DEPARTMENT OF MINES

SOUTH AUSTRALIA

GEOLOGICAL SURVEY

GEOCHEMICAL EXPLORATION IN THE EAREA DAM GLENLOTH MINING FIELDS

Grid F.5, Block 436

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ABSTRACT

Geochemical stream sediment sampling for tin, molybdenum and gold at Earea Dam and Glenloth outlined four areas where streams contain anomalous tin. Follow-up bedrock sampling of these areas and investigation of four known prospects narrowed interest to three worthy of drilling. Results from on-site assaying and logging of drill cuttings however, are not encouraging. Further investigation of primary tin mineralisation appears unwarranted.

Search for alluvial concentrations in Tertiary gravels and present lake sediments is recommended as the next stage in the exploration of the district for tin.

Exploration for deposits of molybdenum and possibly nickel is recommended.

INTRODUCTION

The Tarcoola-Kingoonya district was first explored by John McDouall Stuart in 1858 and was later traversed by John Ross (1874) and Ernest Giles (1875). Settlement followed in 1877, with the establishment of Wilgena Station. Gold was first discovered at Glenloth in 1893, and later in the same year at Tarcoola. Gold and tin were discovered near Earea Dam in 1899. Unconfirmed discoveries of molybdenum were reported from Earea Dam and Commonwealth Hill in 1914.

Previous Investigations

The district has been visited by a number of Government Geologists since H.Y.L. Brown in 1894. A detailed bibliography of earlier reports is given by G.F. Whitten (1968). Almost all of the regional comments herein are based on work by Whitten and his associates who have investigated the district from 1956 to date.

The junior author is the fifth such associate.

In April 1956 a 22,500 square mile area was reserved from the operation of the Mining Act to allow a Departmental aeromagnetic survey for iron deposits.

In March 1965, Australian Development N.L. sought a Special Mining Lease and the Government Reservation was reduced to enable the ompany to explore the Glenloth Goldfield and the Earea Dam tin occurrence.

The S.M.L. was relinquished in January, 1967 and the area was again reserved from the operation of the Mining Act. The location and boundaries of this new Reservation are shown on Plans S7348/1 and S7274. The Reservation was reduced to the two areas shown on Plan S7274 to allow further exploration by private enterprise.

Present Investigations

This report records the results of geochemical exploration for tin, molybdenum and gold carried out at Earea Dam and Glenloth. Preliminary stream sampling began at Earea Dam in October 1967. Full-scale investigations commenced in March 1969 and continued throughout the year.

Location and Access

The Reservation lies midway between Kingoonya and Tarcoola on the Trans Continental Railway Line, about 430 miles by road from Adelaide.

Access is from the main gravel road along the railway and from graded roads to homesteads and outstations. Two wheel drive vehicles are adequate for station tracks but a four wheel drive vehicle is necessary for stream sampling.

Climate

The climate is severe with long hot summers and short mild winters. Tarcoola over a period of 30-50 years has had an average

rainfall of 6.14" per year; but it is erratic and unreliable and has ranged from 2.66" (1929) to 13.75" (1921). Rains of greatest intensity fall during the summer months. The annual evaporation rate is 76", over 12 times the rainfall. Due to the low rainfall, surface drainage tends to be local with most rain being absorbed where it falls or on its way to the nearest depression.

Physiography

The area is one of low relief resulting from the mid-Tertiary peneplanation. Low hills, generally of basement rock, rarely rise above 130 ft. from present plain level. Within the Reservation the hills are mainly granite inselbergs or weathered granite capped with flat-lying silcrete.

About 90% of the basement rocks is thinly covered with sandy and silty loam of aeolian origin. Towards the southeast swamps and small salt lakes extend towards Lake Harris. Kopi flats and occasional outcrops of basement rock outcrop around the salt lakes. Wide, flat plains are blanketed with saltbush and bluebush with sandy areas covered by moderately thick mulga, myall and mallee woodlands.

GEOLOGY

Stratigraphy

The district is the northern portion of the exposed Gawler Platform. The Gawler Platform forms the most eastern extension of the West Australian Shield. The Platform has been a stable mass over most of geological time so that basement rocks are nowhere far from the present land surface.

Discontinuous, widely scattered, exposures make stratigraphic correlation of the pre-Cambrian rocks extremely difficult. Correlation

is based on comparison of rock types with similar rocks exposed on coastal Eyre Peninsula. Outcrop is often very poorly exposed and difficult to locate except when bordering the edges of salt lakes or standing up as resistant inselbergs. The reader is referred to K.R. Miles (1954), R.K. Johns (1961), G.F. Whitten (1960, 1966, 1968), and B.P. Thomson (1966, 1969) for details of the geology of the Gawler Platform.

The northwest-trending belt of granites and metasediments on the TARCOOLA sheet has not yet been mapped in detail apart from the Earea Dam - Glenloth area.

Preliminary mapping of TARCOOLA was begun in 1959 by Whitten (1960) and detailed mapping at Earea Dam - Glenloth was carried out by T.V. Harvey in 1966 for Australian Development N.L. Geological maps included in the report, Plans 69-321 and 69-905 are modified from Harvey (1966).

The following descriptions of rocks exposed in the Reservation and on TARCOOLA are based on reports by Whitten with some additions from Harvey.

Pre-Cambrian

The oldest rocks exposed in the Reservation are a complex series of banded, leucocratic, quartz-feldspar and quartz-feldspar-garnet gneisses outcropping around Earea Dam. These rocks contain numerous basic granulite bands and are associated with jaspilite near Keynella Rock Hole. Aplites, migmatic and intrusive granites and swarms of thin pegmatites have been developed at Earea Dam and Glenloth during intense regional metamorphism.

Similar rocks exposed elsewhere on TARCOOLA have been correlated by Whitten (1960, 1966) with the "Middleback Group" and "Gneiss Complex" of Miles (1954) exposed on northeastern Eyre Peninsula and with the "Flinders Gneiss" and "Hutchinson Group" of Johns (1961)

on southern Eyre Peninsula.

Thomson (1969) believes that these rocks were deposited during the Lower Proterozoic period as shelf sediments on an Archean platform. They were folded in the early Carpentarian period and subjected to regional metamorphism which in some areas reached the granulite facies. The metamorphism was variable in intensity and produced a metasedimentary complex ranging from low-grade shales, quartzites and jaspillites through schists, migmatites, meta-jaspilites and granite gneisses to mobilised, intrusive granites and pegmatites. Thomson (1969) has revised the terminology used above; it is retained here solely for convenience.

The granites and metasediments at Earea Dam and Glenloth contain rare complex pegmatites, swarms of simple pegmatites, greisen pods and veins and several generations of quartz veining.

Greisen veins in kaolinised granite at Mt. Mitchell on the Glenloth Goldfield are associated with quartz veins containing cassiterite, monazite and traces of gold, molybdenite, pyrite and base metal sulphides. Auriferous quartz veins mined at Earea Dam and Glenloth fill shears in granite and contain pyrite, fine-grained magnetite and traces of galena, arsenopyrite, sphalerite and copper sulphides. Cassiterite-bearing quartz veins occur in a granite or pegmatite dyke at South Lake 1 3/4 miles south of Earea Dam. Large "blows" of barren, white quartz with minor limonite outcrop throughout the Reservation.

The relationships of these mineralized veins to each other and to the early Carpentarian granitisation and later acid and basic intrusions are unknown.

Flat-topped tablelands occur near New Year Hill and extend southeastwards through Glenloth. These tablelands are capped with a silcrete-ferricrete layer which formed during a humid stage in the Tertiary and is associated with the widespread peneplanation. The

bedrocks beneath the silcrete cap are medium-grained, sometimes layered and porphyritic and consists of angular quartz set in a kaolin matrix. They are thought to be deeply weathered metasediments, granites and porphyries similar to the fresher residuals exposed at Earea Dam and Glenloth.

A grey, coarse-grained, unstressed, porphyritic granite outcrops in the Cocrilla Hills, 8 miles south of Glenloth Well and 8-12 miles west-northwest of Arcoodarby Well. The granite outcrops in prominent tors and has a magmatic appearance with a low alignment of large feldspar phenocrysts. Numerous xenoliths or partly digested early-phase aplite blocks are scattered in an echelon pattern throughout the granite. Wherever the highly weathered metasediments and migmatic granites outcrop adjacent to this granite, a finer-grained border is often present, indicative of intrusive relationships. The age of the granite is unknown but it is clearly younger than the Glenloth and Earea Dam migmatic granites. There is no known mineralisation in this granite except for sporadic occurrences of massive, white quartz veins.

Unconformably overlying granite at Tarcoola and jaspilite at Wilgena Hill and at the Wallabyng Range, are relatively unmetamorphosed, gently dipping sequences of conglomerates, quartzites and slates which Whitten (1966 and 1968) has correlated with the Carpentarian Corunna Group, of northeastern Eyre Peninsula. At Tarcoola these "Tarcoola Beds" are intruded by microdiorite and porphyry dykes intrude auriferous quartz veins which fill shears in the sediments.

Microdiorite and gabbro dykes intrude granites and metasediments at Earea Dam and Glenloth. Harvey believes that the dykes have intruded re-opened shears, as at Tarcoola, some of which were already filled with auriferous quartz. Basic dykes are closely associated with gold-bearing veins at Earea Dam and with some of the veins at Glenloth.

Harvey distinguished two types of porphyry in the Reservation.

At Tomato Rocks and westward, reddish, medium-grained quartz-orthoclase porphyry outcrops as a large, partly layered, ?extrusive flow and as dykes into the nearby migmatic granite. At Earea Dam, dark grey, fine-grained porphyry dykes intrude the metasediments, granites and basic dykes. Whitten correlated both porphyries with the Gawler Range Volcanics.

No evidence of sediments equivalent to the Adelaide System rocks have yet been discovered in the area but they occur to the east on TORRENS and ANDAMOOKA.

Permian

A long period of subaerial erosion was ended by the deposition of Permian glacial sediments. These rocks have been intersected overlying basement rocks in the Lake Phillipson bore, 90 miles north of Tarcoola.

Cretaceous

Sediments of Cretaceous and younger age occupy the Great Artesian Basin lying to the northeast of the Reservation.

Tertiary

Irregular, late-Tertiary basins containing paralic sands, clay, lignites and gravels occur in the Malbooma-Mulgathing area, 23 miles west of Tarcoola. Thin, silicified Tertiary gravels cap many of the low hills of weathered granite at Glenloth.

Recent

Over 90% of the Reservation is covered by poorly consolidated aeolian silts and sands. A calcrete or lateritic sheet normally exists a few feet below the surface and persists over wide areas. East-west trending seif sand dunes blanket the area to the southwest outside the reserve. Kopi flats and dunes occur close to the low-lying swamps and salt lakes.

Structure

Structurally the area is part of the Gawler Platform which has been a relatively stable mass since the late Carpentarian period. Whitten (1966) states that the Lower Carpentarian rocks in the Tarcoola-Kingoonya district are steeply folded on northeast trending axis; being draped over an upwarp area which trends northeasterly from Malbooma towards Mount Wood, 110 miles north of Kingoonya. Folding is assumed to be related to the granitisation of these sediments and intrusion of mobilised portions of the sedimentary pile.

The Carpentarian "Tarcoola Beds" are unmetamorphosed and have moderate dips. The Late Precambrian, Palaeozoic and Mesozoic succession is presumed flat lying or to show only broad, shallow structures.

No major structural trends have been identified in mapping or photo-interpretation. However, short intense northeast aeromagnetic trends predominate on the TARCOOLA Aeromagnetic Plan and identify iron formations. These trends are less intense on the eastern portion of GAIRDNER where numerous long northwest trends, thought to be caused by basic dykes, dominate. The northwest to north-northwest trend extends onto ANDAMOOKA and TORRENS to the east. The KINGOONYA Aeromagnetic Plan also shows structural complexity similar to that on GAIRDNER with intersecting northeast and northwest trends.

Mineral Resources

Gold

Gold was first discovered in the Tarcoola-Kingoonya district at Glenloth in October 1893. Total recorded production from this goldfield is approximately 8,960 ozs. of gold (Whitten, 1960). Details of individual mines are given in the Record of Mines of South Australia (1908) pages 311-315, and Mining Reviews 8, 9, 11, 13-29, 31, 39-41, 58-61, 63, 64, 67, 68-74.

Mr. J.F. Heylen of Glenloth helped the author identify many of the mines, positions of which are shown on Plan 69-501.

Gold was discovered near Earea Dam in 1899 by a prospecting party from Port Augusta. Total recorded production from this gold field is approximatley 1,850 ozs. Details of individual mines are given in the Record of Mines of South Australia (1908) pages 307-310 and Mining Reviews 17, 21-23, 57, 59-61, 63, 64, 70, 71, 73 and 74. Location of three of the main producers is shown on Plan 69-333.

Tin

Cassiterite was discovered in 1899 at South Lake, $1\frac{3}{4}$ miles south of Earea Dam and at Mt. Mitchell in the Glenloth Goldfield in 1923. Details of these occurrences are given in the Record of Mines (1908) pages 310-311 and Mining Reviews 17, 23, 39, 41, 42, 76 and 77. No production of tin is recorded, except for 48 lbs of concentrate sluiced from 8 tons of dump material at South Lake in 1942. Several hundredweight of concentrate may have been recovered.

Iron

A hill of hematite jaspilite outcrops near the southwestern corner of an unnamed salt lake near Keynella Rock Hole 4½ miles south of Earea Dam. Crawford (1957) estimated the hill to contain 1½ million tons of iron ore. Three samples gave assays of 38.6 to 43.0% iron with 31.4 to 39.0% silica and 0.3 to 0.7% manganese.

Molybdenite

Molybdenite was reported near Earea Dam in 1914. Australian Development N.L. discovered a small quartz vein containing micaceous flakes of a silvery grey mineral which was thought to be molybdenite near Keynella Rock Hole. Samples recently submitted to Amdel however were found to be crystalline flakes of graphite (P12/70).

Graphite is widespread in rocks and quartz veins of the

district and is probably responsible for the early reports of molybdenite. Anomalous molybdenum has, however, been detected in stream sediments and various rock samples. Several flakes of molybdenite have been discovered in the stanniferous quartz veins at Mt. Mitchell (P22/70).

GEOCHEMISTRY

General

The Earea Dam-Glenloth area is difficult to explore geochemically because of the scarcity of suitable streams, the widespread desert loam cover and mechanical distribution of elements from mineralised outcrops.

Reconnaissance indicated that the best method of investigation was to collect gravel samples in the short gullies which drain areas of outcrop. Anomalous localities detected from this sampling should be investigated by rock sampling as the soils of the region are dominantly aeolian in origin and bear no genetic relation to bedrock. Geochemically anomalous zones outlined in outcrop should then be traced beneath sand cover if necessary.

Old workings in the area should be tested for the presence of tin, molybdenum, tungsten, gold and base metals. Pegmatites, gossans, greisens, especially their associated quartz veins, should be closely examined and sampled.

Stream Sampling

Four orientation stream samples were collected near Mount Mitchell, 1½ miles west of Glenloth Well (refer Plan 69-905) and four at Warna Rock Hole (Plan 69-321). The samples were sieved into 6 size fractions and submitted to the Australian Mineral Development Laboratories for the determination of Sn, Mo, Li, As, Ag and Au by semi-quantitative Emission Spectroscopy and Cu, Pb and Zn by Atomic Absorption Spectroscopy. Results for Sn, and Mo are shown in Table 1.

Table 1

Tin and molybdenum content in parts per million of various fractions of stream bed gravel from Warna Rock Hole and Mount Mitchell

Fraction size	Warna Rock Hole (1)	(2)	(3)	(4)	Mount Mitchell (5)	(6)	(7)	(8)
	Orientation Samples				Orientation Samples			
Tin								
* -9 + 16	15	8	15	10	4	4	60	10
-16 + 32	50	15	10	400	6	5	700	700
-32 + 60	50	5	5	40	8	15	1200	600
-60 + 115	3	5	4	5	8	8	800	400
-115 + 250	2	10	4	3	4	15	150	60
-250	2	3	4	3	6	6	60	10
Molybdenum								
-9 + 16	8	5	<3	3	3	3	4	5
-16 + 32	3	3	4	3	3	4	4	4
-32 + 60	4	<3	<3	<3	3	4	4	5
-60 + 115	** <3	<3	<3	<3	3	5	4	5
-115 + 250	<3	<3	<3	<3	<3	<3	<3	<3
-250	3	3	<3	<3	<3	<3	<3	<3

* -9 + 16 represent the grain-size of the fraction of a sediment samples which passes through a 9 mesh (Tyler Standard) sieve and is collected on a 16 mesh sieve.

** < = less than.

Table 2 indicates that the tin content of a gully sample from a mineralised area is highest in the -16 + 115 mesh fraction and that molybdenum is highest in the -9 + 115 mesh fraction.

Results for Cu, Pb, Zn, and Ag show moderate background values with highest content in the -115 mesh fractions.

Lithium is erratic but generally higher in the -60 mesh fractions. The eight orientation samples showed high lithium with high

tin but this trend did not appear in the full scale sampling.

Arsenic is anomalous, ranging from 50 to 150 p.p.m. and is highest in the coarser fractions.

Gold determinations were all less than the detection limit of 3 p.p.m.

The presence of most of the tin and molybdenum in the coarse fractions suggests that these elements are being mechanically dispersed. Physical distribution, would partly explain the low repeatability between samples as shown in Table 2. Sampling differences and analytical variation are other probable factors.

Table 2

Tin content in parts per million of the -16 + 80 mesh fraction of stream bed gravels collected 1 mile north of Mount Mitchell

Field No.	Initial Samples	Resamples
GL 14	200	1000
15	150	6
16	60	15
17	150	6
18	150	200
19	3	4
20	100	6
21	200	40
22	80	150
23	600	100
24	120	1200
25	50	8

Poor repeatability is undesirable in a geochemical survey but is difficult to overcome if element dispersion is mechanical. To adequately explore this environment, close sampling is necessary to increase the probability of at least one sample being anomalous from a

mineralised area. All anomalous points indicated in the initial survey need to be re-sampled together with nearby streams. The heavy-mineral fraction in gravels from these streams should also be examined for the presence of the minerals sought. This has been done at Earea Dam and Glenloth by wet panning and assaying the concentrate for tin in a Hilger-Watts Portable Isotope Fluorescence Analyser.

A total of 692 stream sediment samples were collected at Earea Dam, Glenloth and around Cooritta Hill. The samples were collected from pot holes and behind boulders in gullies, dry-panned to remove coarse material, and placed in numbered packets. Sample sites were marked onto 1" = 20 chain aerial photographs. The sites were marked in the field with numbered metal tags and yellow plastic tape fastened to trees or outcrop with 3" nails. The samples were prepared by sieving through 16 and 115 mesh sieves. The -16 + 115 mesh fraction was placed into a porcelain mortar and crushed to -80 mesh for analysis. The procedure has been improved since the earlier sampling, by sieving out the -16 + 80 fraction in preference to the -16 + 115 fraction. This avoids a preponderance of -80 + 115 fraction in the final, crushed -80 mesh sample.

The stream samples were submitted to Amdel for the determination of Sn, Mo, and Li by Emission Spectroscopy and for Cu and Zn by Atomic Absorption Spectroscopy. Results are plotted on Plans 69-333, 69-501 and 69-901.

Gold was determined by Emission Spectroscopy in the samples from Earea Dam (Plan 69-333) but values were all less than the detection limit of 3 p.p.m. No further determinations have been done as it is thought that Cu, Zn or As will be of more use in outlining gold deposits.

Theshold values for Sn, Li, Cu and Zn have been derived from statistical treatment modified by subjective appraisal. Approximate threshold for an element is considered to be the arithmetic mean plus

twice the standard deviation, assuming normal distribution.

Molybdenum is considered anomalous if detected at above 3 p.p.m.

Results from the three areas sampled have been kept separate because of lithological differences in each area. Subjective threshold levels are shown on each plan.

Stream sampling results at Earea Dam (Plan 69-333) show a marked clustering of anomalous Sn, Mo, Li, Cu and Zn in the area west and southwest of the South Lake. Reference to Geological Plan 69-321 shows that this area is geologically significant as it contains numerous greisen and quartz veins.

The western anomalous stream, $1\frac{3}{4}$ miles northwest of the South Lake Tin Mine, commences over sand-covered leucocratic gneisses veined with minor greisen and quartz veins. The quartz contains grains of ilmenite and occasional flakes of graphite, mistaken for molybdenum in the field (Refer P31/69). M.J. Wort of Amdel has described 11 rock samples from the area in Report MP3265/69.

Resampling of this stream again shows anomalous tin but molybdenum was detected in only one sample at the stream's headwaters.

Traces of cassiterite have been identified by M. Larrett of Amdel in the heavy mineral fraction of the gravels from the stream. (Refer Report MP295/70). Bedrock sampling, recorded in the next Section, was undertaken in the area.

The anomalous streams on the southwest corner of South Lake drain from an area of coarse-grained leucocratic gneisses (P23/69) containing east-west trending bands of granulitic basic rock. The gneisses contain small greisen pods and veins and thin, quartz-rich simple pegmatites. Quartz in the pegmatites often contain small grains of ilmenite and flakes of graphite. This area is geologically similar to the area west of South Lake except that bands of basic granulite are more widespread.

Traces of cassiterite were identified by Amdel in the heavy mineral fraction of gravels from the streams which drain this area. Bedrock

sampling described later, was undertaken to try to discover the source of the cassiterite.

One sample of basic rock from the area has been identified by Amdel as an augite granulite (P22/69) which contains over 5% fresh sulphide minerals consisting of pyrrhotite chalcopyrite, galena and pyrite. Limited inspection of other basics in the area failed to locate further sulphide mineralization. Further work is warranted to investigate the nickel potential of these rocks.

Stream sampling at Glenloth has outlined two tin anomalies of interest. (Refer Plan 69-501). One area occurs about 1 mile north of the Mt. Mitchell tin workings. Numerous short gullies draining from a low hill of silcrete-capped, kaolinised granite contain traces of cassiterite. Molybdenum indicated in the initial sampling as shown on the plan, was not detected on re-sampling. Bedrock sampling was carried out here to locate the source of the cassiterite. The other area of interest occurs about 2 miles east-northeast of Glenloth Well. A number of streams draining from a wide flat valley of sand-covered kaolinised granite were found to contain abundant waterworn fragments of cassiterite up to 1 mm in diameter. Some of the cassiterite occurs as sharp-edged crystals, indicating that they have not travelled far from their source. Chip sampling of outcrops and shallow rotary drilling has been carried out in the area.

Results from stream sampling at Cooritta Hill are shown on Plan 69-901. No follow-up work has been carried out here to date.

Lack of time has so far prevented follow-up examination of single-point tin anomalies or the copper, zinc and lithium highs. Unexpectedly, lithium is often associated with anomalous copper and/or zinc, not with tin as was anticipated from the orientation study.

Recent work has indicated the association of anomalous lead, bismuth and arsenic with tin mineralisation. Further search for primary

tin deposits in the district could be carried out by analysis of the -16 + 80 mesh fraction of stream gravels for Sn, Mo, Pb, Bi and As. The orientation study suggests that a search for basemetal deposits requires analysis of the fine fractions of stream gravels. Additional work would be needed to confirm this hypothesis.

Further search for molybdenum deposits is warranted in the district but will be difficult because of the extreme depth of Tertiary weathering. Molybdenite is a highly unstable mineral in the surface environment and molybdenum is well known for its high mobility in alkialine conditions.

The hypogene portions of molybdenum-bearing ore-bodies could be enriching the local alkaline groundwaters. Sampling of groundwater in bores and wells combined with analysis of leaves and twigs from deep-rooted trees may help to broadly outline promising areas.

A number of investigators (listed in Baranova, 1957) have shown that plants which fix nitrogen, the Leguminosa family are the greatest accumulators of molybdenum and that these plants are sensitive indicators of the molybdenum content of the underlying bedrock or groundwater. Mulga and myall are common local leguminous trees and although not spread over the whole area, they are very favourable because of their deep root penetration. These trees could prove especially useful in prospecting covered areas.

Further investigation into the biogeochemical and groundwater features of the district is warranted. Development of reliable, biogeochemical techniques would make available large areas of the state which at present cannot be prospected because of sediment cover.

Rock Sampling

Rock sampling has been carried out in seven areas of interest.

These are as follows:

1. South Lake Tin Mine
2. Warna Rock Hole, 2½ miles northeast of Warna Well.
3. Keynella Rock Hole, 4½ miles south of Earea Dam.
4. Grid 1, 1 mile west of the South Lake Tin Mine.
5. Grid 2, 1¾ miles northwest of the South Lake Tin Mine.
6. Grid 3, 1 mile north of the Mt. Mitchell tin workings at Glenloth.
7. Grid 4, 2 miles east-northeast of Glenloth Well.

One hundred foot interval grids have been pegged with tape and compass around the known prospects and over the suspected source zones of the anomalous streams. At least a dozen half-inch size chips of weathered or fresh bedrock are collected where possible at each grid point. All outcrops of greisen, quartz veining, pegmatite and basic rock in the grid area are sampled. The grids are geologically mapped at a scale of 1 inch to 200 feet.

South Lake Tin Mine

Cassiterite-bearing quartz veins occur in a 4 feet wide, decomposed granite or pegmatite dyke which strikes at 320-325° and dips at about 60° southwest. Refer to Plan S7349.

Country rock consists of highly weathered, leucocratic and granulitic gneisses whose foliation strikes 060-070° and dips 60-80° southeast.

Several shafts were sunk, the deepest being 54 feet vertical on the footwall side of the dyke. Inflow of water from the salt lake hampered proper testing at depth. A number of pits and shafts to the southeast in the sand dunes are reported to have intersected cassiterite-bearing material.

D.E. Catley (1962) of Broken Hill Proprietary Co. Ltd., examined the mine in 1961-1962 and recommended a regional geochemical survey of the

surrounding area and percussion drilling to test the stanniferous dyke.

In 1965 Australian Development N.L. carried out bedrock sampling on a 100 ft interval grid around the workings. A copper anomaly was found associated with the tin minerlisation. No further work was carried out by the Company.

To check the copper anomaly and study the geology and geochemistry of the tin occurrence the grid was relabelled and bedrock and lake sediments collected. Samples were crushed (or sieved) to -80 mesh and submitted for the determination of Sn, Mo and Au, by Emission Spectrography and Cu and Zn by Atomic Absorption Spectrography.

A geological plan and results of bedrock sampling are shown in Plans S7349, 7350, 7351, 7352 and 7353. Local threshold has been taken as the mean plus twice the standard deviation.

Gold assays were all less than the detection limit of 3 p.p.m.

An intense copper anomaly (Plan S7351) surrounds the tin workings but unexpectedly trends northeast, parallel to the foliation of the gneissic bedrock. The anomaly occurs in an area of granulitic gneisses containing numerous amphibolite-pyroxene bands (P26/69). These rocks have weathered to greenish clay around the mine but to the north gradually grade into fresher leucocratic gneisses (P25/69). The copper anomaly may be due to the presence of disseminated sulphides in the granulite bands similar to the small granulite outcrop discovered near the southwest corner of South Lake.

The southwestern end of the copper anomaly shows a slight north-westerly trend aligned along the tin workings which is probably due to the emplacement of the stanniferous dyke. There is a similar bulge in the contours in the vicinity of lines 600E and 700E which may be related to another non-outcropping dyke.

Molybdenum distribution (Plan S7350) is more erratic than the copper but shows a strong northeasterly trend with minor northwesterly trends. Molybdenum is highly anomalous close to the pit at grid co-ordinates 300N600E.

Tin, (Plan S7352) as expected, is sporadically distributed but shows a rough association with molybdenum and copper. Two anomalous points occur southeast of the workings in the dyke. Three anomalous points with a northeast trend occur close to the pit at 300N600E. Distribution of zinc is haphazard and not related to the other elements.

Plan S7371 shows the superimposed tin, molybdenum, copper and zinc anomalies. The overlap of copper and tin near the workings and a similar overlap associated with high molybdenum at grid point 300W600E is possibily significant. This eastern anomaly may be associated with another granite or pegmatite dyke similar to that outcropping in the workings.

A 40 acre area around the mine was released in September 1967 to allow the pegging of a mineral claim. Six vertical rotary holes have recently been drilled testing the northern portion of the copper-molybdenum anomaly where it projects beyond the mineral claim.

Warna Rock Hole

Australian Development N.L. collected bulk samples from various greisen outcrops and quartz veins near Earea Dam. Two bulk samples of greisens collected at Warna Rock Hole were reported to assay 0.28% and 0.36% tin. This occurrence deserved further follow-up as the greisen zone covers an extensive area and apparently was of an interesting grade. The geology and geochemistry of the greisens could also be investigated.

The greisen occurs as 1 to 2 ft wide veins, striking at about 320-325^{o} and varying in length from 5 to over 200 feet. The veins are

located along a north-south zone 1400 ft long by 200-400 feet wide in strongly jointed, weathered granite which is partly covered with a veneer of sand. The veins have been brecciated in places and recemented with vughy, white quartz veins which strike at 315-325°.

A sampling grid with base line bearing 340°M was pegged over the main greisen zone.

About 70 bedrock and overlying soils samples were collected. Some orientation experiments were carried out on the soils but their high proportion of aeolian silt precluded their use in prospecting.

Eighteen greisen veins were sampled and found to have an average tin content of only 200 p.p.m., much lower than that reported. The greisens are, however, anomalous in Mo, Li, Pb, Bi, As and Be.

No cassiterite mineralisation was discovered in the greisens and their overall low-grade does not justify further investigation.

Keynella Rock Hole

The reported molybdenite occurrence near Keynella Rock Hole was investigated by limited bedrock sampling. Identification of the "molybdenite" as graphite now makes the area unworthy of further investigation.

Grid 1, 1 mile west of the South Lake Tin Mine

Traces of cassiterite were detected by Amdel in heavy mineral fractions from the anomalous streams in this area. Bedrock sampling and mapping on an 800 ft by 1 100 ft grid indicated that a northwest-trending zone of discontinuous greisen veins is the probable source of the cassiterite. These greisens are not extensive enough to warrant further testing.

Grid 2, 1 3/4 miles northwest of the South Lake Tin Mine

Traces of cassiterite were detected in heavy mineral fractions of gravels from the anomalous stream. Anomalous molybdenum was also

detected.

Bedrock sampling and mapping on a 1 000 ft by 1 800 ft grid indicated that widepsread small greisen veins have shed the traces of cassiterite and molybdenum minerals present in the streams. The greisens are too small and widely scattered to warrant further investigation.

Grid 3, 1 mile north of Mt. Mitchell

Reference to Plan 69-501 shows an area of anomalous tin and molybdenum instreams 1 mile north of the Mt. Mitchell tin workings. Molybdenum was not detected in follow-up resampling of the streams.

Bedrock sampling and geological mapping in this area has shown that the tin in the present day gullies occurs as detrital grains of cassiterite. The cassiterite is being shed from flat-lying silcreted gravels of Mesozoic age which cap the kaolinzed granite. The gravels are low-grade and no greisen or quartz veins are evident in the exposed granite bedrock.

The northeast trend of the anomalous stream points may be related to the Tertiary drainage direction. Further investigation of the alluvial gravels in this area and elsewhere in the district is warranted.

Grid 4, 2 miles east-northeast
of Glenloth Well

Several streams draining an area of sand-covered kaolinised granite, east of Glenloth Well, were found to contain abundant cassiterite. Analysis of one stream sample gave 1 200 p.p.m. tin. Ninety shallow rotary holes have been drilled at 50 ft intervals on four lines, 400 ft apart, through the thin sand cover into bedrock in the suspected source area. (See Plan 75-1 000).

Results indicate that the cassiterite in the streams is derived from two sources. The primary source is small greisen veins in the granite bedrock. The other source is thin silcreted gravels which cap

nearby granite hills as at Grid 3. Weathering of the area in the Tertiary resulted in low-grade alluvial tin concentrations in these basal gravels and grits. They have been uplifted and dissected by Recent streams.

The present stream gravels thus contain rounded, waterworn fragments of cassiterite from the weathering of the older gravels and fresh crystals from the scattered greisen veins in the granite bedrock.

The scout drilling failed to detect greisen zones of sufficient size or grade to warrant further investigation.

The tin-bearing Tertiary gravels investigated so far are low grade and only average about 5 ft thick. In some places, however, they are 20-30 feet thick. Further investigation of these gravels elsewhere in the district and of Recent sediments in Lake Harris is necessary to determine if economic alluvial deposits are present.

Grid 4 location is shown on plan 75-1 000.

Mt. Mitchell Tin Workings

One and a half miles west of Glenloth Well a 100-150 ft wide, north-south trending greisenized zone outcrops in kaolinized granite over a distance of 1 500 feet. Several quartz veins contain traces of cassiterite, gold, molybdenite, monazite and base metal sulphides outcrop within the zone at its northern end and are associated with numerous greisen veins. The greisen and quartz veins strike generally north-south and dip steeply to the west.

Australian Development N.L. attempted to diamond drill beneath the northern quartz outcrops but drilling proved difficult with low penetration and high core loss.

The Mt. Mitchell prospect showed promise as a possible low-grade deposit. Hammer drilling, using the Halco 150 Down the Hole Hammer drill, has been undertaken to assess the potential of the whole greisenized

zone. A total of 19 holes angled at 50° eastwards, with a maximum penetration of 150 feet, were drilled on lines 200 ft apart along strike.

Initial results from on-site assaying and logging suggest that the greisens are too low-grade to be of economic interest. Further testing will depend on check assay results from the drilling.

SUMMARY AND CONCLUSIONS

Stream sediment sampling at Earea Dam and Glenloth outlined four areas anomalous in tin. Follow-up bedrock sampling of these anomalies and investigation of four known prospects narrow interest to three worthy of assessment by drilling.

Full assay results* from the drilling at South Lake, Mt. Mitchell and Grid 4 have not yet been received. Initial results from on-site assaying and logging of drilling cuttings are not encouraging. Further investigation of these prospects will depend on the check assays of bulk samples submitted to Amdel.

It now appears that primary tin mineralisation in the district is probably too low grade to be of economic interest. Production from geologically similar deposits at Greenbushes on the West Australian Shield has mainly come from alluvial deposits. Investigation of the Tertiary gravels and Recent lake sediments should therefore be the next stage in the exploration of the district for tin. The Glenloth-Lake Harris area should be concentrated on initially, with search later extending to the basement rocks northwest of Tarcoola.

Basic rocks at Earea Dam containing traces of pyrrhotite-chalcopyrite require further examination to determine their nickel potential.

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*Editor's note: Full assay results are given in addendum for South Lake and Mt. Mitchell. Samples from Grid 4 were not submitted for full assay.

The widespread occurrence of anomalous molybdenum in rocks and stream sediments indicates that deposits of this metal may exist in the district. Surface exposures would all be low-grade because of extreme weathering associated with the Tertiary peneplanation. Search for molybdenum deposits is recommended using either analysis of groundwaters or suitable biogeochemical methods. Development of suitable techniques for this work could be made a joint Department-Amdel project.

16th January, 1976
GFW:RGW:ST

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and

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ADDENDUM

RESULTS OF DRILLING IN THE EAREA DAM - GLENLOTH MINING FIELDS

by

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GEOCHEMICAL EXPLORATION SECTION.

INTRODUCTION

This addendum presents lithological logs and assays obtained from drilling in the three areas mentioned previously in this report. These results in no way alter the general conclusions outlined.

(i) South Lake Mine Grid

Six vertical rotary holes, totalling 698 feet, were drilled to depths between 75 and 155 feet. Samples representative of every 5 feet were taken and assayed by Amdel for Cu, Pb, Co, Ni, and Mo by atomic absorption spectroscopy. Tin was analysed by emission spectroscopy. These results are presented on pages . The locations are shown in Plan S1192. Lithological logs are not available for these holes.

(ii) Mt. Mitchell Mine Grid Glenloth Area

Nineteen rotary percussion holes were drilled at Mt. Mitchell. Samples representative of 6 feet intervals were analysed by Amdel by emission spectroscopy for tin. Assays for tin were also made using the Portable Isotope Fluorescent Analyser. All results were below the detection limit of 0.1% tin. The lithological logs and Amdel analyses are given on pages

The location of the holes are shown on plan S11993.

(iii) Grid 4, 2 miles east-northeast of Glenloth Well

Ninety vertical holes were drilled to an average depth of 8 feet using a Failing W.W.1., drilling rig. All except two holes (12 and 19 feet) have a maximum depth 10 feet or less. Cuttings were analysed, after the first few feet of hole, for Sn using the Portable Isotope Fluorescent Analyser. These results were all below the detection limit of 0.1%. Samples were also assayed using mobile Atomic Absorption Spectrophotometer by the Department of Mines for Pb. These results were all less than 80 ppm.

The location of Grid 4 is shown on plan 75-1 000.

The location of the holes on Grid 4 are not available.

SOUTH LAKE MINE GRID

Analytical Results

(Lithological logs are not available. The location of the holes is shown in plan S11992.)

SOUTH LAKE MINE GRID
(G8251/69 to G8393/69)

Depth(feet)	Cu	Pb	Co	Ni	Mo	Sn
EDR1						
0-5	200	45	180	100	10	1
5-10	190	75	150	90	15	1
10-15	150	65	110	110	8	3
15-20	80	40	70	85	5	1
20-25	Sample missing					
25-30	90	130	75	85	5	2
30-35	80	80	55	80	5	2
35-40	80	35	55	95	5	2
40-45	60	25	40	95	5	2
45-50	50	25	35	100	5	1
50-55	45	25	30	90	5	2
55-60	40	30	30	80	5	2
60-65	45	20	30	75	5	2
65-70	55	30	30	75	5	2
70-75	65	45	30	75	5	4
75-80	45	15	25	70	5	1
80-85	45	25	25	70	5	1
85-90	55	35	30	75	5	1
90-95	70	20	30	75	5	1
95-100	90	75	25	65	5	1
100-105	110	80	30	75	4	2
105-110	90	70	25	80	4	1
110-115	55	50	20	70	3	1
115-120	50	40	25	60	3	1
120-125	45	25	25	60	4	1
EDR2						
0-5	490	75	170	90	5	5
5-10	380	70	80	50	4	30
10-15	330	65	80	95	3	20
15-20	410	50	75	75	3	30
20-25	270	50	70	80	3	5
25-30	280	40	50	65	3	5
30-35	180	30	30	60	5	1
35-40	180	35	35	65	5	1

Depth(feet)	Cu	Pb	Co	Ni	Mo	Sn
40-45	120	25	30	70	4	2
45-50	170	30	25	60	4	1
50-55	200	40	25	55	3	1
55-60	120	20	30	65	3	3
60-65	Sample missing					
65-70	120	20	30	70	4	3
70-75	150	20	25	60	4	2
75-80	120	20	20	55	4	2
80-85	140	20	25	60	5	2
85-90	260	25	35	80	10	2
90-95	150	20	25	65	5	1
95-100	80	15	20	60	5	2
100-105	60	25	20	50	4	1
105-110	90	20	20	50	4	1
110-115	100	25	20	65	3	1
115-120	60	25	20	55	3	1
120-125	90	20	20	65	4	1
125-130A	45	15	25	60	3	1
125-130B	130	30	20	70	3	2
130-135	100	20	20	75	3	2
135-140	60	20	20	65	3	1
140-145	65	15	25	85	4	2
145-150	60	20	25	85	4	2
150-155	50	10	35	80	4	2
EDR3						
0-5	540	40	80	80	4	1
5-10	360	25	65	80	3	1
10-15	170	20	110	75	3	1
15-20	250	30	85	55	4	1
20-25A	360	65	45	50	3	3
20-25B	140	220	65	75	3	1
25-30	440	70	50	55	3	20
30-35	380	210	85	50	3	8
35-40	290	150	75	40	4	5
40-45	200	90	65	45	4	5
45-50	130	55	55	50	4	3
50-55	130	60	50	50	4	3

Depth(feet)	Cu	Pb	Co	Ni	Mo	Sn
55-60	80	45	40	65	3	2
60-65	75	25	40	65	3	2
65-70	50	65	40	65	3	2
70-75	45	20	30	60	3	2
75-80	40	20	30	55	4	2
80-85	30	40	30	55	3	2
85-90	60	25	30	50	3	2
90-95	70	25	30	50	3	2
95-100	100	90	30	50	3	3
100-105	75	75	30	50	3	3
105-110	75	30	25	60	3	3
110-115	100	30	25	55	3	2
115-120	130	20	25	40	5	2
120-125	130	65	40	100	5	1
EDR4						
0-5	550	30	150	75	4	10
5-10	1250	25	120	80	8	150
10-15	2400	50	120	100	10	50
15-20	690	70	90	120	8	5
20-25	360	70	85	110	5	3
25-30	340	65	70	110	5	3
30-35	300	65	70	110	5	3
35-40	230	55	65	110	4	3
40-45	200	45	65	110	5	3
45-50	160	30	55	110	5	50
50-55	Sample missing					
55-60	130	25	40	95	5	5
60-65	300	40	55	85	5	8
65-70	200	20	40	75	4	8
70-75	280	25	40	80	4	10
75-80	190	35	40	85	5	8
80-85	210	35	35	30	5	8
85-90	250	30	40	85	5	5
90-95	160	25	30	65	4	3
95-100	140	25	40	70	3	3
100-105	200	35	40	75	5	8
105-110	110	25	40	70	3	5
110-115	170	30	35	70	3	10
115-120	280	35	35	70	4	10

Depth(feet)	Cu	Pb	Co	Ni	Mo	Sn
EDR5 0-5	900	80	240	95	8	40
5-10	560	15	40	80	3	3
10-15	530	20	80	95	4	
15-20	280	25	110	100	4	3
20-25	250	30	100	95	4	3
25-30	120	25	80	95	4	3
30-35	160	25	85	100	3	15
35-40	160	20	80	95	4	8
40-45	160	25	80	95	4	8
45-50	170	25	75	95	4	8
50-55	170	40	75	100	4	8
55-60	160	30	70	100	5	3
60-65A	180	30	65	95	5	3
60-65B	100	25	30	95	4	10
65-70	130	30	55	110	3	3
70-75	80	25	60	110	3	3
75-80	90	25	60	95	3	5
80-85	85	40	45	85	3	3
85-90	85	20	40	65	3	3
90-95	100	20	50	65	4	3
95-98	180	35	30	75	5	10
EDR6						
0-5	300	40	160	95	5	1
5-10	410	25	110	95	5	80
10-15	520	25	70	100	5	4
15-20	570	30	85	90	4	15
20-25	350	35	75	75	4	30
25-30	300	35	65	65	4	15
30-35	310	30	40	65	4	10
35-40	240	25	30	50	3	8
40-45	400	40	50	55	4	15
45-50	420	65	50	50	5	10
50-55	270	35	45	50	4	8
55-60	240	35	30	40	4	6
60-65	100	35	25	20	3	6
65-70	130	30	25	30	3	6
70-75	95	30	20	20	3	6

LITHOLOGICAL LOGS
and TIN ASSAYS
for the MT. MITCHELL MINE GRID
GLENLOTH AREA.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 1

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No 930/70

Collar Coords. 300N 100W — R.L. — Grid No.

Angle 50 — Bearing 090°M — Depth 150' — Plan No.

Date Bore Commenced 27.11.69 — Completed 27.11.69 — Driller Merrin

Bore Logged by R.G. Wright, B. Leeson — On 27.11.69 — Hirer D.M.

OBJECT: To test Mt. Mitchell Tin-bearing greisen zone.

RESULTS: Intersected weathered and fresh granite with minor greisen veins. Tin assaysed less than 0.1%.

From	To	Sn in p.p.m.	Description
0	6	40	Medium to coarse grained kaolinized granite with 30% of calcretised granite.
6	12	30	Medium to coarse grained kaolinized granite with 20% grey quartz-rich greisen fragments.
12	18	30	As above with 50% grey quartz greisen fragments.
18	24	10	Medium to coarse grained kaolinized granite with 20% quartz greisen fragments.
24	30	20	Coarse grained kaolinized granite with 1-2% greisen fragments.
30	36	50	As above.
36	42	70	As above. 10% greisen fragments.
42	48	20	Medium to coarse grained kaolinized granite with 5% quar greisen.
48	54	10	Medium to coarse grained kaolinized granite.
54	60	40	Coarse grained kaolinized granite with 40% quartz greisen.
60	66	<10	Coarse grained kaolinized granite.
66	72	10	Medium to coarse grained kaolinized granite with 20% grey quartz greisen.
72	78	30	Coarse grained kaolinized granite with 20% grey quartz greisen fragments.
78	84	20	Coarse grained kaolinized granite with 5% quartz greisen fragments.
84	90	70	Coarse grained kaolinized granite with 10-15% quartz greisen fragments. Minor cassiterite on quartz fragments.

From	To	Sn in p.p.m.	Description
90	96	50	Coarse grained kaolinized granite with 5-10% quartz greisen fragments. No cassiterite.
96	102	30	As above.
102	108	30	Coarse grained fairly fresh granite consisting of approx. 50% quartz, 45% feldspar (some kaolinized); 5% greisen.
108	114	20	Coarse grained granite; feldspar quite fresh though some kaolinization. 5% greisen.
114	120	30	As above.
120	126	30	Low yield of coarse material. Quartz fragments; minor kaolinized feldspars. Surface material.
126	132	20	Fresh coarse grained granite, slightly kaolinized; with 5% quartz greisen fragments.
132	138	40	Fresh pink coarse grained granite with 10% quartz greisen
138	144	40	Coarse grained granite as above with 10% quartz greisen.
144	150	40	Fresh coarse grained granite as above with 10% quartz greisen.
	150		END OF HOLE.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 2

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — HD. — Co. — Serial No. 930/

Collar Coords. 300N 030W — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 28.11.69 — Completed 28.11.69 — Driller Merrin

Bore Logged by R.G. Wright, B. Leeson — On 28.11.69 — Hirer D.M.

OBJECT: To test Mt. Mitchell tin-bearing Greisen Zone.

RESULTS: Intersected weathered and fresh granite with minor greisen material veins. Trace cassiterite below 60 ft. Hole assayed less than 1% tin.

From	To	Sn in p.p.m.	Description
0	6	20	Medium grained kaolinized 'granite' with 5% quartz greisen fragments.
6	12	40	Coarse to medium grained kaolinized 'granite' with 1-2% quartz greisen fragments.
12	18	60	Coarse grained kaolinized granite with some white quartz veining. About 10% quartz greisen fragments.
18	24	40	Coarse grained kaolinized granite with minor quartz veining. About 1-2% quartz greisen fragments.
24	30	<70	Coarse grained kaolinized granite with 1-2% quartz greisen fragments.
30	36	50	Coarse grained kaolinized granite with 5% quartz greisen fragments.
36	42	60	Coarse grained kaolinized granite with 1-2% quartz greisen fragments.
42	48	20	Coarse grained kaolinized granite with 1-2% quartz greisen fragments.
48	54	30	Coarse grained part kaolinized-part fresh granite with 1-2% quartz greisen fragments.
54	60	50	Ditto.
60	66	10	Coarse grained part kaolinized and partly fresh granite. Minor quartz greisen fragments. Trace cassiterite on quartz.
66	72	10	Fairly fresh coarse grained granite. Some kaolinization. 1-2% quartz greisen fragments. Trace cassiterite on quartz.
72	78	10	Ditto. No cassiterite.

From	To	Sn in p.p.m.	Description
78	84	10	Fairly fresh granite - some kaolinized feldspar. Minor greisen fragments. Trace tin on quartz grains.
84	90	10	Ditto.
90	96	<10	Quartz fresh coarse grained granite. Minor kaolin. No tin 1% quartz greisen fragments.
96	102	10	Fresh pink coarse grained granite with minor kaolin with trace red-brown cassiterite on vein quartz. Trace of quartz greisen fragments.
102	108	20	Fresh coarse grained granite stained with limonite and with 1-2% kaolinized fragments. Quartz greisen fragments about 1-2%.
108	114	20	Fresh medium to coarse grained granite with 10% grey quartz greisen fragments.
114	120	<10	Ditto.
120	126	<10	Fresh medium to coarse grained granite as above with 1-2% quartz greisen fragments.
126	132	<10	Fresh medium coarse grained granite as above with traces of cassiterite or ilmenite in quartz, and 1% quartz greisen.
132	138	<10	Fresh medium to coarse grained granite with traces of cassiterite or ilmenite in quartz.
138	144	<10	Fresh granite as above with occasional flakes of muscovite and traces of cassiterite or ilmenite in quartz.
144	150	<10	Fresh medium to coarse grained granite as above with flakes of muscovite and strong traces of cassiterite or ilmenite in quartz.
	150		END OF HOLE

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 3

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/7

Collar Coords. 100N 85W — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 28.11.69 — Completed 28.11.69 — Driller Merrin

Bore Logged by R.G. Wright — On 28-29.11.69 — Hirer D.M.

OBJECT: To test Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected weathered and fresh granite with veins or zones of quartz greisen. Trace cassiterite.

From	To	Sn in p.p.m.	Description
0	6	10	Fine to medium grained kaolinized granite with 20% fine fragments of calcretised granite.
6	12	10	Fine to medium grained kaolinized granite with 1-2% calcretised granite fragments.
12	18	10	Fine to medium grained kaolinized granite with 1% of calcrete.
18	24	30	Medium to coarse grained kaolinized granite with 25% grey quartz mica greisen.
24	30	<10	Medium to coarse grained kaolinized granite with several grains of crystalline quartz containing small crystals of cassiterite:- trace only.
30	36	10	Medium to coarse grained partly kaolinized granite with 10% quartz greisen fragments.
36	42	<10	Medium to coarse grained partly kaolinized granite with trace of cassiterite in vein quartz.
42	48	30	Coarse to medium grained part kaolinized part fresh granite in the 30% quartz greisen fragments.
48	54	10	Coarse to medium grained kaolinized granite with 30% grey quartz greisen fragments.
54	60	10	Fresh coarse to medium grained granite with about 20% still kaolinized and with 20% quartz greisen fragments.
60	66	<10	Fresh medium to coarse grained granite with 20% quartz greisen fragments.
66	72	<10	Fresh medium to coarse grained granite as above with 20% quartz greisen fragments.

From	To	Sn in p.p.m.	Description
72	78	<10	Fresh medium to coarse grained granite with occasional flakes of muscovite and 10% quartz greisen fragments.
78	84	<10	Fresh medium to coarse grained granite as above with 20% quartz greisen fragments with traces of cassiterite in quartz.
84	90	30	Fresh granite with flakes of muscovite, as above, with 40% quartz greisen fragments.
90	96	10	Fresh granite with minor muscovite and 50% quartz greisen fragments.
96	102	30	Fresh, medium-coarse grained granite with 40% quartz greisen fragments.
102	108	20	Fresh medium-coarse grained granite as above with 50% quartz greisen fragments. Traces of biotite in quartz.
108	114	20	Fresh, medium-coarse grained granite with 50% quartz greisen and traces of biotite in quartz.
114	120	10	Fresh granite as above with 1-2% brownish biotite or muscovite knots. Some traces of cassiterite in vein quartz.
120	126	20	Fresh granite as above with <1% biotite knots. About 1-2% quartz greisen fragments.
126	132	20	Fresh granite as above with 5% quartz greisen fragments and a few knots of biotite.
132	138	10	Fresh coarse grained granite with 15% haematite stained quartz greisen fragments with a trace of cassiterite in quartz.
138	144	10	Granite as above <5% quartz greisen.
144	150	40	Granite as above with 40% quartz greisen.
	150		END OF HOLE

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 4

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/7

Collar Coords. 100N 030W — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 29.11.69 — Completed 1.12.69 — Driller Merrin

Bore Logged by R.G. Wright, — On 29.11-1.12.69 — Hirer D.M.

OBJECT: To test Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected weathered and fresh granite with frequent greisen zones. Quartz vein(s) from 36-42 ft. Trace cassiterite 42-48', 108-138'.

From	To	Sn in p.p.m.	Description
0	6	20	Coarse grained kaolinized granite with 60% quartz greisen fragments.
6	12	30	Medium to coarse grained kaolinized granite with 40% quartz greisen.
12	18	30	Medium to coarse grained kaolinized granite with 1-2% quartz greisen
18	24	20	Medium to coarse grained kaolinized granite
24	30	20	Medium to coarse grained part kaolinized-part fresh granite.
30	36	20	Medium to coarse grained granite as above - part kaolinized.
36	42	100	Vein quartz with 30% grey quartz greisen and 5% medium to coarse grained granite.
42	48	100	Coarse to medium grained granite with 20% quartz greisen fragments and trace of cassiterite in quartz.
48	54	100	Medium to coarse grained granite with 1-2% quartz greisen fragments.
54	60	100	Medium grained kaolinized granite with 40% grey quartz greisen fragments.
60	66	50	Medium to coarse grained kaolinized granite with 20% quartz greisen.
66	72	30	Medium to coarse grained ½ kaolinized ½ fresh granite with 30% quartz greisen fragments.
72	78	20	Medium to coarse grained fresh pink granite with occasional flakes of biotite. Sample contains 20% quartz greisen fragments.

From	To	Sn in p.p.m.	Description
78	84	30	Fresh granite as above with 10% quartz greisen fragments.
84	90	30	Fresh medium grained granite with 5% quartz greisen fragments.
90	96	20	Fresh medium grained granite as above with 5% quartz greisen fragments.
96	102	50	Fresh medium grained granite as above with 10% quartz greisen fragments.
102	108	20	Fresh medium grained granite as above with 5% quartz greisen fragments.
108	114	20	Fresh medium grained granite containing occasional flakes of biotite and muscovite. Trace of cassiterite in light brown vein quartz.
114	120	<10	Fresh medium grained granite as above.
120	126	<10	Fresh medium grained granite as above with traces of cassiterite in light brown quartz.
126	132	<10	Medium grained granite as above with trace of cassiterite and knots of biotite in brown quartz.
132	138	<10	Medium grained granite as above with 1-2% quartz greisen fragments and traces of cassiterite and biotite in brown vein quartz.
138	144	20	Medium grained granite as above with 40% quartz greisen fragments. About 1% of the sample consists of fragments of fine grained biotite masses with light brown internal reflections - looks similar to cassiterite but is much softer and flaky when broken.
144	150	10	Medium grained granite as above with 20% quartz greisen fragments.
	150		END OF HOLE

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 5

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/70

Collar coords. 100S 60W — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 1.12.69 — Completed 2.12.69 — Driller Merrin

Bore Logged by R. G. Wright — On 1.12.69-2.12.69 — Hirer D.M.

OBJECT: To test Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected weathered and fresh biotite granite with minor quartz greisen zones. Trace cassiterite at 132'-138'. Assayed less than 0.1% tin.

From	To	Sn in p.p.m.	Description
0	6	<10	Medium grained kaolinized and calcretised granite with 40% ferruginous and manganiferous material.
6	12	20	Medium grained kaolinized granite as above
12	18	20	Medium to coarse grained kaolinized granite as above.
18	24	<10	Medium to coarse grained kaolinized granite with 30% quartz greisen fragments.
24	30	30	Medium to coarse grained kaolinized granite with 20% quartz greisen fragments.
30	36	20	Medium to coarse grained kaolinized granite with 5% quartz greisen fragments.
36	42	40	Medium to coarse grained kaolinized granite with 1-2% quartz greisen fragments.
42	48	70	Medium to coarse grained kaolinized granite as above with 30% quartz greisen.
48	54	40	Medium to coarse grained kaolinized granite with 50% quartz greisen.
54	60	30	Medium grained kaolinized granite as above with 40% of the sample being fresh pink feldspar.
60	66	30	Medium grained granite ½ fresh ½ kaolinized with 5% quartz greisen.
66	72	20	Fresh medium to coarse grained granite with 20% grey quartz greisen.
72	78	20	Fresh medium to coarse grained granite with 1-2% quartz greisen.
78	84	20	Fresh medium to coarse grained granite with 5% silicified material (caved).

From	To	Sn in p.p.m.	Description
84	90	40	Fresh granite as above with 5% fragments of fine grained biotite rich granite.
90	96	20	Granite as above with 10% biotite rich fragments and 1-2% quartz greisen.
96	102	20	Granite with 10% biotite rich fragments as above.
102	108	30	Granite with 10% biotite rich fragments and 1-2% quartz greisen.
108	114	30	Granite with 5% biotite-rich fragments and trace of quartz greisen.
114	120	<10	Granite as above with 1-2% biotite rich fragments.
120	126	40	Fresh medium grained granite with 5% black biotite-rich fragments.
126	132	20	Granite as above with 5% fine grained biotite-rich fragments and 1-2% quartz greisen.
132	138	20	Medium grained granite, part kaolinized with 1-2% ferruginous material and trace of quartz greisen. One grain of quartz contains small crystals of cassiterite.
138	144	30	Medium grained part kaolinized granite as above with 1-2% limonite-haematite fragments. About 1% of the sample consists of fine grained biotite fragments.
144	150	50	50% of the sample consists of surface calcrete fragments which have collapsed from the collar of the hole. Remainder is medium grained granite as above.
	150		END OF HOLE.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 6

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/70

Collar Coords. 100S 020E — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 2.12.69 — Completed 2.12.69 — Driller Merrin

Bore Logged by R.G. Wright — On 2.12.69 — Hirer D.M.

OBJECT: To test Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected weathered and fresh biotite granite with greisen zones. No cassiterite observed in hole. Assay less than 0.1% Sn.

From	To	Sn in p.p.m.	Description
0	6	20	Medium grained kaolinized granite with 40% brown calcrete material.
6	12	<10	Medium to coarse grained kaolinized granite.
12	18	<10	Coarse grained kaolinized granite.
18	24	30	Medium to coarse grained kaolinized granite.
24	30	20	Medium grained kaolinized granite.
30	36	40	Medium grained kaolinized granite with 50% quartz greisen
36	42	40	Medium to coarse grained kaolinized granite with 40% quartz greisen.
42	48	160	Medium to coarse grained kaolinized granite with 30% quartz greisen.
48	54	50	Coarse grained kaolinized granite with 50% quartz greisen
54	60	50	Medium to coarse grained kaolinized granite with 20% moderately fresh feldspar and 50% quartz greisen.
60	66	50	Medium grained kaolinized granite - part fresh with 70% quartz greisen fragments.
66	72	30	Medium grained 50% kaolinized 50% fresh granite with 40% quartz greisen fragments.
72	78	30	Medium grained dominantly fresh granite (30% kaolinized) with 50% quartz greisen fragments.
78	84	20	Medium grained fresh granite containing occasional flakes and fine grains of biotite. About 30% of sample is grey quartz greisen fragments.

From	To	Sn in p.p.m.	Description
84	90	20	Medium to coarse grained fresh granite with 5% quartz greisen fragments.
90	96	40	Medium to coarse grained fresh granite with 5% quartz greisen fragments.
96	102	<10	Medium grained granite as above with 5% quartz greisen fragments.
102	108	<10	Medium grained granite as above with 1-2% quartz greisen fragments and a trace of magnetite in light brown veins
108	114	20	Medium grained granite as above.
114	120	20	Medium grained granite as above with 1-2% quartz greisen
120	126	30	Medium grained granite as above with 1-2% of the fragments containing small grains of magnetite.
126	132	<10	Medium grained fresh granite with 1-2% quartz greisen. About 1% of the granite fragments contain small grains of magnetite.
132	138	10	Medium grained granite as above with 1-2% quartz greisen. Traces of magnetite.
138	144	<10	Medium grained granite as above with 1-2% quartz greisen. Traces of magnetite and occasional biotite flakes and fine grained aggregate.
144	150	20	Medium grained fresh granite as above. About 1% of the fragments contain small grains of magnetite.
	150		END OF HOLE

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 7

Project Earea Dam/Glenloth — D.M. 2026/64

SEC. — HD. — CO. — Serial No. 930/70

Collar Coords. 300S 040W — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 2.12.69 — Completed 4.12.69. — Driller Merrin

Bore Logged by R.G. Wright — On 2.12.69-4.12.69 — Hirer D.M.

OBJECT: To test Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected weathered and fresh medium to coarse grained granite with quartz greisen zones. No cassiterite observed. Assay less than 0.1% tin.

From	To	Sn in p.p.m.	Description
0	6	<10	Medium grained kaolinized granite with 60% calcrete material.
6	12	<10	Medium to coarse grained kaolinized granite as above.
12	18	20	Medium to coarse grained kaolinized granite as above with 60% quartz greisen fragments.
18	24	20	Medium to coarse grained kaolinized granite with 40% quartz greisen fragments.
24	30	<10	Medium to coarse grained kaolinized granite with 5% quartz greisen fragments.
30	36	20	Medium to coarse grained kaolinized granite with 30% quartz greisen fragments.
36	42	<10	Medium to coarse grained kaolinized granite with 20% quartz greisen fragments.
42	48	<10	Medium to coarse grained kaolinized granite with 30% fresh feldspar grains.
48	54	<10	Medium to coarse grained (½ fresh ½ kaolinized) with scattered flakes of biotite.
54	60	<10	Medium grained mainly fresh granite with biotite and grains of (?)ilmenite in the quartz and feldspar. About 1% of sample is quartz greisen.
60	66	<10	Medium to coarse grained granite with occasional biotite flakes as above. About 1% of the quartz or granite fragments contain small grains of ilmenite.

From	To	Sn in p.p.m.	Description
66	72	<10	Fresh medium grained biotite granite as above with small grains of ilmenite in 1% of the fragments.
72	78	<10	Fresh medium grained biotite granite as above with ilmenite grains.
78	84	<10	Part kaolinized granite as above with minor grains of ilmenit
84	90	10	Fresh biotite granite as above with scattered grains of ilmenite.
90	96	20	Granite as above - part kaolinized and with scattered grains of ilmenite-magnetite. About 1-2% grains of quartz greisen.
96	102	30	Medium grained biotite granite - part kaolinized with traces of ilmenite and 1-2% quartz greisen fragments.
102	108	10	Granite as above but with 5% quartz greisen fragments.
108	114	10	Medium grained fresh granite with only occasional traces of ilmenite and 5% quartz greisen.
114	120	20	Medium grained fresh biotite granite with traces of ilmenite and 20% quartz greisen fragments.
120	126	10	Fresh granite as above with 20% quartz greisen fragments.
126	132	10	Fresh medium grained granite as above with 10% quartz greisen
132	138	30	Fresh granite with minor biotite and no ilmenite and 10% quartz greisen.
138	144	20	Fresh granite as above between 132-138' with 20% quartz greisen fragments.
144	150	<10	Fresh granite as above with 30% quartz greisen fragments.
	150		END OF HOLE

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 8

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/7[illegible]

Collar Coords. 300S 040E — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 4.12.69 — Completed 5.12.69 — Driller Merrin

Bore Logged by R.G. Wright and B. Leeson — On 4.12.69-5.12.69 — Hirer D.M.

OBJECT: To test the Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected weathered and fresh medium to coarse grained granite with one zone of quartz greisen. Traces of ilmenite and ?cassiterite. Assayed less than 0.1% throughout.

From	To	Sn in p.p.m.	Description
0	6	10	Dominantly calcrete material with 10% medium grained granite
6	12	40	Medium grained kaolinized granite with 5% greisen veining.
12	18	30	Medium grained kaolinized granite with 50% quartz greisen fragments.
18	24	10	Medium to coarse grained kaolinized granite with 1-2% quartz greisen fragments.
24	30	<10	Coarse grained kaolinized granite.
30	36	10	Medium grained kaolinized granite with 5% quartz greisen fragments.
36	42	20	As above.
42	48	20	Medium grained kaolinized granite with 1-2% quartz greisen fragments.
48	54	20	As above.
54	60	<10	As above.
60	66	<10	Medium grained kaolinized granite with 5% fresh feldspar and a trace of quartz greisen.
66	72	10	Medium to coarse grained kaolinized granite with trace greisen
72	78	20	Medium to coarse grained partly kaolinized granite with 70% fresh feldspar and 5% quartz greisen.
78	84	20	Dominantly fresh granite with 30% kaolinized granite and 1-2% quartz greisen.
84	90	10	Fresh medium to coarse grained granite with 5% quartz greisen veining.

From	To	Sn in p.p.m.	Description
90	96	20	Fresh medium to coarse grained granite with traces of ilmenite and 5% quartz greisen fragments.
96	102	20	Fresh granite as above with traces of ilmenite and biotite. Sample contains 5% quartz greisen.
102	108	10	As above with 1-2% quartz greisen.
108	114	20	Fresh granite with more common biotite flakes. 1-2% quartz greisen.
114	120	30	Fresh medium to coarse grained granite with scattered flakes of biotite and trace ilmenite.
120	126	20	Fresh medium grained granite
126	132	10	As above
132	138	<10	Fresh medium grained granite with 5% quartz grains. Trace ?cassiterite on quartz grains. Minor biotite.
138	144	<10	Fresh medium grained granite with scattered flakes of biotite and traces of ilmenite.
144	150	<10	Fresh medium grained granite with scattered flakes of biotite and traces of ilmenite. Less than 5% quartz greisen.
	150		END OF HOLE

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 9

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/70

Collar Coords. 500S 040W — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 5.12.69 — Completed 6.12.69 — Driller Merrin

Bore Logged by B. Leeson, K. Harris — On 5.12.69-6.12.69 — Hirer D.M.

OBJECT: To test Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected weathered and fresh granite with veins or zones of quartz greisen. Minor vein quartz. No cassiterite observed. Assayed less than 0.1% Sn.

From	To	Sn in p.p.m.	Description
0	6	20	Medium to coarse grained kaolinized granite with some surface material. About 30-40% of the recovered material is quartz greisen.
6	12	<10	Coarse grained kaolinized granite with minor surface material. 2% quartz greisen fragments.
12	18	<10	Medium grained kaolinized granite with 5% quartz greisen.
18	24	10	Medium grained kaolinized granite with occasional aggregates of biotite.
24	30	<10	Medium grained kaolinized granite. Plentiful small flakes of biotite associated with the feldspar.
30	36	20	Medium grained kaolinized granite. 40% quartz greisen. Minor vein quartz.
36	42	<10	Medium grained kaolinized granite with 50% quartz greisen fragments.
42	48	<10	Medium grained partly kaolinized granite; few biotite flakes. 20% quartz greisen.
48	54	<10	Medium grained partly kaolinized granite with few biotite flakes. 15% quartz greisen.
54	60	<10	Medium grained fresh granite with flakes and aggregates of biotite. 2% quartz greisen.
60	66	<10	Medium grained fresh granite with 15% quartz greisen.
66	72	10	Medium grained fresh granite with common small biotite flakes. 15% quartz greisen.

From	To	Sn in p.p.m.	Description
72	78	<10	Medium grained fresh pink granite. 5% quartz greisen fragments.
78	84	10	Medium grained fresh granite with plentiful biotite. 2% quartz greisen.
84	90	<10	Medium grained fresh granite with plentiful biotite. 5-10% quartz greisen.
90	96	30	Medium grained fresh granite with plentiful flakes of biotite. 5% quartz greisen.
96	102	20	Medium grained fresh granite with plentiful flakes of biotite. Quartz greisen 5-10%.
102	108	<10	Fresh biotite granite with 5% quartz greisen.
108	114	<10	Medium grained fresh granite with flakes and aggregates of biotite. 5-10% quartz greisen.
114	120	30	Fresh medium grained biotite granite with 5-10% quartz greisen.
120	126	30	Medium grained fresh biotite granite.
126	132	20	Medium grained fresh granite with 5% quartz greisen.
132	138	10	As above. Minor vein quartz.
138	144	10	Fresh biotite granite with 10% quartz greisen.
144	150	20	Fresh granite with 2% quartz greisen.
	150'		END OF HOLE.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 10

Project Earea Dam/ Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/70

Collar Coords. 500S 040E — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 6.12.69 — Completed 6.12.69 — Driller Merrin

Bore Logged by B. Leeson — On 6.12.69 — Hirer D.M.

OBJECT: To test Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected weathered and fresh medium grained granite, with quartz greisen veining. Chloritic ?shear zone at 36-48 ft. No cassiterite observed. Assayed less than 0.1% Sn.

From	To	Sn in p.p.m.	Description
0	6	10	Surface material; silcrete fragments probably from transported boulder.
6	12	20	Medium grained kaolinized granite.
12	18	30	Medium grained kaolinized granite with 15% quartz greisen fragments.
18	24	<10	Medium grained partly kaolinized granite; about 1/3 of the feldspars are fresh and pink. 5% quartz greisen fragments.
24	30	10	Medium grained partly kaolinized biotite granite; about 40% of the feldspars are fresh. The biotite generally occurs in aggregates. 5% quartz greisen fragments.
30	36	10	Essentially fresh medium grained granite with few kaolinized feldspars. 5-10% quartz greisen fragments.
36	42	10	Fresh medium grained pink slightly chloritic granite. Minor kaolinization. 15% quartz greisen fragments.
42	48	70	Medium grained kaolinized and slightly chloritic granite; approximately 50% of the feldspars are kaolinized. 15% quartz greisen fragments.
48	54	50	Essentially fresh medium grained pink granite; 10% of the feldspars are kaolinised. 50% of the material is a quartz greisen.
54	60	20	Medium grained fresh granite. 10% quartz greisen fragments.
60	66	20	Fresh medium grained biotite granite with trace chlorite. 20% quartz greisen.
66	72	10	Fresh medium grained granite with 5% quartz gresien fragments.

From	To	Sn in p.p.m.	Description
72	78	10	Essentially fresh medium grained pink granite; minor kaolinization. 5% quartz greisen.
78	84	10	Fresh medium grained biotite granite with 5% quartz greisen.
84	90	10	Fresh medium grained biotite granite with 5-10% quartz greisen.
90	96	20	Fresh medium grained biotite granite with 5-10% quartz greisen. Low yield of coarse material - ? indicated a much finer grained granite than above.
96	102	30	As above.
102	108	20	As above.
108	114	20	As above.
114	120	50	As above.
120	126	10	As above.
126	132	30	Essentially fresh medium grained biotite granite with approximately 10% coarse kaolinized feldspars. 2% quartz greisen.
132	138	40	As above.
138	144	20	As above; large biotite flakes.
144	150	10	Essentially fresh medium grained biotite granite with 5% of the feldspars kaolinized. Large flakes of mica. Less than 2% quartz greisen.
	150		END OF HOLE.

Note:- The low yield of coarse material is more probably a function of drilling (worn bit) than a change of rock-type.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 11

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/70

Collar Coords. 700S 020W — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 6.12.69 — Completed 8.12.69 — Driller Merrin

Bore Logged by B. Leeson — On 8.12.69 — Hirer D.M.

OBJECT: To test the Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected partly kaolinized and fresh granite, with one major zone of dark quartz greisen. No cassiterite observed. Assayed less than 0.1% Sn.

From	To	Sn in p.p.m.	Description
0	6	<10	Surface material. Kunkar[1]
6	12	<10	Coarse grained kaolinized granite with 5% fresh feldspars.
12	18	<10	As above.
18	24	30	Medium to coarse grained partly kaolinized biotite granite; about 40% of the felspars are fresh. Biotite in clots of tiny flakes.
24	30	70	Medium to coarse grained partly kaolinized granite; 50% of the feldspars are fresh. 50% of the recovered material is very dark grey quartz greisen[2].
30	36	30	As Above; 70% of the feldspars are fresh.
36	42	30	As above. Minor chlorite.
42	48	<10	Dark grey quartz greisen. 5% granite material.
48	54	30	50% dark grey quartz greisen; 50% essentially fresh granite (with about 10% of the feldspars kaolinized). Minor chlorite.
54	60	20	As above.
60	66	30	Essentially fresh granite; minor kaolinization. 10% dark grey greisen. Minor chlorite.
66	72	20	Fresh medium grained granite. Biotite clots. 5% dark quartz greisen.
72	78	<10	Fresh medium grained granite; 2% of the feldspars are kaolinized. Biotite plentiful as small flakes. 1-2% dark quartz greisen.
78	84	<10	Fresh medium grained pink biotite granite. 1-2% dark quartz greisen.
84	90	10	As above.

From	To	Sn in p.p.m.	Description
90	96	<10	As above; less than 1% greisen.
96	102	<10	Fresh medium grained biotite granite, with minor chlorite. (Low yield of coarse fraction.)
102	108	<10	As above. No chlorite. (Low yield of coarse fraction.)
108	114	<10	Fresh medium grained biotite granite. 1-2% dark quartz greisen. Biotite as obvious flakes. Large clots of tiny micaceous grains of ?biotite.
114	120	<10	As above.
120	126	<10	As above.
126	132	<10	As above.
132	138	<10	As above.
138	144	<10	As above.
144	150	<10	As above.
	150		END OF HOLE.

[1] There is surface material (kunkar, and kaolin grains of near surface origin) throughout the hole.

[2] Identification of this material as quartz greisen is rather doubtful. It is much darker and fine grained than the material described from previous holes, and is less obviously micaceous. It could be a fine grained basic intrusive, or an altered inclusion within the granite.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 12

Project Earea Dam/Glenloth — D.M. 2026/74

Sec. — Hd. — Co. — Serial No. 930/70

Collar Coords. 700S 060E — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 150 ft — Plan Ref.

Date Bore Commenced 8.12.69 — Completed 9.12.69 — Driller Merrin

Bore Logged by B. Leeson — On 8.12.69-9.12.69 — Hirer D.M.

OBJECT: To test the Mt. Mitchell tin-bearing greisen zone.

RESULTS: Passed through weathered and unweathered coarse to medium grained biotite granite. Minor quartz greisen. Iron staining from 36-45 ft. Traces cassiterite between 114 and 120 ft. Assayed less than 0.1% Sn throughout.

From	To	Sn in p.p.m.	Description
0	6	<10	Coarse surface material; kunkar. Weathered granite.
6	12	<10	Near surface material, and more dominant fragments of granite and quartz.
12	18	<10	Coarse to medium grained kaolinized granite, dominant quartz suggests possible quartz veining, although none of the material is of vein quartz appearance.
18	24	<10	Medium grained kalonized granite; some of the feldspars are fairly fresh. Minor biotite. Some surface material.
24	30	<10	As above, minor quartz greisen.
30	36	<10	As above.
36	42	10	As above; considerable iron staining.
42	48	10	Essentially fresh medium grained biotite granite. Considerable iron staining. 5% of the feldspars are kaolinized.
48	54	<10	Fresh medium grained biotite granite. Minor kaolinization. Minor iron staining.
54	60	<10	Essentially fresh medium grained iron stained biotite granite. Biotite flakes. Trace chlorite. 1% quartz greisen.
60	66	10	Fresh medium grained biotite granite. 1-2% quartz greisen.
66	72	10	As above. 5% quartz greisen.
72	78	<10	As above. Minor chlorite.
78	84	<10	Fresh medium grained biotite granite. 10% quartz greisen.

From	To	Sn in p.p.m.	Description
84	90	<10	Fresh medium grained biotite granite. 5-10% quartz greisen.
90	96	20	Fresh medium grained biotite granite. 1% quartz greisen.
96	102	<10	Fresh medium grained biotite granite. Bio-ite flakes common. 5% greisen.
102	108	20	Fresh medium grained biotite granite.
108	114	30	As above. 5% greisen.
114	120	20	Fresh medium grained biotite granite with few muscovite flakes. Minor chlorite. Trace cassiterite, 5-10% greisen.
120	126	40	Fresh medium grained granite. Biotite plentiful. 5% greisen. Low yield of coarse material.
126	132	30	Fresh medium grained biotite granite; minor kaolinization. 1-2% greisen.
132	138	20	As above.
138	144	10	As above.
144	150	<10	As above.
	150		END OF HOLE.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 13

Project Earea Dam/Glenloth — D.M.2026/64

Sec. — Hd. — Co. — Serial No. 930/70

Collar Coords. 900S 020W — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 60 ft — Plan Ref.

Date Bore Commenced 9.12.69 — Abandoned 9.12.69 — Driller Merrin

Bore Logged by B. Leeson — On 9.12.69 — Hirer D.M.

OBJECT: To test the Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected coarse grained granite with zone of 50% dark grey greisen from 36 to 60 ft. No cassiterite observed. Assayed less than 0.1%. Abandoned at 60 ft, 90 ft short of intended depth, for technical reasons.

From	To	Sn in p.p.m.	Description
0	6	<10	Surface material; weathered granite.
6	12	20	Essentially fresh coarse grained granite; minor kaolinization.
12	18	10	Fresh coarse grained granite. Minor biotite and few flakes of muscovite.
18	24	20	Fresh coarse to medium grained biotite granite. Biotite plentiful as flakes and clots. Minor muscovite. Minor quartz greisen.
24	30	<10	As above.
30	36	10	Coarse grained fresh biotite granite. Minor muscovite. 1-2% greisen.
36	42	50	50% coarse grained granite as above; 50% dark grey greisen
42	48	40	As above.
48	54	20	As above.
54	60	10	As above; 40% greisen.
	60		HOLE ABANDONED DUE TO COLLAPSE.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 14

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/70

Collar Coords. 900S 060E — R.L. — Grid No.

Angle 50° — Bearing 090° M — Depth 150 ft — Plan Ref.

Date Bore Commenced 9.12.69 — Completed 10.12.69 — Driller Merrin

Bore logged by B. Leeson — On 9-10.12.69 — Hirer D.M.

OBJECT: To test the Mt. Mitchell tin-bearing greisen zone

RESULTS: Passed through fresh coarse and medium grained biotite granite with minor quartz greisen veining. Trace ?cassiterite between 120 and 132 ft. Assayed less than 0.1% Sn throughout.

From	To	Sn in p.p.m.	Description
0	6	<10	Surface material - kunkar. Fairly fresh coarse grained biotite bearing granite.
6	12	<10	Fresh coarse grained biotite-bearing granite.
12	18	<10	Fresh coarse grained biotite granite. Biotite flakes; occasional muscovite flakes. Minor quartz gresien.
18	24	<10	As above.
24	30	20	Fresh coarse medium grained biotite-bearing granite. Minor chlorite. 5% quartz greisen.
30	36	<10	Fresh coarse to medium grained biotite-bearing granite. 10% quartz greisen. Some surface material.
36	42	<10	Fresh coarse to medium-grained pink biotite granite. Biotite flakes; occasional muscovite. 5-10% greisen. Trace ?ilmenite of ?magnetite.
42	48	<10	Fresh coarse to medium grained pink biotite-bearing granite. Occasional muscovite flakes. Trace ?ilmenite or ?magnetite. 5-10% greisen.
48	54	<10	Fresh medium grained pink biotite-bearing granite. Minor muscovite. 5-10% greisen.
54	60	10	As above.
60	66	<10	As above.
66	72	<10	Medium grained fresh granite with 2% greisen.
72	78	<10	As above. 5% greisen.
78	84	<10	As above.

From	To	Sn in p.p.m.	Description
84	90	<10	Medium grained fresh granite. 1% greisen.
90	96	<10	Fresh medium grained biotite with 10-15% grey quartz greisen.
96	102	10	Fresh pink medium grained biotite granite with 5% greisen.
102	108	<10	As above.
108	114	<10	Fresh pink medium grained biotite granite with 1-2% quartz greisen material.
114	120	<10	As above. ?cassiterite.
120	126	10	Fresh pink medium grained biotite granite.
126	132	10	As above. ?trace cassiterite.
132	138	<10	Fresh pink medium grained biotite granite.
138	144	<10	Fresh pink medium grained biotite granite. Minor quartz greisen.
144	150	20	Medium grained fresh biotite-bearing granite. Minor magnetite. Minor quartz greisen.
	150		END OF HOLE

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 15

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No 930/70

Collar Coords. 1100S 020W — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 108 ft — Plan Ref.

Date Bore Commenced 10.12.69 — Abandoned 12.12.69 — Driller Merrin

Bore Logged by B. Leeson — On 10-12.12.69 — Hirer D.M.

OBJECT: To test the Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected fresh coarse to medium grained granite with minor greisen veins. Trace cassiterite below 72 ft. Assayed less than 0.1% Sn. Hole abandoned at 108 ft.

From	To	Sn in p.p.m.	Description
0	6	<10	Weathered granite with minor greisen.
6	12	<10	Essentially fresh coarse to medium grained biotite granite with minor quartz greisen. About 10% kaolinization.
12	18	<10	As above. Biotite plentiful as tiny flakes.
18	24	<10	Essentially fresh medium grained biotite granite; about 10% kaolinization; plentiful biotite as small flakes.
24	30	<10	Coarse grained essentially fresh biotite granite; about 10% kaolinization.
30	36	<10	Essentially fresh coarse to medium grained biotite granite; about 5% kaolinization.
36	42	10	As above.
42	48	<10	Fresh medium grained biotite granite with trace quartz greisen
48	54	<10	As above.
54	60	<10	As above.
60	66	<10	Medium grained pink muscovite bearing biotite granite.
66	72	<10	Medium grained fresh pink biotite-bearing granite. Minor magnetite.
72	78	20	As above. 1% greisen. Some vein quartz with ?cassiterite.
78	84	<10	As above.

From	To	Sn in p.p.m.	Description
84	90	<10	Coarse to medium grained fresh muscovite-bearing biotite granite. 5% quartz greisen.
90	96	<10	As above. Trace cassiterite on (vein) quartz.
96	102	<10	Fresh medium grained biotite granite.
102	108	<10	As above.
	108		HOLE ABANDONED DUE TO CONTINUAL COLLAPSE.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 16

Project Earea Dam/Glenloth			D.M. 2026/64
Sec.	Hd.	Co.	Serial No.
Collar Coords. 1100S 035E		R.L.	Grid No.
Angle 50°	Bearing 090°M	Depth 18 ft	Plan Ref.
Date Bore Commenced 13.12.69		Completed 13.12.69	Driller Merrin
Bore Logged by B. Leeson		On 13.12.69	Hirer D.M.

OBJECT: To test Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected fresh secondarily silicified coarse grained biotite with minor vein quartz. Trace ?cassiterite. Assayed less than 0.1% Sn throughout. Abandoned at 18 ft.

From	To	Sn in p.p.m.	Description
0	6	<10	Fresh very coarse grained pink granite with 1-2% quartz greisen. Minor vein quartz.
6	12	<10	Fresh coarse grained pink biotite granite. Minor vein quartz.
12	18	<10	Secondarily silicified fresh coarse grained pink biotite granite. Some vein quartz. Trace ?cassiterite.
	18		HOLE ABANDONED DUE TO CONTINUAL COLLAPSE

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION 15
LOG OF WAGON DRILL HOLE. NO. GLW 15A

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/70

Collar Coords. 1072S 51E — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 102 ft — Plan Ref.

Date Bore Commenced 13.12.69 — Completed 13.12.69 — Driller Merrin

Bore Logged by B. Leeson — On 13.12.69 — Hirer D.M.

OBJECT: To test the Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected fresh biotite granite (?porphyritic in places) with inclusions and minor greisens. Major greisen zone 90 - 102 ft. Comprises sheared vein quartz (?series of small veins) carrying minor cassiterite, between 24 and 66 ft. Assayed less than 0.1% Sn throughout.

From	To	Sn in p.p.m.	Description
0	6	<10	Coarse grained fresh biotite granite with minor quartz greisen and vein quartz
6	12	<10	Coarse to medium grained muscovite-bearing biotite granite with 5% quartz greisen. Minor ?sheared vein quartz.
12	18	<10	Medium grained fresh, pink muscovite-bearing biotite-rich granite. 5% quartz greisen.
18	24	<10	Medium grained granite as above. ?some sedondary silicification.
24	30	<10	As above, minor greisen. Occasional small crystals of cassiterite.
30	36	<10	Medium grained fresh muscovite-bearing biotite granite with minor greisen, and sheared ?vein quartz, small crystals of cassiterite not uncommon.
36	42	<10	Medium grained granite as above; minor greisen. Trace to minor cassiterite as small grains in quartz.
42	48	<10	Medium grained fresh biotite-rich, granite; muscovite. Minor quartz greisen. Minor fine-grained rock with green sheared appearance. ?inclusion within the granite.
48	54	10	Fresh granite as above with about 5% fine-grained basic rock (?inclusion or dyke). Minor sheared vein quartz.
54	60	<10	As above; minor greisen.
60	66	10	Fresh medium grained biotite granite with 5% fine-grained basic rock. ?some vein quartz. Trace cassiterite.

From	To	Sn in p.p.m.	Description
66	72	<10	Fresh medium grained ?porphyritic biotite-rich granite. Minor quartz greisen,
72	84	<10	As above; minor fine-grained basic rock.
84	90	<10	Medium grained fresh muscovite-bearing biotite-rich pink granite. Minor fine grained basic rock. Minor greisen. Minor shear-quartz.
90	96	<10	Medium grained granite as above. 50% of material is fine-grained dark grey greisen. Minor sheared vein quartz.
96	102	10	As above.
	102		HOLE COMPLETED.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 17

Project Earea Dam/Glenloth			D.M. 2026/64
Sec.	Hd.	Co.	Serial No. 930/70
Collar Coords. 1063S 85E		R.L.	Grid No.
Angle 50°	Bearing 090°M	Depth 30 ft	Plan Ref.
Date Bore Commenced 13.12.69		Abandoned 13.12.69	Driller Merrin
Bore Logged by B. Leeson		On 13.12.69	Hirer D.M.

OBJECT: To test the Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected 30 ft of coarse to medium grained biotite-rich fresh granite, with sheared vein quartz. No cassiterite observed. Assayed less than 0.1% Sn.

From	To	Sn in p.p.m.	Description
0	6	< 10	Surface material - kunkar. Fresh medium to coarse grained biotite granite. Rare cassiterite grains on quartz.
6	12	10	Fresh medium-grained biotite-rich granite. Minor sheared quartz.
12	18	10	As above. 30% vein quartz.
18	24	< 10	Coarse to medium grained fresh biotite-bearing granite. 15-20% sheared vein quartz.
24	30	< 10	As above.
	30		HOLE ABANDONED DUE TO PERSISTENT COLLAPSE.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION
LOG OF WAGON DRILL HOLE NO. GLW 17A

Project Earea Dam/Glenloth — D.M. 2026/64

Sec. — Hd. — Co. — Serial No. 930/70

Collar Coords. 1063S 105E — R.L. — Grid No.

Angle 50° — Bearing 090°M — Depth 102 ft — Plan Ref.

Date Bore Commenced 14.12.69 — Completed 14.12.69 — Driller Merrin

Bore Logged by B. Leeson — On 14.12.69 — Hirer D.M.

OBJECT: To test the Mt. Mitchell tin-bearing greisen zone.

RESULTS: Intersected fresh coarse to medium grained biotite granite with minor greisen; basic rock from 54 - 102 ft; sheared quartz from 0 - 60, and 78 - 84 ft. Minor cassiterite at 78 - 84 ft. Assayed less than 0.1% Sn throughout.

From	To	Sn in p.p.m.	Description
0	6	30	Fresh coarse-grained biotite-bearing granite. 5% dark grey quartz greisen. Minor, possibly sheared, quartz.
6	12	<10	Fresh coarse to medium grained biotite-rich granite. 10-15% biotite-bearing sheared vein quartz.
12	18	20	Fresh, coarse to medium grained muscovite-bearing biotite-rich granite. 5% quartz greisen. 5% sheared quartz.
18	24	10	As above; 5% greisen, 5% sheared quartz.
24	30	30	Fresh, coarse to medium grained biotite-rich granite as above. 5-10% quartz greisen. 5-10% sheared vein quartz.
30	36	<10	As above.
36	42	20	Fresh medium grained biotite-rich granite with 5% quartz greisen. 10% sheared quartz.
42	48	10	As above.
48	54	<10	Fresh medium-grained granite as above. Minor greisen 15-20% vein quartz with evidence of shearing.
54	60	<10	Fresh coarse to medium grained biotite granite. Minor sheared quartz. 30% dark grey-green fine-grained ?greisen or basic rock.
60	66	20	Medium to coarse grained biotite-rich granite. 10% dark grey-green fine-grained ?basic rock as above. Minor quartz greisen. Minor sheared quartz.
66	72	10	Medium to coarse grained granite as above. 10% dark grey-green rock as above. 1-2% quartz greisen.

From	To	Sn in p.p.m.	Description
72	78	20	Medium-grained fresh biotite-rich granite 5-10% fine-grained ?basic rock as above; minor greisen, ?minor sheared vein quartz.
78	84	<10	Medium grained fresh biotite granite. 5-10% fine-grained grey ?basic as above. Minor quartz greisen. 10% sheared vein quartz. Trace cassiterite on apparently unsheared quartz
84	90	10	Medium grained fresh pink biotite-bearing granite. 5% fine grained ?basic rock as above. ?some vein quartz.
90	96	<10	Medium grained fresh biotite granite. 5-10% ?basic rock as above.
96	102	<10	As above.
	102		END OF HOLE.

PETROGRAPHIC DESCRIPTIONS OF ROCK SAMPLES IN THE EAREA DAM - GLENLOTH AREA

CONYNGHAM ST. FRENVILLE SOUTH AUSTRALIA 5063 TELEPHONE 79 1621 TELEGRAMS "AMDEL" ADELAIDE

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

PLEASE ADDRESS ALL CORRESPONDENCE TO THE DIRECTOR.

OUR REFERENCE: MP 1/14/0
YOUR REFERENCE:

20th June, 1969

The Director,
Department of Mines,
Box 38, Rundle Street P.O.,
ADELAIDE 5000

REPORT MP 3265/69

YOUR REFERENCE:	Application of 10th March, 1969 and appended detailed request sheet.
MATERIAL:	A suite of 11 rocks.
LOCALITY:	Earea Dam, 20 miles west of Kingoonya, S.A.
IDENTIFICATION:	P22/69 to P32/69 inclusive.
DATE RECEIVED:	11th March, 1969.
WORK REQUIRED:	Petrology and mineragraphy as detailed in application.
X-ray Diffraction by:	R.N. Brown.
Electron Probe Microanalysis by:	P.K. Schultz.
Investigation and Report by:	M.J. Wort.
Services Manager:	A.H. Spry.

for N. Draper
Director.

11 ROCK SAMPLES FROM EAREA DAM

Sample P22/69: PTS 22853: PS 12757

Rock Name:
Augite granulite.

Hand Specimen:
Medium grained, even-textured, dark grey, with abundant fine grained disseminated yellowish sulphides. Limonitic on weathered surfaces.

Polished Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	1
Augite	73
Plagioclase	20
Opaques	5
Sphene	0.5 - trace
Rutile	trace

The texture is very granular, and dominated by augite with subordinate labradorite of composition about An_{54}. Some of the labradorite shows pericline twinning. Average grain size of the pyroxene and feldspar is 0.63-0.7 mm. The sphene is pleochroic in reddish-browns and occurs in grains from 0.049 to 0.14 x 0.42 mm. Some grains resemble cassiterite, but electron probe microanalysis confirmed that the mineral is sphene. Many of the sphene grains are closely associated with opaque sulphides or contain inclusions of them. The quartz occurs as relatively fine interstitial grains. Locally it shows a spherulitic habit. Some of the plagioclase contains patches of fine grained ?carbonate alteration.

Polished Section:
Opaque minerals identified occur in the following order of abundance:

Pyrrhotite
» Arsenopyrite
> Chalcopyrite
> Pyrite

Pyrrhotite grains dug out of the polished section were magnetic and yielded a positive borax bead test for iron. The whole polished section has a weak magnetic response. The pyrrhotite grains commonly contain relatively fine grained chalcopyrite near their grain boundaries. Fine grained chalcopyrite also occurs discretely in gangue. Pyrrhotite also occasionally contains inclusions of pyrite and of subhedral arsenopyrite - again generally near the grain margins, although arsenopyrite may occur near the pyrrhotite core. Commonly the pyrite is separated from the pyrrhotite by a thin intervening irregular layer of gangue.

Coarse arsenopyrite may be weakly zoned, and carry peripheral pyrrhotite. Etching with HNO_3 accentuates the zoning, the marginal zones being less corroded.

Fine grained discrete pyrrhotite may occur along grain boundaries in the gangue, producing irregular trains.

The density of sulphide mineralisation is fairly high.

Grain Sizes:

Pyrrhotite: 0.56 x 0.21 mm down to 0.007 mm.
Arsenopyrite: 0.42 x 0.35 mm down to 0.014 mm.
Chalcopyrite: 0.048 x 0.176 mm down to 0.021 mm.
Pyrite: 0.096 x 0.064 mm down to 0.0048 mm.

Sample: P23/69: TS 22854

Rock Name:

Deformed leucocratic gneiss.

Hand Specimen:

Essentially a crudely but coarsely foliated quartz-feldspar rock, with feldspar "augen" up to 1.2 cm in diameter.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Quartz	40
K-feldspar	58
Plagioclase	trace
Sericite	0.5
?Epidote	trace
?Tourmaline	trace
Muscovite	trace

Some of the larger quartz grains show strained extinction. Others have developed fibrous lamellae. Fine recrystallized quartz mosaic occurs in coarser quartz along cracks and grain boundaries; also in areas of mixed grain sizes. Two small clusters of pleochroic colourless to yellow ?dravite tourmaline were observed in association with muscovite. Fine sericite, mainly below 0.035 mm in length, occurs concentrated in altered plagioclase, but also in K-feldspars affected by a strong brownish cloudy clay-mineral alteration.
The coarser quartz grains are about 0.11 mm in diameter, but individual K-feldspar grains may cover areas up to 6.5 mm wide. Fine fractures which cut K-feldspar are filled by fine-grained quartz mosaic.

Sample: P24/69: TS 22855

Rock Name:
Vein quartz.

Hand Specimens:
Massive quartz with weakly ironstained joints and streaky solution pits. Sawn surfaces contain pits up to 2 mm long, containing a pinkish-yellow powder. Broken surfaces carry areas of darker brownish and yellowish powders.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	98-99
Leucoxene	trace
?Kaolin	0.5
Sericite and Muscovite	trace-0.5
Rutile	trace

The massive quartz consists of a mosaic of grains with weakly sutured boundaries. Some grains show strained extinction. Within this mozaic, pods of intergrown ?kaolin, muscovite and peripheral leucoxene and limonite occur. A single black opaque aggregate of rutile and leucoxene was observed in reflected light.

Identification of Kaolin:

Pale pink-buff, dull ochre and brownish-ochre powders observed as cavity fillings and coatings in the hand specimens were examined optically and seen to consist of fine quartz flakes and a clay mineral similar to that observed in thin section. X-rays have confirmed that the clay mineral is kaolin.

Sample: P25/69: TS 22856

Rock Name:

Leucocratic Gneiss.

Hand Specimen:

Grey-white, with streaky-granular concordant quartz scattered through a feldspar groundmass. Medium-grained.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Quartz	20
Altered K-feldspar	40
Altered Plagioclase	40
Zircon	trace
Epidote	trace
?Chlorite	trace

The texture is composed of relatively coarse grained pods and streaks of quartz aggregate, set in a matrix of altered K-feldspar and plagioclase of variable grain size. Most of the plagioclase is highly altered by fine sericite, and only relict traces of albite twinning and of occasional pericline twinning remain. A few of the coarser less sericitic K-feldspars have marginal sericitic and myrmekitic grains of finer size. The cores of some of the plagioclase grains carry a colourless ?chlorite mineral.

Sample: P26/69: TS 22857

Rock Name:
Altered granulitic gneiss.

Hand Specimen:
Medium-grained, whitish on weathered surfaces, with accentuated weathering close to dark resistant bands. Sawn surfaces are mottled grey and have a silicified aspect.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	40
Plagioclase	20
Sericite	22
Hornblende	7
Chlorite	5
Rutile	trace-1
Sphene	2
Opaques	2
Muscovite	trace
?Sodic amphibole	trace

The thin section was cut across the junction of two rock "types" - a darker altered rock relatively rich in chlorite, amphiboles and sphene, and a paler, more leucocratic rock with a highly sericitised plagioclase feldspar matrix which becomes progressively less altered until fresh unaltered plagioclase occurs about one inch away from the junction. The sphene is associated with cloudy titania, and at times occurs enclosed by cloudy aggregates. In the darker altered rock some of the quartz is strongly corroded and relatively fine grained. Colourless chlorite here forms dense fine grained aggregates. Hornblende and a dark bluish-green pleochroic ?sodic amphibole also occur forming up to 15% each in localised fields. However, the ?sodic amphibole occurs only in restricted patches within the dark altered zone. Some of the hornblende is fibrous, weakly radiating and locally the ?sodic amphibole carries ferruginous alteration.

Irregular patches of opaques carry fine spots of leucoxene. Most of the fresh plagioclase appears to be calcic andesine but a grain of labradorite An_{58} was observed. Pericline twinning is common. Elongate granular quartz grains are weakly aligned throughout the rock.
Grain size of the sphene ranges from 0.14 x 0.105 mm up to 0.245 x 0.455 mm.

Sample P27/69: PTS 22858

Rock Name:
Pegmatite.

Hand Specimen:
Coarse grained, dominantly pink K-feldspar with minor grey feldspar, and grey quartz. The quartz is streaky and irregular.

Polished Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	15
K-feldspar	83
Plagioclase	trace
Muscovite	0.5
Biotite	trace
Sphene	trace-0.5
Opaques, mainly leucoxene	0.5-1
Epidote	trace
Clay	trace

The K-feldspar is affected by weak to strong, patchy to cloudy clay mineral alteration. Relict sericitised plagioclase of relatively fine grain size occurs within K-feldspar mosaics. Traces of grid-iron twinned ?microcline are also present. The quartz forms granular mosaics locally with weakly sutured grain boundaries. Sphene locally forms aggregates of strongly prismatic crystals, with interstitial ?kaolinitic clay. ?Kaolinitic clay also occurs between layers of muscovite, much of which is intergrown with streaky opaques and limonitic matter.

Leucoxene forms coarse opaque patches with intergrown rutile, sphene, and very fine grained ilmenite, generally below 3 microns in diameter. It also occurs as clouds of very fine grains scattered through altered feldspar. Fibrous altered biotite with marginal opaques also occurs locally.

Sample: P28/69: PS 12574

Rock Name:
Tin-bearing quartz vein.

Hand Specimens:
Fragments of grey to white quartz with local clusters and trains of black cassiterite crystals. One specimen contains growth-zoned prismatic white quartz crystals with marginal cassiterite, set in a grey quartz matrix. A $1\frac{1}{2}$ inch wide vein fragment contains two generations of quartz which line opposing walls - one generation is grey brown; the other is white, coarsely crystalline and locally vuggy.

Polished Specimen:
The matrix consists of grey quartz cut by a few weakly limonitic fractures.
Grain size of the cassiterite ranged from 0.2 mm to 3.2 x 1.6 mm, 2.6 x 1.6 mm. Many of the grains expose subhedral short prisms or almost square sections. Fusing into aggregates is common.
To rule out any possibility of confusion with rutile, confirmatory tests were made with refractive index oils and grains were also "tinned" by reduction with nascent hydrogen.

Sample: P29/69: PTS 22859

Rock Name:
Leucocratic gneiss.

Hand Specimens:
Coarse grained, of intergrown quartz and feldspar with very minor opaques and limonitic matter. One specimen carries yellowish alteration of the feldspars, and rounded "inclusion" areas up to 6 x 9 mm, now filled by limonitic matter.

Polished Thin Section:

An optical estimate of the constituents gives the following:

	%
Quartz	30
K-feldspar	67
Ilmenite	trace
Sericite/muscovite	2
Biotite	trace
Plagioclase	0.5

Broad areas of K-feldspar are cut by concordant pods and linking streaks of quartz mosaic, in which the opaque mineral occurs. Its identification as ilmenite was confirmed by electron probe microanalysis, which failed to detect any wolfram. Biotite and also relict plagioclase feldspar occur in a thin relatively fine grained altered zone immediately adjacent to a 1.5 - 2 mm wide quartz mosaic band. Alteration of the coarse K-feldspar varies from cloudy clay mineral "dust" to relatively coarse sericite. In some grains fine muscovite laths lie oriented parallel with the prism faces of the feldspar. Muscovite aggregates occur at grain boundaries.
Both in the thin section and in the hand specimens, quartz and K-feldspar proportions are very variable - quartz at times forming 50% or more by volume.

Sample: P30/69: PS 12575

Hand Specimen:

Mottled grey quartz with fine weakly limonitic fractures and pocks. Scattered buff to white irregular spots of 2 mm average size and rare black streaks and clots of opaques up to 5 mm long and up to 2 mm wide occur.

Polished Section:

An optical estimate of the constituents gives the following:

	%
Quartz	85
Ilmenite	15
Rutile	trace
Limonite	trace

The identification of the ilmenite was confirmed by electron probe as some grains displayed internal reflections which is rare in ilmenite.
Rutile occurs rarely as small grains at the ilmenite/quartz grain boundary.
Grain size of the ilmenite ranged from 1 x 1.5 mm to 2 x 5 mm in the polished section.

Sample: P31/69: PTS 22860: PS 12576

Rock Name:
Vein quartz.

Hand Specimen:
Mottled grey quartz with fine shining black opaque streaks and clots. Traces of yellowish clay occur in spots on broken surfaces. Weathered surfaces carry weak limonitic staining.

Polished Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	97
Muscovite	trace
?Chalcedony	1
Opaques	1
Epidote	trace
K-feldspar	0.5-1

The opaques are set mainly in quartz, but also in areas of ?chalcedony with marginal intergrown muscovite and weakly iron-stained muscovite. Cloudy K-feldspars of relatively coarse size occur very infrequently, and may contain a flake or two of sericite. In shape the opaques tend to be spiky and irregular. Grain sizes range from 6 microns to 66 microns, with aggregates filling cracks and covering areas up to 0.14 x 0.91 mm.
An X-ray of buff powder filling a pit on a sawn face identified the mineral as chalcedony.

CONYNGHAM ST. FREWVILLE SOUTH AUSTRALIA 5063 TELEPHONE 79 1662 TELEGRAMS 'AMDEL' ADELAIDE

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

PLEASE ADDRESS ALL CORRESPONDENCE TO THE DIRECTOR.

OUR REFERENCE: MP 1/14/0
YOUR REFERENCE:

11th September, 1969.

The Director,
South Australian Department of Mines,
Box 38, Rundle Street Post Office,
ADELAIDE, S.A. 5000

Attention: R.G. Wright.

REPORT MP 295-70

YOUR REFERENCE:	Application dated 17/7/69.
MATERIAL:	Stream sediments (9).
LOCALITY:	Earea Dam.
IDENTIFICATION:	P 189/69 to P 197/69.
DATE RECEIVED:	18/7/69
WORK REQUIRED:	Heavy mineral analysis.

Investigation and Report by: M.J.W. Larrett.

X-Ray Diffraction by: Dr R. Brown.

Services Manager: Dr A.H. Spry.

for N. Draper
Director.

Polished Section:

Powder scratched from the polished section was nonmagnetic and infusible in sodium carbonate and borax fluxes. The very fine grain size and highly perfect cleavage suggested that the mineral was graphite and electron probe micro-analysis confirms the identification since no iron, manganese or molybdenum could be detected.

The graphite areas are highly fragmented to produce micro-mosaics of grains down to a micron to two in size. Discrete flakes, aggregates ranging in size from 0.056 mm to 0.21 mm, and fissure infillings ranging from 0.049 x 0.385 mm to 0.105 x 1.19 mm occur.

Sample: P32/69

Rock Name:

Vein Quartz.

Hand Specimen:

Contains fine irregular vugs containing residual yellow and buff powdery mineral - most having been leached away. Vugs containing fine sericite and greenish-white mica also occur.

Determination of Powdery Mineral:

An X-ray of the yellow buff powder indicated a cubic lattice, but no distinct species could be identified. Some of the powder was subsequently briquetted and analysed by electron probe, as follows:

Tungsten	high
Lead	relatively high
Iron	possibly trace
Silicon	slight
Aluminium	slight

The silicon and aluminium suggest that a fine alumino-silicate of the kaolin group is present. However, the strong tungsten and lead correspond to raspite ($PbWO_4$), a brownish yellow mineral recorded at Broken Hill, New South Wales. The original X-ray pattern obtained corresponds neither to raspite nor to its polymorph stolzite, so that the mineral's identity remains unsolved. Elements sought for without success by electron probe include Sb, Bi, Mo, Ti, Ca, P, V, Zn, Mg, Cu and S.

ct.10

MINERALOGY OF NINE HEAVY MINERAL SUITES FROM EAREA DAM STREAM SEDIMENT SAMPLES

Nine stream sediment samples were submitted for identification of the heavy minerals present, and an indication of relative abundances.

Each sample was oven-dried and subjected to a heavy mineral separation, using TBE (tetrabromoethane S.G. 2.96) as the separating medium, and the results are shown in Table 1.

Representative portions of each of the heavy fractions were obtained by riffling, and these were 'tinned', using hydrochloric acid in a zinc crucible to expose any cassiterite grains which might be present. (The action of HCL plus zinc on cassiterite causes a veneer of grey metallic tin to be formed on the grains, and makes identification easier).

Portions of each of the 'tinned' heavy fractions were examined optically by means of standard R.I. oil mounts to identify the non opaque phases, and to obtain individual volume percentages by grain counts on a minimum of 300 grains. Further portions of each, were mounted as polished briquettes to facilitate identification of the opaque phases present. Grain counts were also carried out on these to obtain individual volume percentages, and the values are shown, together with those for the non opaques, in Table 2.

Identification of some of the non opaques was made difficult by the presence of thin films or coatings of iron-oxides and/or hydroxides on the surfaces of the grains.

1. MINERALOGY

1.1 Non-Opaques

Zircon occurs as colourless, subrounded to subhedral grains containing numerous inclusions, some of which are opaque. Zoning is fairly common in the larger grains.

Rutile was observed as typical dusky red to orange, subrounded grains.

Garnet was present both as subangular pinkish fragments and as colourless to pink, subrounded and well rounded grains containing a few inclusions.

Cassiterite was observed as dark reddish-brown grains up to 0.25 mm diameter, well rounded, and in some cases subrounded.

Monazite occurs as very well rounded grains up to 0.75 mm diameter, showing excellent cleavage, and in most cases covered by a dusky brown ?alteration product.

Topaz was seen as irregular and subangular to subrounded, colourless grains, containing patches of minute 'dusty' opaque inclusions.

All mineral grains in the heavy fractions were, in varying degrees, coated with films of iron oxides and/or hydroxides.

The optical identification of topaz and monazite was verified by x-ray diffraction analysis.

1.2 Opaques

Ilmenite was found to be the dominant opaque mineral present in all fractions and occurs as subangular to subrounded grains, generally fresh and unaltered. Some grains are oxidised to hematite along edges and fractures, and some show partial alteration to leucoxene. A small proportion of the grains have been extensively, and in some instances, completely altered to porous amorphous iron-titanium oxides. A few grains have been completely replaced by leucoxene, which in places has recrystallised to very fine grained rutile. Rare grains were observed which contain oriented exsolution lamellae of hematite.

Martite (oxidised magnetite), was observed as subangular to subrounded, discrete grains, showing in many cases the typical 'Widmanstetten' replacement texture of hematite replacing the magnetite along octahedral planes. The octahedral form of the magnetite host is still evident in many grains, and a few grains contain minor exsolution lamellae of ilmenite.

Goethite was observed as a minor constituent only, and occurs as discrete subrounded, angular, and elongate fragments showing a colloform layered texture or a fine grained porous texture.

Hematite as discrete grains is of limited occurrence, and generally occurs as subangular to rounded grains of fairly coarsely crystalline material containing rare patches of exsolved ilmenite. Magnetite was observed in very minor amounts as discrete, partly rounded octahedra showing little or no evidence of oxidation.

Leucoxene occurs as rare, well rounded grains, composed of porous masses of fine grained titanium oxide derived from the replacement of ilmenite.

All heavy fractions were examined carefully, as requested, under ultra-violet light sources (both long and short wavelength); but the only apparent response obtained was from the zircon and monazite present. The zircons gave a yellowish fluorescence, and the monazite gave a faint greenish response.

Although no tungsten, molybdenum, or tantalum/niobium minerals etc., were detected optically, it is suggested that a semi-quantitative spectrographic analysis may be a fairly rapid and inexpensive method for detecting such minerals, especially if they are in such small concentrations as to be almost non detectable microscopically.

TABLE 1: HEAVY MINERAL CONTENT

Sample No.	Wt. Taken gms.	Wt. of L.F. gms.	Wt. of H.F. gms.	Wt. % H.F.
P 189/69	20.00	8.67	11.33	56.7
P 190/69	20.00	10.26	9.74	48.7
P 191/69	19.63	14.45	5.18	26.4
P 192/69	13.55	5.56	7.99	59.0
P 193/69	20.00	9.01	10.99	54.9
P 194/69	20.00	4.91	15.09	75.4
P 195/69	17.69	6.19	11.50	65.0
P 196/69	14.33	5.80	8.53	59.6
P 197/69	13.73	8.05	5.68	41.3

TABLE 2: VOLUME PERCENTAGES OF INDIVIDUAL MINERALS IN HEAVY FRACTIONS

Sample No.	P. Section No.	Total Opaques	Zircon %	Rutile %	Garnet %	Monazite %	Topaz %	Cassiterite %	Ilmenite %	Martite %	Hematite %
P189/69	12834	82.0	9.0	1.0	2.0	Trace	-	Trace	69.0	4.0	5.0
P190/69	12835	70.0	12.0	1.0	3.0	1.0	1.0	1.0	58.0	7.0	2.0
P191/69	12836	72.0	20.0	1.0	1.0	1.0	1.0	Trace	59.0	6.0	1.0
P192/69	12837	70.0	9.0	1.0	2.0	1.0	13.0	Trace	54.0	12.0	1.0
P193/69	12838	82.0	10.0	1.0	1.0	2.0	1.0	2.0	65.0	9.0	4.0
P 194/69	12839	83.0	7.0	3.0	4.0	2.0	1.0	-	58.0	16.0	2.0
P195/69	12840	83.0	11.0	1.0	3.0	1.0	-	-	65.0	13.0	Trace
P196/69	12841	80.0	16.0	1.0	-	1.0	1.0	-	55.0	12.0	2.0
P197/69	12842	75.0	17.0	1.0	2.0	2.0	1.0	-	45.0	15.0	4.0

Continued.

TABLE 2: CONTINUED

Sample No.	Polished Section No.	Goethite %	Magnetite %	Leucoxene %	"Others" %
P189/69	12834	3.0	1.0	-	6.0
P190/69	12835	1.5	1.5	Trace	11.0
P191/69	12836	4.0	1.0	1.0	4.0
P192/69	12837	1.0	1.0	1.0	4.0
P193/69	12838	1.0	2.0	1.0	1.0
P194/69	12839	5.0	1.0	1.0	Trace
P195/69	12840	4.0	1.0	Trace	1.0
P196/69	12841	7.0	2.0	2.0	1.0
P197/69	12842	8.0	1.0	2.0	2.0

N.B. "Others" consists of trace amounts of amphibole, tourmaline, hypersthene, andalusite, staurolite and epidote.

CONYNGHAM ST. FREWVILLE SOUTH AUSTRALIA 5063 TELEPHONE 79 1662 TELEGRAMS 'AMDEL' ADELAIDE

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

PLEASE ADDRESS ALL CORRESPONDENCE TO THE DIRECTOR.

OUR REFERENCE: MP 1/14/0

YOUR REFERENCE:

10th February, 1970.

The Director,
South Australian Department of Mines,
Post Office Box 38,
Rundle Street Post Office,
ADELAIDE, S.A. 5000

5

REPORT MP 2585-70

YOUR REFERENCE:	Application dated 19/1/70.
MATERIAL:	Black shiny material in quartz vein.
LOCALITY:	Earea dam - Glenloth Project. Quartz vein near Keynella rock hole 4½ miles south of Earea Dam.
IDENTIFICATION:	P12/70,
DATE RECEIVED:	21/1/70.
WORK REQUIRED:	Identification.

Investigation and Report by: Dr R.N. Brown.

Services Manager: Dr A.H. Spry.

for N. Draper
Director.

BLACK SHINY MINERAL

1. MATERIAL

A soft grey-black shiny flaky mineral occurring sporadically in two pieces of vein quartz.

2. TREATMENT

An x-ray diffraction photograph was taken of the material.

3. RESULT

The mineral is graphite.

jjp.1

CONYNGHAM ST. FREWVILLE SOUTH AUSTRALIA 5063 TELEPHONE 79 1662 TELEGRAMS 'AMDEL' ADELAIDE

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES

PLEASE ADDRESS ALL CORRESPONDENCE TO THE DIRECTOR.

OUR REFERENCE: MP 1/14/0

YOUR REFERENCE:

12th February, 1970

The Director,
Department of Mines,
Box 38, Rundle Street P.O.,
ADELAIDE. S.A. 5001.

REPORT MP 2713/70

YOUR REFERENCE:	Application dated 29th January, 1970.
MATERIAL:	One rock chip.
LOCALITY:	Mt. Mitchell Tin Mine, Glenloth Goldfield.
IDENTIFICATION:	P22/70.
DATE RECEIVED:	30th January, 1970.
WORK REQUIRED:	Identification of silvery miner

Investigation and Report by: R. Cooper.

Services Manager: Dr A. H. Spry.

for N. Draper,
Director.

MOLYBDENITE SAMPLE FROM THE MT. MITCHELL TIN MINE, GLENLOTH GOLDFIELD

Sample : P22/70

Location:
Mt. Mitchell Tin Mine, Glenloth Goldfield (Earea Dam - Glenloth Project).

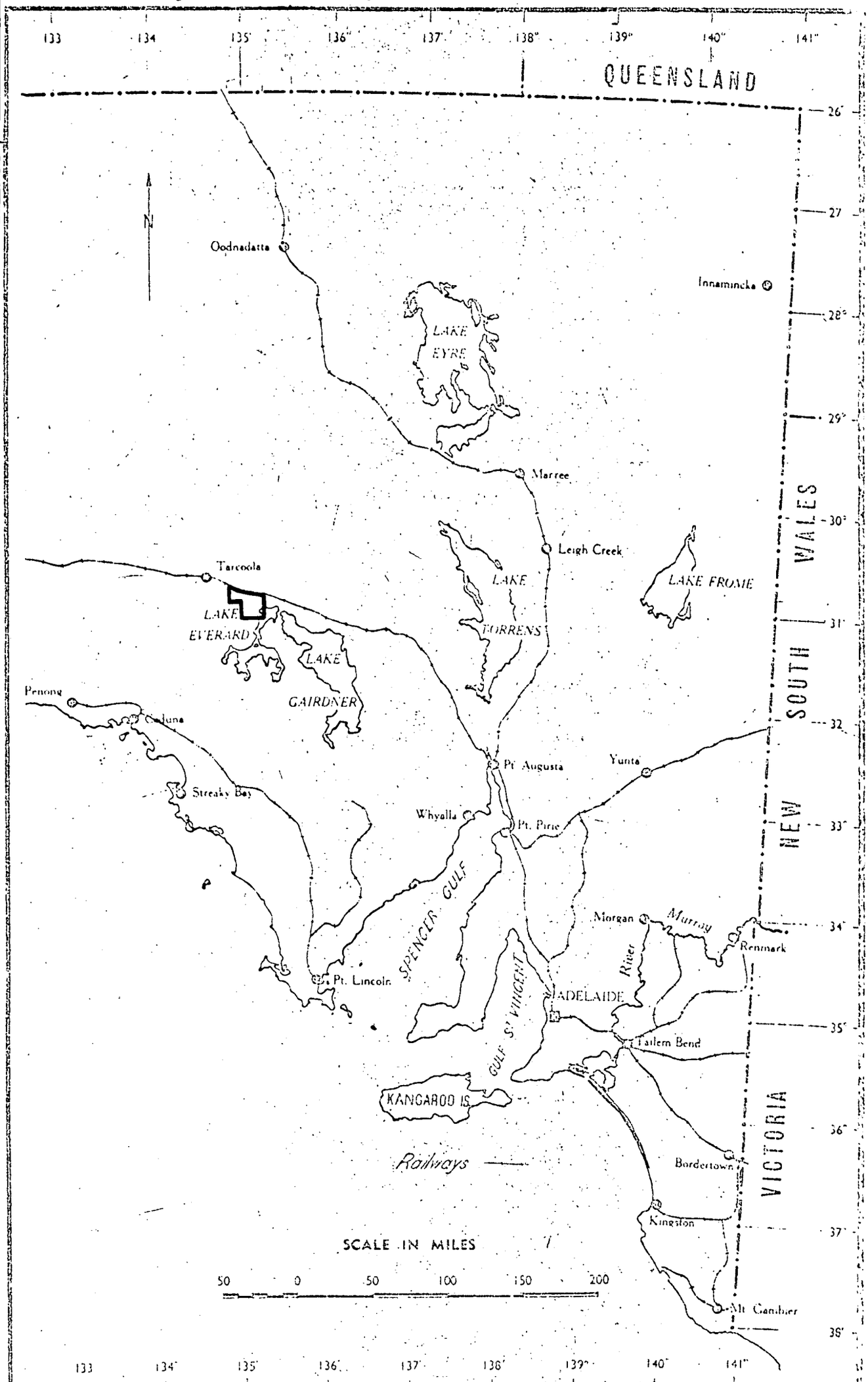
Rock Name:
Vein quartz with fleck of molybdenite.

Hand Specimen:
The sample sent for examination consisted of a fleck of silvery mineral in a chip of quartz.

Thin Section:
An X-ray powder diffraction photograph was taken of the silvery mineral and it proved to be molybdenite.

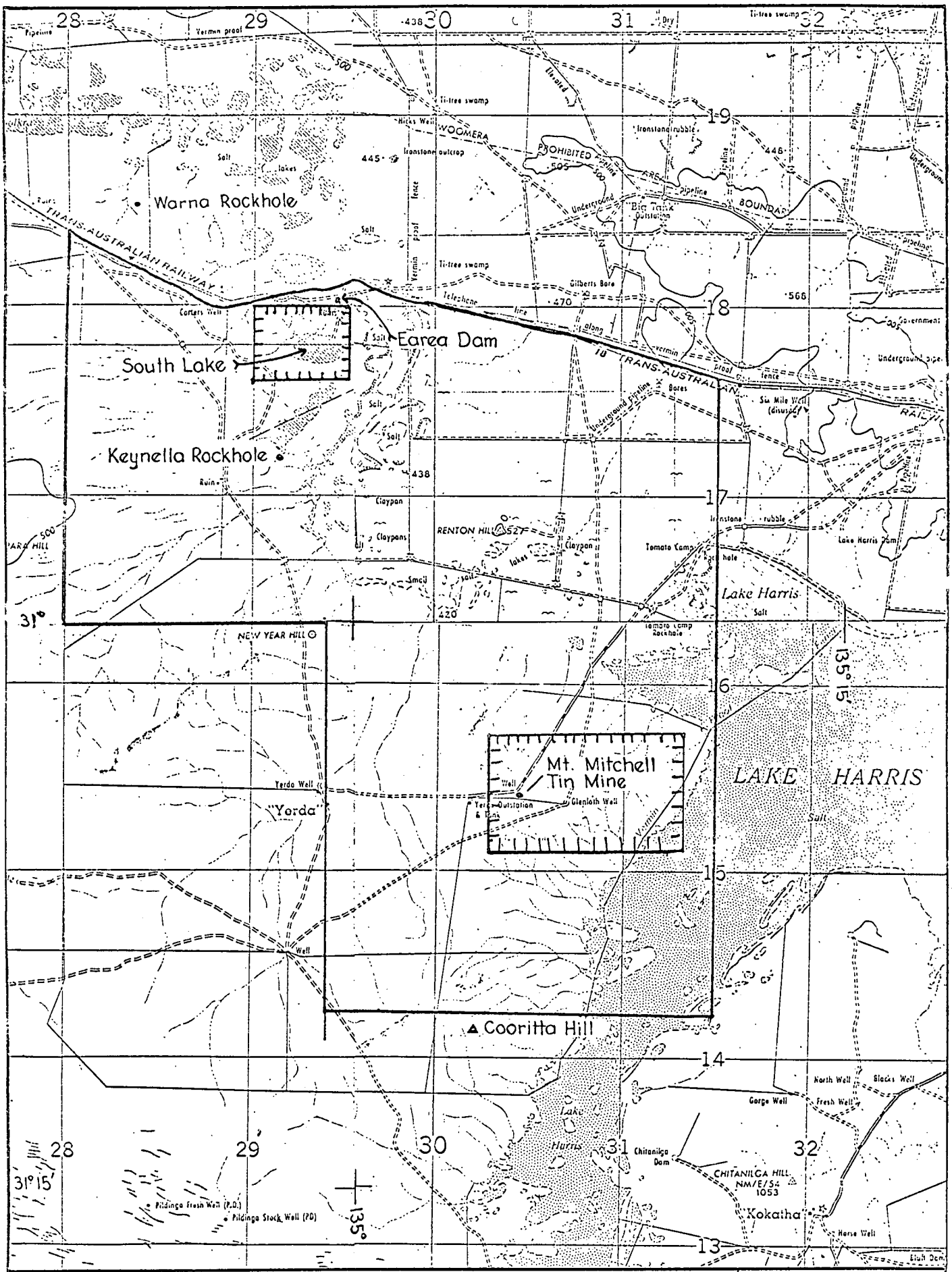
Peaks obtained on photograph.			Compare with molybdenite in ASTM index-card 17-744.		
Peak A°	Intensity	Order	Peak	Intensity	Order
6.1	S	1	6.09	100	1
			3.04	S	
2.7	M-S	4	2.71	70	2 =
2.62	M	5	2.63	60	5 =
2.34	M	6	2.344	60	5 =
2.27	M	7			
2.20	M		2.194	60	5 =
2.03	W		2.034	30	
1.88	W		1.889	40	
1.83	V-W				
1.75	W		1.755	30	
1.58	S	2	1.581	70	2 =
1.53	S	3	1.529	70	2 =
1.36	W		1.363	20	
1.243	M		1.249	40	

S - Strong M - Moderate W-Weak VW - Very Weak.



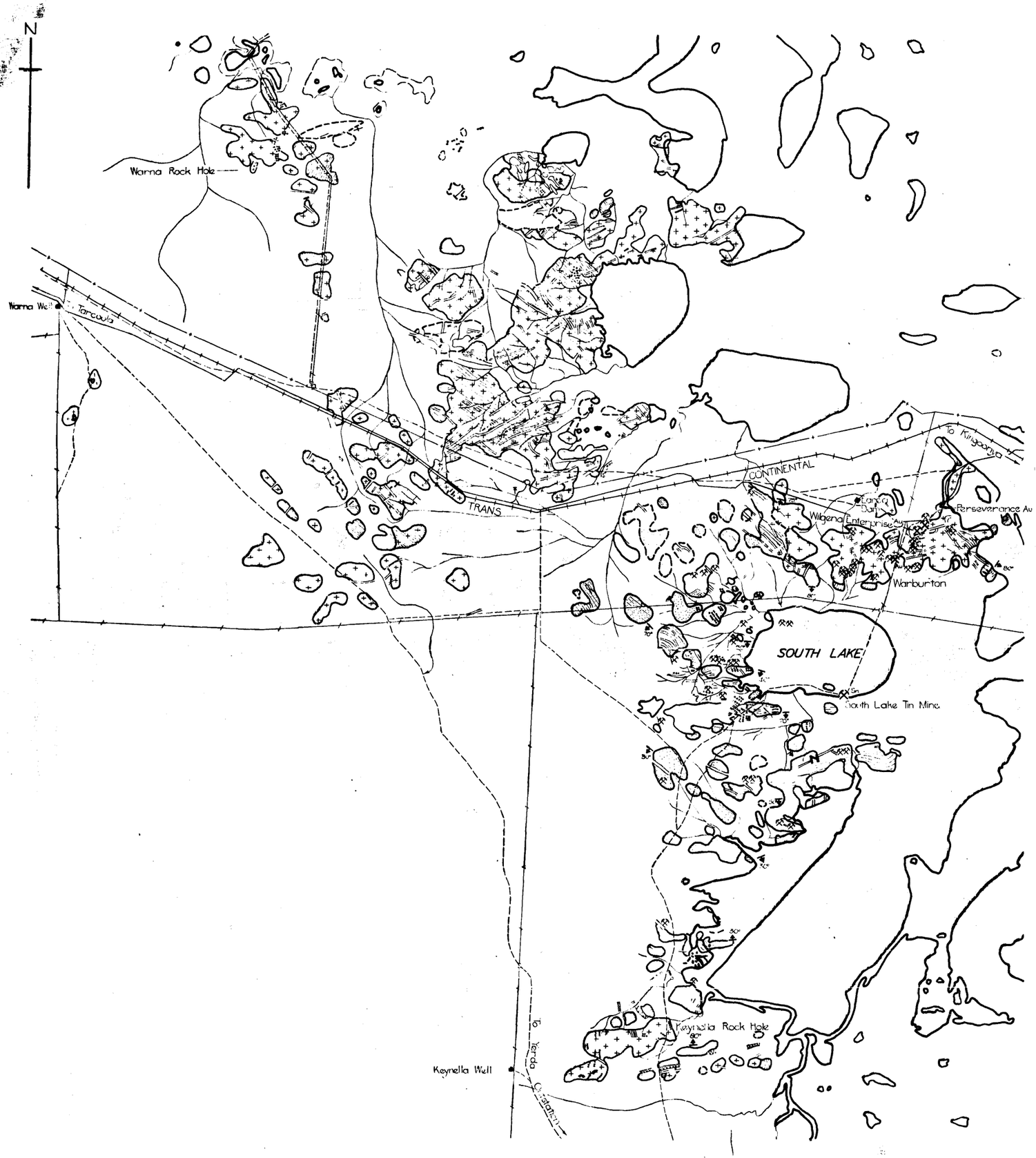
DEPARTMENT OF MINES — SOUTH AUSTRALIA

	Drn.	LOCALITY PLAN EAREA DAM - GLENLOTH RESERVED AREA	SCALE: AS SHOWN
	Tcd.		S 7348/1
	Chd.	2/3/67 - 15/10/69.	Bb
	Rvd.		DATE: 30-5-69



	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale : 1" = 4miles
Compiled :	LOCATION OF EAREA DAM – GLENLOTH RESERVED AREA	Date : 30/5/69
Drn. | Ckd.	2/3/67 – 15/10/69 16/10/69 – 8/10/70	Drg. No. 57274 Eb

1M—2 70 A1810



LEGEND

CAINOZOIC

- Lake deposits, gypseous clays, silts and quartz sands
- Soil mantles, gypseous in part, with calcrete horizon. Aeolian sand sheets and seif dunes.
- Deeply weathered metasediments, granites and porphyrys capped with silcrete--ferricrete.

PRE-CAMBRIAN

- Dark green, fissile siltstone
- Jaspilite
- Leucocratic quartz-feldspar and quartz-feldspar garnet gneisses with augite and hornblende granulite bands. These rocks grade into granite gneiss and migmatic granite and in places contain thin, concordant pegmatite swarms.

IGNEOUS ROCKS

- Reddish, medium-grained, quartz orthoclase porphyry dykes.
- Dark grey, fine-grained, orthoclase porphyry dykes.
- Microdiorite and gabbro dykes.
- Foliated migmatic and intrusive granites and granite gneisses.
- Quartz reefs. Greisen pods and veins, limonitic where indicated.

- Main Road.
- Track.
- Railway.
- Boundary Fence.
- Dog-Proof Fence.
- Ephemeral Stream.
- Lake.
- WATER FEATURES Bore.
- Tank.
- Well.
- Earth Tank or Dam.
- Quarry.
- Geological Boundaries.
- Fault or Shear.
- BEDDING Vertical.
- FOLIATION Strike.
- METAMORPHIC BANDING Strike and Dip.
- Mine.
- Prospect.
- Au Gold
- Sn Tin

SCALE IN MILES
½ 0 ½ 1½ 2 2½
0 2 3 4
SCALE IN KILOMETRES

GEOLOGY AFTER AUSTRALIAN DEVELOPMENT N.L. 1966

DEPARTMENT OF MINES — SOUTH AUSTRALIA

EAREA DAM
GEOLOGICAL PLAN

GEOCHEMICAL EXPLORATION SECTION.	GEOLOGIST.	Drn. RGW	SCALE 1 INCH = 40 CHAINS
		Tce. AGA	69-321
		Chd. L.Y.W.	Bb
Director of Mines	SUP. GEOLOGIST.	Encl.	DATE: 25TH JUNE, 1969

TO WINDIDDA

PERSEVERANCE
Au
WILGENA ENTERPRISE
Au
WARBURTON
Au

EAREA DAM

SOUTH LAKE TIN MINE
Sn

SOUTH LAKE

CONTINENTAL

TRANS

TANK

TO YERDA OUTSTATION

KEYNELLA ROCK HOLE

TO YERDA OUTSTATION

KEYNELLA WELL

TO TARCOOLA

TO WARNA WELL

N

SCALE IN CHAINS

20 0 20 40 60 80

SCALE IN METRES

LEGEND

Metal contents in parts per million, of the -16+ 11- mesh fraction of stream bed gravels are listed in the order

Sn
Mo
Li
Cu
Zn

Mine
Prospect
Au Gold
Sn Tin
Mo Molybdenum
Tl Tourmaline

Metal Content

Sn > 10ppm
Mo > 5ppm
Li > 60ppm
Cu > 50ppm
Zn > 45ppm

< less than > more than

DEPARTMENT OF MINES — SOUTH AUSTRALIA

EAREA DAM

METAL CONTENT OF STREAM BED GRAVEL

GEOCHEMICAL EXPLORATION SECTION	GEOLOGIST	*Drn. RW.	SCALE: 1INCH = 20CHAINS
		Tcd. AR	69-333
		Chd.	R.B.
Director of Mines	SUP. GEOLOGIST	Exd.	DATE: 27TH FEB 1969

N

To Kingoonya

Mt Mitchell Tank

Sn Au Mo

Glenloth Well

pipeline

Tarcoola

Au

Gov't Tank

Well

Glenloth Gov't Battery

LAKE

HARRIS

Arcoordaby

Old Bore

Disused Well

Loaritta Hill

Old Bore

Old Bore

Old Bore

SCALE

MILES 0 ¼ ½ 1 2 MILES

Geology after Australian Development N.L. 1966

LEGEND

CAINOZOIC

- Lake deposits, gypseous clays, silts and quartz sands.
- Soil mantles, gypseous in part, with calcrete horizon. Aeolian sand sheets and seif dunes.
- Deeply weathered metasediments, granites and porphyrys capped with silcrete-ferricrete

PRE-CAMBRIAN

- Green schistose siltstone

IGNEOUS ROCKS

- Reddish, medium-grained, quartz orthoclase porphyry
- Microdiorite and gabbro dykes
- Grey, coarse-grained porphyritic granite
- Fine-grained, early phase of porphyritic granite or altered remnants of older granitoid rocks
- Foliated, migmatitic and intrusive granites and granite gneisses
- Quartz reefs. Greisen pods and veins

- Track
- Boundary Fence
- Dog proof fence
- Ephemeral stream
- Lake
- Geological boundaries

WATER FEATURES

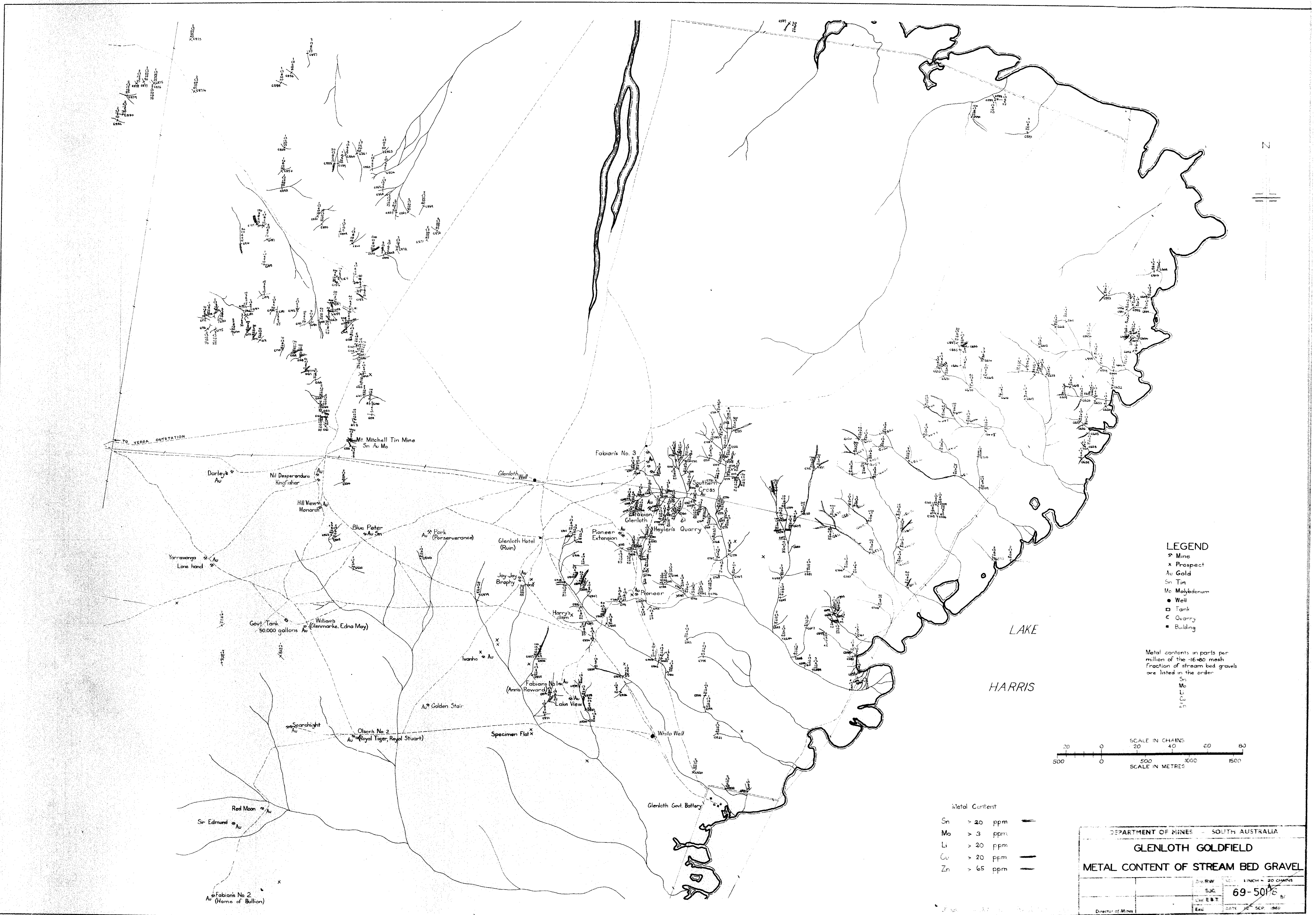
- Windmill
- Tank
- Well
- Quarry
- Pipeline

- Building
- Mines and prospects
- Au Gold
- Sn Tin
- Mo Molybdenum

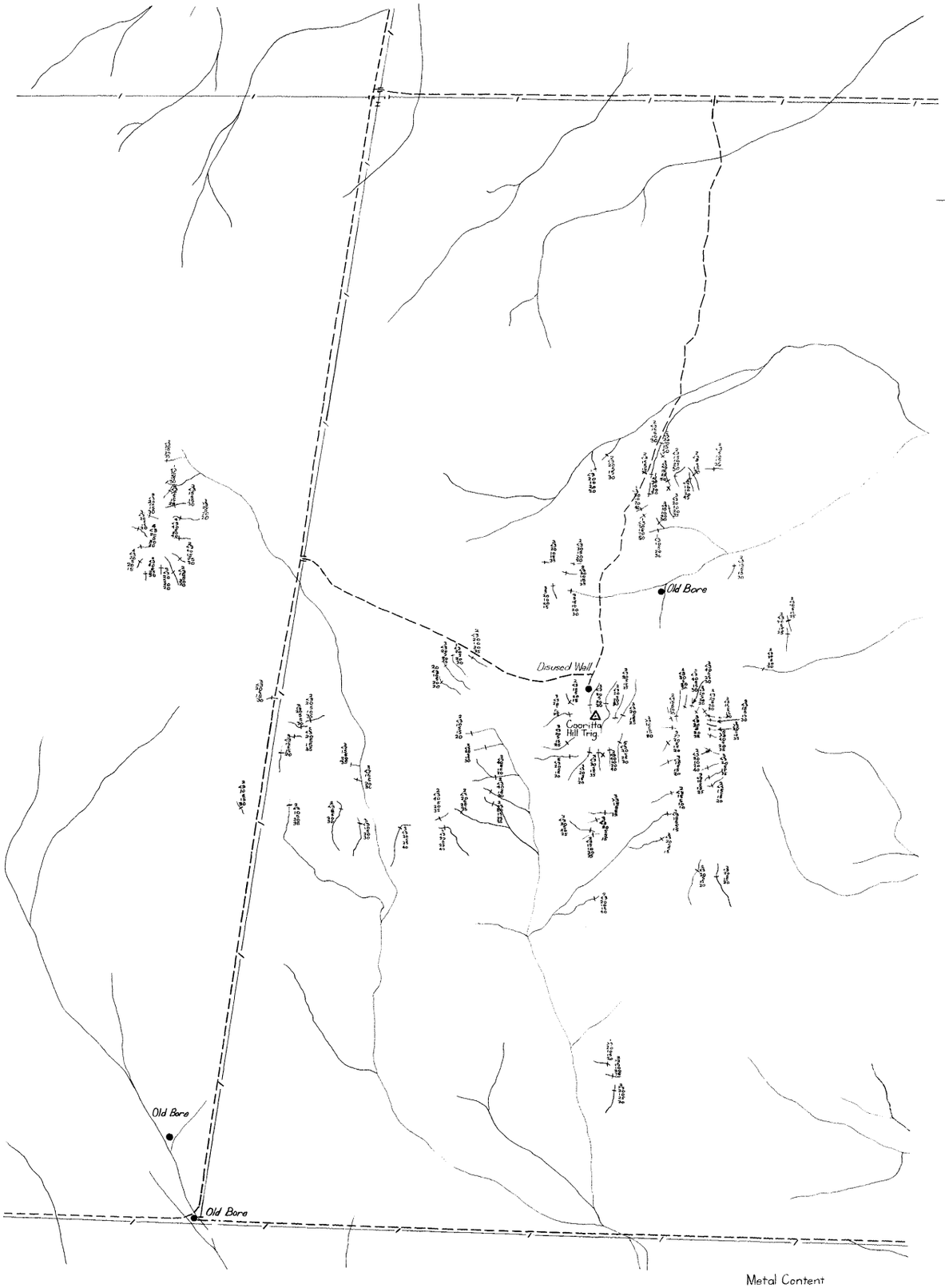
DEPARTMENT OF MINES — SOUTH AUSTRALIA

GLENLOTH GOLDFIELD GEOLOGICAL PLAN

GEOCHEMICAL EXPLORATION SECTION		Drn. R.W.	SCALE 1 inch - 40 chains
	GEOLOGIST	Trd. R.H.	69-905
		Chd. L.V.W.	Bf
Director of Mines	SUP GEOLOGIST	Exd.	DATE 28 Oct 1969



DEPARTMENT OF MINES - SOUTH AUSTRALIA
GLENLOTH GOLDFIELD
METAL CONTENT OF STREAM BED GRAVEL
1 INCH = 20 CHAINS
69-501
LEGEND
Mine
x Prospect
Au Gold
Sn Tin
Mo Molybdenum
Well
Tank
Quarry
Building
Metal contents in parts per million of the -16+80 mesh fraction of stream bed gravels are listed in the order
Sn
Mo
Li
Cu
Zn
Metal Content
Sn > 20 ppm
Mo > 3 ppm
Li > 20 ppm
Cu > 20 ppm
Zn > 65 ppm
SCALE IN CHAINS
20 0 20 40 60 80
500 0 500 1000 1500
SCALE IN METRES
N
LAKE
HARRIS
TO YERDA OUTSTATION
Mt Mitchell Tin Mine
Sn Au Mo
Darley's
Au
Nil Desperandum
Kingfisher
Hill View
Monarch
Blue Peter
Au Sn
Pork
(Perseverance)
Glenloth Well
Glenloth Hotel
(Ruin)
Fabian's No. 3
Southern Cross
Fabian
Glenloth
Hayley's Quarry
Pioneer
Extension
Pioneer
Yarrawonga
Lone hand
Jay-Jay
Brophy
Harry's claim
Govt. Tank
50,000 gallons
William's
(Glenmarke, Edna May)
Ivanho
Fabians No 1
(Anna Reward)
Lake View
Golden Stair
Searchlight
Olsen's No 2
(Royal Tiger, Royal Stuart)
Specimen Flat
White Well
Glenloth Govt. Battery
Red Moon
Sir Edmund
Fabian's No 2
(Home of Bullion)
Director of Mines



LEGEND

- x Prospect
- Fence
- Well or bore
- Track
- Trig point
- Stream
- Sample point

Metal contents in parts per million of the -16 to +80 mesh fraction of stream bed gravels are listed in the order

Sn
Mo
Li
Cu
Pb
Zn

SCALE IN CHAINS
20 0 20 40 60 80
400 0 500 1000 1500
SCALE IN METRES

Metal Content

Sn	> 10	ppm.
Mo	> 3	ppm.
Li	> 40	ppm.
Cu	> 10	ppm.
Pb	> 25	ppm.
Zn	> 50	ppm.

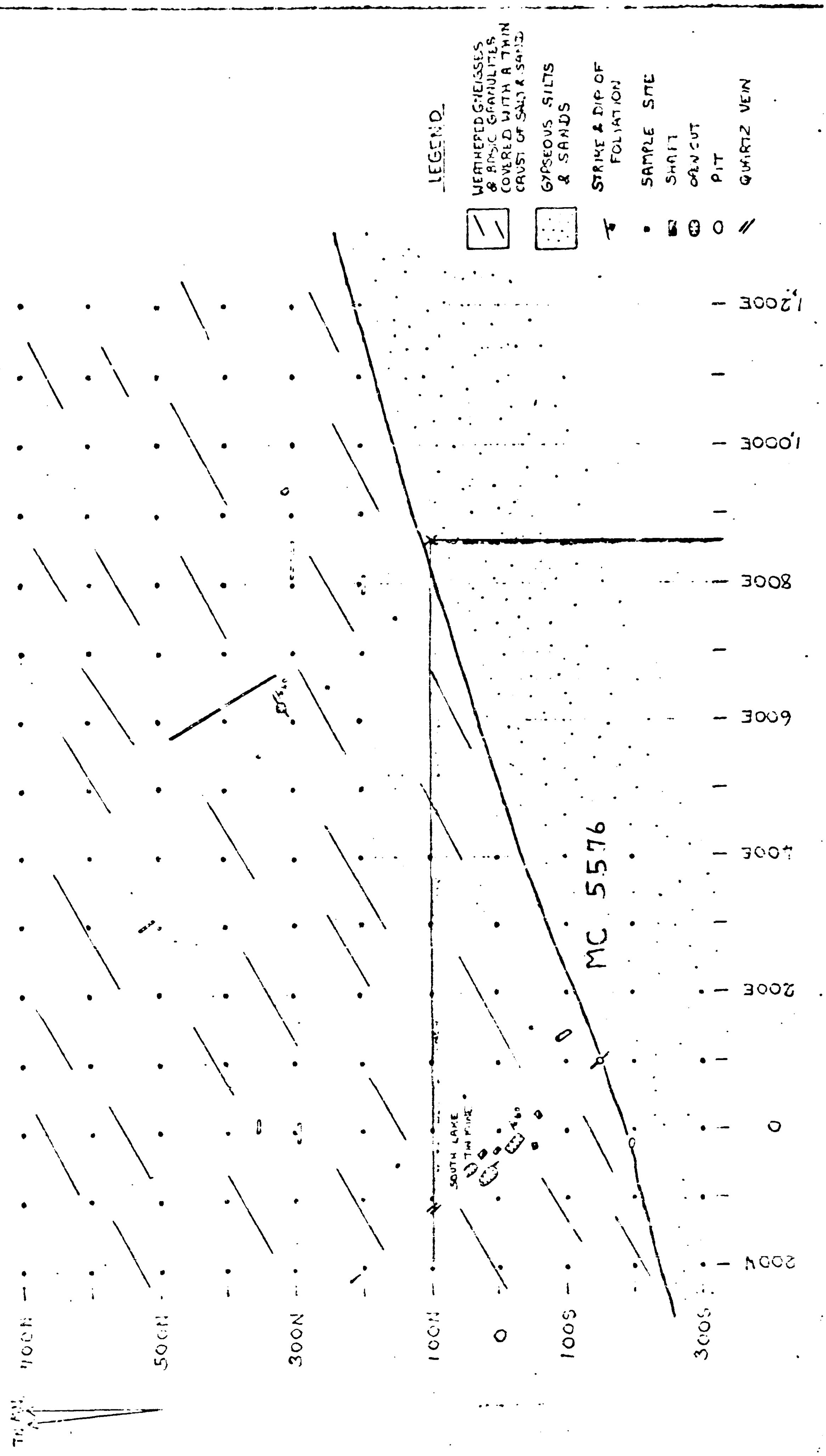
Base compiled from uncontrolled aerial photographs.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

COORITTA HILL

METAL CONTENT OF STREAM BED GRAVEL

GEOCHEMICAL EXPLORATION SECTION	GEOLOGIST	Drn. R.G.W.	SCALE : 1 INCH = 20 CHAINS
		Tcd. S.J.C.	69-901
Director of Mines	SUP. GEOLOGIST	Ckd. L.V.W.	BE
		Exd.	DATE 27 OCTOBER 1969

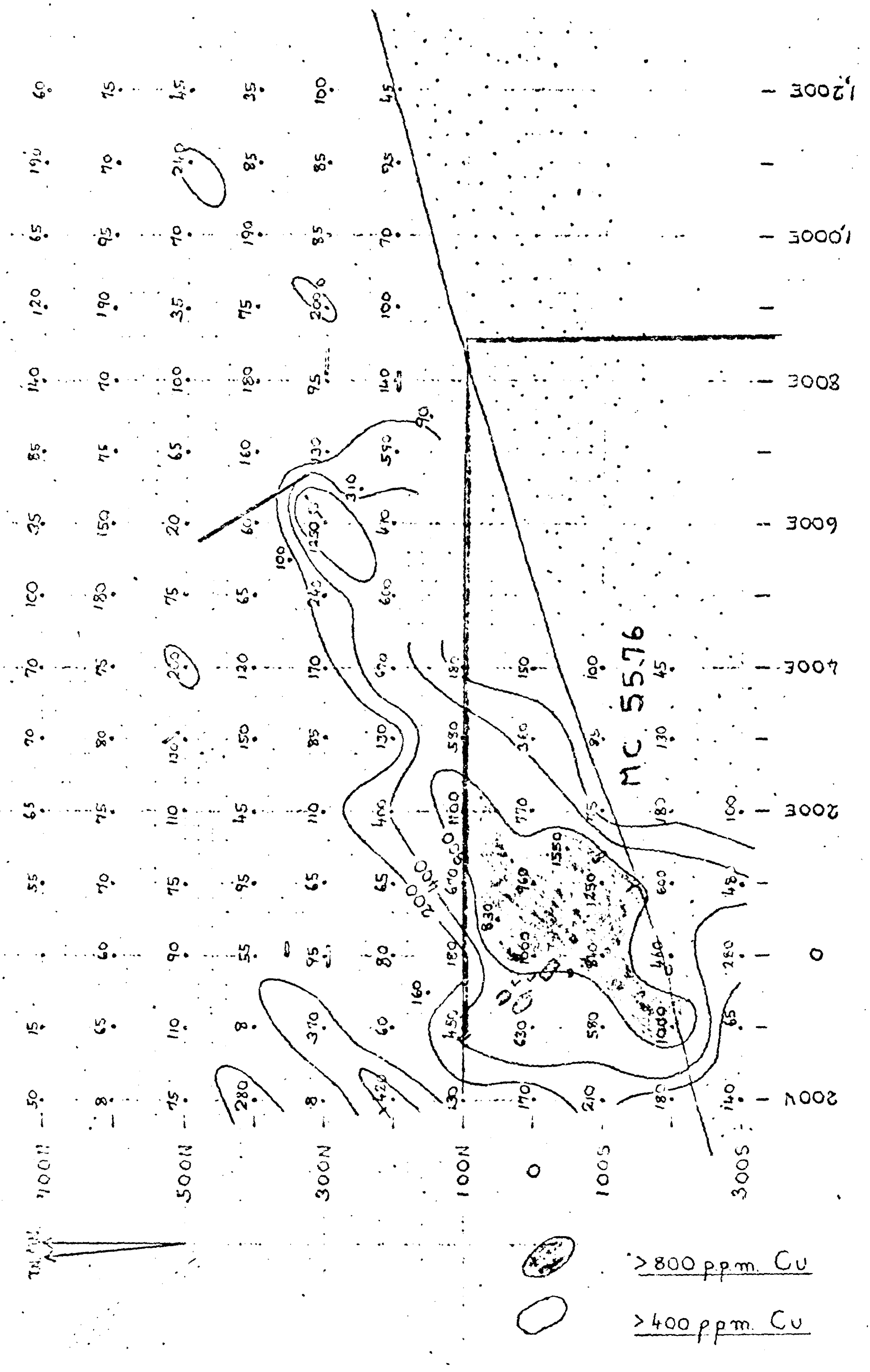


DEPARTMENT OF MINES — SOUTH AUSTRALIA

SCALE: 1" = 200'

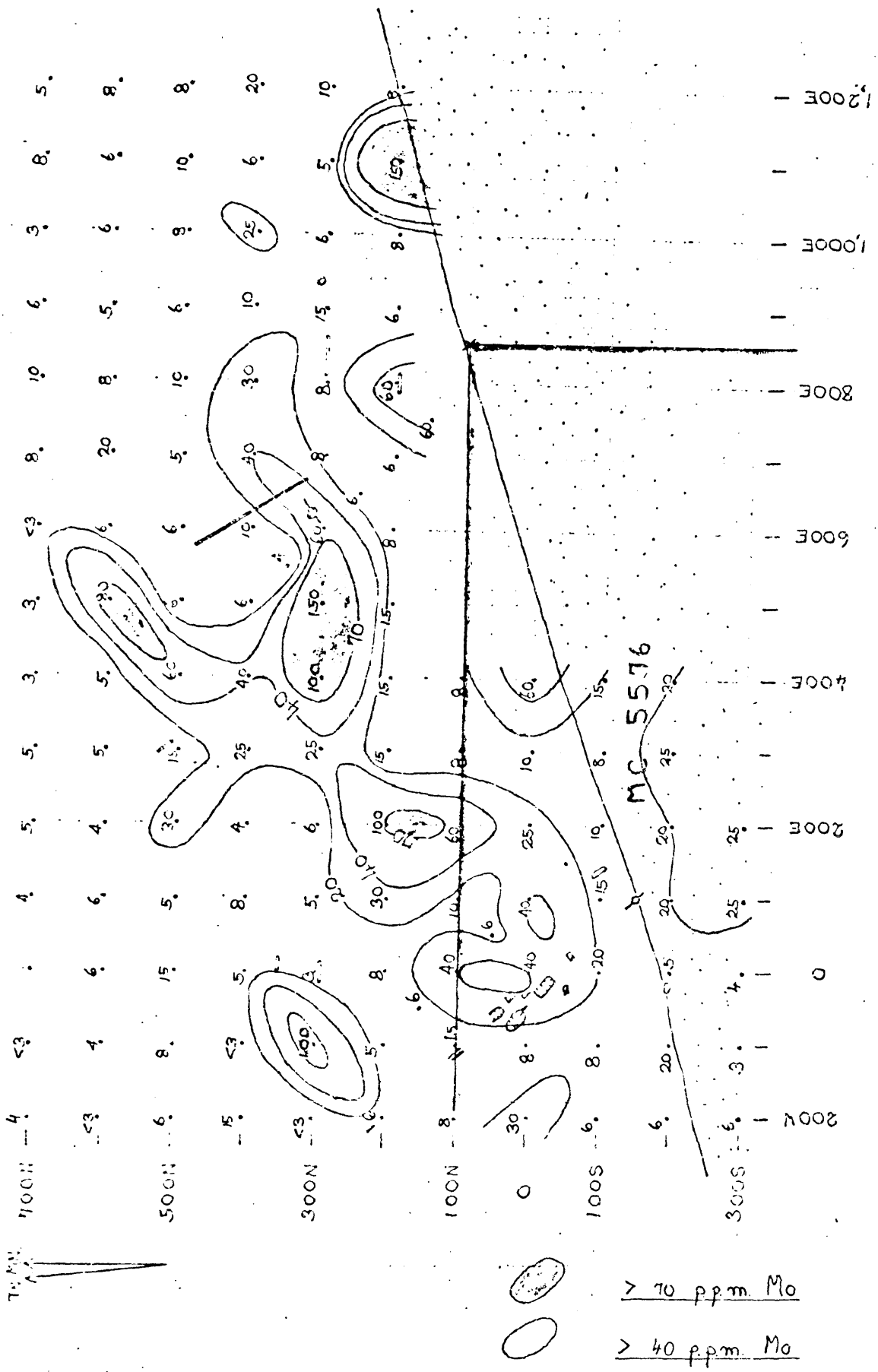
S 7349/1 Bb

GEOLOGICAL PLAN.



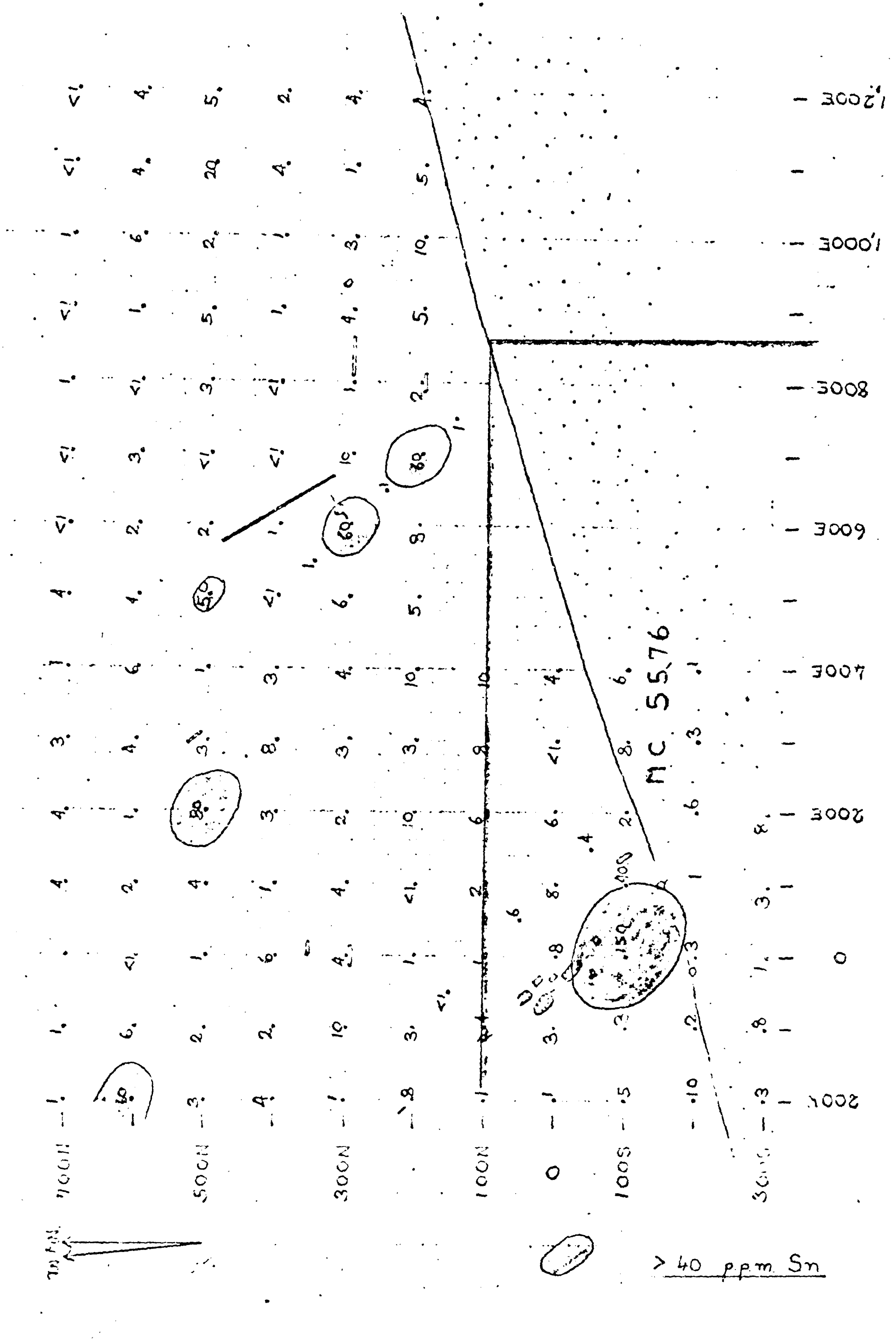
DEPARTMENT OF MINES — SOUTH AUSTRALIA

GEOCHEMICAL EXPLORATION SECTION	Drn. / Tcd. / Ckd.	SOUTH [illegible] TIN MINE Copper in Bedrock in [redacted]. p.p.m.	SCALE: 1" = 200' S 7351/1 Bb DATE 25/6/69



DEPARTMENT OF MINES — SOUTH AUSTRALIA

	Molybdenum in Bedrock in ppm.	Scale: 1" = 200'
		S 7350/1 Bb
		Date: 25/6/69



DEPARTMENT OF MINES — SOUTH AUSTRALIA

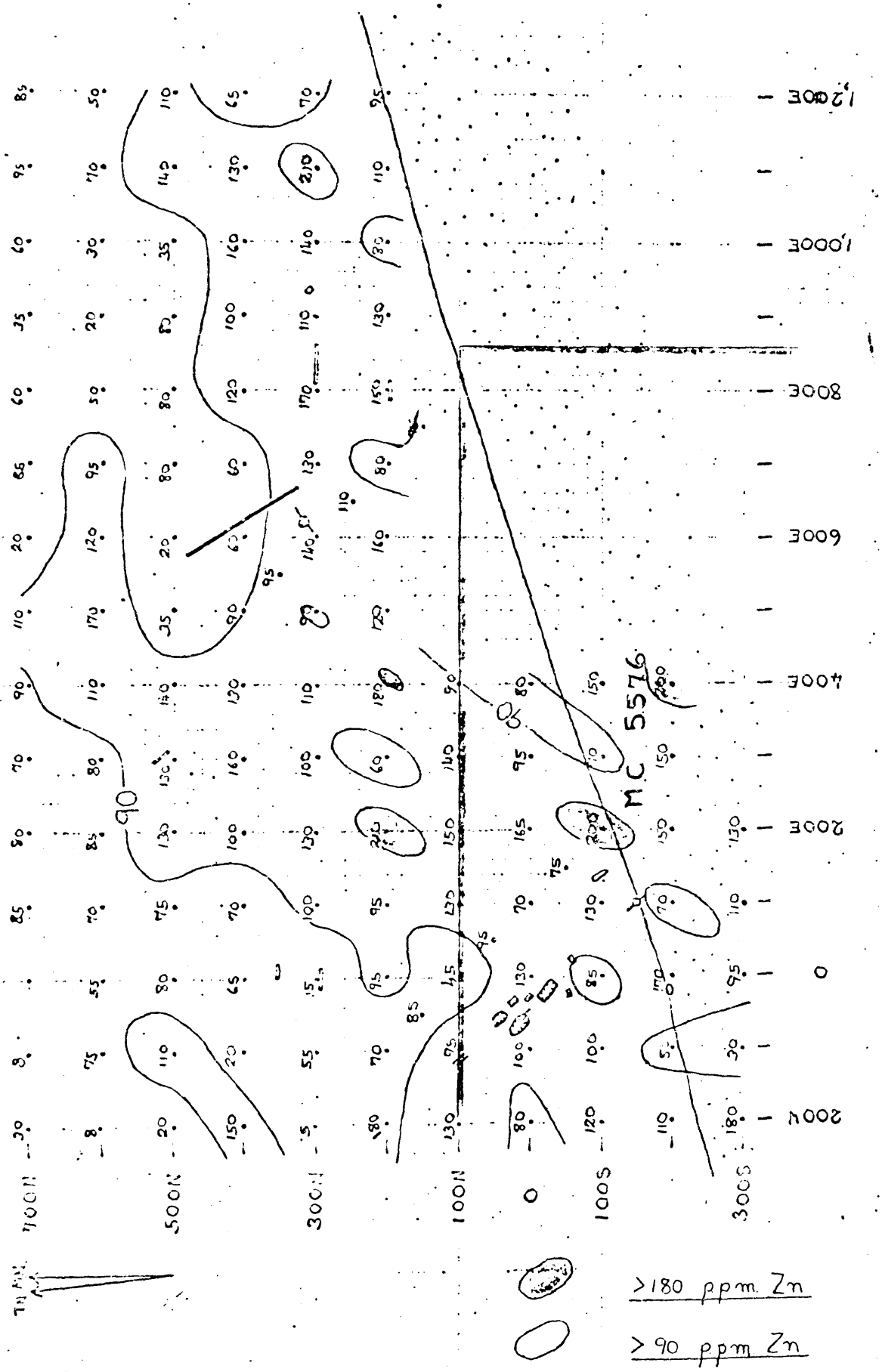
SOUTH [illegible] TIN MINE

Tin in bedrock
in [redacted] ppm

SCALE: 1" – 200'

S 7352/1 Bb

DATE 25/6/69



DEPARTMENT OF MINES — SOUTH AUSTRALIA

SOUTH EAST DRILLING

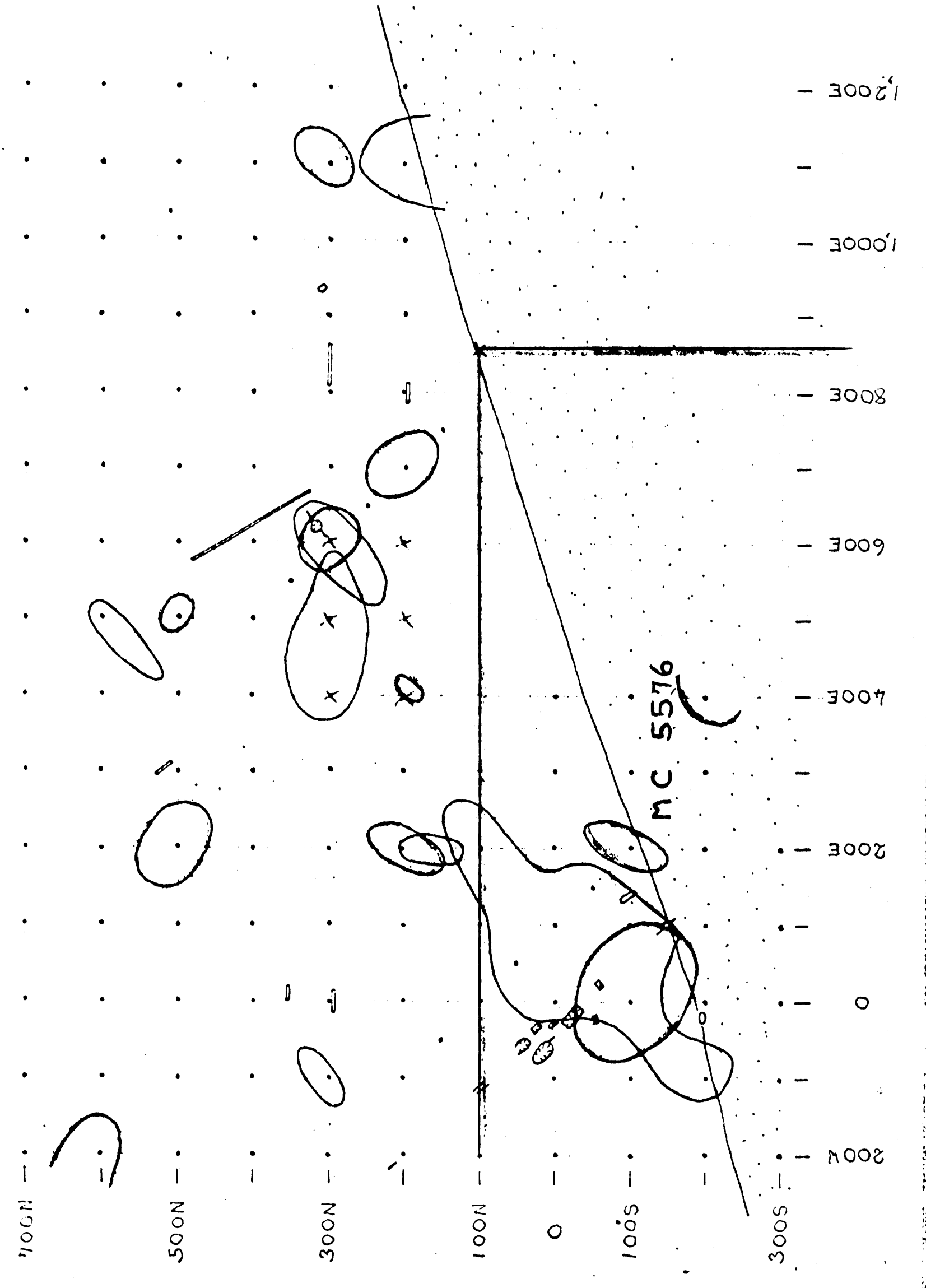
Zinc in Bedrock

in ppm.

Scale: 1" = 200'

S7353/1 Bb

Date: 25/6/69



DEPARTMENT OF MINES — SOUTH AUSTRALIA

GEOLOGICAL INTERPRETATION SECTION	Drn.	SOUTH LAKE TIN MINE	SCALE: 1" = 200'
	Tsd.	ANOMALOUS TIN, MOLYBDENUM, COPPER & ZINC IN BEDROCK	S 7371 Bb
	Chd.		
	Dsd.		DATE: 25/6/69

SOUTH LAKE TIN MINE GRID

MT. MITCHELL TIN MINE GRID

GRID 4

RESERVE

SOUTH LAKE

GLENLOTH GOLDFIELD

BATTERY RESERVE

LAKE HARRIS

TRANS-AUSTRALIAN

PIPELINE

Flood Plain

RENTON HILL 527

NW ARM

SEC. 298

Tank
Carter Well
Earea Dam
Perseverance
Wilgena Enterprise
Warburton
South Lake
Gilbert's Bore & Tk
Yards
Dam
Yard
Tomato RH
Mt Mitchell Tank
Mitchell
Glenloth Well
Fabian No 3
Southern Cross
Darley
Mt Desperandum
Kingfisher
Hillview
Monarch
Blue Peter
Pork
Fabian's Glenloth
Pioneer Ext
Old Glenloth Hotel
Pioneer
Jay Jay
Lone Hand
Yarrawonga
Two Mugs
Glenmarkie (Edna May)
Harry's
Dew Tank
Ivan Ho
Golden Stair
Fabian No 1
Lake View
Searchlite
Specimen Flat
Battery Hill
Royal Tiger (Royal Stewart)
Govt. Battery
Red Moon
Sir Edmund
Home of Bullion
Fabian No. 2 (Lander's Regret)
Sred
VPE

31°
135°

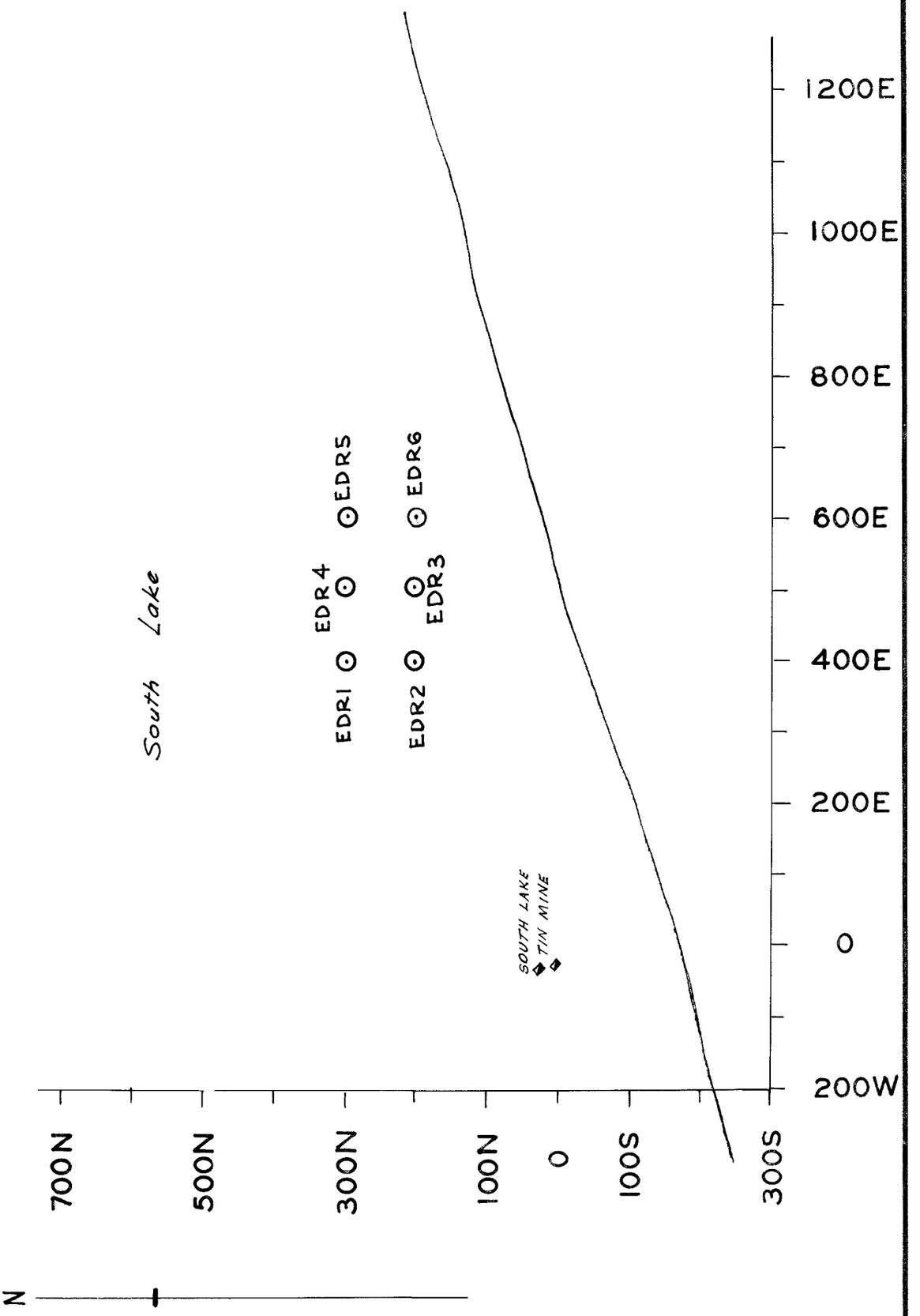
SCALE IN KILOMETRES
0 1 2 3 4 5 6 7

10 CENTIMETRES

DEPARTMENT OF MINES AND ENERGY — SOUTH AUSTRALIA

EAREA DAM
GLENLOTH GRID LOCATION
AND DRILL HOLE LOCALITY MAP

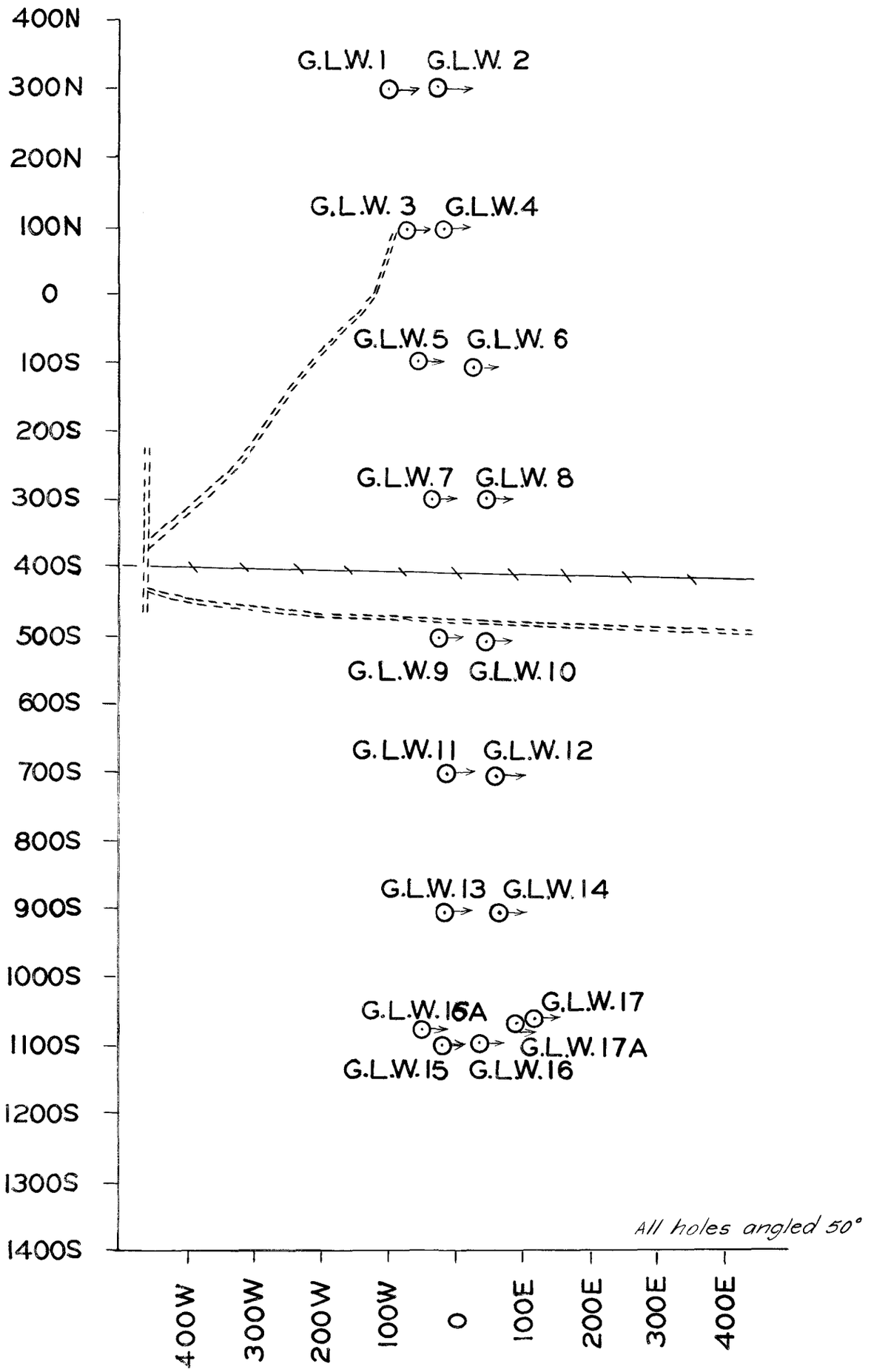
	COMPILED:	DRN: J.W	SCALE 1:50,000	PLAN NUMBER
DIRECTOR GENERAL		CKD:	DATE:	75-1000



DEPARTMENT OF MINES — SOUTH AUSTRALIA

	Drn.	SOUTH LAKE TIN MINE GRID SHOWING HALCO ROTARY DRILL HOLES	SCALE: 1" = 200'
	Tcd. D.W.W.		S11992
	Ckd.		
	Exd.		DATE: 25th June '69

5836-11
500—2.69 665



DEPARTMENT OF MINES — SOUTH AUSTRALIA

	Drn.	MT. MITCHELL TIN MINE GRID SHOWING LOCATION OF HALCO DRILL HOLES	SCALE: 1" = 200'
	Tcd. D.W.M.		S11993
	Ckd.		
	Exd.		DATE: 30th Sept. '69

5935-IV
500--2.69 665