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DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
METALLIC MINERALS SECTION

REPORT ON

MOLYBDENUM AND TUNGSTEN IN THE SOUTH-EASTERN PORTION OF SPILSBY ISLAND (SIR JOSEPH BANKS GROUP).

by

A. H. Blissett,
Assist. Senior Geologist

&

K. R. Warne,
Geologist.

10th December, 1964 D.M. 2070/63

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REPORT ON

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ABSTRACT

Investigations have shown that in the Sir Joseph Banks Grou molybdenite and scheelite are confined to the southern tip of Spils by Is. The minerals occur in thin irregular veins, in masses of quartz and as disseminations scattered through granite which is thought to be Archaean in age.

Geophysical surveys over concealed granite have indicated weak anomalies which might be caused by the overlying kunkar or by disseminated molybdenite at a shallow depth.

Bulk samples across the main mineralised zone along the coast contained a maximum of 0.128% tungstic oxide and 0.065% molybdenum, which are considered too low to be of immediate econom ic interest.

INTRODUCTION AND ACKNOWLEDGEMENTS

Geological surveys and investigations with ultra-violet lamps to detect scheelite carried out in the Sir Joseph Banks Grou have been described by Nixon (1964) and in a further report being prepared by the writers. The operations showed that molybdenite and scheelite are practically restricted to the southern portion o Spilsby Is. and traces only of scheelite, wolfram and sulphides were found on other islands.

This report discusses the geology of the mineral deposits on Spilsby Is. and the grade as indicated in chemical and spectrographic analyses. During the period 6th January to 24th January, 1964, chip samples across veins, quartz masses and granite had been collected with difficulty, because of the hardness of the hos granite which tends to outcrop around the coast in smooth benches formed by flat-lying joints and exfoliation planes. The Director of Mines requested bulk samples, and a party of 5 men from the Min ing Branch led by Mining Foreman S. Williams was landed on 8th Mar 1964. Their equipment, stores and about 50 empty 44 gallon drums to receive the rock were towed by the Fisheries Research Vessel "Investigator" (P. J. Mitchell, master) from Port Lincoln on a S.A.

Harbors Board pontoon. An International "Scout" was also transported on the pontoon to take equipment from the landing place on the north-western coast for about 2 miles to the site of operations in the south, and to carry the broken rock back to the northern coast for loading.

Channels were blasted by the mining party for 636 ft. across the main mineralised zone (See Plan 64-754). Owing to the toughness of the granite, two parallel lines of shot holes 1 ft. apart were drilled by an Atlas Copco "Cobra" petrol driven rock drill to a depth of 1 ft. with holes about 15 in. apart. The width of the trench varied because the granite tended to break into slabs lifted by the force of the explosions. About 20 tons of rock were collected. Significant molybdenite was uncovered at the southern end of the channel and therefore a separate sample was cut over the last 15 ft. in a trench parallel with the main channel

The material was loaded into the 44 gallon drums (already placed in position on the pontoon) and was towed with all the equipment back to Port Lincoln on 22nd March.

Senior Geologist L. G. Nixon later recommended an Induced Polarisation survey over the southern tip of the island. As the F.R.V. "Investigator" was not available, the launch "Aberdeen" (Skipper, R. B. Whillas) was hired from Port Lincoln and the geophysical party was landed on 22nd April, 1964. Surveyor J. Erkelens laid out a grid with lines 250 ft. apart, assisted by one of us (A.H.B.) who noted the chief geological features at the same time for discussion with the geophysical party. This information formed the basis for the sketch map (Plan 64-413) shown in the report by Taylor (1964). The geophysical survey was carried out by B. J. Taylor assisted by R. Catlin and R. Kaiser between 23rd April and 6th May.

The investigations were greatly helped by the skill and friendly co-operation shown by the master and crew of the F.R.V. "Investigator;" and by the assistance and hospitality received from Mr. P. Jacobs of Spilsby Is.

LOCATION AND COMMUNICATIONS

Spilsby Is. is the largest island in the Sir Joseph Banks Group, being about 2 miles long from north to south and 1½ miles across at the widest point. It lies in Spencer Gulf, 28 miles north of east from Port Lincoln, where launches may be hired. Several fishing boats pay visits to the islands in favourable weather. Light charter planes can land on the gently sloping north central portion of the island, south of Mr. Jacobs' house.

GEOGRAPHY

Like the rest of the islands in the archipelago, Spilsby Is. presents a gently sloping "whale-back" profile. The highest point is towards the north-eastern corner and is about 165 ft. above sea-level. (P. J. Mitchell, pers. comm.). Though the island is within the 15 in. rainfall belt, Mr. Jacobs has stated that during the past 6 years, the average annual rainfall has been much less than this.

Except for narrow coastal exposures of granitic rocks, the overlying kunkar outcrops over much of the island, being partly covered by sand and sandy loam, which supports coarse grasses, Mesembryanthemum, low bushes and clumps of casuarinas. There is no surface water. Water for stock is supplied by dams and the household supply is drawn from wells east of the sand dunes near the north-western coast. About 500 sheep are normally grazed on the island.

GENERAL GEOLOGY

The geological setting of the Sir Joseph Banks Group generally has been recorded by Nixon (1964) and further data will be described in another report being prepared by the writers. The basement rocks are a complex series of paragneisses and metasediments injected by granitic rocks and basic dykes, assigned by Johns (1961) to the Flinders Group and thought to be Archaean.

In the south-eastern part of Spilsby Is. the host rocks in the mineralised zone consist entirely of intrusive granite and rocks considered to be granitised sediments, cut by microgranite and pegmatite dykes or veins.

Archaean (?)

Grey porphyritic potassic granite.

This variety is massive and coarse grained and contains many tabular phenocrysts of orthoclase showing Carlsbad-twinning and orientated at random. There is no evidence of gneissosity, in contrast with other granites elsewhere in the Sir Joseph Banks Group (See Appendix I, Specimen TS 13527). The granite is apparently intrusive but its age is unknown. It is presumably Archaean or lower Proterozoic.

Red granite.

Though this granite is usually granular, there are wide variations in texture and grain size. The main outcrop is about 500 ft. wide at the extreme south-eastern tip of Spilsby Is. and it forms a wide bench partly obscured by large water-worn blocks and boulders. Much of the outcrop is a hard siliceous fine to medium-grained granite with an aplitic appearance, usually red or pink weathered. The contacts with the grey porphyritic granite are not chilled and are gradational over a width of about 2 ft. in which the red granite has become porphyritic in places. (See Plate 4.).

North of the main outcrop, irregular patches of microgranite and medium-grained granite occur within the grey porphyritic granite. Here also, there are no chilled margins and the contacts dip under the coarse granite in a manner indicative of layering. East of the centre of the main sample channel, an irregular mass of siliceous aplite was observed within the grey granite. The mass is 30 ft. long and up to 4 ft. wide, dipping south-westerly at 85°. As indicated in the petrological description (Appendix I, specimen TS 13527) the contact is not sharp.

It appears possible that the red granite may have been formed by the granitisation at a great depth of an arenaceous formation during the intrusion of the coarser porphyritic granite. Further evidence will be offered by the authors in a later report on the Sir Joseph Banks Group.

Microgranite dyke.

The grey porphyritic granite is cut by a microgranite dyke ranging in width from 1 ft. 6 in. to 2 ft. 4 in. east of the centre of the main trench (See Plan 64-754). The dyke passes into tongues trending northwards and southwards near its western end; it is cut and displaced a short distance by a pegmatite vein described below. No metallic minerals were observed within the dyke.

Pegmatite Veins.

Numerous pegmatite veins cut both the grey porphyritic granite and the red granite, and they vary in thickness from a few inches up to at least 3 ft. 9 in. Molybdenite and scheelite are apparently absent. The thinner veins are generally simple in structure, consisting of coarse feldspar and quartz; some contain biotite and others carry hornblende. The microgranite dyke described above has been cut and displaced about 3 ft. by a composite pegmatite vein 3 ft. 9 in. wide. About half the northern part of the vein is composed of feldspar-quartz-biotite pegmatite; and the remainder is medium-grained granite which becomes coarser towards the contact with the host granite.

<u>Tertiary.</u>

In the northern part of the area shown on Plan 64-754, the marine bench is backed by a low cliff of 6 ft. to 8 ft. thickness of soft mottled red and greenish clay resting on unweathered granit and overlain in turn by about 6 ft. of flat lying kunkar. (See Plate 3). Farther north the clay rests on kaolinised granite. Southwards the cliff becomes lower and at the extreme south-eastern tip of the island a thin cover of kunkar rests directly on fresh granite.

ECONOMIC GEOLOGY

<u>Mineralisation</u>

Molybdenite (molybdenum disulphide) and scheelite (calcium tungstate) were identified by the Department of Mines in specimens collected on Spilsby Is. in August, 1963, by a party of students from Scotch College. Mineragraphic studies showed that pyrite amd minor amounts of cassiterite and chalcopyrite may occur with the molybdenite and scheelite, together with purple fluorite and traces of galena.

During January, 1964, the authors carried out an examination of the coast of Spilsby Is. by night, using ultra-violet lamps, to detect scheelite which fluoresces pale bluish-white to yellowish-white, depending on the amount of molybdenum within the mineral. Trains of scheelite crystals within thin veins were outlined by parallel white lines painted on the rock; aggregates and individual crystals were circled for identification during subsequent investigations in daylight when occurrences of molybdenite were also marked and studied.

The deposits may be grouped as follows:

a. Irregular veins

b. Within pods or masses of quartz

c. Disseminations and pods within the host granite.

a. Irregular veins.

Scheelite is difficult to distinguish with the naked eye, but the ultra-violet lamps showed that many of the crystals occur along thin irregular veins, usually with quartz. Many of the veins strike to the north-west or the north-east, though there are wide variations in trend (See Plates 5 and 6). Scattered patches and flakes of molybdenite are present in or near veins containing scheelite. Plate 7 illustrates parallel veins bearing scheelite, with a small bleb of molybdenite within the white oval marked "M." There are rare crystals of wolfram (iron-manganese tungstate).

The veins cut smooth granite benches and dips are rarely visible, but are apparently steep, and over about 70°. They appear to be related to joint or fracture planes, and thin zones of shearing. They cut across the coarse grey porphyritic granite and also the red granite.

b. Within pods or masses of quartz.

In the northern part of the mineralised area, across which the sample trenches were cut, there are many pods and blocks of pale grey to brownish quartz ranging in size from a few inches in diameter to masses several feet across. Some are elongated and irregular in shape, though many have a rounded or oval-shaped outline. They appear to be rare to the south and south-west. Many of the inclusions contain scattered crystals of scheelite and flake or aggregates of molybdenite. East of the centre of the main sample channel, an included block 2 ft. across of aplite associated with quartz and carrying both scheelite and molybdenite has been cut by a pegmatite vein.

c. Disseminations and pods within the host granite.

The ultra-violet lamps indicated many scattered crystals and aggregates of scheelite which appear to be most abundant in the coarse grey porphyritic granite. Sporadically distributed flakes and patches of molybdenite were noted, usually but not always, near crystals of scheelite. On the weathered wave-cut granite beaches, small cavities were observed which may once have contained pods of molybdenite now weathered out owing to its softness. Plate 8 shows such a cavity at the bottom of which some molybdenite remains (indicated by arrow).

Ore-Genesis

Molybdenite, scheelite and fluorite are minerals usually formed by mineralising gases or fluids concentrated in the later stages of granitic intrusions. It is likely that during the cooling of the coarse grey granite and the red granite thought to have been derived from the alteration of sedimentary rocks, reduction in volume produced fracture planes along which first the microgranite dyke and then the mineralised veins and pegmatites were emplaced. Near the centre of the sample channel, a mass of aplite and quartz containing molybdenite and scheelite has apparently been truncated by a pegmatite vein which is itself barren. This indicates that the metallic minerals were probably first deposited from the volatile fluids and that the pegmatites represent a later phase when most of the gases had been removed.

Sampling.

During the visit in January, 1964, the sporadic distribution of molybdenite and scheelite was recognised. Chip samples were taken, assays of which are listed in Appendix II (Report No. AN 203-64). The results showed that scheelite is more abundant than molybdenite and that significant amounts of both minerals are concentrated in thin scattered veins. However, the host granite is only weakly mineralised, though traces of molybdenum are higher than in granite on the north-east coast of Spilsby Is. (See Appendix II, Report No. AN 702-64). Spectrographic analyses indicated anomalies for copper (up to 800 p.p.m.) and titanium (up to 1200 p.p.m.) in the south-east.

In March, 1964, the mining party obtained about 20 tons of rock from channels cut for a total of 636 ft. from north to south across the main mineralised area. At 350 ft. south, the line of trenching was moved a few feet west to avoid piles of boulders (See Plan 64-754). The south part of the trench was interrupted for about 30 ft. by boulders south of the 470 ft. mark. Scattered patches of scheelite and molybdenite were noted at the southern end of the trench and a separate bulk sample weighing about half a ton was obtained from a parallel channel 15 ft. long.

The material was processed by the Metallurgical Section of Australian Mineral Development Laboratories to determine the metal content, and spectrographic analyses were also made. (See Appendix II, Report No. AN 710-64). The 20 ton bulk sample (A 145/64) contained 0.025% molybdenum and 0.038% tungstic oxide (WO_3). The 15 ft. sample (A 144/64) assayed 0.065% molybdenum and 0.128% tungstic oxide. At the present time these figures are too low to warrant further investigation. Spectrographic analyses revealed anomalies for lead, bismuth, lithium, titanium and rubidium though the amounts are of little more than academic interest.

INDUCED POLARISATION AND RESISTIVITY SURVEYS

Taylor (1964) concluded that though weak shallow anomalies were indicated west and south-west of the mineralised zone, it was not possible to determine definitely whether they were caused by the highly conductive overburden of kunkar and superficial deposits resting on the granite, or by shallow mineral disseminations within the granite. However the results show that workable concentration of molybdenite are unlikely.

CONCLUSIONS

Molybdenite and scheelite are confined to the southern tip of Spilsby Is. Bulk sampling has shown that the deposits are too disseminated and are of too low a grade to be exploited at the present time. Geophysical surveys have indicated that though there may be shallow and weak disseminations of molybdenite within the granite west and north of the exposed mineralised zone, the anomalies probably originated in the overburden.

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AHB:KRW:EMD
10.12.64.

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NIXON, L. G., 1964 - Geological Reconnaissance of the Sir Joseph Banks Group of Islands. Unpub. Rep. Dept. of Mines of S.Aust., G.S. No.3022.

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LIST OF PLATES

APPENDIX I

PETROLOGICAL REPORT

Australian Mineral Development Laboratories

Locality: S.E. corner of Spilsby Island, Sir Joseph Banks Group

Material: Granitic rock specimens

P. 15/64: HB17/64: TS13527

This consists partly of granite and partly of aplite. The granitic part shows a strong resemblance to the granitic gneiss P541/63: JJStickney4: TS13242,* but in P15/64 there does not appear to be any recognizable gneissosity. Large crystals up to 15 mm across of Carlsbad-twinned, string-microperthite orthoclase are very prominent, but unlike those in many of the rocks from Spilsby Island, they do not show a preferred orientation. Orthoclase (some microperthitic) and quartz are the dominant minerals; oligoclase is fairly common, though less so than in the aplite, and some is antiperthitic. Biotite, though fairly prominent, is a minor constituent. Opaques, hornblende, zircon and apatite are accessory minerals, and are associated with the biotite.

The aplitic part of the specimen is more even-grained than the other, the grain size varying between 1 and 4 mm. Mafic minerals are absent. Quartz is the dominant mineral, but feldspar (microcline, orthoclase and oligoclase) is also common. Some of the orthoclase contains exsolution beads of plagioclase (bead-microperthitic). Some of the plagioclase is antiperthitic and some is severely sericitized, but in some parts it is quite fresh. Minor chlorite (presumably derived from biotite) and myrmekitic intergrowths are present.

There is little in the way of a contact zone between the two parts of the specimen, though plagioclase seems to be absent within 1-2 mm of the granite. The plagioclase in both parts of the rock appears to be of the same composition.

* Submitted by J. E. Johnson from Stickney Island after first investigation, 1963.

Investigated by: D. SMALE

Officer in Charge, Mineralogy Section: H. W. FANDER

L. WALLACE COFFER,
Director.

APPENDIX II

CHEMICAL AND SPECTROGRAPHIC ANALYSES

SPILSBY ISLAND

REPORT AN 710-64

Australian Mineral Development Laboratories

ANALYSES OF BULK CHANNEL SAMPLES - S.E. SPILSBY ISLAND

CHEMICAL ANALYSES (in %)

Sample Mark	Molybdenum	Tungstic oxide	Selenium	Uranium oxide (U_3O_8)
A144/64	0.065	0.128	0.0015	x 0.002
A145/64	0.025	0.038	3 ppm	NR

SPECTROGRAPHIC ANALYSES (in parts per million)

	Sample Mark	
	A144/64	A145/64
Copper (Cu)	18	25
Lead (Pb)	50	200
Zinc (Zn)	20	60
Cobalt (Co)	6	6
Nickel (Ni)	100	60
Silver (Ag)	0.2	0.3
Gold (Au)	x 3	x 3
Tin (Sn)	3	4
Tantalum (Ta)	x100	x100
Niobium (Nb)	x 50	x 50
Beryllium (Be)	x 2	x 2
Barium (Ba)	300	500
Vanadium (V)	15	18
Lithium (Li)	1000	800
Titanium (Ti)	700	3000
Manganese (Mn)	120	400
Strontium (Sr)	150	200
Rubidium (Rb)	1200	1500
Zirconium (Zr)	20	150
Gallium (Ga)	10	8
Mercury (Hg)	0.15	x 0.15
Bismuth (Bi)	500	NR
Scandium (Sc)	NR	10

x indicates "less than." NR = Analysis not requested

AN710/62 (contd.)

A 144/64 - 15 ft. channel sample (½ ton)
A 145/64 - Bulk channel sample (approx. 20 tons)

Analysis for Mo, WO_3 and Se by: D. McPHARLIN
Analysis for U_3O_8: C. ROBINSON
Spectrographic Analyses by: A. B. TIMMS
Officer in Charge, Analytical Section: T. R. FROST.

L. WALLACE COFFER,
Director.

REPORT AN203-64

Australian Mineral Development Laboratories

CHEMICAL ANALYSES - SHORT CHANNEL SAMPLES - S.E. SPILSBY ISLAND

Sample Mark		Molybdenum (Mo) %	Tungstic oxide (WO_3)		Remarks
A1017/64	HB18/64	0.003	0.013		1 ft. across vein
A1018/64	HB19/64	ND	0.002		Host granite
A1019/64	HB20/64	0.024	2.04		10 in across vein
A1020/64	HB21/64	0.090	0.455		4 in. vein
A1021/64	HB22/64	ND	0.014		6 in. S. wall rock of vein.
A1022/64	HB23/64	ND	0.008		6 in. N. wall rock of vein.
A1023/64	HB24/64	0.128	1.10		5 in. across vein
A1024/64	HB25/64	0.013	0.29		6 in. across vein
A1025/64	HB26/64	0.003	0.007		6 in. hanging wall of A1024
A1026/64	HB27/64	0.006	0.005		6 in. footwall of A1024
A1027/64	HB28/64	0.003	0.005		3 ft. across host granite.
A1028/64	HB29/64	ND	0.001		6 ft. across host granite.
A1029/64	HB30/64	0.015	0.011		Granite chip samples
A1030/64	HB31/64	0.002	0.145		Medium granite chip samples
A1031/64	HB32/64	ND	0.033		Porphyritic granite samples
A1032/64	HB33/64	0.002	0.020		Medium granite samples
A1033/64	HB34/64	0.020	0.055	Channel	1 ft. 6 in.
A1034/64	HB35/64	0.050	0.19		5 in. across vein
A1035/64	HB36/64	0.019	0.041		5 ft. granite
A1036/64	HB37/64	0.023	0.020		3 ft. granite
A1037/64	HB38/64	0.045	0.018		1 ft. granite
A1038/64	HB39/64	0.075	0.059		5 ft. granite
A1039/64	HB40/64	0.015	0.021		1 ft. 3 in. granite
A1040/64	HB41/64	0.175	1.10		1 ft. 6 in. granite
A1041/64	HB42/64	0.013	0.039		1 ft. 2 in. granite
A1042/64	HB43/64	0.070	0.096		2 in. vein
A1043/64	HB44/64	0.048	0.063		1 ft. 6 in. granite
A1044/64	HB45/64	0.003	0.021		15 ft. across granite
A1045/64	HB46/64	0.001	0.011		2 ft. wall rock (E)

AN 203-64 (contd.)

Sample Mark		Molybdenum (Mo) %	Tungstic oxide (WO_3) %		Remarks
A1046/64	HB47/64	0.037	0.072		1 ft. across vein
A1047/64	HB48/64	0.003	0.033		2 ft. wall rock (W)
A1048/64	HB49/64	0.002	0.022		4 ft. granite
A1049/64	HB50/64	0.003	0.012		1 ft. granite
A1050/64	HB51/64	0.005	0.008	Channel	3 ft. 8 in. granite
A1051/64	HB52/64	0.017	0.022		1 ft. granite
A1052/64	HB53/64	0.005	0.002		9 ft. granite
A1053/64	HB54/64	0.016	0.010		1 ft. 4 in. granite
A1054/64	HB55/64	0.007	0.007		2 ft. granite
A1055/64	HB56/64	0.006	0.003		1 ft. granite
A1056/64	HB57/64	0.009	0.001		2 ft. granite
A1057/64	HB58/64	ND	0.001		General sample - Dam
A1058/64	HB59/64	ND	0.001		" " "

ND indicates "not detected"

Analyses by: D. McPHARLIN

Officer in Charge, Analytical Section: T. R. FROST.

REPORT AN 203-64

Australian Mineral Development Laboratories

SPECTROGRAPHIC ANALYSES - SHORT CHANNEL SAMPLES - S.E. SPILSBY ISLAND

Sample Mark		Copper (Cu)	Lead (Pb)	Zinc (Zn)	Silver (Ag)	Vanadium (V)	Cobalt (Co)	Tin (Sn)	Manganese (Mn)	Iron (Fe) (%)	Nickel (Ni)	Strontium (Sr)	Titanium (Ti)	Barium (Ba)	Zirconium (Zr)	Lithium (Li)
A1017/64	HB18/64	800	18	30	0.3	15	3	10	100	0.8	5	20	200	150	20	500
A1018/64	HB19/64	8	100	20	0.2	12	3	x 2	100	0.6	4	200	1000	400	100	700
A1019/64	HB20/64	600	25	40	0.3	25	5	2	200	1.5	6	200	2000	300	20	700
A1020/64	HB21/64	300	70	x 20	0.8	10	3	2	80	0.6	10	150	600	300	20	700
A1021/64	HB22/64	12	60	x 20	0.2	12	2	5	80	0.6	6	150	1000	250	50	700
A1022/64	HB23/64	10	50	20	0.2	10	3	4	80	0.5	8	150	800	400	50	800
A1023/64	HB24/64	40	30	x 20	0.3	10	5	5	80	0.6	8	80	800	250	20	800
A1024/64	HB25/64	20	30	20	0.2	8	2	4	50	0.6	8	100	600	400	20	700
A1025/64	HB26/64	15	70	25	0.2	12	3	2	80	0.6	6	200	1200	400	50	700
A1026/64	HB27/64	12	60	x 20	0.2	10	2	x 2	50	0.5	5	150	400	300	40	600
A1027/64	HB28/64	8	70	20	0.2	12	1	x 2	60	0.4	5	200	500	400	40	600
A1028/64	HB29/64	20	60	20	0.3	12	2	x 2	50	0.4	5	200	300	500	40	600
A1029/64	HB30/64	30	60	25	0.2	20	3	x 2	100	0.7	7	150	800	500	100	800
A1030/64	HB31/64	25	80	x 20	0.2	8	1	2	20	0.2	5	150	200	300	20	500
A1031/64	HB32/64	12	60	x 20	0.2	10	2	x 2	70	0.4	5	200	300	300	40	700
A1032/64	HB33/64	25	60	x 20	0.3	10	1	x 2	20	0.3	4	80	200	200	30	500
A1033/64	HB34/64	50	60	x 20	0.2	12	x 1	3	40	0.4	10	150	400	400	x 20	700
A1034/64	HB35/64	300	60	x 20	0.5	15	1	8	40	0.6	10	150	800	500	20	700

REPORT AN 203-64 (contd.) SPECTROGRAPHIC ANALYSES

Sample Mark		Copper (Cu)	Lead (Pb)	Zinc (Zn)	Silver (Ag)	Vanadium (V)	Cobalt (Co)	Tin (Sn)	Manganese (Mn)	Iron (Fe) (%)	Nickel (Ni)	Strontium (Sr)	Titanium (Ti)	Barium (Ba)	Zirconium (Zr)	Lithium (Li
A1035/64	HB36/64	25	100	x 20	0.5	12	2	x 2	20	0.4	7	100	600	500	30	500
A1036/64	HB37/64	20	100	x 20	0.2	12	1	x 2	20	0.4	10	100	250	400	20	700
A1037/64	HB38/64	50	80	x 20	0.8	12	3	2	20	0.5	10	100	300	300	40	700
A1038/64	HB39/64	25	100	x 20	0.3	12	2	x 2	30	0.5	10	100	400	400	40	700
A1039/64	HB40/64	25	100	x 20	0.2	10	2	x 2	40	0.4	8	100	200	400	30	600
A1040/64	HB41/64	25	80	x 20	0.2	8	1	2	20	0.5	6	150	200	500	x 20	600
A1041/64	HB42/64	30	80	x 20	0.2	12	1	5	30	0.4	5	150	400	500	50	500
A1042/64	HB43/64	25	70	x 20	1	18	2	x 2	30	0.6	8	150	800	500	x 20	800
A1043/64	HB44/64	12	80	x 20	0.2	15	1	x 2	20	0.3	5	150	300	500	x 20	600
A1044/64	HB45/64	10	100	x 20	0.2	12	1	x 2	50	0.3	5	150	300	250	30	700
A1045/64	HB46/64	15	150	x 20	0.1	12	1	8	80	0.4	8	100	300	300	50	800
A1046/64	HB47/64	30	150	20	0.5	10	1	8	50	0.3	8	80	300	300	30	800
A1047/64	HB48/64	30	150	x 20	0.5	12	2	x 2	70	0.4	8	100	700	400	50	800
A1048/64	HB49/64	10	100	x 20	0.2	12	2	x 2	60	0.4	6	100	600	500	30	700
A1049/64	HB50/64	10	80	x 20	0.2	15	2	x 2	60	0.4	5	100	800	500	150	800
A1050/64	HB51/64	25	100	20	0.2	12	1	x 2	60	0.4	5	100	300	400	50	800
A1051/64	HB52/64	15	100	25	0.3	15	2	6	60	0.4	7	120	400	300	60	800
A1052/64	HB53/64	12	60	25	0.2	18	2	6	100	0.6	6	150	800	250	100	800
A1053/64	HB54/64	15	20	x 20	0.2	18	2	8	60	0.6	8	100	700	150	80	500

Sample Mark		Copper (Cu)	Lead (Pb)	Zinc (Zn)	Silver (Ag)	Van-adium (V)	Co-balt (Co)	Tin (Sn)	Mang-anese (Mn)	Iron (Fe) (%)	Nickel (Ni)	Stron-tium (Sr)	Titan-ium (Ti)	Barium (Ba)	Zir-conium (Zr)	Lith ium (Li)
A1054/64	HB55/64	12	25	x 20	0.2	18	3	8	60	0.4	6	100	500	150	60	700
A1055/64	HB56/64	25	40	20	0.3	15	3	6	80	0.5	8	200	800	200	150	700
A1056/64	HB57/64	18	30	20	0.2	10	2	6	30	0.3	7	120	700	200	100	600
A1057/64	HB58/64	15	80	20	0.3	15	3	x 2	60	0.6	5	120	1200	500	150	800
1058/64	HB59/64	12	70	20	0.2	15	3	x 2	60	0.6	5	100	1000	500	150	800

x Indicates "less than"
All samples in parts per million, except Iron (Fe) in %
Gold (Au) - All samples less than 3 ppm
Beryllium (Be) " " " " 1 ppm
Niobium (Nb) " " " " 50 ppm
Tantalum (Ta) " " " "100 ppm
Chromium (Cr) - Not recorded, owing to contamination from crusher.

Analyses by: A. B. TIMMS

Officer-in-Charge, Analytical Section: T. R. FROST

L. WALLACE COFFER,
Director.

REPORTS AN 280-64: AN 702-64

Australian Mineral Development Laboratories

SPECTROGRAPHIC ANALYSES OF GRANITE SAMPLES, SPILSBY ISLAND

		Sample Mark		
		A146/64 (HB61/64/LP)	A34/64 (HB5/64)	A35/64 (HB17/64)
Molybdenum	(Mo)	40	2	150
Tungsten	(W)	80	x 20	x 20
Tin	(Sn)	8	15	10
Copper	(Cu)	5	5	40
Lead	(Pb)	15	40	120
Zinc	(Zn)	x 20	25	30
Cobalt	(Co)	4	1	2
Nickel	(Ni)	4	5	5
Silver	(Ag)	0.1	0.2	0.3
Gold	(Au)	x 3	x 3	x 3
Tantalum	(Ta)	x100	NR	NR
Niobium	(Nb)	x 50	x 50	x 50
Beryllium	(Be)	x 1	x 2	x 2
Barium	(Ba)	30	500	200
Manganese	(Mn)	50	100	70
Titanium	(Ti)	200	1500	1000
Vanadium	(V)	3	20	12
Lithium	(Li)	150	x 30	x 30
Mercury	(Hg)	x 0.15	NR	NR
Zirconium	(Zr)	x 30	80	200
Strontium	(Sr)	2	200	250
Rubidium	(Rb)	50	NR	NR
Gallium	(Ga)	10	25	20
Scandium	(Sc)	x 10	x 50	x 50

A146/64 - Kaolinised granite; S.E. Spilsby Is., north of bulk channel sample.

A34/64 - Porphyritic granite, N.E. coast

A35/64 - Leucogranite, S.E. coast.

x indicates "less than."

NR = Assay not requested

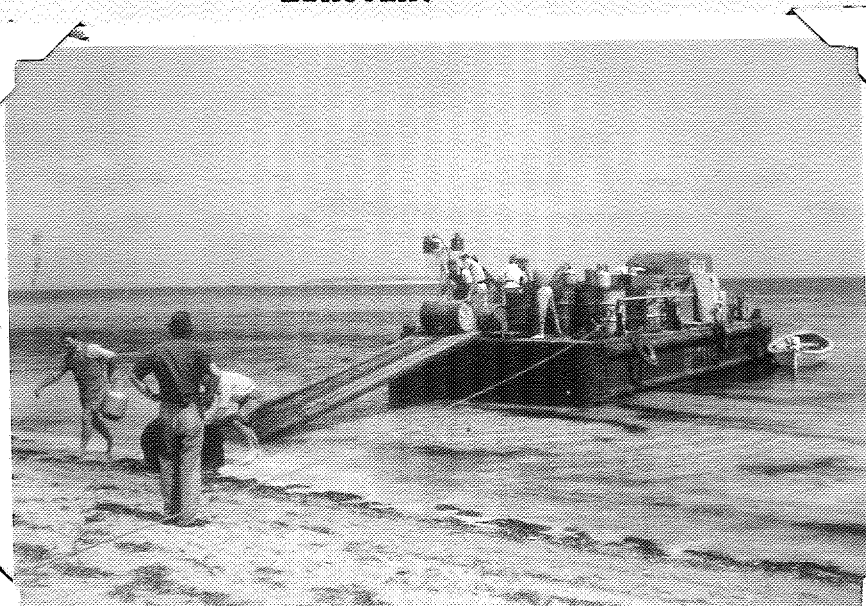
Analyses by: A. D. TIMMS

Officer in Charge, Analytical Section: T. R. FROST.

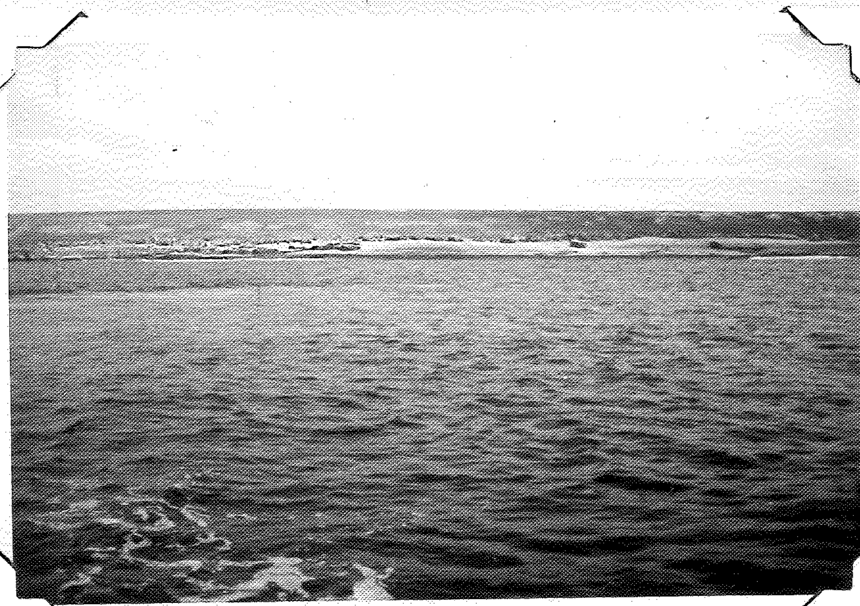
L. WALLACE COFFER,
Director.

PLATES

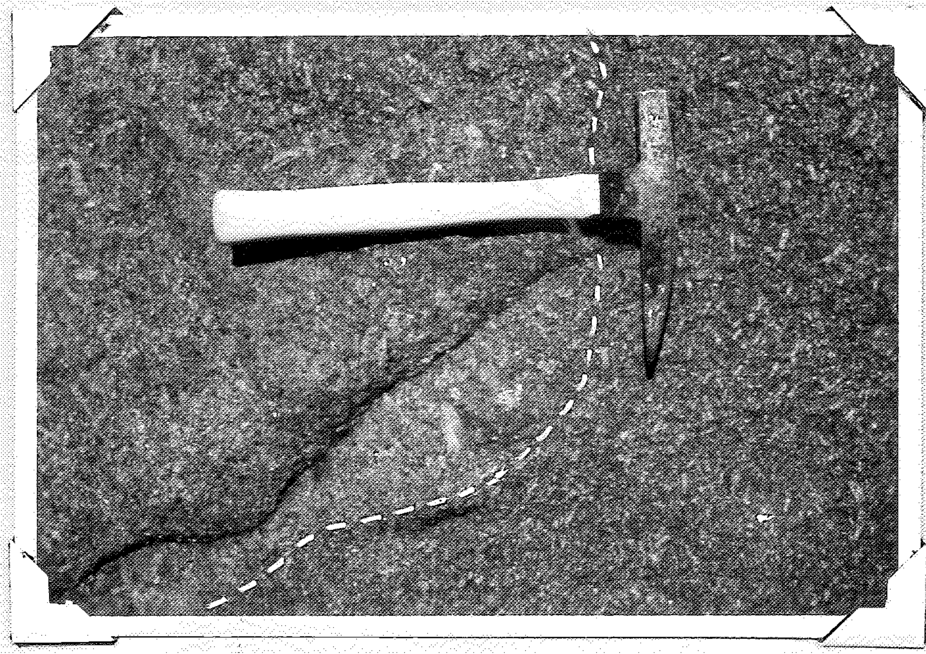
1. F.R.V. "Investigator" and pontoon, "Troubridge" berth, Port Lincoln.

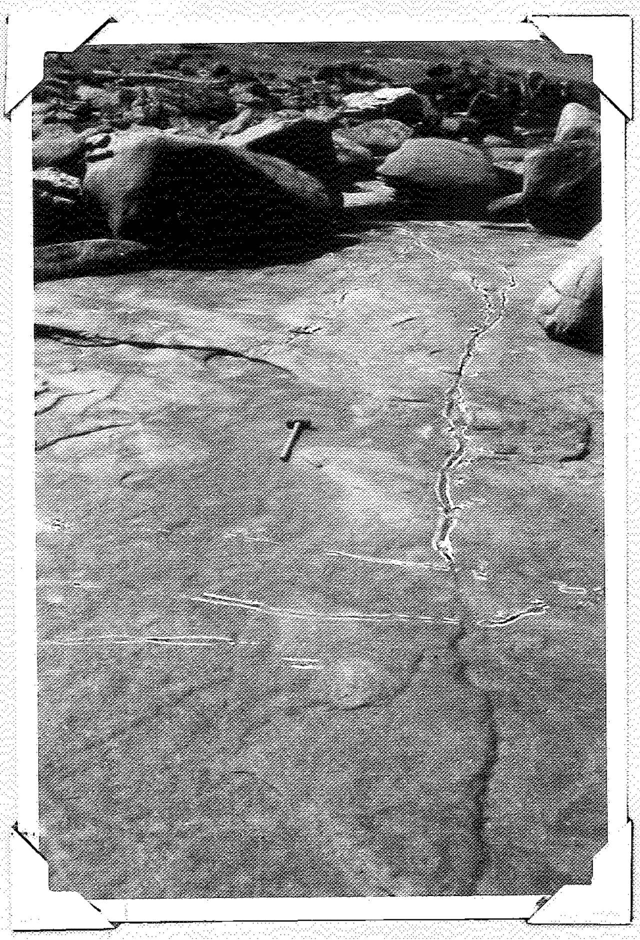


2. Unloading pontoon, north-western coast of Spilsby Is. (Duffield Is. in background)



3. General view of mineralised zone, south-eastern Spilsby Is.

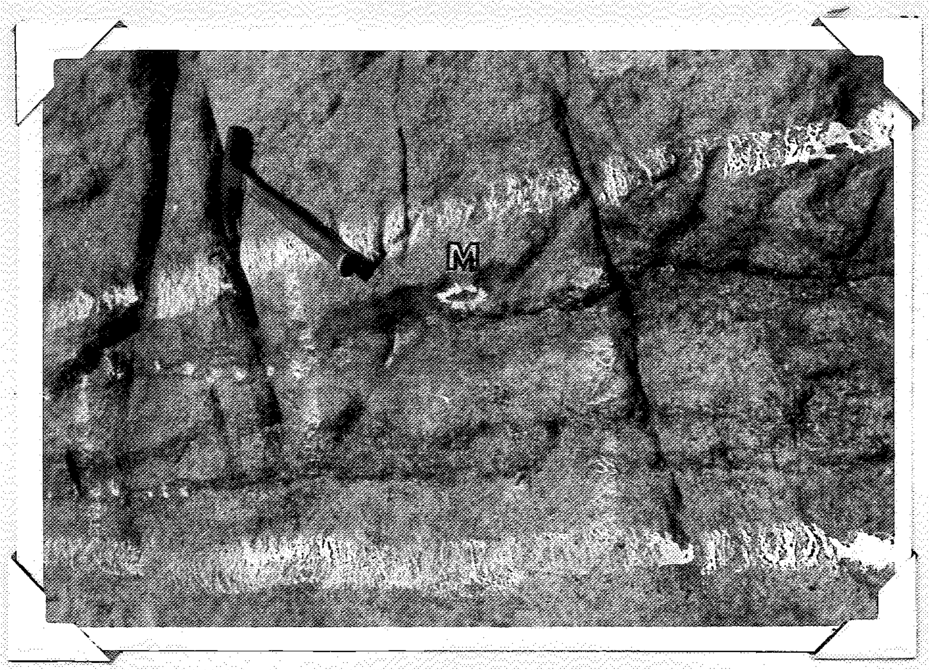




4. (Above) Contact between grey porphyritic granite and red granite.

5. (Left) Veins of scheelite with molybdenite.

6. Veins of scheelite with molybdenite.

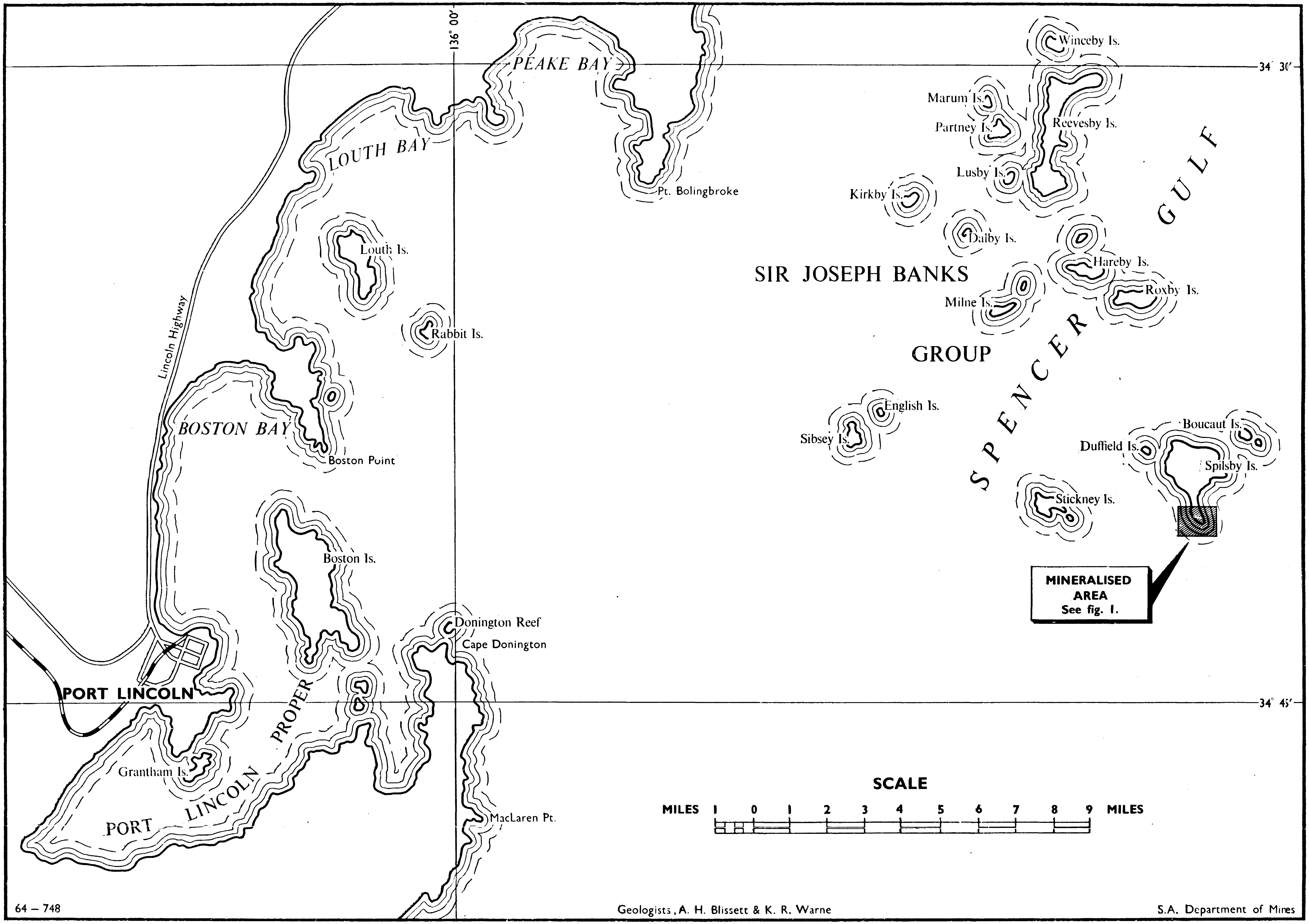


7. Veins of scheelite and bleb of molybdenite.

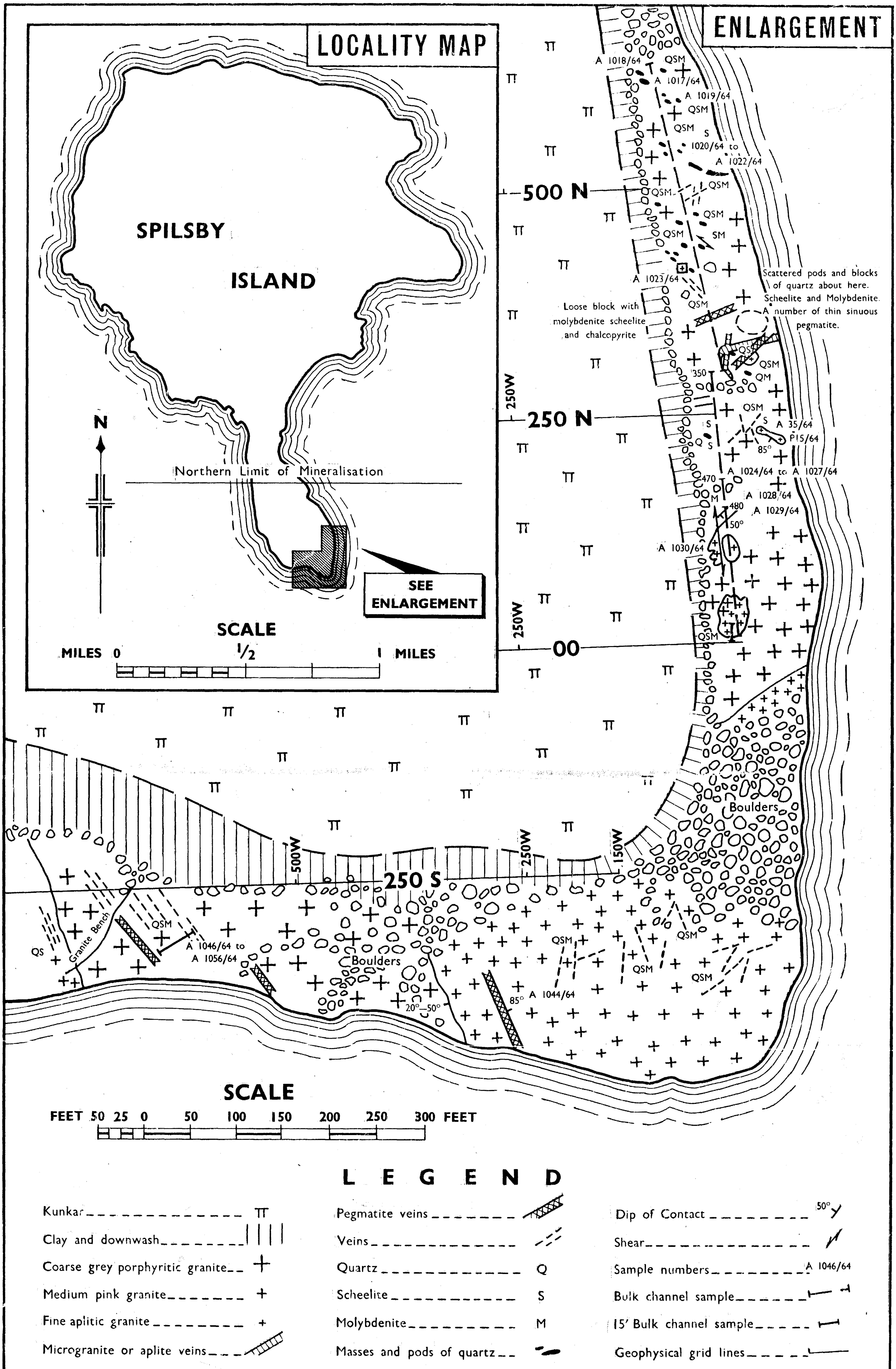
8. Weathered pod of molybdenite.

9. Blasting sample channel.

10. Loading rock, northern coast of Spilsby Is.
(Boucaut Is. in background)



136° 00′
34° 30′
34° 45′
PEAKE BAY
LOUTH BAY
Pt. Bolingbroke
Louth Is.
Rabbit Is.
Lincoln Highway
BOSTON BAY
Boston Point
Boston Is.
Donington Reef
Cape Donington
PORT LINCOLN
Grantham Is.
PORT LINCOLN PROPER
MacLaren Pt.
Winceby Is.
Marum Is.
Partney Is.
Reevesby Is.
Lusby Is.
Kirkby Is.
Dalby Is.
Hareby Is.
Roxby Is.
Milne Is.
SIR JOSEPH BANKS
GROUP
SPENCER GULF
English Is.
Sibsey Is.
Boucaut Is.
Duffield Is.
Spilsby Is.
Stickney Is.
MINERALISED
AREA
See fig. 1.
SCALE
MILES 1 0 1 2 3 4 5 6 7 8 9 MILES
64 – 748
Geologists, A. H. Blissett & K. R. Warne
S.A. Department of Mines



64 – 754

Geologists, A. H. Blissett & K. R. Warne

S.A. Department of Mines