.2	2.7	5.1		
780' -790'	10	6	42	nil	1.1	2.9		
790' -800'	10	3	43	nil	1.0	2.2		
800' -810'	10	3	44	nil	1.0	2.9		0.0035
810' -820'	10	5	42	nil	0.7	2.6		
820' -830'	10	5	44	nil	0.7	1.3		
830' -840'	10	5	42	nil	0.9	1.7		
840' -850'	10	4	44	nil	1.0	1.4		
850' -860'	10	2	46	nil	1.3	1.5		
860' -870'	10	4	43	nil	1.1	1.2		

034

99 036

Sample from-to	Interval int.(ft)	CaO %	MgO %	Al2O3 %	Fe %	SiO2 %	B2O3 %	Na %
870' -880'	10	4	45	trace	1.1	0.4		0.0034
880' -890'	10	5	43	trace	1.1	0.4		
890' -900'	10	4	44	trace	1.1	0.1		0.0032
900' -910'	10	4	46	trace	1.1	0.3		0.0020
910' -920'	10	4	45	trace	1.0	0.1		
920' -930'	10	4	44	nil	1.0	0.2		
930' -936'	6	4	44	trace	1.3	1.9		
936' -937'	1	no sample; marker 5.						
937' -947'	10	9	40	nil	0.9	1.6		
947' -957'	10	9	40	nil	0.9	0.6	0.00042	0.0105
957' -967'	10	5	43	trace	0.9	0.5		
967' -977'	10	3	43	nil	1.0	3.8		
977' -987'	10	3	43	nil	1.3	3.6		
987' -999'	12	3	44	nil	1.0	1.6		
999' -1023'	no sample; marker 6.							
1023'-1031'								0.0076

<u>source</u>: letter from H.K. Wellington, Launceston Offices, Tas. Dept. of Mines, 15-6-1971 for CaO, MgO, Al2O3, SiO2; and 11-2-1976 for Fe.

<u>note</u> 1: Al2O3 values greater than trace are linked to the incorporation of non carbonate beds in the sample.

note 2: This revision (February 1988) renumbers certain markers to maintain compatibility with the revision of MC 2. Markers 2 and 3a were previously 2a and 2` respectively; greenschist rubble tentatively classed as 2b/2c should be matched with unlabled minor schists in MC 28.

TABLE 2 **Bore No 2,** Main Creek; assay results from Mines Department Laboratory, Launceston, with annotations by H. Shannon.

Sample Interval from-to	int.(ft)	CaO %	MgO %	Al2O3 %	Fe %	Fe2O3 %	SiO2 %
0' - 16' greenschist, no samples.							
16' - 20' core loss with 6" dolomite; no samples; fault inferred.							
26' - 32'	6	10.2	34.6	BLD	1.0	1.4	3.4
32' - 40'	8	28.2	21.0	BLD	1.4	2.0	4.1
40' - 48'	8	26.0	22.3	BLD	2.1	3.0	2.2
48' - 61'3	13.25	no sample; marker 1					
61'3- 69'	7.75	2.0	39.0	0.09	3.2	4.6	8.9
69' - 78'	9	3.1	42.9	BLD	2.5	3.5	0.8
78' - 86'	8	5.2	40.2	BLD	1.8	2.6	2.5
86' - 94'	8	2.9	43.2	BLD	1.9	2.7	1.3
94' -102'6	8.5	1.6	43.7	BLD	4.3	6.2	0.4
102'6-111'	8.5	2.0	44.1	BLD	2.2	3.2	0.6
111' -119'	8	12.4	34.6	BLD	1.8	2.6	0.9
119' -127'	8	7.2	39.4	BLD	2.0	2.9	1.3
127' -136'6	9.5	1.2	44.8	BLD	2.3	3.3	1.0
136'6-145'	8.5	1.5	44.6	BLD	2.2	3.2	0.9
145' -153'	8	1.7	42.1	BLD	2.2	3.2	5.7
153' -161'	8	2.6	42.9	BLD	2.0	2.9	0.3
161' -169'	8	1.8	42.9	BLD	2.1	3.0	3.2
169' -177'	8	1.7	43.4	BLD	2.2	3.2	2.7
177' -185'	8	1.8	44.5	BLD	2.0	2.9	1.0
185' -193'	8	1.2	44.8	BLD	2.0	2.9	0.4

036

99 038

from-to	int(ft)	CaO	MgO	Al2O3	Fe	Fe2O3	SiO2
193' -201'	8	1.5	44.9	BLD	2.0	2.9	0.5

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from-to	int(ft)	CaO %	MgO %	Al2O3 %	Fe %	Fe2O3 %	acid insols. %
201' -209'	8	1.9	44.1	BLD	2.2	3.2	0.94
209' -217'	8	1.8	44.0	BLD	2.5	3.5	0.42
217' -225'	8	1.6	43.6	BLD	2.8	4.0	0.36
225' -233'	8	1.7	43.8	BLD	2.7	3.8	0.42
233' -240'	7	1.3	44.1	BLD	2.5	3.6	0.54
240' -248'	8	1.9	43.7	BLD	2.5	3.5	0.56
248' -256'	8	1.6	42.3	BLD	2.1	3.0	5.4
256' -264'	8	1.3	44.1	BLD	2.1	3.0	1.2
chemical boundary, marker 2a?							
264' -272'	8	2.5	35.4	BLD	2.1	3.0	17.3
272' -280'	8	12.3	28.3	BLD	0.91	1.3	17.4
280' -288'	8	4.5	33.3	BLD	1.4	2.0	19.3
chemical boundary, marker 2							
288' -300'	12	18.8	27.1	BLD	0.37	0.53	9.4
(talcose section possibly marker 2).							
300' -310'	10	10.4	34.8	BLD	0.32	0.46	8.9
310' -320'	10	6.6	37.8	BLD	0.37	0.53	9.0
320' -330'	10	10.4	35.9	BLD	0.37	0.53	6.2
330' -340'	10	6.6	38.1	BLD	0.43	0.61	9.1
340' -350'	10	16.0	27.3	BLD	0.48	0.69	14.0
350' -360'	10	17.4	26.1	BLD	1.1	1.5	12.4

from-to	int(ft)	CaO %	MgO %	Al2O3 %	Fe %	Fe2O3 %	acid insols. %
360' -370'	10*	20.8	21.2	0.76	0.84	1.2	16.3

* The interval includes 9" of non carbonates (marker 3a).

from-to	int(ft)	CaO %	MgO %	Al2O3 %	Fe %	Fe2O3 %	acid insols. %
370' -380'	10	10.4	32.5	BLD	0.91	1.3	11.3
380' -387'6	7.5	15.0	27.0	BLD	0.91	1.3	15.2
387'6-415'3	27.75	no samples; marker 3.					
415'3-425'	9.75	5.0	42.5	BLD	2.1	3.0	0.40
425' -436'	11	2.5	44.2	BLD	2.1	3.0	0.40
436' -447'	11	3.3	43.4	BLD	2.1	3.0	0.30
447' -458'	11	3.1	43.9	BLD	2.0	2.9	0.30
458' -468'	10	2.2	44.0	0.05	2.0	2.9	1.8
468' -469'	1 no sample.						
469' -476'9	7.75	2.2	43.9	BLD	2.1	3.0	1.6
476'9-477'3	0.5	no sample; greenschist.					
477'3-486'3	9	3.8	41.7	BLD	2.1	3.0	3.0
486'3-501'	14.75	no samples; marker 4.					
501' -511'	10	8.0	31.9	BLD	1.7	2.4	15.7
511' -523'6	12.5	3.3	37.8	BLD	1.7	2.4	11.8
523'6-528'	4.5	no sample; includes minor greenschists top and bottom; marker 4z.					
528' -540'	12	2.2	37.5	BLD	1.8	2.6	13.8
540' -549'3	9.25	3.9	35.6	BLD	1.4	2.0	16.6
549'3-550'9	1.5	no sample; split of greenschist marker 4z.					
550'9-563'	12.25	3.3	41.3	BLD	1.3	1.8	5.8
563' -575'	12	2.2	37.3	BLD	0.91	1.3	15.7
575' -587'	12	3.9	39.9	BLD	0.77	1.1	8.1

from-to	int(ft)	CaO %	MgO %	Al203 %	Fe %	Fe203 %	acid insols. %
587' -599'	12	10.0	35.8	BLD	0.91	1.3	6.0
599' -609'	10	14.5	30.2	BLD	0.91	1.3	10.1
609' -610'9	1.75	no sample; marker 4y.					
610'9-621'	10.25	7.5	38.2	BLD	1.1	1.5	4.7
621' -631'	10	11.4	35.6	BLD	0.91	1.3	4.2
631' -641'	10	2.0	41.6	BLD	0.91	1.3	8.5
641' -651'	10	1.8	39.8	BLD	0.77	1.1	12.5
651' -662'	11	3.6	41.2	BLD	0.84	1.2	6.5
662' -671' (incorporates greenschist stringers).	9	5.2	36.6	0.91	1.3	1.8	12.1
671' -681'	10	4.9	42.2	BLD	1.1	1.5	1.5
681' -691'	10	2.5	44.1	BLD	0.7	1.0	2.5
691' -701'	10	2.8	44.4	BLD	0.64	0.92	1.0
701' -711'	10	8.4	39.8	BLD	0.64	0.92	1.1
711' -721'	10	4.5	42.8	BLD	0.56	0.80	0.6
721' -731'	10	8.4	39.0	BLD	0.7	1.0	2.3
731' -741'	10	6.1	41.6	BLD	0.7	1.0	0.6
741' -751'	10	10.6	37.5	BLD	1.1	1.5	1.5
751' -761'	10	7.0	41.5	BLD	0.91	1.3	0.4
761' -771'	10	2.5	45.9	BLD	0.77	1.1	0.2
771' -782'	11	2.5	45.8	BLD	0.84	1.2	0.2
782' -787'6	5.5	no sample; marker 5					
787'6-798'	10.5	2.8	45.3	BLD	0.91	1.3	0.6
798' -809'	11	3.3	44.4	BLD	0.98	1.4	1.0

from-to	int(ft)	CaO %	MgO %	Al2O3 %	Fe %	Fe2O3 %	acid insols. %
809' -820'	11	2.8	45.3	BLD	0.91	1.3	0.4
820' -831'	11	2.2	45.6	BLD	0.7	1.0	0.5
831' -843'	12	3.6	43.1	BLD	0.77	1.1	2.7
843' -861'3	18.25	no samples; marker 6 (part)					
861'3-864'9	3.5	16.8	29.9	0.10	2.2	3.1	2.7
864'9-877'6	12.75	no samples; marker 6 (part)					
877'6-888'	10.5	4.0	40.6	BLD	0.84	1.2	3.8
888' -896'	8	6.8	38.7	BLD	0.91	1.3	3.2
896' -904'9	8.75	no sample; marker 7.					
904'9-915'	10.25	3.4	41.3	BLD	0.7	1.0	4.4
915' -925'	10	2.2	43.6	BLD	0.6	0.86	2.2
925' -935'	10	2.0	44.0	0.2	0.6	0.86	0.9
935' -945'	10	2.0	43.2	BLD	0.64	0.92	3.1
945' -955'	10	2.4	41.9	BLD	0.77	1.1	5.0
955' -964'	9	2.2	44.9	BLD	0.52	0.74	0.3
964' -974'	10	2.0	42.4	BLD	0.46	0.66	4.5
974' -978'	4	4.8	35.6	0.2	0.6	0.86	13.3

sample includes greenschist stringers.

978' -980'9	2'9	no sample; greenschist marker 8a
980'9-993'	12'3	no assay record; magnesite.
993' -997'9	4'9	no sample; greenschist marker 8.
997'9-1003'	5'3	no assay record; magnesite

source; Mines Dept. Laboratory, Launceston. Letters 19-5-1972 and 5-2-1972.

Note 1: Detection limit for Al_2O_3 is 0.05% thus BLD = <0.05.

Note 2: This revision (February 1988) changes the numbering of markers to account for the absence of a thick marker west of MC 12 in an area tested by costeans. Markers 3 and 4 were previously considered to be 2 and 3 respectively.

TABLE 8.2 M.C.No 27 DDH. CORE SAMPLE COMPOSITIONS

MINERAL PROPORTIONS DATA FROM C.S.I.R.O. REPORT MCC562 AMALGAMATED WITH MAGNESITE/DOLOMITE/CALCITE COMPOSITIONS FROM C.S.I.R.O. REPORT MCC589 AND CALCULATED TO SHOW APPORTIONMENT OF ELEMENTS BETWEEN MAGNESITE AND DOLOMITE, ETC. FOR EACH SAMPLE.

Sample depth	Mineral	Element	Mineral Element	Mineral
	Magnesite	Mg;Ca;Fe;Mn:	Quartz SiO2:	iron oxides
	Dolomite	Mg;Ca;Fe;Mn:	talc/chlor/felspar	pyrite
	Calcite	Ca :	total silicates	total Fe ox/sulph

S(m)	Mag / Dol / Cal	Mg	Ca	Fe	Mn	Quartz / talc/chlor/fels / total	Fe oxides / FeS / total
E. margin of deposit (minor karst cavity indicated).							
33	95.4	26.74	0.10	1.48	0.06	0.6	
	4.0	0.53	0.85	0.03	0.00	0.0	
	0.0	0.0				0.6	0.0
34	92.1	25.62	0.07	1.63	0.06	0.8	
	7.1	0.93	1.49	0.05	0.00	0.0	
	0.0		0.0			0.8	0.0
35	93.9	26.25	0.09	1.90	0.08	0.6	Feox 0.1
	5.4	0.71	1.17	0.03	0.00	0.0	
	0.0		0.0			0.6	0.1
36	95.3	26.44	0.09	1.96	0.09	0.05	Feox 0.2
	4.0	0.53	0.87	0.03	0.00	0.0	
	0.0		0.0			0.05	0.2
(no assay for magnesite; use average of magnesite assays for 35 and 37.)							
37	87.3	24.02	0.07	1.82	0.08	1.0	
	10.7	1.38	2.30	0.09	0.01	1.0 felspar	
	0.0		0.0			2.0	
37.85-40.0	marker 1 greenschist						
40	86.9	23.60	0.08	2.21	0.07	1.8	
	11.3	1.46	2.48	0.13	0.01	0.0	
	0.0		0.0			1.8	

042

99 044

S(m)	Mag	Mg	Ca	Fe	Mn	Quartz	Fe oxides
	Dol					talc/chlor/fels	FeS
	Cal					total	total
41	85.7	23.58	0.08	2.21	0.06	0.7	
	13.6	1.79	3.00	0.10	0.01	0.0	
	0.0		0.0			0.7	
42	95.7	26.63	0.07	2.08	0.06	0.6	
	3.7	0.48	0.78	0.03	0.00	0.0	
	0.0		0.0			0.6	
43	93.7	25.60	0.10	2.77	0.08	1.9	
	4.4	0.59	0.85	0.05	0.01	0.0	
	0.0		0.00			1.9	
(no sample; cavity and broken core: use average of 42 and 44)							
44	91.8	24.57	0.12	3.45	0.10	3.2	
	5.0	0.69	0.92	0.07	0.01	0.0	
	0.0		0.0			3.2	
45	91.5	24.73	0.07	2.74	0.10	3.1	
	5.4	0.71	1.16	0.04	0.00	0.0	
	0.0		0.0			3.1	
46	96.4	26.42	0.09	2.20	0.07	0.3	
	3.3	0.43	0.71	0.03	0.00	0.0	
	0.0		0.0			0.3	
47	90.9	25.53	0.06	1.66	0.07	0.9	
	8.2	1.08	1.79	0.05	0.01	0.0	
	0.0		0.0			0.9	
48	96.5	26.19	0.12	3.26	0.11	0.6	
	2.9	0.38	0.63	0.03	0.00	0.0	
	0.0		0.0			0.6	
49	92.6	25.80	0.06	1.98	0.06	1.9	Feox 0.1
	5.2	0.69	1.15	0.04	0.00	0.0	0.0
	0.2		0.08			1.9	0.1
50	94.0	26.56	0.07	1.49	0.06	1.6	
	4.4	0.59	0.96	0.03	0.00	0.0	
	0.0		0.0			1.6	
51	96.8	27.29	0.07	1.35	0.05	0.6	
	2.6	0.34	0.57	0.02	0.00	0.0	
	0.0		0.0			0.6	

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
52	91.1	25.24	0.06	1.76	0.09	1.7	
	7.2	0.95	1.57	0.04	0.00	0.0	
	0.0		0.0			1.7	
53	96.9	27.23	0.07	1.62	0.06	0.6	
	2.5	0.33	0.55	0.02	0.00	0.0	
	0.0		0.0			0.6	
54	89.9	25.15	0.06	1.52	0.05	1.3	
	8.6	1.15	1.94	0.05	0.00	0.0	
	0.0		0.0			1.3	
55	95.0	26.66	0.10	1.94	0.07	0.9	
	4.1	0.53	0.90	0.03	0.00	0.0	
	0.0		0.0			0.9	
56	95.7	26.41	0.07	1.91	0.07	0.6	
	3.7	0.48	0.81	0.03	0.00	0.0	
	0.0		0.0			0.6	
57	90.0	24.60	0.07	2.57	0.10	0.5	
	9.5	1.24	2.09	0.07	0.01	0.0	
	0.0		0.0			0.5	
58	90.2	25.07	0.07	1.98	0.08	0.5	
	8.8	1.16	1.95	0.06	0.01	0.0	
	0.0		0.0			0.5	

(no magnesite assay; use average of 57 and 59.)

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
59	71.2	20.11	0.05	1.08	0.04	1.6	
	27.2	3.57	0.48	0.81	0.03	0.0	
	0.0		0.0			1.6	
60	93.0	26.20	0.07	1.30	0.06	1.0	
	6.0	0.78	1.32	0.04	0.00	0.0	
	0.0		0.0			1.0	
61	92.5	25.92	0.06	1.50	0.06	2.4	0.0
	4.9	0.65	1.07	0.03	0.00	0.0	0.1
	0.0		0.0			2.4	0.1
62	93.7	25.22	0.09	3.50	0.19	2.5	0.0
	3.6	0.47	0.78	0.05	0.00	0.0	0.2
	0.0		0.0			2.5	0.2

044

99 040

S(m)	Mag / Dol / Cal	Mg	Ca	Fe	Mn	Quartz / talc/chlor/fels / total	Fe oxides / FeS / total

62.4-64.25 marker 2a; dolomitic greenschist with talcose margins

S(m)	Mag / Dol / Cal	Mg	Ca	Fe	Mn	Quartz / talc/chlor/fels / total	Fe oxides / FeS / total
65	86.5	23.77	0.10	2.05	0.08	1.9	
	11.4	1.47	2.46	0.10	0.01	0.0	FeS 0.2
	0.0		0.0			1.9	0 2
66	79.2	21.84	0.13	1.48	0.06	1.9	
	18.8	2.43	4.06	0.16	0.02	0.0	FeS 0.1
	0.0		0.0			1.9	0.1

(no dolomite assay, dolomite composition taken from 65 above. In the CSIRO table the magnesite assay is repeated in the dolomite position)

67.2-70.35 marker 2; dolomitic greenschist and amphibolite with talc schist margins

S(m)	Mag / Dol / Cal	Mg	Ca	Fe	Mn	Quartz / talc/chlor/fels / total	Fe oxides / FeS / total
71	90.9	25.35	0.20	1.55	0.06	1.7	0.0
	7.2	0.94	1.52	0.08	0.01	0.0	FeS 0.2
	0.0		0.0			1.7	0.2
72	87.8	24.25	0.20	2.20	0.11	3.8	
	8.4	1.07	1.82	0.10	0.01	0.0	
	0.0		0.0			3.8	
73	95.1	25.84	0.09	3.17	0.12	2.5	
	2.4	0.32	0.52	0.02	0.00	0.0	
	0.0		0.0			2.5	
74	74.8	20.69	0.05	1.78	0.06	3.8	
	21.3	2.76	4.59	0.19	0.02	0.0	FeS 0.1
	0.0		0.0			3.8	0.1
75	79.6	21.83	0.07	1.93	0.07	4.3	
	15.9	2.04	3.44	0.13	0.01	0.0	FeS 0.2
	0.0		0.0			4.3	0.2
76	86.1	22.78	0.08	3.42	0.14	1.1	
	12.7	1.63	2.77	0.09	0.01	0.0	
	0.1		0.04			1.1	
77	39.0	10.45	0.05	1.46	0.05	5.0	
	55.8	7.17	12.13	0.38	0.03	0.0	FeS 0.2
	0.0		0.0			5.0	0.2

(No dolomite value given; use composition for 76)

045

99 049

S(m)	Mag	Mg	Ca	Fe	Mn	Quartz		Fe oxides
	Dol					talc/chlor/fels	FeS	Cal
	total		total					
77.5-79.35 marker 3a (dolomitic greenschist with talcose margins).								
80	68.4	18.19	0.08	2.53	0.10	3.1		
	28.5	3.59	6.17	0.38	0.03	0.0		
	0.0		0.0			3.1		
80.18-88.2 marker 3, upper split; dolomitic greenschist and amphibolite with talcose top.								
89-	53.0	13.28	0.08	3.29	0.11	1.0		0.0
	35.0	4.39	7.32	0.49	0.02	10.0(chlorite)	FeS	1.0
	0.0		0.0			11.0		1.0
88.8-97.8 marker 3, lower split; dolomitic greenschist with minor magnesite, no sample.								
97.8-98.15 dolomitic magnesite; no sample.								
98.15-100.05 marker 3z; dolomitic greenschist.								
100+	83.6	22.45	0.08	3.29	0.11	3.4		0.0
	12.9	1.67	2.71	0.18	0.01	0.0	FeS	0.1
	0.0		0.0			3.4		0.1
100.9-101.6 marker 3z' stringer; dolomitic greenschist.								
102	61.3	16.81	0.07	1.96	0.10	2.6		
	36.0	4.67	7.60	0.51	0.05	0.0	FeS	0.1
	0.0		0.0			2.6		0.1
103	85.5	23.43	0.07	2.80	0.11	2.6		
	11.9	1.52	2.46	0.23	0.02	0.0		
	0.0		0.0			2.6		
104.3-111.2 marker 4; dolomitic greenschist and amphibolite with talcose margins.								
112	89.9	25.11	0.06	2.23	0.10	2.8		0.0
	7.2	0.95	1.50	0.08	0.01	0.0	FeS	0.1
	0.0		0.0			2.8		0.1

046

99 048

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
113	84.7	23.57	0.10	1.82	0.08	2.8	
	12.4	1.65	2.62	0.09	0.01	0.0	FeS 0.1
	0.0		0.0			2.8	0.1
114	74.8	21.15	0.05	1.39	0.05	1.0	
	24.2	3.22	5.16	0.19	0.01	0.0	
	0.0		0.0			1.0	
115	84.5	23.66	0.07	1.50	0.07	1.7	
	13.8	1.56	2.90	0.10	0.01	0.0	
	0.0		0.0			1.7	
116	84.9	23.15	0.08	2.13	0.08	1.4	
	13.7	1.79	2.90	0.11	0.01	0.0	
	0.0		0.0			1.4	
117	87.4	24.00	0.06	1.81	0.07	1.3	
	11.2	1.47	2.37	0.08	0.01	0.0	FeS 0.1
	0.0		0.0			1.3	0.1
118	90.0	24.44	0.06	2.37	0.09	1.4	
	8.6	1.12	1.83	0.07	0.00	0.0	
	0.0		0.0			1.4	

(no value given for dolomite; take average composition for 118 and 120.)

119	42.0	11.49	0.05	0.91	0.04	3.1	
	54.9	7.14	11.74	0.51	0.03	0.0	
	0.0		0.0			3.1	

120.1-129.0 marker 4z; dolomitic greenschist and amphibolite with talcose margins.

129	92.9	24.72	0.07	3.60	0.14	1.2	
	5.9	0.77	1.25	0.07	0.01	0.0	
	0.0		0.0			1.2	
130	98.6	26.75	0.08	2.97	0.13	0.1	
	1.3	0.17	0.28	0.01	0.00	0.0	
	0.0		0.0			0.1	
131	94.1	25.52	0.09	2.65	0.12	0.6	0.0
	5.0	0.65	1.06	0.05	0.00	0.0	0.3
	0.0		0.0			0.6	0.3

047

90 049

S(m)	Mag	Mg	Ca	Fe	Mn	Quartz	Fe oxides
	Dol					talc/chlor/fels	FeS
	Cal					total	total
132	97.1	26.26	0.06	2.55	0.09	0.6	
	2.3	0.30	0.49	0.02	0.00	0.0	
	0.0		0.0			0.6	
133	94.0	25.92	0.07	1.93	0.08	1.1	
	4.9	0.64	1.06	0.04	0.00	0.0	
	0.0		0.0			1.1	
134	91.6	25.39	0.05	1.92	0.08	0.9	
	7.5	0.97	1.59	0.08	0.01	0.0	
	0.0		0.0			0.9	

134.6-136.55 marker 4y; dolomitic greenschist and amphibolite with talcose margins.

137	90.6	24.84	0.06	1.86	0.08	0.6	0.0
	8.7	1.12	1.84	0.08	0.01	0.0	FeS 0.1
	0.0		0.0			0.6	0.1
138	87.8	24.09	0.06	1.79	0.08	1.7	
	10.4	1.34	2.22	0.11	0.01	0.0	FeS 0.1
	0.0		0.0			1.7	0.1
139	84.9	23.33	0.06	1.83	0.09	1.5	
	13.4	1.73	2.85	0.12	0.01	0.0	FeS 0.2
	0.0		0.0			1.5	
140	90.5	25.04	0.06	1.38	0.05	1.0	
	6.6	0.85	1.41	0.06	0.00	0.0	FeS 1.9
	0.0		0.0			1.0	1.9
141	81.3	22.32	0.06	1.84	0.09	0.7	
	18.0	2.03	4.28	0.16	0.03	0.0	
	0.0		0.0			0.7	
142	79.2	21.76	0.06	1.46	0.07	1.0	
	19.6	2.52	4.17	0.17	0.01	0.0	FeS 0.2
	0.0		0.0			1.0	0.2
143	17.5	4.81	0.02	0.34	0.02	0.5	
	81.0	10.46	16.95	0.66	0.06	0.0	
	1.0		0.40			0.5	

(silicates shown as chlorite with no quartz in C.S.I.R.O. table)

144	82.5	22.42	0.08	2.20	0.10	1.0	
	16.5	2.09	3.52	0.21	0.01	0.0	
	0.0		0.0			1.0	

048

99 050

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
145	29.7	8.09	0.04	0.67	0.03	3.0	Feox 0.1
	67.0	8.50	14.36	0.73	0.07	0.0	FeS 0.1
	0.1		0.04			3.0	0.2
146	56.0	15.02	0.03	1.71	0.05	1.9	
	42.1	5.29	8.25	0.53	0.04	0.0	
	0.0		0.0			1.9	
147	39.0	10.90	0.04	0.53	0.03	0.7	
	60.3	7.76	12.99	0.74	0.05	0.0	
	0.0		0.0			0.7	
148	26.0	7.06	0.03	0.60	0.03	1.2	
	72.8	9.22	15.51	0.88	0.08	0.0	
	0.0		0.0			1.2	
149	4.0	1.09	0.01	0.08	0.00	2.0	
	94.0	12.07	20.10	1.03	0.09	0.0	
	0.0		0.0			2.0	
150	4.1	1.11	0.01	0.11	0.00	1.6	
	94.3	11.84	20.08	1.33	0.10	0.0	
	0.0		0.0			1.6	
151	8.5	2.36	0.01	0.15	0.01	1.3	
	90.2	11.34	19.11	1.38	0.14	0.0	
	0.0		0.0			1.3	
152	34.1	9.36	0.02	0.92	0.05	2.2	
	63.7	8.11	13.46	0.88	0.10	0.0	
	0.0		0.0			2.2	
153	79.9	22.04	0.06	1.85	0.12	1.3	
	18.8	2.44	4.00	0.16	0.02	0.0	
	0.0		0.0			1.3	
154	95.4	25.71	0.07	3.06	0.09	0.5	
	4.1	0.54	0.87	0.03	0.00	0.0	
	0.0		0.0			0.5	
155	64.0	17.68	0.04	1.41	0.06	1.2	
	34.5	4.47	7.29	0.27	0.02	0.0	FeS 0.3
	0.0		0.0			1.2	0.3

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
156	7.5	2.01	0.01	0.10	0.01	2.0	
	90.5	11.71	19.19	0.91	0.08	0.0	
	0.0		0.0			2.0	
157	63.0	17.61	0.05	1.11	0.06	1.3	
	35.7	4.60	7.52	0.39	0.04	0.0	
	0.0		0.0			1.3	
158	90.5	25.39	0.08	1.19	0.06	1.6	0.0
	7.8	1.02	1.64	0.05	0.01	0.0	FeS 0.1
	0.0		0.0			1.6	0.0
159	67.6	18.72	0.05	1.55	0.09	3.5	
	28.7	3.79	6.10	0.24	0.02	0.0	FeS 0.2
	0.0		0.0			3.5	0.2
160	95.8	26.72	0.07	2.06	0.09	0.5	
	3.7	0.49	0.78	0.03	0.00	0.0	
	0.0		0.0			0.5	
161	90.8	25.39	0.08	1.74	0.09	5.2	
	4.0	0.53	0.84	0.03	0.00	0.0	
	0.0		0.0			5.2	
162	90.7	25.54	0.06	1.22	0.07	1.4	
	7.9	1.04	1.66	0.06	0.01	0.0	
	0.0		0.0			1.4	
163	70.4	19.09	0.06	2.46	0.08	2.0	
	27.6	3.59	5.80	0.28	0.02	0.0	
	0.0		0.0			2.0	
164	67.1	18.24	0.04	2.05	0.07	2.2	
	30.7	3.96	6.44	0.37	0.03	0.0	
	0.0		0.0			2.2	
165	29.4	8.06	0.03	0.85	0.04	1.7	
	68.9	8.93	14.59	0.80	0.06	0.0	
	0.0		0.0			1.7	
166	7.9	2.15	0.01	0.25	0.01	2.5	
	89.6	11.35	18.79	1.30	0.10	0.0	
	0.0		0.0			2.5	

050

99 052

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
167	53.9	14.43	0.05	1.85	0.08	0.8	
	45.3	5.78	8.25	0.47	0.04	0.0	
	0.0		0.0			0.8	
168	60.0	16.49	0.05	1.76	0.07	1.0	
	39.0	5.07	8.25	0.47	0.04	0.0	
	0.0		0.0			1.0	

(silicates shown as 1.0 chlorite with no quartz! in C.S.I.R.O. table)

169	39.0	10.73	0.05	0.82	0.05	1.0	
	60.0	7.70	12.66	0.67	0.07	0.0	
	0.0		0.0			1.0	
170	25.3	6.95	0.03	0.49	0.04	1.0	
	74.6	9.59	15.53	0.85	0.07	0.0	
	0.0		0.0			1.0	
171	42.1	11.82	0.06	0.69	0.05	2.1	
	55.8	6.74	11.85	0.55	0.04	0.0	
	0.0		0.0			2.1	
172	74.3	20.74	0.05	1.35	0.09	2.9	
	22.8	3.00	4.84	0.17	0.02	0.0	
	0.0		0.0			2.9	
173	89.7	24.69	0.09	2.08	0.01	1.2	
	9.1	1.17	1.92	0.09	0.01	0.0	
	0.0		0.0			1.2	
174	37.4	10.30	0.06	0.77	0.04	0.6	
	62.0	7.97	12.89	0.73	0.06	0.0	
	0.0		0.0			0.6	
175	80.5	22.11	0.06	1.80	0.10	3.6	
	15.9	2.10	3.35	0.09	0.01	0.0	
	0.0		0.0			3.6	
176	86.6	23.64	0.09	1.96	0.10	0.5	
	12.9	1.71	2.71	0.09	0.01	0.0	
	0.0		0.0			0.5	
177	89.1	22.96	0.08	4.71	0.13	6.1	
	4.8	0.62	1.02	0.04	0.00	0.0	
	0.0		0.0			6.1	

178.2-178.5 marker 5; talc schist

051

93 053

S(m)	Mag	Mg	Ca	Fe	Mn	Quartz		Fe oxides
	Dol					talc/chlor/fels		FeS
	Cal					total		total

179 no sample, extrapclate from 180 below

180	82.7	23.06	0.07	1.10	0.07	1.6		
	15.7	2.04	3.32	0.10	0.01	0.0		
	0.0		0.0			1.6		
181	49.9	13.82	0.05	0.50	0.02	1.3		
	48.8	6.30	10.23	0.40	0.04	0.0		
	0.0		0.0			1.3		
182	65.3	17.90	0.08	1.31	0.09	1.8		
	32.9	4.24	6.96	0.26	0.02	0.0		
	0.0		0.0			1.8		
183	57.2	15.30	0.05	1.54	0.15	1.6		
	41.2	5.27	8.71	0.37	0.05	0.0		
	0.0		0.0			1.6		
184	55.0	14.03	0.04	1.42	0.09	2.3		
	42.7	5.46	8.89	0.44	0.06	0.0		
	0.0		0.0			2.3		
185	52.5	14.03	0.04	1.42	0.09	3.6		
	43.9	5.71	9.25	0.27	0.03	0.0		
	0.0		0.0			3.6		
186	62.4	17.00	0.07	1.63	0.13	2.5		
	35.1	4.64	7.49	0.20	0.02	0.0		
	0.0		0.0			2.5		
187	58.5	16.04	0.05	1.50	0.10	3.3		0.0
	37.9	4.9	7.98	0.40	0.05	0.0	FeS	0.3
	0.0		0.0			3.3		0.3
188	78.8	20.92	0.06	2.48	0.12	2.1		
	19.1	2.46	4.07	0.15	0.02	0.0		
	0.0		0.0			2.1		

(composition taken for dolomite listed as a second determination on 187)

189	77.0	21.29	0.06	1.32	0.07	2.0		
	21.0	2.71	4.41	0.22	0.02	0.0		
	0.0		0.0			2.0		

189.9-238.5 marker 6/7; calcitic/dolomitic greenschist, amphibolite, talc schist. Marginal talcose zones.

052

93 054

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total

Quartz and Crystalline talc zone

S(m)	Mag/Dol/Cal	Mg	Ca	Fe	Mn	Quartz/talc/chlor/fels/total	Fe oxides/FeS/total
239	58.6	15.97	0.06	1.32	0.07	3.6	
	37.8	4.97	7.97	0.26	0.05	0.0	
	0.0		0.0			3.6	
240	36.3	10.00	0.05	0.79	0.07	3.2	0.0
	60.3	7.75	12.77	0.69	0.17	0.0	FeS 0.2
	0.0		0.0			3.2	0.2

241.25-273.9 marker 8; calcitic/dolomitic greenschist and amphibolite with talcose margins and minor magnesite rock.

S(m)	Mag/Dol/Cal	Mg	Ca	Fe	Mn	Quartz/talc/chlor/fels/total
274	27.3	7.61	0.03	0.38	0.04	3.7
	69.0	9.05	14.72	0.36	0.05	0.0
	0.0		0.0			3.7
275	62.2	17.26	0.05	1.06	0.09	1.7
	36.1	4.69	7.66	0.26	0.05	0.0
	0.0		0.0			1.7
276	80.5	22.06	0.04	1.63	0.12	0.7
	17.3	2.30	3.70	0.07	0.01	1.5 talc
	0.0		0.0			2.2

(silicates shown as 0.7 talc and 1.5 chlorite with no quartz in C.S.I.R.O. table; deemed not probable.)

S(m)	Mag/Dol/Cal	Mg	Ca	Fe	Mn	Quartz/talc/chlor/fels/total
277	82.7	22.76	0.05	1.52	0.11	1.2
	16.1	2.12	3.44	0.07	0.01	0.0
	0.0		0.0			1.2
278	87.45	24.25	0.055	1.45	0.11	1.3
	11.25	1.485	2.40	0.05	0.01	0.0
	0.0		0.0			1.3

(no sample, data taken from average of 277 and 279.)

S(m)	Mag/Dol/Cal	Mg	Ca	Fe	Mn	Quartz/talc/chlor/fels/total
279	92.2	25.74	0.06	1.38	0.11	1.4
	6.4	0.85	1.36	0.03	0.01	0.0
	0.0		0.0			1.4
280	72.9	19.97	0.05	1.17	0.10	0.6
	26.5	3.48	5.64	0.16	0.03	0.0
	0.0		0.0			0.6

053

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
281	74.2	20.68	0.07	0.95	0.09	1.3	
	24.5	3.23	5.21	0.12	0.03	0.0	
	0.0		0.0			1.3	
282	79.4	22.09	0.06	1.03	0.12	1.3	
	19.3	2.56	4.12	0.08	0.01	0.0	
	0.0		0.0			1.3	
283	83.1	23.09	0.06	1.03	0.12	2.5	
	14.4	1.90	3.08	0.04	0.01	0.0	
	0.0		0.0			2.5	
284	65.9	18.41	0.05	0.61	0.09	2.4	
	31.7	4.17	6.82	0.12	0.03	0.0	
	0.0		0.0			2.4	
285	71.8	20.28	0.05	0.50	0.06	1.8	
	26.4	3.46	5.65	0.11	0.03	0.0	
	0.0		0.0			1.8	
286	76.0	21.34	0.06	0.65	0.10	1.0	
	21.0	2.77	4.46	0.11	0.05	2.0 talc	
	0.0		0.0			3.0	
287	58.5	16.34	0.04	0.66	0.08	1.6	
	39.9	5.26	8.56	0.20	0.04	0.0	
	0.0		0.0			1.6	
288	81.0	22.32	0.06	1.34	0.12	0.0	
	14.0	1.83	3.00	0.07	0.02	5.0 talc	
	0.0		0.0			5.0	
289	77.5	21.74	0.07	0.74	0.09	0.0	
	14.7	1.92	3.13	0.08	0.02	7.8 talc	
	0.0		0.0			7.8	
290	81.7	22.84	0.07	0.72	0.08	1.6	
	16.7	2.16	3.54	0.08	0.03	0.0	
	0.0		0.0			1.6	
291	74.0	20.71	0.05	0.61	0.07	0.0	
	22.0	2.88	4.67	0.10	0.03	4.0 talc	
	0.0		0.0			4.0	
292	73.6	20.48	0.04	0.94	0.11	0.9	
	18.9	2.47	4.02	0.07	0.02	6.6 talc	
	0.0		0.0			7.5	

054

99 056

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
293	73.0	20.48	0.04	0.94	0.11	0.0	
	17.0	2.21	3.61	0.08	0.03	10.0 talc	
	0.0		0.0			10.0	
294	75.0	20.58	0.04	1.27	0.10	0.0	
	16.0	2.13	3.41	0.05	0.02	9.0 talc	
	0.0		0.0			9.0	
295	89.4	24.60	0.05	0.70	0.07	0.0	
	2.9	0.39	0.62	0.01	0.00	7.7 talc	
	0.0		0.0			7.7	
296	77.5	21.98	0.07	0.74	0.09	0.5	
	21.0	2.81	4.47	0.11	0.03	1.0 talc	
	0.0		0.0			1.5	
297	54.0	15.08	0.05	0.88	0.11	1.0	
	41.0	5.47	8.71	0.26	0.06	4.0 talc	
	0.0		0.0			5.0	

298.25-307.5 marker 9; dolomitic greenschist with talcose margins.

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
308	15.6	4.33	0.01	0.35	0.05	3.3	
	81.1	10.59	17.10	0.82	0.21	0.0	
	0.0		0.0			3.3	
309	61.7	17.21	0.06	1.26	0.16	5.3	
	33.0	4.40	6.99	0.21	0.06	0.0	
	0.0		0.0			5.3	
310	38.7	10.88	0.05	0.68	0.08	2.6	
	58.3	7.57	12.26	0.64	0.12	0.4 talc	
	0.0		0.0			3.0	

310.7-313.0 marker 10; talc schist and dolomitic amphibolite.

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
313	82.7	23.59	0.07	0.74	0.08	1.4	
	15.9	2.12	3.33	0.10	0.02	0.0	
	0.0		0.0			1.4	
314	88.3	24.94	0.05	1.29	0.12	1.5	
	10.2	1.36	2.16	0.03	0.01	0.0	
	0.0		0.0			1.5	

055

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
315	91.2	26.14	0.06	0.84	0.10	1.2	
	7.6	1.02	1.61	0.02	0.01	0.0	
	0.0		0.0			1.2	
316	90.9	26.07	0.06	0.72	0.09	0.9	
	8.2	1.09	1.73	0.05	0.02	0.0	
	0.0		0.0			0.9	
317	83.7	23.45	0.06	1.55	0.13	0.8	
	15.5	2.08	3.26	0.06	0.02	0.0	
	0.0		0.0			0.8	
318	72.0	20.60	0.05	0.60	0.07	0.8	
	27.2	3.67	5.71	0.09	0.03	0.0	
	0.0		0.0			0.8	
319	80.0	22.74	0.05	0.81	0.10	1.2	
	18.8	2.53	3.97	0.08	0.02	0.0	
	0.0		0.0			1.2	
320	65.1	18.43	0.06	0.83	0.10	0.9	
	34.0	4.56	7.21	0.16	0.06	0.0	
	0.0		0.0			0.9	

From 321 on there are no determinations of magnesite/dolomite composition: use average of the compositions for the 313-320 interval for 321-325 inclusive.

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
321	79.7					1.8	
	18.5					0.0	
	0.0					1.8	
322	88.8					1.0	
	10.2					0.0	
	0.0					1.0	
323	91.5					3.3	
	5.2					0.0	
	0.0					3.3	
324	78.3					2.1	
	19.6					0.0	
	0.0					2.1	

S(m)	Mag / Dol / Cal	Mg	Ca	Fe	Mn	Quartz / talc/chlor/fels / total	Fe oxides / FeS / total
325	57.1					3.1	
	39.8					0.0	
	0.0					3.1	

326.2-373 (end hole.) Strata W of deposit. Magnetite bearing greenschist/amphibolite with minor unusual carbonate 361.8-362.9 (sample below).

S(m)	Mag / Dol / Cal	Mg	Ca	Fe	Mn	Quartz / talc/chlor/fels / total	Fe oxides / FeS / total
362	0.0					11.4	Feox 35.2
	24.8					16.2chl/4.8fel	FeS 7.6
	0.0					27.6	42.8

TABLE 1 M.C. No 28 DDH. CORE SAMPLE COMPOSITIONS

MINERAL PROPORTIONS DATA FROM C.S.I.R.O. REPORT MCC562 AMALGAMATED WITH MAGNESITE/DOLOMITE/CALCITE COMPOSITIONS FROM C.S.I.R.O. REPORT MCC589 AND CALCULATED TO SHOW APPORTIONMENT OF ELEMENTS BETWEEN MAGNESITE AND DOLOMITE, ETC. FOR EACH SAMPLE. GEOLOGY, H. SHANNON.

Sample depth (m)	Mineral	Element	Mineral	Element	Mineral
	Magnesite	Mg;Ca;Fe;Mn:	Quartz	SiO2:	iron oxides
	Dolomite	Mg;Ca;Fe;Mn:	talc/chlor/felspar		pyrite
	Calcite	Ca :	total silicates		total Fe ox/sulph

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
53	49.2	13.64	0.07	0.78	0.08	9.4	0.0
	41.4	5.47	8.64	0.19	0.03	0.0	0.0
	0.0		0.0			9.4	0.0
54	44.0	12.53	0.04	0.68	0.07	19.0	
	37.0	4.95	7.79	0.16	0.03	0.0	
	0.0		0.0			19.0	
55	61.2	16.62	0.06	1.40	0.11	14.9	
	23.8	3.07	5.01	0.14	0.02	0.0	
	0.0		0.0			14.9	
56	38.8	10.28	0.04	1.68	0.09	16.9	
	43.3	5.57	9.30	0.44	0.04	0.0	
	0.0		0.0			16.9	
57	51.5	14.28	0.06	1.46	0.09	9.2	
	39.3	5.20	8.43	0.27	0.03	0.0	
	0.0		0.0			9.2	
58	72.9	20.03	0.06	1.98	0.13	12.4	
	19.4	2.57	4.22	0.15	0.02	0.0	
	0.0		0.0			12.4	

(dolomite values taken from average of 57 and 59.

058

99 060

S(m)	Mag	Mg	Ca	Fe	Mn	Quartz	Fe oxides
	Dol					talc/chlor/fels	FeS
	Cal					total	total
59	18.7	5.17	0.01	0.49	0.03	12.4	
	68.9	9.12	15.12	0.62	0.09	0.0	
	0.0		0.0			12.4	

(magnesite values taken from average of 58 and 61.)

60.2-60.4 talc/chlorite schist; no sample

61	63.4	17.66	0.05	1.59	0.10	7.3	
	29.3	3.83	6.41	0.28	0.04	0.0	
	0.0		0.0			7.3	
62	77.9	21.65	0.07	1.67	0.12	2.6	
	19.7	2.63	4.24	0.15	0.02	0.0	
	0.0		0.0			2.6	
63	57.5	15.98	0.05	1.15	0.09	3.0	
	23.5	3.06	5.03	0.13	0.01	15.0 talc	
	1.0		0.40			18.0	
64	11.5	2.84	0.37	0.40	0.03	8.5	
	59.5	7.76	12.64	0.68	0.10	20.0 talc	
	0.0		0.0			28.5	
65	0.0	0.0	0.0	0.0	0.0	28.7	
	71.3	9.03	15.15	0.87	0.11	0.0	
	0.0		0.0			28.7	
66	0.0	0.0	0.0	0.0	0.0	27.4	
	72.5	8.98	15.02	1.26	0.20	0.0	
	0.0		0.0			27.4	

66.45-66.7 talc schist; no sample.

67	56.2	15.02	0.04	2.38	0.12	25.2	
	18.6	2.43	3.94	0.18	0.01	0.0	
	0.0		0.0			25.2	
68	32.5	8.12	0.03	2.46	0.11	43.0	Feox 0.5
	20.0	2.60	4.35	0.26	0.02	2.5 talc	0.0
	1.5		0.6			46.0	0.5

(discrepencies in data table adjusted).

69.7-70.6 talcose chlorite schist no sample

059

99 062

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
71	0.0	0.0	0.0	0.0	0.0	11.1	
	88.9	11.56	19.10	0.68	0.07	0.0	
	0.0		0.0			11.1	
72	2.0	0.53	0.00	0.08	0.01	10.0	
	87.9	11.47	18.36	0.62	0.10	0.0	
	0.0		0.0			10.0	
73	54.5	15.37	0.06	0.08	0.09	0.0	
	36.0	4.84	7.50	0.19	0.03	8.0 talc	
	1.0		0.40			8.0	
74	59.5	17.05	0.05	0.73	0.09	0.0	
	31.5	4.11	6.65	0.13	0.03	7.0 talc	
	0.5		0.20			7.0	
75	57.0	16.50	0.05	0.74	0.09	0.0	
	24.0	2.92	5.14	0.08	0.02	17.0 talc	
	0.0		0.0			17.0	
76	70.3	19.97	0.07	0.84	0.09	3.4	
	26.3	3.59	5.63	0.12	0.03	0.0	
	0.0		0.0			3.4	
77	0.8	0.22	0.00	0.03	0.00	4.0	
	95.2	12.53	20.55	0.62	0.13	0.0	
	0.0		0.0			4.0	
78	2.1	0.80	0.00	0.08	0.01	3.2	
	94.8	12.38	20.26	0.69	0.14	0.0	
	0.0		0.0			3.2	
(no sample; interpolate from average of 78 and 79 figures).							
79	3.4	0.93	0.00	0.12	0.01	2.3	
	94.3	12.22	19.97	0.75	0.14	0.0	
	0.0		0.0			2.3	
80	0.1	0.03	0.00	0.00	0.00	1.6	
	98.3	12.97	20.94	0.53	0.10	0.0	
	0.0		0.0			1.6	
81	3.0	0.83	0.00	0.07	0.01	0.5	
	93.0	12.31	19.63	0.50	0.11	0.5 talc	
	2.0		0.80			1.0	

060

95 062

S(m)	<u>Mag</u> <u>Dol</u> <u>Cal</u>	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
<u>82</u>	13.0	3.65	0.01	0.23	0.02	0.0	
	76.0	9.98	16.27	0.38	0.05	10.5 talc	
	0.5		0.20			10.5	
<u>83</u>	56.5	15.90	0.05	1.06	0.10	0.0	
	38.0	5.01	8.18	0.14	0.03	6.0 talc	
	0.0		0.0			6.0	
<u>84</u>	67.0	18.79	0.03	1.25	0.12	1.0	
	19.5	2.62	4.10	0.08	0.02	12.0 talc	
	0.5		0.20			13.0	
<u>85</u>	9.5	2.56	0.01	0.36	0.02	2.5	
	70.5	9.20	14.88	0.62	0.06	18.0 talc	
	1.5		0.60			20.5	
<u>86</u>	44.5	12.35	0.04	1.20	0.06	3.0	
	20.5	2.72	4.37	0.15	0.02	31.5 talc	
	0.5		0.20			34.5	
<u>87</u>	57.5	16.26	0.04	1.13	0.07	2.5	
	22.0	2.93	4.72	0.09	0.01	18.0 talc	
	0.0		0.0			20.5	
<u>88</u>	60.0	16.78	0.05	1.42	0.09	0.5	
	18.5	2.44	3.96	0.09	0.01	20.5 talc	FeS 0.5
	0.0		0.0			20.5	0.5

<u>89</u> no sample - estimate as for 88 above.

<u>89.9-93.4</u> marker 2a; dolomitic greenschist.

<u>94</u>	54.5	14.50	0.04	2.39	0.10	0.0	
	18.5	2.39	3.92	0.19	0.02	27.0 talc	
	0.0	0.0				27.0	
<u>95</u>	34.0	9.11	0.03	1.43	0.07	3.4	
	31.6	4.06	6.66	0.33	0.03	29.2 talc	
	1.3		0.52			32.6	
<u>96</u>	60.1	16.14	0.06	2.36	0.12	1.3	
	38.5	5.01	8.19	0.50	0.07	0.0	
	0.0		0.0			1.3	

<u>97.0-100.7</u> marker 2; dolomitic greenschist; no sample.

061

99 063

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total

102,103 no sample; extrapolate from 103 below.

103	0.0	0.0	0.0	0.0	0.0	30.1	
	69.9	9.03	15.12	0.62	0.06	0.0	
	0.0		0.0			30.1	

103-103.5 marker 2'; dolomitic greenschist; (a stringer of marker 2)

104,105 no assay; extrapolate from 106 below.

106	0.0	0.0	0.0	0.0	0.0	10.5	
	89.5	11.89	18.78	0.51	0.05	0.0	
	0.0		0.0			10.5	
107	17.7	4.87	0.03	0.52	0.03	19.2	
	63.8	8.35	13.40	0.59	0.07	0.0	
	0.0		0.0			19.2	
108	53.6	14.99	0.05	1.14	0.08	12.2	
	34.2	4.48	7.19	0.32	0.04	0.0	
	0.0		0.0			12.2	

(no dolomite values given; dolomite composition taken from 107 above)

109 no sample; extrapolate from 108 above.

109.7-111.9 marker 3a; dolomitic greenschist.

112	0.7	0.20	0.00	0.01	0.00	10.4	
	88.9	11.66	18.85	0.63	0.11	0.0	
	0.0		0.0			10.4	
113	8.0	2.18	0.01	0.25	0.02	4.5	
	76.5	10.04	16.12	0.68	0.10	5.0 talc	
	5.0		2.00			9.5	

114 no sample; extrapolate from 113 above.

114.7-115.2 minor greenschist, no sample.

116	31.2	8.41	0.04	1.19	0.06	2.1	
	66.6	8.44	13.87	1.09	0.09	0.0	
	0.0		0.0			2.1	

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
117	56.9	15.27	0.05	2.31	0.10	3.5	
	39.5	5.03	8.20	0.60	0.05	0.0	
	0.0		0.0			3.5	

(no sample; value taken from average of 116 and 118.)

118	82.6	22.13	0.06	3.42	0.13	4.9	
	12.3	1.61	2.52	0.10	0.01	0.0	
	0.0		0.0			4.9	

119,120 no sample; extrapolate from 118.

120.3-133.3 marker 3; dolomitic greenschist.

134,135 no sample; extrapolate from 138.

135.4-137.8 marker 3z; dolomitic greenschist.

138	79.9	21.04	0.07	3.68	0.17	2.4	
	17.6	2.25	3.72	0.23	0.02	0.0	
	0.0		0.0			2.4	

139 no sample; extrapolate from 138.

140,141 no sample; extrapolate from 142.

142	75.8	20.44	0.08	3.24	0.11	2.3	
	21.9	2.87	4.65	0.24	0.02	0.0	
	0.0		0.0			2.3	
143	13.1	3.56	0.02	0.44	0.02	2.1	
	84.8	11.01	17.86	0.94	0.13	0.0	
	0.0		0.0			2.1	
144	88.8	24.66	0.08	2.21	0.11	4.1	
	7.1	0.94	1.47	0.07	0.00	0.0	
	0.0		0.0			4.1	
145	73.5	20.62	0.06	1.58	0.08	1.2	
	24.9	3.35	5.22	0.14	0.01	0.0	
	0.0		0.0			1.2	
146	70.8	19.80	0.06	1.66	0.08	1.2	
	27.9	3.77	6.05	0.16	0.01	0.0	
	0.0		0.0			1.2	

147,148 no sample; extrapolate from 146.

063

99 065

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total
149,150,151 no sample; extrapolate from 152.							
152	91.0	25.10	0.06	2.29	0.08	1.0	
	7.0	0.94	1.49	0.05	0.00	0.0	FeS 0.5
	0.0		0.0			1.0	0.5
153	93.9	26.08	0.08	2.64	0.09	1.3	
	4.7	0.62	1.01	0.04	0.00	0.0	
	0.1		0.04			1.3	
154	91.0	24.33	0.05	2.71	0.10	0.0	
	9.0	1.19	1.94	0.07	0.00	0.0	
	0.0		0.0			0.0	
155	86.5	23.32	0.06	2.76	0.10	0.0	
	13.0	1.72	2.82	0.11	0.01	0.0	
	0.0		0.0			0.0	
(no sample;values taken from average of 154 and 156.)							
156	82.0	22.30	0.07	2.80	0.10	0.0	Feox 1.0
	17.0	2.24	3.70	0.15	0.01	0.0	
	0.0		0.0			0.0	1.0
157	0.0	0.0	0.0	0.0	0.0	10.5	
	87.2	11.43	18.77	0.67	0.05	0.0	
	2.2		0.88			10.5	
158	85.9	23.59	0.08	2.79	0.09	2.8	
	11.1	1.43	2.33	0.15	0.02	0.0	
	0.0		0.0			2.8	
159	75.9	20.47	0.06	3.06	0.12	3.4	
	20.3	2.62	4.25	0.23	0.02	0.0	
	0.0		0.0			3.4	
160 no sample; extrapolate from 159 above							
161 no sample; extrapolate from 162 below							
162	72.0	19.28	0.06	2.85	0.14	4.4	
	23.4	3.06	4.97	0.19	0.01	0.0	
	0.0		0.0			4.4	
163	69.2	18.96	0.06	2.00	0.15	11.7	
	19.1	2.50	4.16	0.15	0.02	0.0	
	0.0		0.0			11.7	

S(m)	Mag Dol Cal	Mg	Ca	Fe	Mn	Quartz talc/chlor/fels total	Fe oxides FeS total

164, 165, 166, 167, 168; cavity, no samples: represent by average of 162 and 163 samples.

168.8-178.1 marker 4; greenschist, no sample.

Hole ends in magnesite at 178.4

065

09 067

DRAFT

by
Col Graham.

Savage River Magnesite Development.

Report SR/SRM 1.
January 28,1988.

066

Executive Summary.

Review of the work carried out by the CSIRO and others indicates that the Savage River deposit contains reserves of approximately 40 million tonnes of raw magnesite from which a range of products, including magnesium metal and premium quality refractories, could be made by specialised processing.

Two facts combine to make this magnesite deposit of special interest : * the very low Boron content sought after by manufacturers of premium quality magnesite refractories and * the CSIRO Patent for production of exceedingly high purity magnesia from this ore, using pressurised carbon dioxide leaching.

While the deposit is known to be very large, a good deal more exploration of the orebody is required to upgrade the ranking of the reserves and provide the quality information needed to plan an operation based on selective mining and accurate process control.

The specific conditions required to produce chemically purified magnesia from this ore have been determined and are incorporated in a Patent Application but while this provides the confidence to proceed, a second phase of experimental work is needed now to satisfy the Patent Licencing requirements and to prove that * the process can be converted to a commercial operation at the desired scale * that the end product will perform as required and * that the whole operation is profitable.

To satisfy the requirements set out above * a comprehensive exploration and quality assessment program is needed * the design, construction and operation of a pilot production unit is necessary and when the end product becomes available for evaluation * marketing and economic studies will be required to evaluate the technical and economic feasibility of full scale production.

067

Introduction.

With the completion of chemical processing studies by the CSIRO on the Savage River magnesite and the granting of a Licence Agreement to IMI over the resulting Patent, investigations must move now to a pilot production plant, in order to provide the engineering data needed for assessment and development of a full scale plant.

This review attempts to set the studies already completed within the wider framework of investigations needed for the development of an integrated production system, extending from mining to sales. The system will be reviewed in reverse order, commencing with end products, to develop and explain the logical constraints which should be imposed on each preceding section of the processing operations.

Marketing.

General.

Magnesite is essential to modern industry, with approximately 90% or 7.4 million tonnes used for production of high temperature refractories and the balance divided between chemical and metal production . Review of the recent history of the magnesite industry shows that it is one of oversupply, principally due to the worldwide downturn in the consumption of basic refractories. This downturn was the result of two main factors * reduced steel production and * a marked reduction in the consumption of basic refractories per tonne of steel, brought about by a significant improvement of the quality of the magnesia used.

Consequently, it is obvious that there is little chance of breaking into the market with an "ordinary" magnesite product in the forseeable future. For the exploitation of the Savage River magnesite deposit to be considered at this time, it would be essential to be able to manufacture a premium refractory product and there is every indication from the CSIRO work that this may be possible with careful processing.

If the Savage River magnesite is used for manufacture of refractories, a secondary market may exist for the production of magnesium metal. This would require allocation of the best of the raw ore for this purpose and may be viable only with a large scale operation in which selective mining was used to produce a range of grades for other processes.

Basic Refractories.

From enquiries made by the CSIRO and from other sources, it is evident that magnesia of the following specification commands a premium and should enjoy an assured and expanding market if competitively priced.

Mg O...........99.0 % minimum.

B2 O3...........0.005 % maximum.

Fe2 O3..........0.05 % maximum.

Ca O / Si O2.......4 : 1 minimum

Relative Density......3.55 minimum

However, the above specification is not the full requirement, as it cannot guarantee success of the final ware with prolonged service at high temperature. Factors, such as size and packing density of the periclase crystals and the characteristics of the minute quantity of impurities used as a final bond for these crystals, determine attributes such as slag resistance and mechanical strength of the commodity. Assessment of these factors and attributes requires sophisticated physical testing of magnesia and the ware produced from it.

Production of crystals of periclase from 0.05 to 0.5 mm in size from magnesia effects a simultaneous increase in relative density to 3.40 or greater, depending on the temperature to which the magnesia is taken and quantity and disposition of the contaminants present. As well as chemical purity, the final quality may be influenced equally by the heating method used, of which the two main ones are : * "deadburn" calcining in a rotary kiln at 1650 to 2000 degrees Celcius or * fusion in an electric furnace at approximately 2850 degrees celcius. The latter method produces crystals 10 to 15 larger than the former with a significantly higher relative density (3.50 - 3.58 vs 3.35 - 3.45). Although obviously more expensive to produce, fused magnesia imparts superior attributes to refractories and commands prices from $1,300 to $2,050 per tonne.

From the above it can be seen that, before contemplating erection of a major facility, it is essential to prove the full production path and to provide pilot quantities of the actual product for customer evaluation. This product should be representative of the quality which can be sustained over the life of the enterprise.

Constraints on Processing.

Whilst the Savage River magnesite readily meets the Boron specification and the CSIRO process can produce the required chemical purity,it is difficult to meet the relative density specification from precipitated magnesia even with two stages of calcining in a rotary kiln. The main reasons for this probably stem from the difficulty of producing a sufficiently dense briquette for calcining and insufficient temperature and time for crystal growth.

For a chemically refined magnesia particularly, fusion appears to be the only assured means of achieving a premium specification in these aspects. Whilst the fusion process may be more difficult and expensive than " deadburning "in a rotary kiln, it may * provide an opportunity to optimise the composition of the matrix, * reduce earlier processing costs by allowing a greater tolerance for iron, * eliminate the need for expensive high density briquetting and * provide independence of fluctuations in the price of fuel oil or gas.

An investigation into the equipment used for the production of fused magnesia and the associated technical challenges and costs should be undertaken first, as it has a significant bearing on many production steps and may have a bearing on the location of the plant.

Post Precipitation Processing.

It has been demonstrated by the CSIRO work that carbon dioxide leaching and subsequent precipitation of hydro-magnesite can eliminate most of the impurities in the raw ore and enable production of a magnesia containing 99.0% Mg O or better.

The precipitated hydro-magnesite ((Mg5 (CO3)4 (OH)2.4H2O)) is separated from the circuit liquor by vacuum filtration. The resultant filter cake has to be dried and consolidated to impart sufficient mechanical strength for subsequent processing. Unfortunately, the purity and particle shape are not likely to provide natural bonding properties and briquetting and other measures may be necessary to achieve the required degree of strength. Good abrasion and shatter resistance is essential to reduce comminution and dusting but the mass must have sufficient porosity to allow the rapid removal of free and combined water to prevent decrepitation during heating.

Subsequent processing includes low temperature calcination, either in a rotary or shaft kiln, at a temperature between 600 and 900 degrees Celcius. It is required for two purposes * to decompose the magnesium carbonate to form caustic magnesia and retrieve carbon dioxide for the leaching process and * to impart a sintered structure for improved density and handling strength. This calcination should be carried out with a "clean" fuel, such as gas or fuel oil so as to avoid contamination of the product with solid combustion residues, or it could be carried out in an indirectly heated rotary kiln with a poorer fuel.

While there is a possibility that the fusion process may not require feedstock of the same strength as for final calcining in a rotary kiln, production of an intermediate caustic calcined magnesia is desireable for at least two other reasons * to recover carbon dioxide for the leach process and * to make high purity caustic magnesia available for sale to various industries in that form.

Two main areas need to be resolved before proceeding with the design of the Post Precipitation Processing stage * the agglomeration process required to produce briquettes for calcination and * the method of calcination and retrieval of carbon dioxide.

Leach Precipitation Process.

Under controlled conditions, leaching of magnesite ore with pressurised carbon dioxide has been shown to result in the production of a very high purity magnesia. While the purity is more than adequate for most purposes, magnesia destined for use in super basic refractories should contain less than 0.01 % of Boric Oxide and preferably less than 0.3 % of iron oxide and alumina combined. The Savage River magnesite has shown inherent levels of Boron which are several orders lower than necessary but the iron oxides have been found to be intimately associated with the magnesite and have proved difficult to eliminate to comfortable levels. The actual iron specification which has to be attained with the Savage River magnesite has not been determined, because it depends ultimately on the high temperature characteristics of all of the contaminants combined, not only the principal fluxes such as Boric Oxide and Iron Oxide but also Amina, Lime, Silica and others which may promote a low melting point in trace amounts.

It is essential to be able to carry out sophisticated refractoriness tests on the end product to determine what levels of iron oxide may be tolerable in Savage River material manufactured in a specific way, because predictions cannot be made from the chemical constitution at this stage.

With the iron specification determined, the conditions under which chemical processing must take place to achieve it have been well defined in the CSIRO work. It has been demonstrated in the laboratory that iron can be brought to a level of 0.1 % (1) without resort to a separate iron precipitation using Aluminium Sulphate, but very strict control of the whole process will be necessary to achieve the desired iron level consistently and economically.

In order to minimise capital and operating costs in the leaching plant, the feed should be a controlled blend of raw ore, precalcined at a temperature specific to the feed, slaked in the minimum time at a controlled temperature and wet milled to less than 0.15 mm. Leaching should take place using a maximum pulp density in conjunction with a minimum temperature, Carbon Dioxide pressure, agitation and retention time appropriate to the effective dissolution of magnesia. By these methods, iron dissolution will be minimised while magnesia dissolution will be maximised.

Reference (1) - CSIRO Report MCC 518, pp 22.

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Process development leaching was carried out batchwise in autoclaves by the CSIRO and it would seem appropriate to use adequately instrumented, scaled up versions of these units in the pilot plant to provide flexibility for continuing experimental work. However, if the pilot plant is to provide engineering data for design of a large scale plant, some skill will be needed to interface batch leaching and precipitation with the preceding processes of rotary calcination, cooling, slaking and wet grinding and the following ones such as vacuum filtration, briquetting and rotary calcination.

An opportunity may be presented, during the wet milling operation prior to leaching, to reject a portion of the lower grade feedstock by use of size classification in closed circuit with crushing and milling. Because dolomite decomposes at a higher temperature than magnesite, dolomitic fragments in the feed may remain at a larger size than the magnesite on crushing after calcining and moreso after the slaking process. Silicious material, also, may remain more competent than magnesite and offer similar opportunity for rejection with the dolomitic materil. Improvement in the magnesite / dolomite ratio in the feedstock for leaching would not only provide more economical processing but it would help to minimise iron dissolution. While this would be highly desireable, a fast means would have to be found to determine the residual magnesite / dolomite ratio of the feed routinely prior to leaching, in order to optimise the leach conditions.

Selection of the appropriate equipment to achieve ongoing and regular output of semi-commercial quantities of product having a tight specification will be a signifiant chemical engineering challenge, the success of which is central to the success of this project.

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Precalcination, Slaking and Grinding.

Great care is essential in the preparation of the raw magnesite for leaching to maximise the magnesite dissolution while at the same time minimising the iron dissolution. The main technical concern is to precalcine the raw feed evenly, at a temperature specifically chosen to suit the magnesite / dolomite ratio in the feed at any particular time.

The classic way of achieving a known feed quality on a continuous basis is * to have a well documented orebody, * to carry out selective mining on a program designed to utilise as much of the resource as possible, * to blend the various qualities of raw material under accurate control and * to have an effective system for routine sampling and analysis.

Having a feed material with minimum variability and of a predetermined quality is routinely achieved in other industries by the use of properly designed blending systems and this requirement should present no major engineering problems. The key to process control with this system is to keep a running inventory of quantity and quality of material in the stockpiles, so that control can be exercised over selective mining, where the aggregate quality is really determined. Fast and accurate routine sampling and analysis of ore before mining and on stockpiling is essential for this purpose.

With known feed quality, the appropriate precalcination temperature can be determined from the results of the CSIRO studies. However, translating that information into effective calcination of the raw magnesite in a continuous process environment presents a formidable challenge, which the CSIRO workers were not able to overcome in the time available. The basic problem is to effectively heat all of the material to a designated minimum temperature within the allocated time, without overheating a significant portion.

For effective heat transfer, the feed should be as small as possible but that brings problems of dusting and variable residence time for the numerous sizes in the feed. It also reduces the opportunity for rejection of dolomitic and silicious fragmentson size after calcination. If the latter is proved not to be a viable proposition, equipment is available for gas suspension calcination of magnesite ground to minus 2 mm. Proponents of this method claim that the temperature control of the calcine is improved and the speed of reaction is much greater. Other benefits claimed are greater operational flexibility and reduced capital and operating costs (particularly fuel costs).

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The conventional units used for caustic calcination of magnesite are shaft and rotary kilns and they require a feed size of approximately minus 50 mm. plus 15 mm. for comfortable materials handling operation and dust reduction. The shaft kiln, in particular, requires a feed size range devoid of the fines which tend to pack into interstitial voids, blocking off the hot gas stream from certain areas and causing localised under-calcining. While both of these kilns can be operated with the hottest gasses counterflow to the product, for a more gradual and thorough heat transfer, it might be expected that the degree of calcination would change from the outer surface to the core of such large particles and for particles of different size. This matter may be of little consequence for ordinary caustic-calcining but it is of considerable importance to the carbon dioxide leach process.

The size of raw magnesite calcined in the CSIRO experiments was arbitarily chosen to suit the feed handling system of the rotary calciner and was minus 6mm. plus 2.5 mm. but despite the fineness and narrow size band, severe difficulties were encountered in controlling the calcine quality and experimental rotary calcination was abandoned.

Precalcination for the carbon dioxide leach process may require a combination of calcining processes to achieve the desired results, if the gas suspension method is not appropriate for the total quantity for other reasons. For instance, it may be possible that there is a natural correlation between the magnesite / dolomite ratio and the size fractions in crushed raw ore which requires a different calcination temperature for efficient leaching.

Even if this is not so, it may be appropriate to calcine the fine particles separately because of the different rate of heat transfer and different materials handling properties. In this case, gas suspension calcination may be considered for the fines and another process such as a rotary kiln or fluidised bed system for the coarse particles. Thus, wastage of the natural fines would be avoided, providing that due regard was pai in the mining operation to elinination of overburden and obvious gangue, and post calcining grinding costs would be reduced. If it transpired that there was a difference in quality in the sizes, part of the lower grade product might be diverted to other uses.

The fuel used for precalcintion is an important consideration in the economics of the process and though pulverised coal is a common fuel for this purpose, investigation will be needed to ensure that iron bearing ash residues do not add to the problems of minimising iron entrainment, which is critical to the success of the

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project. If the precalcination is carried out on the same site as the final calcination or melting, it may be possible to utilise waste heat for precalcination. It will probably be necessary to collect and purify the carbon dioxide liberated during the decomposition of the raw magnesite and these operations would be assisted by the use of a cleaner heating gas.

After calcination, it is recommended that the material be cooled, and crushed if necessary, before slaking because the temperature at which this process takes place and the length of time taken has a pronounced effect on iron pickup. Exploitation of any size / quality relationship, therefore, should take place by screening out a selected oversize prior to crushing. The size to which the calcine is crushed prior to slaking has yet to be determined and will be influenced by the necessity to achieve hydration of the magnesia thoroughly in the shortest possible time at the lowest temperature. Eventually, it should be ground smaller than 0.15 mm. for effective leaching and this may require a wet milling step in closed circuit with size classification apparatus such as hydrocyclones. An opportunity may be presented at this stage, also, to reject the larger particles if they are shown to be of inferior quality. Care will be needed during milling and sizing to limit the dissolution of iron from the hydrated magnesia or from the equipment.

077

Exploration, Mining, Stockpiling and Blending.

It has been shown that to produce the low iron magnesia critical to the success of this project at the present time, the grade of magnesite presented for precalcining must not fall below a certain level at any time. Though variability can be tolerated to a certain extent, it is essential to have it under control and to know the quality accurarely so that the process can be adjusted to accommodate the change. These matters can be addressed successfully using the common industrial practices of stockpile blending coupled with appropriate laboratory facilities.

The real essence of raw feed control will originate in selective mining prior to stockpiling and an inventory system which will engineer feed stockpiles of predetermined quality. To do this, it will be necessary to have an idea of the aggregate quality of the mineable reserves and to have a mining plan, based on appropriate borehole information, capable of utilising the maximum amount of raw magnesite.

Currently, there is a limited number of boreholes and as yet no accurate estimate of what a sustainable average quality may be, though there is an amount of evidence from prospecting that the deposit is of considerable size.

A review of the exploration data is being carried out by others and , no doubt, will recommend that a substantial drilling and analysis program should be undertaken to determine the quantity of the various ore grades available and to provide information on which preliminary mining plans can be constructed.

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Conclusions.

The success of this project in the current circumstances, hinges on a number of factors, some technical but all of them impinge on the economic viability.

The technical keypoints relate to the ability of the process to produce magnesia with the level of iron low enough to allow achievement of refractory properties equal to the best available and to present the final product in a form capable of commanding the top price.

The economic keypoint concerns the efficient use of energy and the selection of processes and energy sources which will remain competitive over the lifespan of th enterprise.

RETRIEVED

99-282A

CONTINUING TENURE APPLICATION AREA
EXPLORATION LICENCE 4/61
SAVAGE RIVER, TASMANIA

1. STATUS OF THE MAGNESITE PROJECT: MAIN CREEK AND BOWRY CREEK DEPOSITS

VOLUME 2

BY

C.H.C.SHANNON

8-2-1988

SAVAGE RESOURCES LIMITED

Incorporated in Tasmania

BOWRY FORMATION FROM SPECIMEN REEF TO ROCKY RIVER

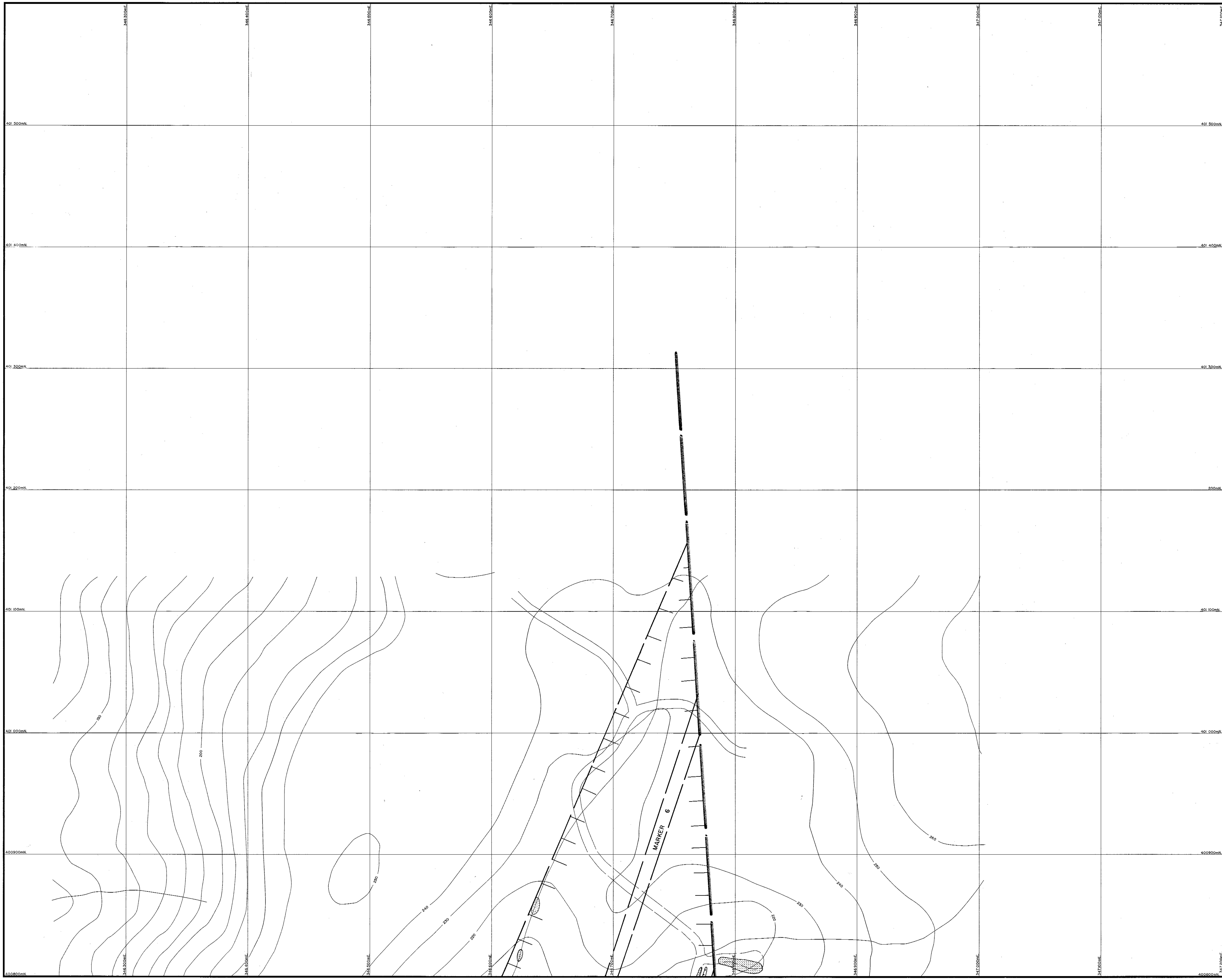
SCALE 1: 25,000

Drawn by H. Shannon Feb. 1988

88-2775 Vol. 1

FIG. 1

6461



LEGEND

CARBONATES

SILICA ROCK

TALC

POROUS OCHRE, AFTER CARBONATE

RESIDUAL SAND, AFTER CARBONATE

SAND OR POROUS OCHRE / LIMONITE PISOLITES

GREENSCHIST BRECCIA USUALLY OVER CARBONATE

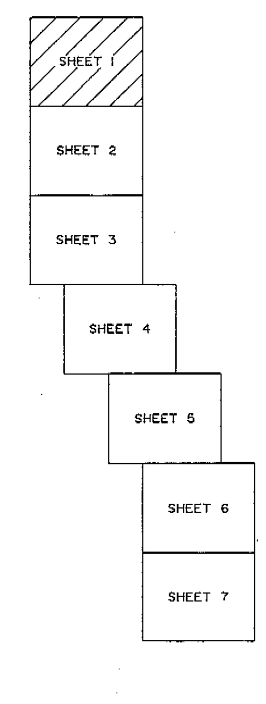
GREENSCHIST UNDIFFERENTIATED

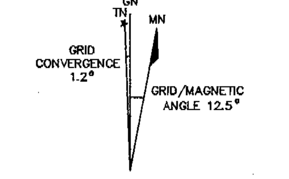
GREENSCHIST WITH DISSEMINATED MAGNETITE

MAGNETITE ROCK

GREY SANDSTONE

SHEET LOCATION





5 cm

99 082

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SAVAGE RIVER E.L. 4 / 61
MAIN CREEK MAGNESITE
SHEET 1 88-2775 Vol 1

DRILLING, GEOLOGY
OUTCROP & INTERPRETATION

DRAWN BY : H.S.
DRAFTSMAN: T.G.D.S.
DATE : Feb. '88
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SCALE 1:1000 METRES

FIG. 2-1

6461

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6462

99 083

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MAIN CREEK MAGNESITE
SHEET 2

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SCALE 1:1000 — 20 10 0 10 20 30 40 METRES

FIG. 2-2

6462

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6463
MAIN CREEK
MAGNESITE LENS
M MARKER 6
MARKER 3
A
C
D
MC 28 D.D.H.
MC 1 D.D.H.
KARST BRECCIA PIPE
LEGEND
CARBONATES
SILICA ROCK
TALC
POROUS OCHRE, AFTER CARBONATE
RESIDUAL SAND, AFTER CARBONATE
SAND OR POROUS OCHRE / LIMONITE PISOLITES
GREENSCHIST BRECCIA USUALLY OVER CARBONATE
GREENSCHIST UNDIFFERENTIATED
GREENSCHIST WITH DISSEMINATED MAGNETITE
MAGNETITE ROCK
GREY SANDSTONE
SHEET LOCATION
SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5
SHEET 6
SHEET 7
GRID/MAGNETIC ANGLE 12.5°
6463
5 cm
99 084
SAVAGE RESOURCES LIMITED
SAVAGE RIVER E.L. 4 / 61
MAIN CREEK MAGNESITE
SHEET 3
88-2775
Vol 2
DRILLING, GEOLOGY
OUTCROP & INTERPRETATION
DRAWN BY : H.S.
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METRES
FIG. 2-3
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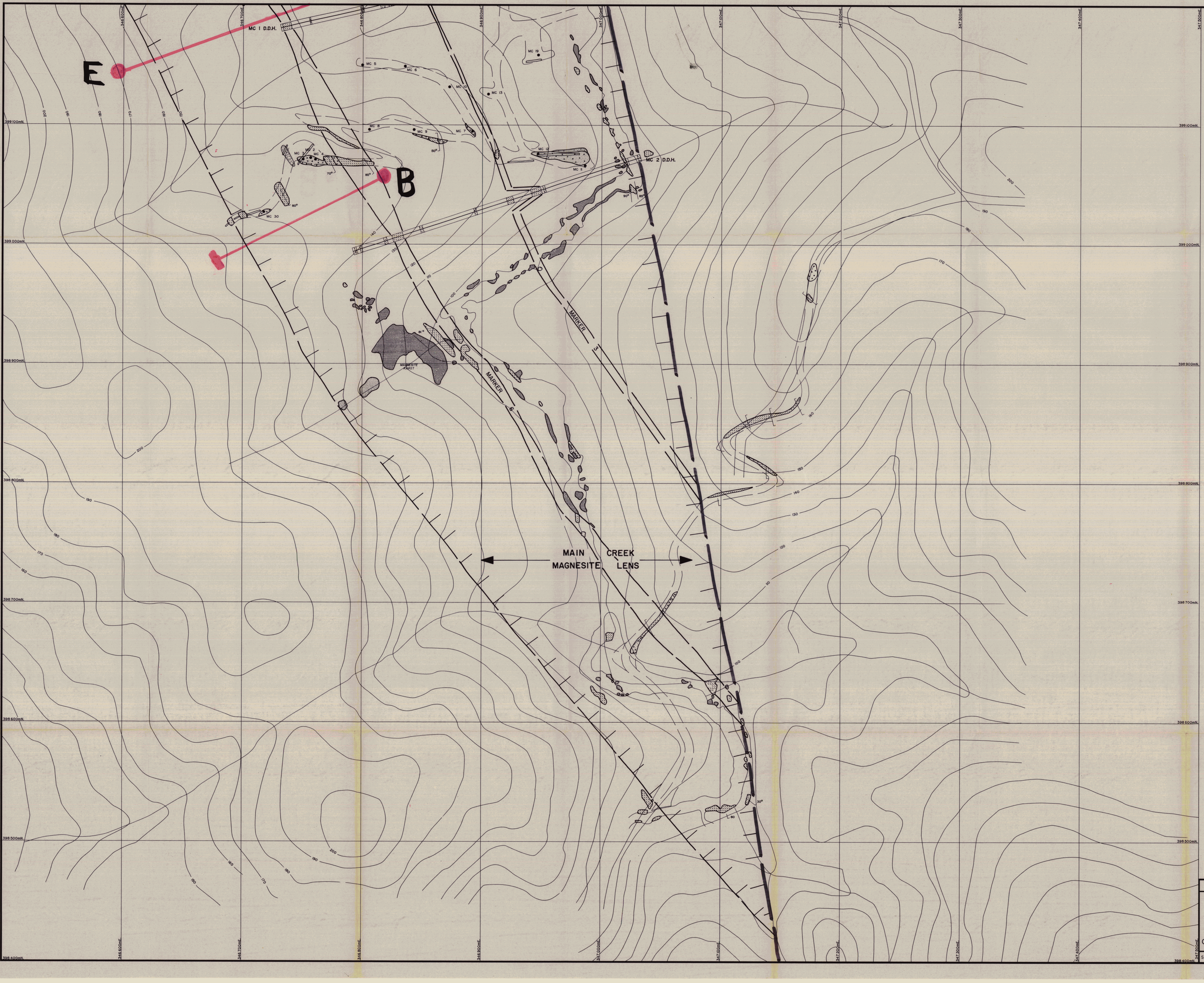

LEGEND

- CARBONATES
- SILICA ROCK
- TALC
- POROUS OCHRE, AFTER CARBONATE
- RESIDUAL SAND, AFTER CARBONATE
- SAND OR POROUS OCHRE / LIMONITE PISOLITES
- GREENSCHIST BRECCIA USUALLY OVER CARBONATE
- GREENSCHIST UNDIFFERENTIATED
- GREENSCHIST WITH DISSEMINATED MAGNETITE
- MAGNETITE ROCK
- GREY SANDSTONE

SHEET LOCATION

SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5
SHEET 6
SHEET 7

GRID CONVERGENCE 1.2°
GRID/MAGNETIC ANGLE 12.5°

6464

5 cm

99 085

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MAIN CREEK MAGNESITE
SHEET 4 88-2775 Vol 2

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SCALE 1 : 1000 — 20 10 0 10 20 30 40 METRES

FIG. 2-4

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6465

6465

99 086

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FIG. 2-5

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FIG. 2-6

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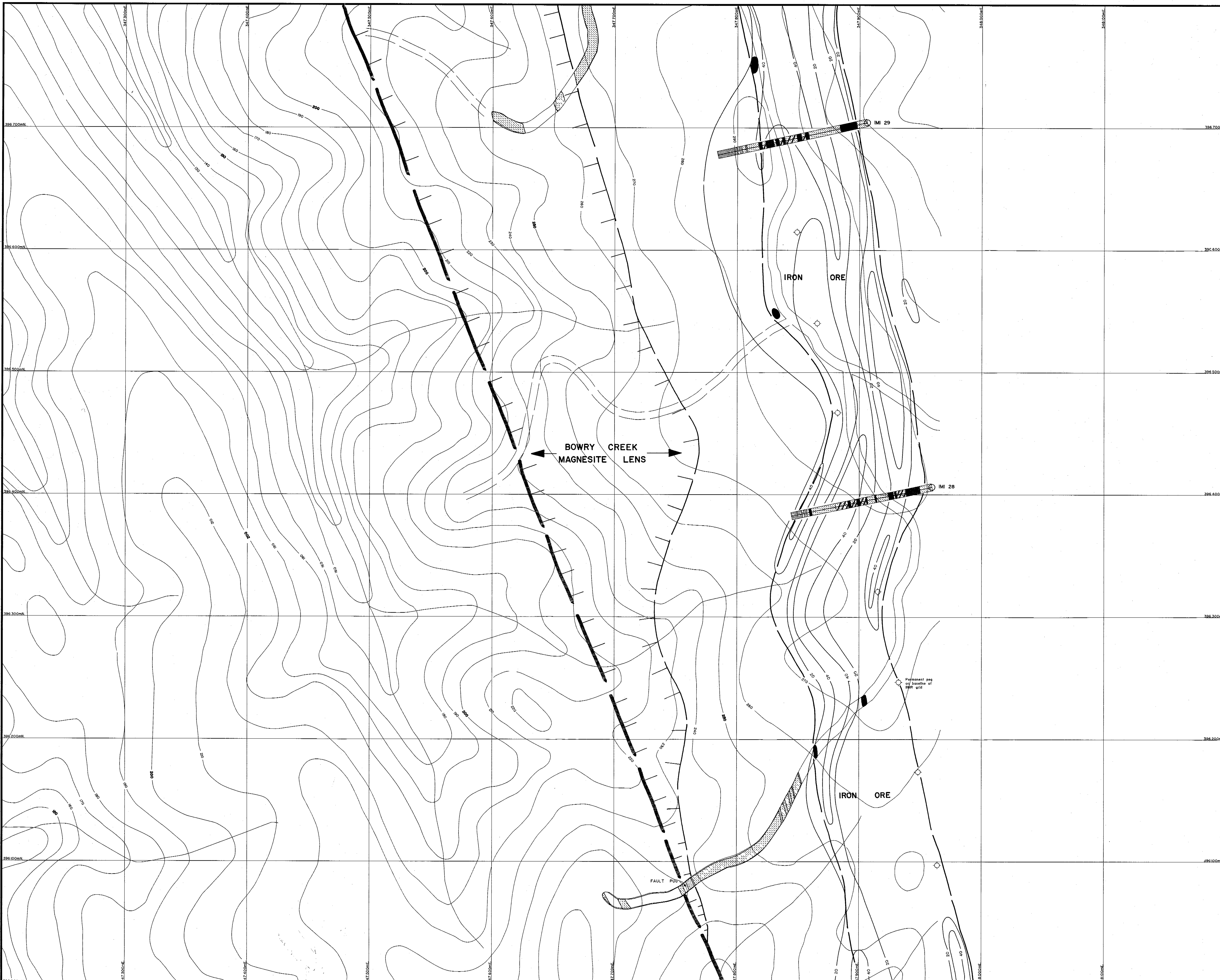
6467



L E G E N D

- CARBONATES
- SILICA ROCK
- TALC
- POROUS OCHRE AFTER CARBONATE
- RESIDUAL SAND, AFTER CARBONATE
- SAND OR POROUS OCHRE / LIMONITE PISOLITES
- GREENSCHIST BRECCIA USUALLY OVER CARBONATE
- GREENSCHIST UNDIFFERENTIATED
- GREENSCHIST WITH DISSEMINATED MAGNETITE
- MAGNETITE ROCK
- GREY SANDSTONE

20 20,000 nT CONTOUR

SHEET LOCATION

SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5
SHEET 6
SHEET 7

GRID CONVERGENCE 1.3°
GRID/MAGNETIC ANGLE 12.5°

6467

5 cm

99 088

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MAIN CREEK MAGNESITE
SHEET 7 88-2775 Vol 2

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FIG. 2-7

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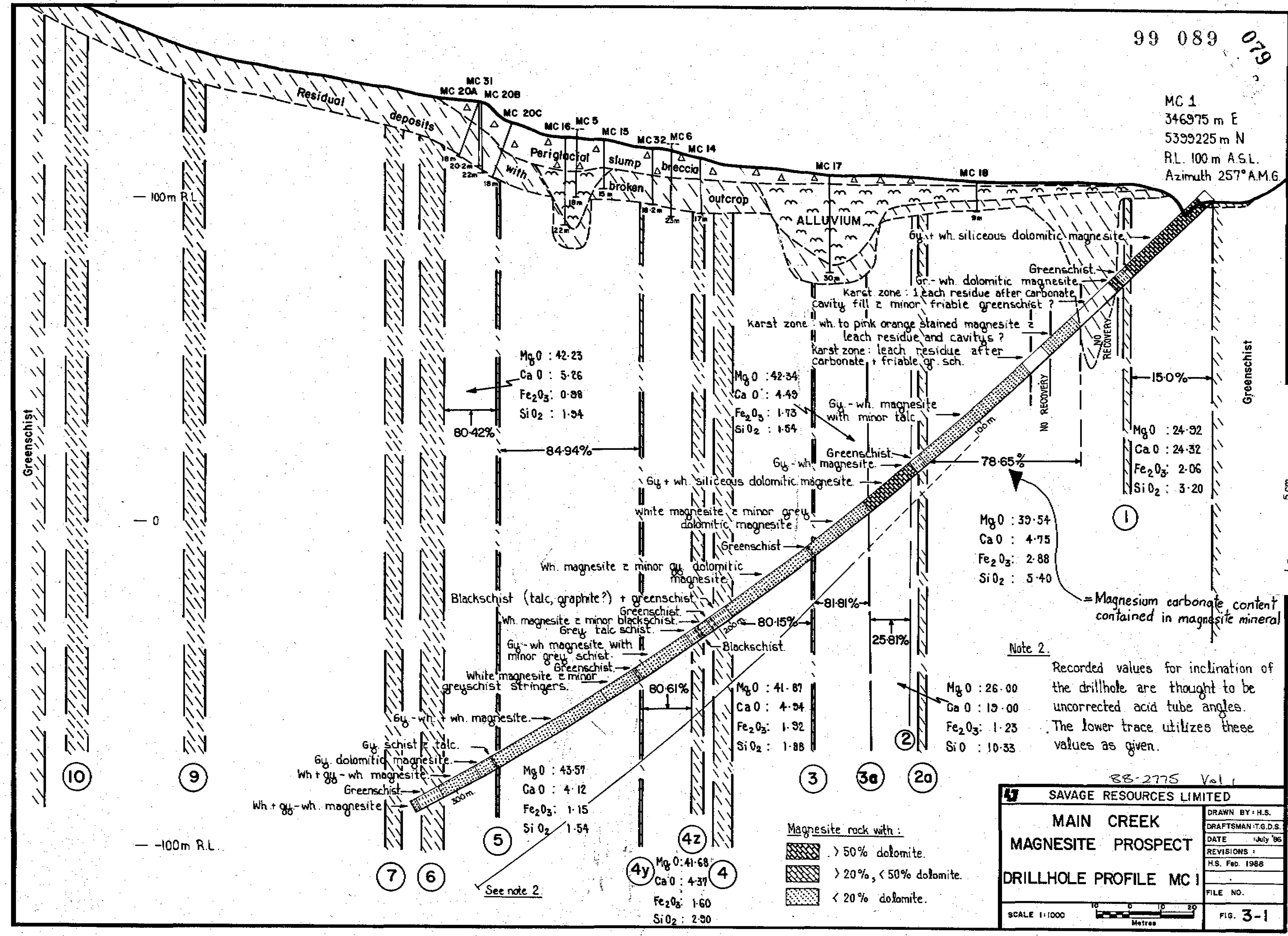
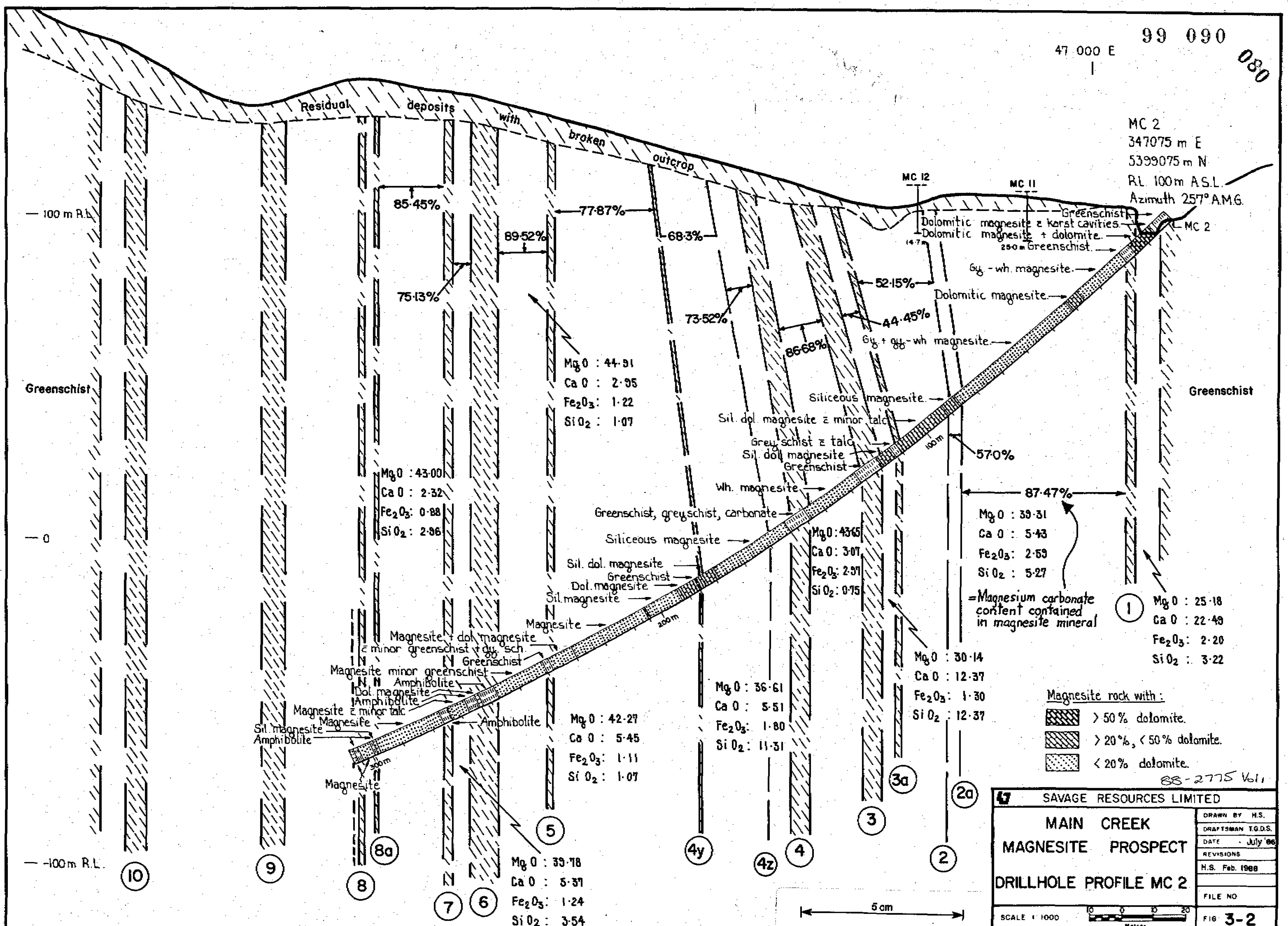
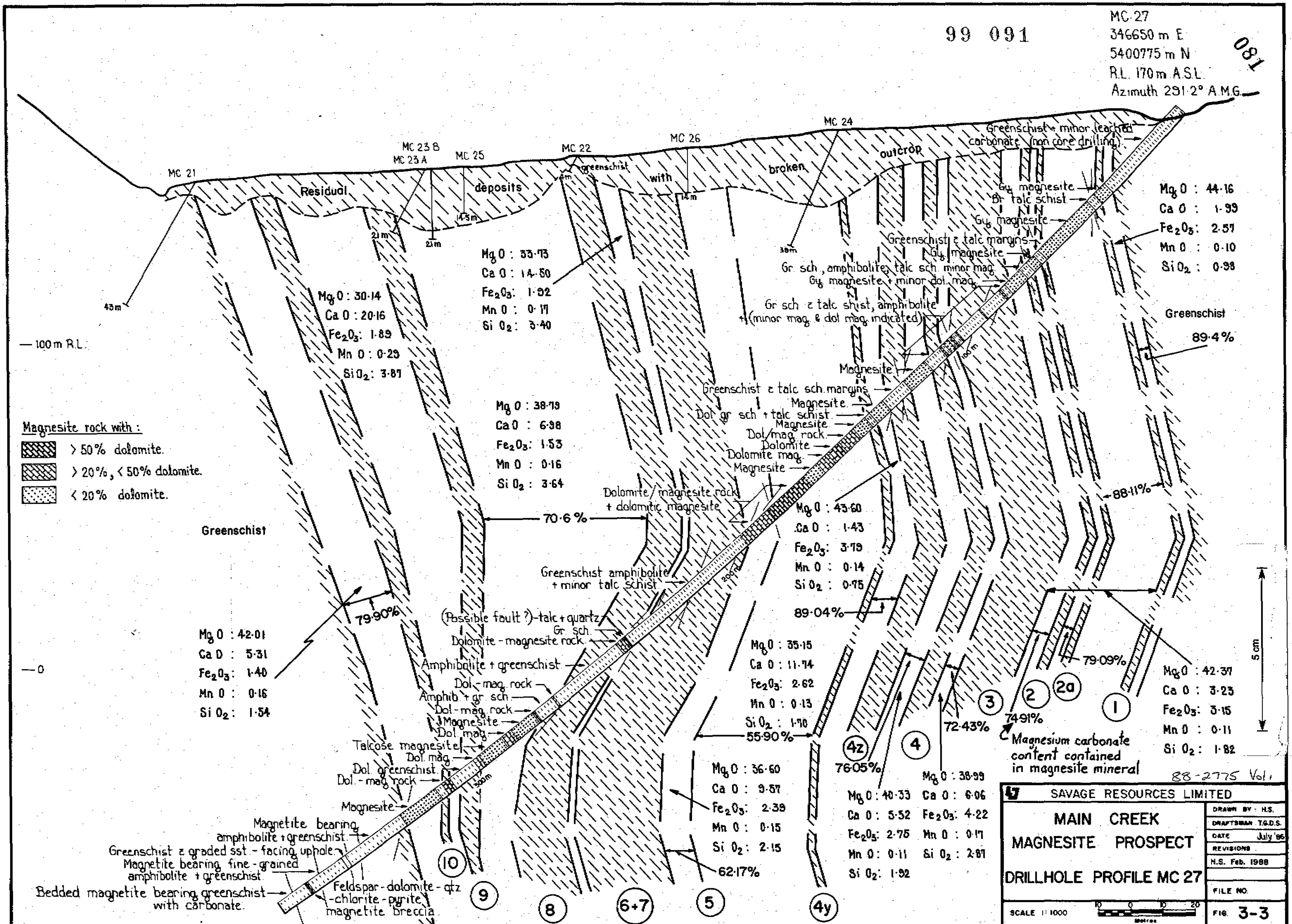
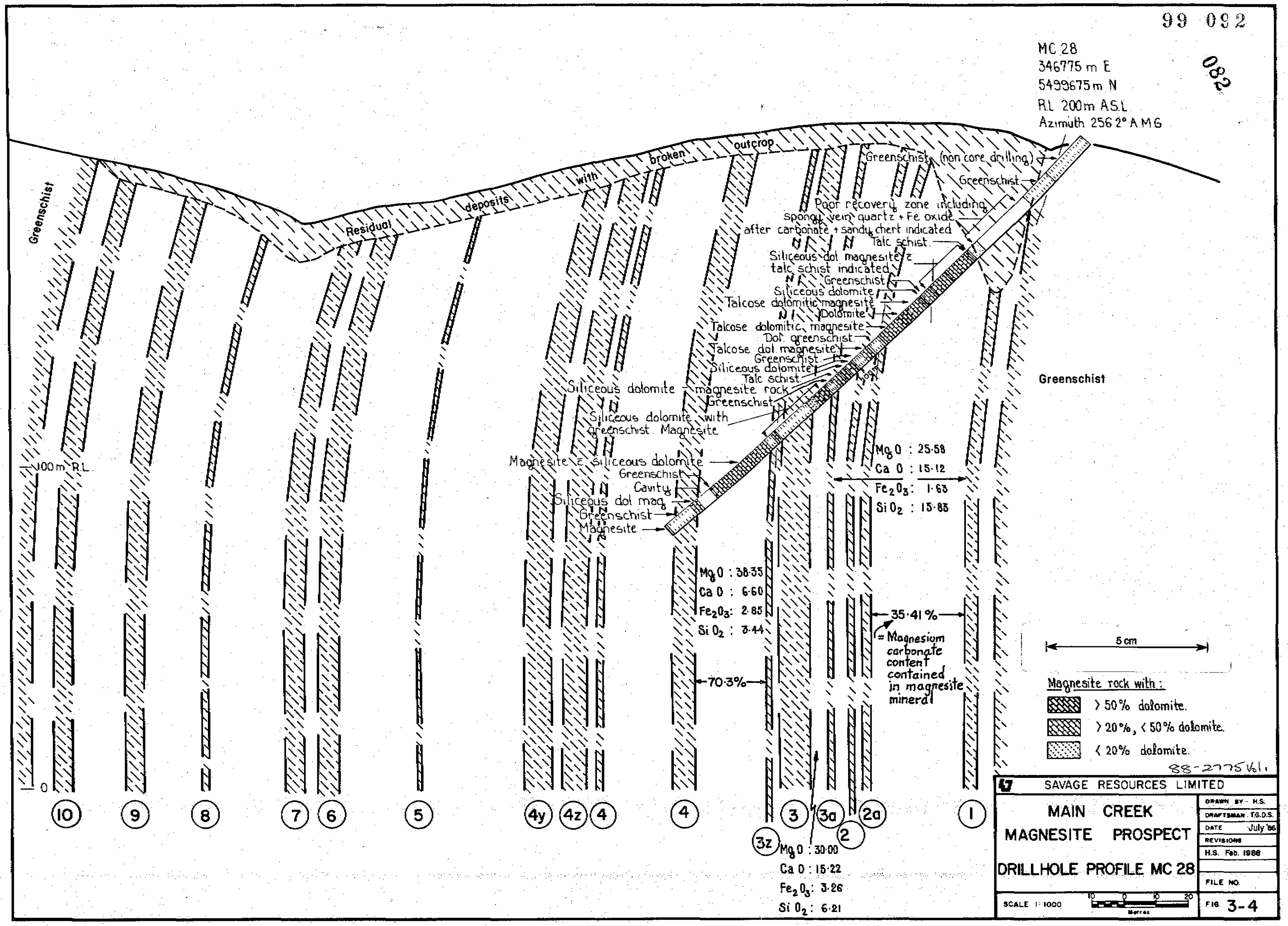


99 089 079
MC 1
346975 m E
5399225 m N
R.L. 100 m A.S.L.
Azimuth 257° A.M.G.
Residual deposits
Periglacial slump breccia with broken outcrop
ALLUVIUM
MC 31
MC 20A
MC 20B
MC 20C
MC 16
MC 5
MC 15
MC 32
MC 6
MC 14
MC 17
MC 18
100m R.L.
0
-100m R.L.
Greenschist
Gy. + wh. siliceous dolomitic magnesite
Greenschist
Gr.- wh. dolomitic magnesite
Karst zone : leach residue after carbonate cavity fill ē minor friable greenschist ?
Karst zone : wh. to pink orange stained magnesite ē leach residue and cavitys ?
Karst zone : leach residue after carbonate, + friable gr. sch.
NO RECOVERY
NO RECOVERY
Gy. - wh. magnesite with minor talc
Greenschist
Gy. - wh. magnesite
Gy + wh. siliceous dolomitic magnesite
white magnesite ē minor grey dolomitic magnesite
Greenschist
Wh. magnesite ē minor gy. dolomitic magnesite
Blackschist (talc, graphite?) + greenschist
Greenschist
Wh. magnesite ē minor blackschist
Grey talc schist
Blackschist
Gy.- wh magnesite with minor grey schist
Greenschist
White magnesite ē minor greyschist stringers
Gy.- wh. + wh. magnesite
Gy. schist ē talc
Gy. dolomitic magnesite
Wh + gy - wh magnesite
Greenschist
Wh + gy - wh. magnesite
100m
200m
300m
80.42%
84.94%
78.65%
15.0%
81.81%
80.15%
25.81%
80.61%
MgO : 42.23
CaO : 5.26
Fe2O3 : 0.88
SiO2 : 1.54
MgO : 42.34
CaO : 4.49
Fe2O3 : 1.73
SiO2 : 1.54
MgO : 24.32
CaO : 24.32
Fe2O3 : 2.06
SiO2 : 3.20
MgO : 39.54
CaO : 4.75
Fe2O3 : 2.88
SiO2 : 5.40
= Magnesium carbonate content contained in magnesite mineral
MgO : 41.87
CaO : 4.94
Fe2O3 : 1.92
SiO2 : 1.88
MgO : 26.00
CaO : 19.00
Fe2O3 : 1.23
SiO : 10.33
MgO : 43.57
CaO : 4.12
Fe2O3 : 1.15
SiO2 : 1.54
MgO : 41.68
CaO : 4.37
Fe2O3 : 1.60
SiO2 : 2.90
Note 2.
Recorded values for inclination of the drillhole are thought to be uncorrected acid tube angles. The lower trace utilizes these values as given.
See note 2.
10
9
7
6
5
4y
4z
4
3
3a
2
2a
1
5 cm
Magnesite rock with :
> 50% dolomite.
> 20%, < 50% dolomite.
< 20% dolomite.
88-2775 Vol 1
SAVAGE RESOURCES LIMITED
MAIN CREEK MAGNESITE PROSPECT
DRILLHOLE PROFILE MC 1
DRAWN BY: H.S.
DRAFTSMAN: T.G.D.S.
DATE July '86
REVISIONS :
H.S. Feb. 1988
FILE NO.
SCALE 1:1000
Metres
FIG. 3-1



99 090
080
47 000 E
MC 2
347075 m E
5399075 m N
RL 100m A.S.L.
Azimuth 257° A.M.G.
Residual deposits with broken outcrop
MC 12
MC 11
100 m R.L.
0
-100m R.L.
Greenschist
Greenschist
85·45%
89·52%
77·87%
68·3%
75·13%
73·52%
86·68%
52·15%
44·45%
57·0%
87·47%
Mg O : 44·91
Ca O : 2·95
Fe2O3: 1·22
Si O2 : 1·07
Mg O : 43·00
Ca O : 2·32
Fe2O3: 0·88
Si O2 : 2·86
Mg O : 43·65
Ca O : 3·07
Fe2O3: 2·97
Si O2 : 0·75
Mg O : 39·31
Ca O : 5·43
Fe2O3: 2·59
Si O2 : 5·27
Mg O : 25·18
Ca O : 22·49
Fe2O3: 2·20
Si O2 : 3·22
Mg O : 30·14
Ca O : 12·37
Fe2O3: 1·30
Si O2 : 12·37
Mg O : 36·61
Ca O : 5·51
Fe2O3: 1·80
Si O2 : 11·31
Mg O : 42·27
Ca O : 5·45
Fe2O3: 1·11
Si O2 : 1·07
Mg O : 39·78
Ca O : 5·37
Fe2O3: 1·24
Si O2 : 3·54
Greenschist
Dolomitic magnesite ≥ karst cavities
Dolomitic magnesite + dolomite
14·7m
25·0m Greenschist
Gy - wh. magnesite
Dolomitic magnesite
Gy + gy - wh magnesite
Siliceous magnesite
Sil. dol. magnesite ≥ minor talc
Grey schist ≥ talc
Sil. dol. magnesite
Greenschist
Wh. magnesite
Greenschist, greyschist, carbonate
Siliceous magnesite
Sil. dol. magnesite
Greenschist
Dol. magnesite
Sil. magnesite
Magnesite
Magnesite + dol. magnesite
≥ minor greenschist + gy. sch.
Greenschist
Magnesite minor greenschist
Amphibolite
Dol. magnesite
Amphibolite
Magnesite ≥ minor talc
Magnesite
Sil. magnesite
Amphibolite
Amphibolite
Magnesite
100m
200m
300m
=Magnesium carbonate content contained in magnesite mineral
Magnesite rock with :
> 50 % dolomite.
> 20 %, < 50 % dolomite.
< 20 % dolomite.
1
2
2a
3
3a
4
4y
4z
5
6
7
8
8a
9
10
88-2775 Vol1
5 cm
SAVAGE RESOURCES LIMITED
MAIN CREEK
MAGNESITE PROSPECT
DRILLHOLE PROFILE MC 2
DRAWN BY H.S.
DRAFTSMAN T.G.D.S.
DATE July '86
REVISIONS
H.S. Feb. 1988
FILE NO
SCALE 1 : 1000
Metres
FIG 3-2


99 091
MC 27
346650 m E
5400775 m N
R.L. 170 m A.S.L.
Azimuth 291·2° A.M.G.
081
MC 21
MC 23 B
MC 23 A
MC 25
MC 22
MC 26
MC 24
Residual
deposits
with
broken
outcrop
greenschist
Greenschist + minor leached carbonate (non core drilling)
Gy magnesite
Br talc schist
Gy magnesite
Greenschist ē talc margins
Gy magnesite
Gr. sch., amphibolite, talc sch. minor mag.
Gy magnesite + minor dol. mag.
Gr sch ē talc shist, amphibolite + (minor mag. & dol mag. indicated)
Magnesite
Greenschist ē talc sch. margins
Magnesite
Dol. gr. sch. + talc schist
Magnesite
Dol/mag rock
Dolomite
Dolomite mag.
Magnesite
Dolomite / magnesite rock + dolomitic magnesite
Greenschist amphibolite + minor talc schist
(Possible fault ?) - talc + quartz
Gr. sch.
Dolomite - magnesite rock
Amphibolite + greenschist
Dol - mag. rock
Amphib. + gr. sch.
Dol - mag. rock
Magnesite
Dol. mag.
Talcose magnesite
Dol. mag.
Dol. greenschist
Dol. - mag. rock
Magnesite
Magnetite bearing amphibolite + greenschist
Greenschist ē graded sst - facing uphole
Magnetite bearing fine - grained amphibolite + greenschist
Bedded magnetite bearing greenschist with carbonate
Feldspar - dolomite - qtz - chlorite - pyrite - magnetite breccia
43m
21m
21m
14·5m
4m
14m
38m
100m
200m
300m
— 100 m R.L.
— 0
Mg O : 44·16
Ca O : 1·99
Fe_2O_3 : 2·57
Mn O : 0·10
Si O_2 : 0·98
Greenschist
89·4%
Mg O : 33·73
Ca O : 14·50
Fe_2O_3 : 1·92
Mn O : 0·17
Si O_2 : 3·40
Mg O : 30·14
Ca O : 20·16
Fe_2O_3 : 1·89
Mn O : 0·29
Si O_2 : 3·87
Mg O : 38·79
Ca O : 6·98
Fe_2O_3 : 1·53
Mn O : 0·16
Si O_2 : 3·64
Magnesite rock with :
> 50% dolomite.
> 20%, < 50% dolomite.
< 20% dolomite.
Greenschist
70·6 %
88·11%
Mg O : 43·60
Ca O : 1·43
Fe_2O_3 : 3·79
Mn O : 0·14
Si O_2 : 0·75
89·04%
79·90%
Mg O : 42·01
Ca O : 5·31
Fe_2O_3 : 1·40
Mn O : 0·16
Si O_2 : 1·54
Mg O : 35·15
Ca O : 11·74
Fe_2O_3 : 2·62
Mn O : 0·13
Si O_2 : 1·70
55·90%
79·09%
Mg O : 42·37
Ca O : 3·23
Fe_2O_3 : 3·15
Mn O : 0·11
Si O_2 : 1·82
5 cm
72·43%
74·91%
76·05%
Magnesium carbonate content contained in magnesite mineral
88-2775 Vol.
Mg O : 36·60
Ca O : 9·57
Fe_2O_3 : 2·39
Mn O : 0·15
Si O_2 : 2·15
62·17%
Mg O : 40·33
Ca O : 5·52
Fe_2O_3 : 2·75
Mn O : 0·11
Si O_2 : 1·92
Mg O : 38·99
Ca O : 6·06
Fe_2O_3 : 4·22
Mn O : 0·17
Si O_2 : 2·87
1
2
2a
3
4
4z
4y
5
6+7
8
9
10
SAVAGE RESOURCES LIMITED
MAIN CREEK MAGNESITE PROSPECT
DRILLHOLE PROFILE MC 27
DRAWN BY : H.S.
DRAFTSMAN T.G.D.S.
DATE July '86
REVISIONS
H.S. Feb. 1988
FILE NO.
SCALE 1 : 1000
Metres
FIG. 3-3



99 092
082
MC 28
346775 m E
5499675 m N
R.L. 200m A.S.L.
Azimuth 256.2° A.M.G.
Greenschist
Residual deposits with broken outcrop
Greenschist (non core drilling)
Greenschist
Poor recovery zone including spongy vein quartz + Fe oxide after carbonate + sandy chert indicated
Talc schist
Siliceous dol magnesite c talc schist indicated
Greenschist
Siliceous dolomite
Talcose dolomitic magnesite
Dolomite
Talcose dolomitic magnesite
Dol. greenschist
Talcose dol magnesite
Greenschist
Siliceous dolomite
Talc schist
Siliceous dolomite - magnesite rock
Greenschist
Siliceous dolomite with greenschist. Magnesite
Magnesite c siliceous dolomite
Greenschist
Cavity
Siliceous dol mag
Greenschist
Magnesite
100m R.L.
0
MgO : 25.58
CaO : 15.12
Fe2O3 : 1.63
SiO2 : 15.83
Greenschist
MgO : 38.35
CaO : 6.60
Fe2O3 : 2.85
SiO2 : 3.44
70.3%
35.41%
= Magnesium carbonate content contained in magnesite mineral
5 cm
Magnesite rock with :
> 50% dolomite.
> 20%, < 50% dolomite.
< 20% dolomite.
88-2775 Vol. 1
10
9
8
7
6
5
4y
4z
4
4
3
3a
2a
1
3z
2
MgO : 30.00
CaO : 15.22
Fe2O3 : 3.26
SiO2 : 6.21
SAVAGE RESOURCES LIMITED
MAIN CREEK MAGNESITE PROSPECT
DRILLHOLE PROFILE MC 28
DRAWN BY - H.S.
DRAFTSMAN - T.G.D.S.
DATE July '86
REVISIONS
H.S. Feb. 1988
FILE NO.
SCALE 1:1000
Metres
FIG. 3-4