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PROGRESS REPORT

on the

EXPLORATION FOR ALLUVIAL TIN DEPOSITS IN N. E. TASMANIA

and the

FURNEAUX GROUP

No. 139. October, 1966.

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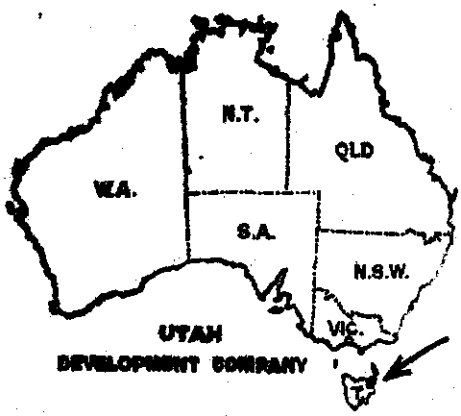

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ELS 2/65 6/63

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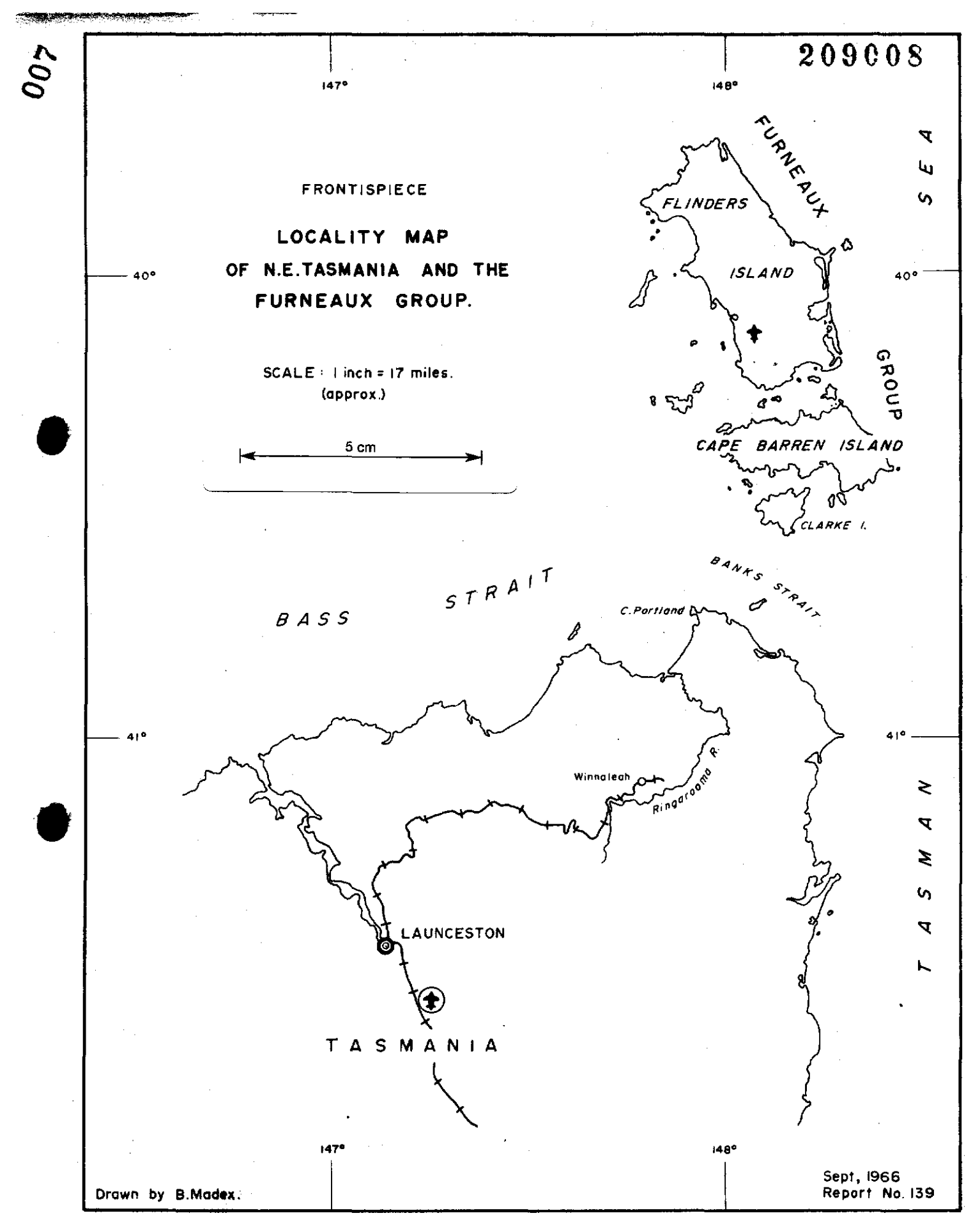
FRONTISPIECE

LOCALITY MAP OF N.E.TASMANIA AND THE FURNEAUX GROUP.

SCALE : 1 inch = 17 miles.
(approx.)

5 cm



Drawn by B.Madex.

Sept, 1966
Report No. 139

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CONCLUSIONS AND RECOMMENDATIONS

This report records results to the completion of the first stage of testing for tin in the Company's Exploration Licences EL. 6/63 in N. E. Tasmania, and EL. 2/65 in the Furneaux Group Islands to the north.

The testing has been confined exclusively to alluvial concentrations of cassiterite of lower to mid-Tertiary and later age. Deposits in the area can be divided into three types -

(1) High-grade deep leads;

(2) Upper, probably younger, shallow sheeted deposits;

(3) Extensive, fairly deep, perhaps lower grade deposits which have some of the characteristics of both (1) and (2) above.

Testing has been carried out on all the above types of alluvial deposits. In general the deposits of type (1) above were found to be deeper than expected and hence uneconomic, and those of type (2) contained low, erratic values. Deposits of type (3) might offer some prospect for small-scale selective mining.

Exploration Licence EL. 6/63 (North Eastern Tasmania):

A total of ten separate areas have been tested within the Exploration Licence (see Table E). Of these, two areas, Test Area No. 5 (the Mussel Roe River Swamp) and Test Area No. 11 (Boobyalla Area) showed significant concentrations of tin. The others either contained little or no tin, or were too deep to be of economic interest to the Company.

Test Area No. 5 (Mussel Roe River Swamp): Test Area No. 5 does not readily fall into any of the three types of deposits mentioned above, having characteristics of both types (1) and (3). The area is a linear, heavily wooded river swamp, six miles in length and averaging 1,000 ft. in width, containing fluviatile sediments varying in depth from 15 - 20 ft. In the northern part of the river swamp, three drill traverses tested a length of 8,000 ft. along the course of the Mussel Roe River. Of the 2,444 ft. drilled in 69 holes, only 11 holes contained tin values in excess of 0.10 lb. Sn/cu. yd. The average value of the 11 holes was 0.31 lb Sn/cu. yd. over a depth of

26 ft. The tin is found in a thin discontinuous basal wash in distinct "runs" or "pools", which are generally associated with depressions in the granite basement. These stanniferous runs are generally no more than 50 - 60 ft. wide, and separated by as much as 300 ft. of barren material.

In the northern traverse MR. 2, 17 holes tested the swamp over a width of 1,320 ft., and 8 holes tested the terraces on the adjacent flanks. Although 7 holes in the swamp established the presence of four separate stanniferous runs averaging 0.23 lb Sn/cu. yd. over 25 ft., the value over the full width of the swamp was 0.02 lb Sn/cu. yd. at 24.4 ft. Providing similar runs occur north and south of this line over a length of 4,000 ft., the possible reserves would be 772,000 cu. yds. at 0.23 lb Sn/cu. yd.

In the centre traverse MR. 3, 7 holes tested the swamp over a width of 700 ft., and 13 holes tested the adjacent terraces. The holes in the swamp contained only a trace of tin, and one hole on the eastern terrace obtained a value of 0.11 lb Sn/cu. yd. over 42 ft.

The southern traverse MR. 1, contains 14 holes in the swamp and 10 holes on the adjacent terraces. Four holes in the swamp established the presence of three stanniferous runs averaging 0.32 lb Sn/cu. yd. over a depth of 30 ft. The average value over the 1,000 ft. width of the swamp is 0.11 lb Sn/cu. yd. at a depth of 30 ft. Providing similar stanniferous runs occur north and south of the traverse over a length of 4,000 ft., the possible reserves would be 728,000 cu. yds. at 0.32 lbs Sn/cu. yd. South of this traverse, a further 12,000 ft. of swamp remains untested.

The general similarity of the swamp and the lithological section present at line MR. 1 to that of Wood's Mussel Roe Mine, approximately two miles due south, suggests there is a possibility that they are a single geological feature which has been separated by the block faulting. If this is the case, it is possible the values in the southern part of the swamp will equal or approach Wood's mine, where selective sluice mining has treated approximately 500,000 cu. yds. at a grade of 0.4 to 0.5 lb Sn/cu. yd.

Thus the Mussel Roe Swamp contains inferred reserves from north to south of 772,000 cu. yds. of 0.23 lb Sn/cu. yd. (MR. 2), and 728,000 cu. yds. of 0.32 lb Sn/cu. yd. (MR. 1) in two sections each 4,000 ft. in length, and may contain a further $1\frac{1}{2}$ million cu. yds. of material of similar grade in the southern part.

Due to the exceedingly swampy nature of the area, and the presence of a rather heavy timber cover, the cost of preparing for and carrying out further

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drilling will be high. It is considered that the reserves of tin likely to be proved do not warrant an extension of the drilling programme.

Test Area No. 11 (Boobyalla Area): Drilling in this area has indicated a wide alluvial filled channel some 6,000 ft. in width, probably 10,000 ft. + in length, and in excess of 100 ft. in depth. 27 sample holes, varying in depth from 20 - 104 ft., and totalling 1,506 ft., were completed, of which six holes recorded values exceeding 0.10 lb Sn/cu. yd. The average value of the six holes is 0.176 lb Sn/cu. yd. to an average depth of 35 ft., while the average value of the 27 holes is 0.054 lb Sn/cu. yd. over 36.7 ft. The stanniferous holes are widely separated, and it is impossible to correlate the respective stanniferous horizons. Inferred reserves calculated about each individual stanniferous hole might aggregate 788,700 cu. yds. at a grade of 0.16 lb Sn/cu. yd.

Two previous drilling programmes carried out immediately east of the Boobyalla area recorded average values of 0.13 lb Sn/cu. yd. to a depth of approximately 55 ft. In dredging at the Dorset Flats on the Ringarooma River, the Storeys Creek Tin Mining Co. N. L. treated 30 million cu. yds. at 0.135 lb Sn/cu. yd. Based on the Boobyalla drilling information, and the Storeys Creek Company's dredging experience, it is now believed that the most favourable reserves available in Test Area No. 11 will not exceed 30 million cu. yds. of 0.15 lb Sn/cu. yd.

Exploration Licence EL. 2/65 (Furneaux Group of Islands):

Flinders Island: Flinders Island, the more northerly and larger of the two main Furneaux Group Islands, is made up of a backbone of rugged hills composed of Devonian granite, surrounded by generally low alluviated areas, underlain by flat-lying near-shore marine calcareous sediments, probably in excess of 100 ft. in thickness. Two areas on the western coast, Patts River and Tanners Bay, have yielded limited quantities of cassiterite from thin Tertiary fluviatile sediments partly exhumed by the present streams. Only minor alluvial and lode tin has been reported from other localities on the Island.

Small areas of Tertiary basalt are mainly confined to the southern part of the Island. A flow up to 50 ft. in thickness is present in a broad valley on the western side of the Darling Range in the vicinity of Cann Hill, $2\frac{1}{2}$ miles east of Whitemark. Thin fluviatile sands and gravels have been reported underlying this basalt at two localities, and one at O'Doherty Creek east of Whitemark is reported to contain cassiterite. It is possible that the basalt flow overlies a more extensive fluviatile section which might be stanniferous, particularly as it is immediately adjacent to the Patts River source area.

Due to the extensive cover of marine sediments, particularly in the eastern coastal plains, and the rather restricted source areas, there seems little chance of locating other high-grade stanniferous leads at shallow depth on the Island.

An inspection of the Cann Hill area is proposed when convenient, in an effort to verify the existence of, and gain added information on, the possible sub-basaltic lead.

Cape Barren Island: A stadia survey of the Rooks River Valley on Cape Barren Island was completed, and a topographic plan produced at 1" = 200 ft.

A drilling programme of 34 holes, totalling 1, 513 ft., was carried out in this area between August, 1965 and May, 1966. Tin values occur at two horizons, one within 40 ft. of the surface, and on bedrock, respectively. Towards the head of the channel where the section has been more fully tested, indicated reserves (majority of upper tin, some lower tin on bedrock) are calculated to be 630, 000 cu. yds. at a grade of 0. 28 lb Sn/cu. yd. to an average depth of 33 ft. If the lower horizon is projected north-easterly to traverse CB. 3, the possible reserves to a depth of 145 ft. may aggregate 4 million cu. yds. of 0. 25 lb Sn/cu. yd. Since no hole penetrated the base of the gutter where the highest values would be expected, it is considered that further drilling to the base of the lead might increase the grade of the above material to 0. 50 lb Sn/cu. yd. Except for one hole which encountered low-grade values from 70 - 95 ft. in depth about 500 ft. from the shoreline, the most northern or downstream traverse (CB. 2) failed to encounter tin or test the bedrock surface within the channel. Should the stanniferous gravels at bedrock continue to the shore, an additional 4 million cu. yds. would be present, but this may be in excess of 145 ft. in depth.

Recommendations:

Testing in the Mussel Roe River Swamp and Boobyalla Areas (EL. 6/63) suggests there is little likelihood of an economic deposit being found in either, and no further exploration is recommended.

In the Rooks River Area of Cape Barren Island (EL. 2/65) insufficient drilling has been completed, particularly in the lower horizon to fully evaluate the grade. Present indications suggest that a gravel pump operation might be feasible. A further 30 holes, totalling 3, 000 ft., is therefore proposed.

The Company's operations to date on Cape Barren Island have been restricted to the Rooks River Area, and since there is a possibility of other areas of similar size occurring elsewhere in the Island, it is proposed that a photo-geological and structural geological study of the entire Island be undertaken concurrently with the drilling programme. Mapping of the Ransom Creek and Modder River areas, at a scale of approximately 1" = 200 ft., is also recommended.

At the completion of the present exploration programme, a series of tests were designed to check the probable percentage recovery of tin from alluvial material, and the reliability of the field results, drill and plant performance. This test work tends to indicate that our calculated field grade figures are low, perhaps by an average of 20%; however, it is considered that insufficient test work was carried out to enable a correction to be applied to the field figures with certainty. To obtain a more accurate grade correction factor, the volume recovery of a sample, i. e. measurement of volume recovered over measurement of volume in drillhole, has to be calculated, requiring a measurement of the volume of material in the drillhole for each respective drill sample. Therefore, in any subsequent testing of alluvial deposits it will be necessary to carry out further testing of drill and plant performance in the initial stages, and at regular intervals throughout the programme. Also, a measurement of the sample volume in the drillhole must be taken for each sample.

As an aid to the broad geological understanding, it is recommended that specimens of carbonaceous clay from each area and each distinct alluvial horizon should be retained for palynological examination and age determination. Mineral grain counts should also be carried out on the different heavy mineral assemblages from different wash horizons in an effort to associate alluvial deposits to each other, and to a particular source area.

INTRODUCTION

The Company holds two Exploration Licences in Tasmania for tin and gold; EL. 6/63 in N. E. Tasmania, and EL. 2/65 in the Furneaux Group Islands immediately to the north.

An extensive programme, including photogeological and field mapping, induced polarization geophysics, reconnaissance auger drilling and quantitative sample drilling, has been carried out in the areas over a period of $2\frac{1}{2}$ years, commencing in February, 1964.

Tin occurs in the areas as (1) primary greisen veins and greisen "floors" generally associated with the contact between intrusive granite bosses and surrounding metasediments; and (2) alluvial concentrations in past and present river channels. Marine concentrations offshore may also exist, but none has so far been discovered. The Company is examining the offshore portions of EL. 2/65, but this is a separate project and will not be reported here. No primary deposits were tested, the exploration programme being restricted to alluvial concentrations in old river channels (leads). The tin in these channels is associated with gravels in complex fluviatile successions which also include sands, silts and clays.

A report summarising the progress of testing in EL. 6/63 and a review of the original proposals were presented in December, 1965 (Warin and Appleby, 1965). The present report summarises results in the period December to May, 1965, in EL. 6/63, and the investigations of EL. 2/65.

The entire project has been carried out under the direction of management (Messrs. Richard D. Ellett and T. A. Rodgers), and in the initial stages the close supervision of Mr. Don King, and later Mr. O. N. Warin. A number of Company personnal, present and past, participated in the investigations. These include Mr. G. E. Allen (Geologist) who shared responsibility for the programme during the period September, 1965 to January, 1966, before being transferred to the Blackwater Coal Project, Messrs. C. K. Wong (Mining Engineer), G. C. Campe (Contract Geologist), P. L. Price (Geologist), and J. G. Bartlett, K. O'Hanlon and L. M. Lees (Field Assistants).

Acknowledgement is due to many people of N. E. Tasmania and Cape Barren Island. In particular Mr. Ron Lawry, Mine Manager for the Star Hill Syndicate, Gladstone, who gave generously of time, effort and often machinery, Mr. S. L. Crawford of Winnaleah, Mr. Reg Munro, charter pilot of Launceston, and Mr. and Mrs. Tom Langley of Cape Barren Island.

HISTORY

In early 1962, the Company commenced investigations of the tin prospects in Australia by preparing geological reports of the known tinfields in the various States. The most likely prospect arising from these reports was put forward by Mr. Don King, then Project Geologist with the Company (King, 1963). He recommended that the Company take out an Exploration Licence over a major portion of the alluvial tinfield in N. E. Tasmania, together with an option over Wood's Mussel Roe Tin Mine in this area.

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On October 17, 1963, an option was negotiated over Wood's Mussel Roe Mine with the owner, Mr. Vernon Wood. The Company initiated a field study (Howard, 1963), followed by an exploratory drilling programme which showed that the property could not be mined profitably by the Company (Appleby, 1964). The option was relinquished in April, 1964.

On October 29, 1963, the Company was granted an Exploration Licence (EL. 6/63) of 300 square miles covering the greater part of the alluvial tinfield in N. E. Tasmania, and a geological study was begun by Mr. O. N. Warin, Project Geologist, in February, 1964. As this progressed, a further area of 84 square miles was added to the south-west corner of the Exploration Licence in January, 1964. In November, 1964, Mr. Warin presented a comprehensive report (Warin and Appleby, 1964), recommending ten areas for testing. The drilling programme commenced on December 15, 1964. About this time, Mr. Don King made a reconnaissance of the Furneaux Group of Islands in eastern Bass Strait. He recommended that the Company apply for an Exploration Licence covering the Islands and the offshore areas surrounding them. On February 24, 1965, the Company was granted EL. 2/65 of 3,300 square miles covering this area. A further reconnaissance by Messrs. Don King and P. W. Goscombe in early 1965 led to the decision to undertake a more intensive geological reconnaissance of Cape Barren Island. Mr. Goscombe carried out a three weeks' geological reconnaissance of the western part of the Island, and presented a report with proposals for drilling in May, 1965 (Goscombe, 1965). Drilling commenced at Rooks River on Cape Barren Island in early August, 1965.

In December, 1965, the progress of investigations was reviewed (Warin and Appleby, 1965). The assessment indicated that, although the results of the drilling were generally discouraging, the reasoning behind the original proposals (Warin and Appleby, 1964) was quite valid. The area of the Exploration Licence was reduced to 140 square miles on December 3, 1965.

The drilling programme was completed in EL. 6/63 on May 3, 1966, and it was decided to further reduce the Licence to three separate blocks covering the most promising areas and totalling 70 square miles. The drilling contract was finally terminated on May 10, 1966, after a series of tests had been carried out to check the cassiterite recoveries of the drilling method and sample washing plant.

Messrs. Ellett and Appleby made a brief reconnaissance of the Furneaux Group Islands (EL. 2/65) in late August, 1965, particularly the known and likely stanniferous areas on Flinders Island. In light of experience in Tasmania, the Flinders Island areas did not appear promising, and the area

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TABLE A.

DRILLING STATISTICS

	Footage Drilled (ft.)	Duration	Time (hrs.)	Cost per hr. (A.$)	Cost per ft. (A.$)	Type of Drill - Operator
N. E. Tasmania, EL. 6/63 Sample Drilling	834	13 weeks			$2.20 plus $270 move-in	Rotary Failing 1500 (abandoned) (W. L. Sides & Son).
	30 experimentation		48	$4.90		do.
	5,869	73 weeks			$2.20 plus $540 move-in/ move-out	Cable Tool Percussion Drill. Goldfields G. 33 (W. L. Sides & Son.)
	1,006	22 weeks			$4.85	Cable Tool Percussion Drill. Ruston Bucyrus (Department of Mines, Tas.)
Testing of method and Recoveries			24.5	$4.90		Cable Tool Percussion Drill. Goldfields G. 33 (W. L. Sides & Son).
Reconnaissance Auger Drilling	4,857	50 days	278	$17.50	$1.00 plus $550 move in/move out	Gemco Auger Drill. (Foundation Engineering Pty. Ltd.)
	19,070	106 days	706	$13.00	48¢ plus $260 move in/move out	Gemco Auger Drill (A. S. James Pty. Ltd.)
Cape Barren Island EL. 2/65	400	20 weeks				Conrad Stork Pioneer Drill (abandoned) (U. D. C.)
Sample Drilling	1,113	12 weeks			$2.50 plus $700 move in/move out (Launceston - Cape Barren Is.)	Cable Tool Percussi on Drill. Goldfields G. 33 (W. L. Sides & Son).

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of the Licence was reduced to 1,575 square miles to include only Cape Barren Island and the immediate offshore area. The drilling programme at Rooks River on Cape Barren Island was finally terminated on May 7, 1966.

DRILLING AND SAMPLING METHODS AND STATISTICS

Because of the questionable recovery of cassiterite from the Cable Tool Percussion drill employed in the Company's testing at Wood's Mussel Roe Mine (Appleby, 1964), various alluvial drilling methods were investigated. The factors of efficiency, cost, availability and mobility led to the selection of a rotary rig with a 6" I.D. casing.

Drilling with a modified Failing 1500 rotary drill began in December, 1964. This rig proved unsatisfactory, and was finally withdrawn after completing 834 ft. in 24 holes, seven of which had been abandoned. A description of the method involved, and more obvious reasons for its failure, are discussed in Report No. 135. The four months' trial period and final abandonment of the rotary drill seriously delayed the whole exploration programme, and the Company was forced to revert to using Cable Tool Percussion drills. A vacuum sand-pump for cleaning up the bottom of the holes was added to the method employed at Wood's Mussel Roe Mine as described in Report No. 128.

On Cape Barren Island, initial drilling used Banca 3" hand drilling equipment with a Conrad Stork Pioneer drill. The lightweight drill string proved unsatisfactory, and a set of 5" water well tools was ordered for the rig. The heavier equipment drilled quite satisfactorily; however, due to the exceptionally tight nature of the ground, and low pulling capacity of the rig, great difficulty was experienced in retrieving the casing. The latter phase of the drilling programme was completed with a truck mounted Goldfields G.33 cable tool percussion drill similar to the one used by the Company in N.E. Tasmania.

A record of the drilling statistics is included in Table A.

SAMPLE PROCESSING

When drilling at Wood's Mussel Roe Mine, serious doubts arose regarding the accuracy and consistency of the sample concentrating technique (see Report No. 128); therefore, prior to the commencement of the present drilling programme, research was carried out by the C.S.I.R.O. in Melbourne to determine the design of an efficient mechanical concentrating plant. A description of the plant finally evolved is given as an Appendix

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TABLE B.

Comparison of Grades from Bores 78 and 78A

Test Area 11

Depth (ft.)	Bore 78		Bore 78A	
	Recovery of section (%)	Value lbs Sn/cu.yd	Recovery of section (%)	Value lbs Sn/cu.yd
0 - 5	130	Nil	101	Nil
5 - 10	116	Nil	71	Nil
10 - 15	93	Nil	75	Nil
15 - 20	79	Nil	69	Nil
20 - 25	74	Nil	93	Nil
25 - 30	93	Trace	83+	0.09
30 - 35	93	0.10	141	0.26
35 - 40	83	Nil	69	0.17
40 - 45	51	0.07	102	0.40
45 - 50 (45-46.7)	79	0.27	130	0.39
50 - 55			56+	0.09
55 - 58.5			145	Nil

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NORTH-EAST TASMANIA

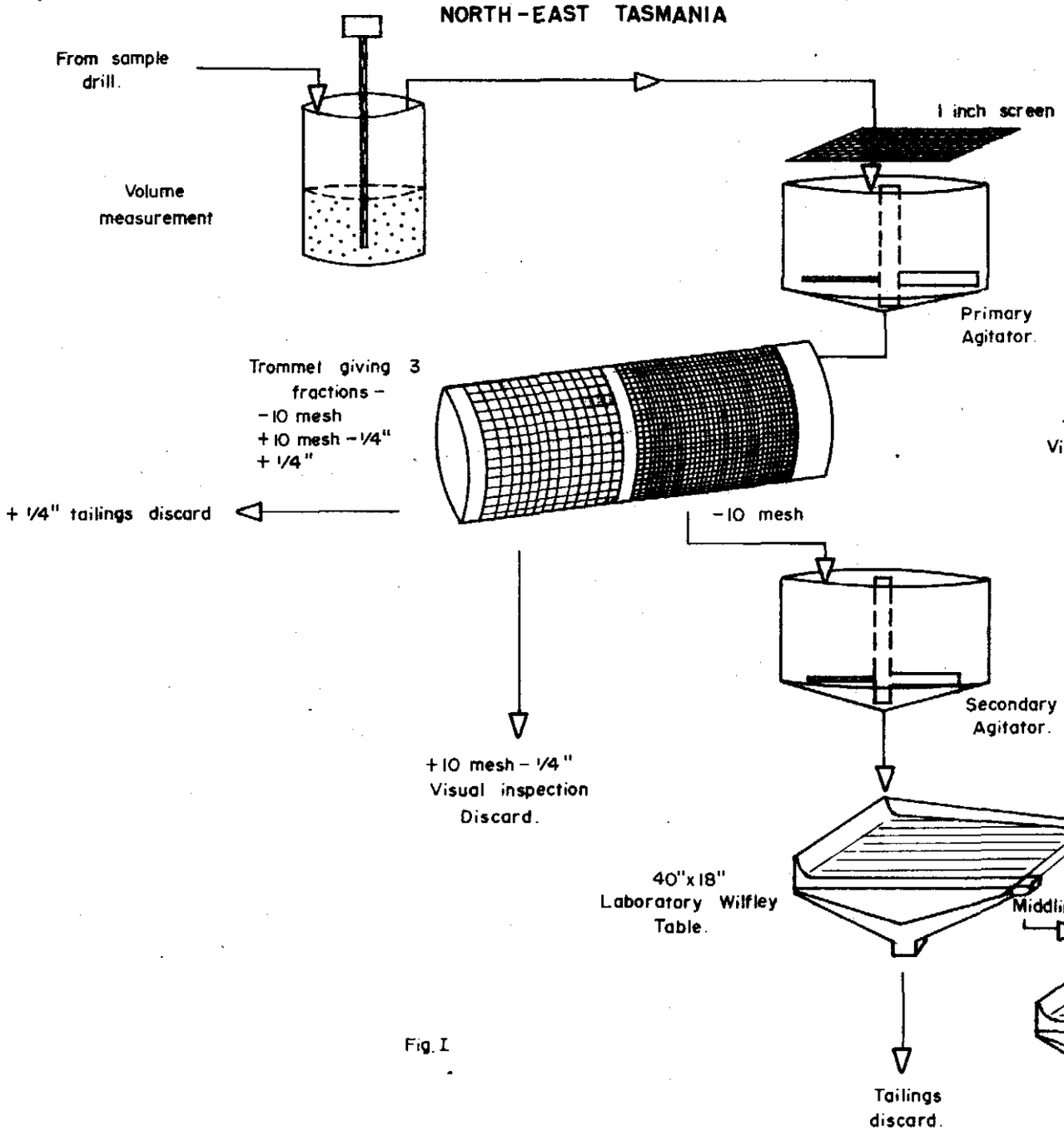
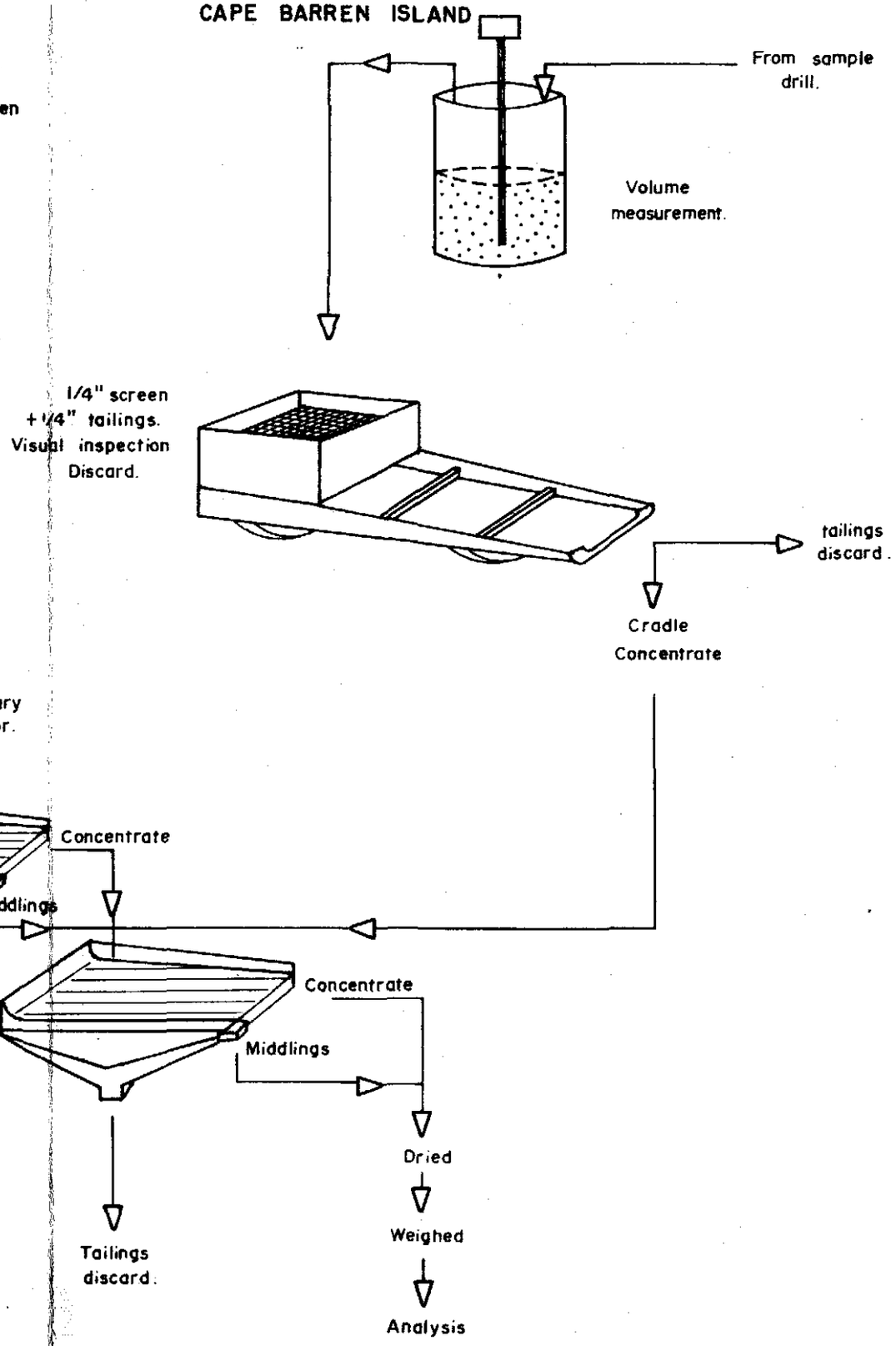


Fig. I

SAMPLE FLOW SHEET FOR U.D.C. DRILLING.

CAPE BARREN ISLAND



Drawn by B. Madex.

Sept, 1966.
Report No. 139

in Report No. 135. Plant production averaged 80 ft. of hole sample per day.

On Cape Barren Island, because of the isolation and logistic problems, the drill samples were screened to -$\frac{1}{4}$" and roughly concentrated in a cradle. This rough concentrate was then shipped to the plant in N. E. Tasmania, and reconcentrated across the laboratory Wilfley tables.

A concentration flow sheet is presented in Fig. I.

TEST OF DRILLING AND SAMPLING TECHNIQUES

The Company has now completed 11,409 ft. of sample drilling (including the programme at Wood's Mussel Roe Mine - 2,187 ft.). Throughout the entire programme, because of the nature of the ground and the type of drilling used, recoveries varied greatly. It was impossible to standardise drilling from actual mined recoveries or from exposures in pits. In one instance, two holes (Bore 78 and 78A) 10 ft. apart gave widely varying grades and recoveries (see Table B). These differences could be due to actual variations in grade even over 10 ft.; however, it seems most likely that some at least of the variation arises from the drilling technique.

With these problems in mind, a short programme (May 4-10, 1966) was designed to test probable recoveries both in the method of drilling and the sample treatment plant.

To check the drilling results, it was assumed the drilling method had been reasonably constant, and that the primary variables would be (1) sizing of stanniferous wash; i. e. relative percentage of silt, sand and gravel fractions, (2) grade of tin concentrate in the wash, and (3) grain size of tin concentrate.

A quantity of cassiterite concentrate was obtained and sized into -60 mesh, +60 to -30 mesh, +30 to -10 mesh, and +10 mesh fractions, and from each fraction both split and grab samples were forwarded to the Mines Department laboratories in Launceston for analysis. Barren silt, sand and gravel was also sized into 60 mesh (silt), +60 to 10 mesh (fine sand), +10 mesh to -$\frac{1}{4}$" (coarse sand) and +$\frac{1}{4}$" to 3" (gravel) fractions. Stanniferous samples of varying composition were placed in a hole in which the casing was bedded in clay, and then drilled out.

A total of 12 separate tests on material introduced into a hole endeavoured to establish the probable recoveries from the following combinations:

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TABLE C

Variations of composition and grain size of wash and tin concentrate used in tests of drill concentration plant performance

Average Wash	15% silt (-60 mesh), 40% fine sand (+60 mesh to -10 mesh), 30% coarse sand (+10 mesh to -$\frac{1}{4}$"), 15% gravel (+$\frac{1}{4}$" to -3").
Fine Wash	15% silt, 55% fine sand, 15% coarse sand, 15% gravel.
Coarse Wash	15% silt, 20% fine sand, 50% coarse sand, 15% gravel.
Average tin concentrate	50% -60 mesh, 50% +60 mesh to -30 mesh.
Fine tin concentrate	100% -60 mesh.
Coarse tin concentrate	50% +60 mesh to -30 mesh, 50% +30 mesh to -10 mesh.

Variable Stanniferous Values used:

2.4	lbs.	Sn/c.y.	over	5 ft.	equivalent to	0.3	lbs	Sn/c.y.	over	40 ft.
4.8	"	"	"	5 ft.	" "	0.6	"	"	"	40 ft.
8.0	"	"	"	5 ft.	" "	1.0	"	"	"	40 ft.
12.0	"	"	"	5 ft.	" "	1.5	"	"	"	40 ft.
24.0	"	"	"	5 ft.	" "	3.0	"	"	"	40 ft.

Constant Stanniferous Values used;

8.0	lbs.	Sn/c.y.	over	5 ft.	equivalent to	1.0	lbs	Sn/c.y.	over	40 ft.

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TABLE D.

RESULTS OF SAMPLE TESTING

Sample No.	Sn rec. lbs Sn/c.y.	Sn added lbs Sn/c.y.	Sn Recy. %	Sample Settlement-% meas. volume in drillhole initial vol. measurement Plug	Wash	Total	Volume Recovery Meas. vol. recovered meas. vol. in drillhole Plug	Wash	Total	Cal. grade wt. rec. Sn / meas. vol. rec.	Grade wt. init. Sn / meas. vol. in drillhole	Calc. grade Theoretical grade %
1	0.0687	0.0991	69.3	81	57	73	90	114	96	0.840	1.134	74.1
2	0.1268	0.1983	63.9	76	61	71	112	152	124	1.236	2.400	51.5
3	0.3051	0.3300	92.5	70	105	82	102	80	92	3.453	3.423	100.9
4	0.4560	0.4956	92.0	71	82	75	102	105	103	5.053	5.637	89.6
5	0.7903	0.9905	79.8	100	73	91			91	8.237	9.343	88.2
6	0.2901	0.3300	87.9	88	101	93	99	73	89	2.994	3.036	98.6
7	0.2789	0.3300	84.5	101	78	93	92	101	94	2.718	3.036	89.5
8	0.2627	0.3138	83.7	93	78	87	95	83	91	2.822	3.067	92.0
9	0.2760	0.3561	77.5	63	103	76			102	3.026	3.978	76.1
10	0.2764	0.3300	83.8	84	70	77			97	4.041	4.692	86.1
11	0.0192	Nil										
12	0.2846	0.3300	86.2						102	25.640	29.491	86.9
13	0.0391	0.0476	82.1	)			)			1.470	1.160	126.7
14	0.0499	0.0516	96.7	) Not applicable			) Not applicable			1.876	1.257	149.2
15	0.9103	0.9905	91.9	)			)			22.182		

1. Wash of constant composition with a variable cassiterite content of constant size.

2. Wash of constant composition with a constant cassiterite content of variable size.

3. Wash of variable composition with a constant cassiterite content of constant size.

4. A stanniferous wash was placed inside the casing, and the casing was then withdrawn and redriven as if in virgin ground.

In three separate tests, stanniferous wash of variable grade was put directly through the sample treatment plant.

The composition (i. e. percentage silt, sand gravel) of average wash, fine wash and coarse wash was calculated from wash intersections recorded in the previous drilling, and material of these compositions was reconstituted. Before each test, a 10 ft. plug of barren material (50% +60 mesh to 10 mesh, 50% +10 mesh to -$\frac{1}{4}$") was placed in the bottom of the hole. The 5 ft. section of stanniferous wash to be tested was placed on top of the plug, and the whole section drilled out as three approximately equal 5 ft. samples. The range of variations used for the wash and tin concentrate are shown in Table C.

TEST SAMPLE RESULTS

Statistical Results: See Table D.

Interpretation of Graphical Results:

The results of the test programme have been plotted graphically to show the general trends which might be expected during sample drilling. The graphs can be used to give an indication of the accuracy of the field results.

1. Percentage Recovery of Tin: The percentage recovery of tin depends on the tin losses which occur during the drilling and the sample preparation and on the accuracy of the tin assays.

   Fig. II plots the percentage recovery of tin against grade. A calculated and a theoretical grade have been used. The theoretical grade shows the effect of volume recovery on grade, and should be studied in connection with the grade-volume recovery factor (Fig. IV). The

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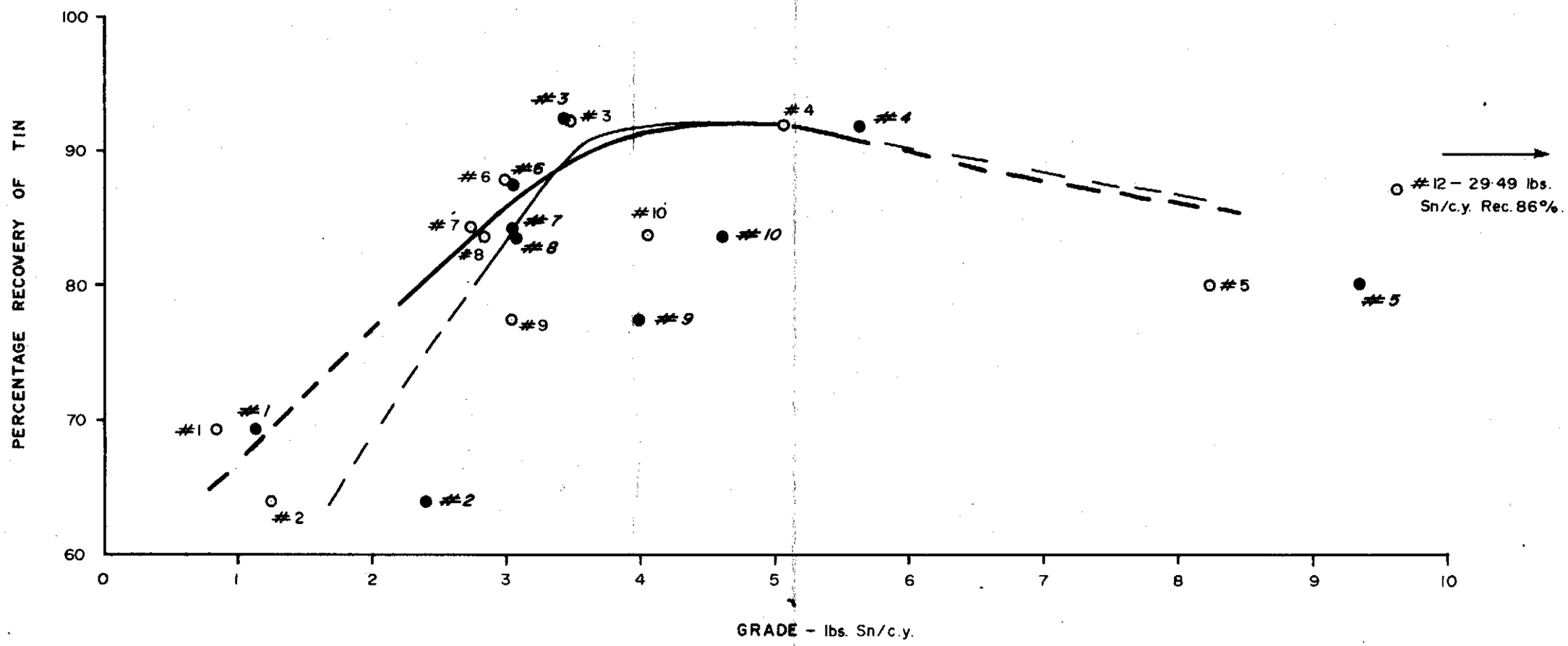

Calculated Grade = $\frac{\text{wt. of Sn.}}{\text{meas. vol. recovered}}$ in lbs. Sn/c.y.

Theoretical Grade = $\frac{\text{wt. of Sn.}}{\text{meas. vol. in drill hole.}}$ in lbs. Sn/c.y.

INDEX

HOLE

- 1.
- 2.
- 3.
- 4.
- 5.
- 6. Coarse wash.
- 7. Fine wash.
- 8. Coarse tin.
- 9. Fine tin.
- 10.

5 cm

Fig. II

PERCENTAGE TIN RECOVERY VERSUS GRADE.

Drawn by B. Madex.

Report No. 139

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use of the calculated grade removes factors which are inherent in the test procedure; i. e. settlement of the sample when tipped into the drillhole and having a known quantity of tin present.

This curve shows increasing tin recovery with increasing grade, until a peak is reached about 4-5 lbs Sn/cu. yd. The recovery then appears to decrease slowly. The tin recovery for field samples can be estimated by applying the calculated grade of the sample to the generalised curve.

The curve presented is the best fit of all ten test results. The results of tests 1, 2, 3, 9 and 10 are the most widely divergent from the generalised curve.

The wide variation between tests 1 and 2 could be due to a high recovery for 1, or conversely, a low recovery for 2. With only two results in the lower grade range, it is not possible to state which recovery is more representative.

The somewhat high value of test 3 is apparently due to the comparatively high tin recovery in the lower plug section (see Fig. III).

The low values shown by tests 9 and 10 could be due to:

No. 9 Fine tin recovery of fine tin is lower than that for medium and coarse tin.

No. 10 Short plug sample - if a longer plug section had been used the final tin recovery would be greater.

2. Tin Settlement in Sample (Fig. III): When a stanniferous horizon is entered, the digging action of the tools aggitates the sample material and allows gravity settlement of tin to take place. The recovery curves give an indication of the amount and depth of tin settlement. An ideal recovery curve for a homogeneous stanniferous wash (5 ft. thick) is included for a comparison.

The plotted recovery curves fall into four groups:

(a) Samples Nos. 3 - 8.
(b) Fine tin sample - No. 9.
(c) Short plug sample - casing withdrawal - No. 10.
(d) Low grade samples - Nos. 1 and 2.

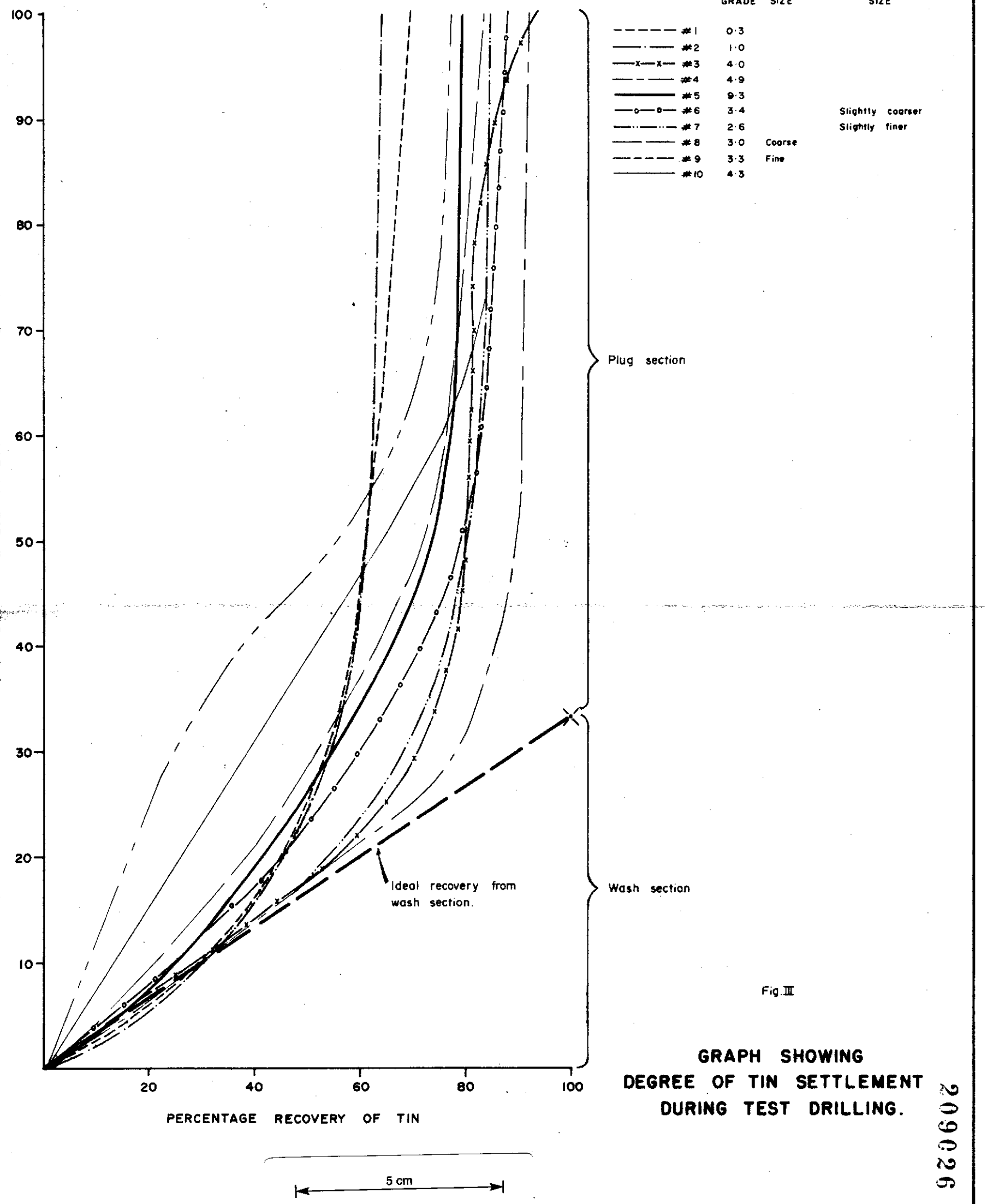

Fig. III

GRAPH SHOWING DEGREE OF TIN SETTLEMENT DURING TEST DRILLING.

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Drawn by B. Madex.

Report No. 139

(a) Samples Nos. 3 - 8: These samples all have the same general recovery curve. The tin recovery in the lower half of the plug material is very small, except in the case of sample No. 3 which is slightly anomalous.

(b) Fine tin sample - No. 9: The recovery curve over the wash section is steep, indicating a high degree of tin settlement. The violent digging action of the drill tools has caused a rapid downward movement of the fine tin through the wash interstices. The plug section of the sample contains an appreciable amount of the recovered tin in the upper 4 ft., but only a trace amount (4%) in the lower section.

(c) Short plug sample - casing withdrawal - No. 10: The drill casing was withdrawn from the bottom of the hole after the sample was tipped in. The sample, which had a 6 ft. plug below the stanniferous wash, was drilled in the normal manner; i.e. alternately driving the casing and drilling out the sample. The curve has a constant gradient for the initial 70% recovery, after which it moves upward with increasing steepness. The initial recovery gradient is steeper than all the other sample tests, excluding No. 9, and the only new factor introduced was that of withdrawing and driving the casing. The jarring action during the withdrawal and driving, together with the disruption of the sample, caused by the different diameters of the casing shoe and casing, would produce tin settlement.

(d) Low grade samples - Nos. 1 and 2: The curves for Nos. 1 and 2 are similar to those of Nos. 3 - 8, but show a recovery lag throughout their length. There is not enough available evidence on tin recoveries in lower grade samples to establish the nature or relationships of the factors causing the low recoveries.

3. Percentage Recovery of Tin related to tin grain size and material composition (Figs. II and III): The range of tin grain size and material composition tested was insufficient to bring about any marked change.

Tin grain size tested:

Test 9 - Fine	100% -60 mesh
Test 8 - Coarse	50% +60 to -30 mesh
	50% +30 to -10 mesh

027

Tests 1 - 7, 10, 12 - Medium	50% -60 mesh 50% +60 to -30 mesh

The tin recovery of the fine grained sample is lower than that for the medium and coarse grained samples of similar grade (see Fig. III). It would seem that increasing fineness in grain size will result in decreasing tin recoveries. It is possible that a series of curves similar to that of Fig. II could be constructed for samples in the finer grain size ranges.

The effect, if any, of the increase from medium to coarse grained tin has been masked in most cases by the strong grade effect. For similar grades (Nos. 6 and 8) the grain size of the tin (coarse or medium) has no effect on recovery.

Sample Composition:

Test 7	Fine wash - 15% silt, 55% -10 mesh, 15% -$\frac{1}{4}$", 15% gravel.
Test 6	Coarse wash - 15% silt, 20% -10 mesh, 50% $\frac{1}{4}$", 15% gravel.
Tests 1-5, 8-11, 12	Medium wash - 15% silt, 40% -10 mesh, 30% $\frac{1}{4}$", 15% gravel.

The difference between the tin recoveries for the coarse (No. 6) and fine (No. 7) wash is small, and may be a function of increasing grade. The tin recovery for a medium wash at a comparable grade (No. 8) is slightly lower than either No. 6 or No. 7. The sample composition over the range tested has a very minor effect when compared with other factors influencing the tin recovery.

4. Grade and Volume recovery factor (Fig. IV): In Fig. IV, volume recoveries are plotted against grade recoveries. The volume recovery of any sample is a percentage measure of the amount of material recovered and/or the degree of compaction or expansion of the sample. Grade recovery is a percentage measure of the grade established by the drilling against the actual grade in situ (in the test work the actual grade created inside the casing). A series of samples with the same percentage tin recovery will be on the same curve (the curves for 90%, 80% and 70% tin recovery are plotted on Fig. IV). The small graph shows the 100% and 70% tin recovery curves over a wide range of values.

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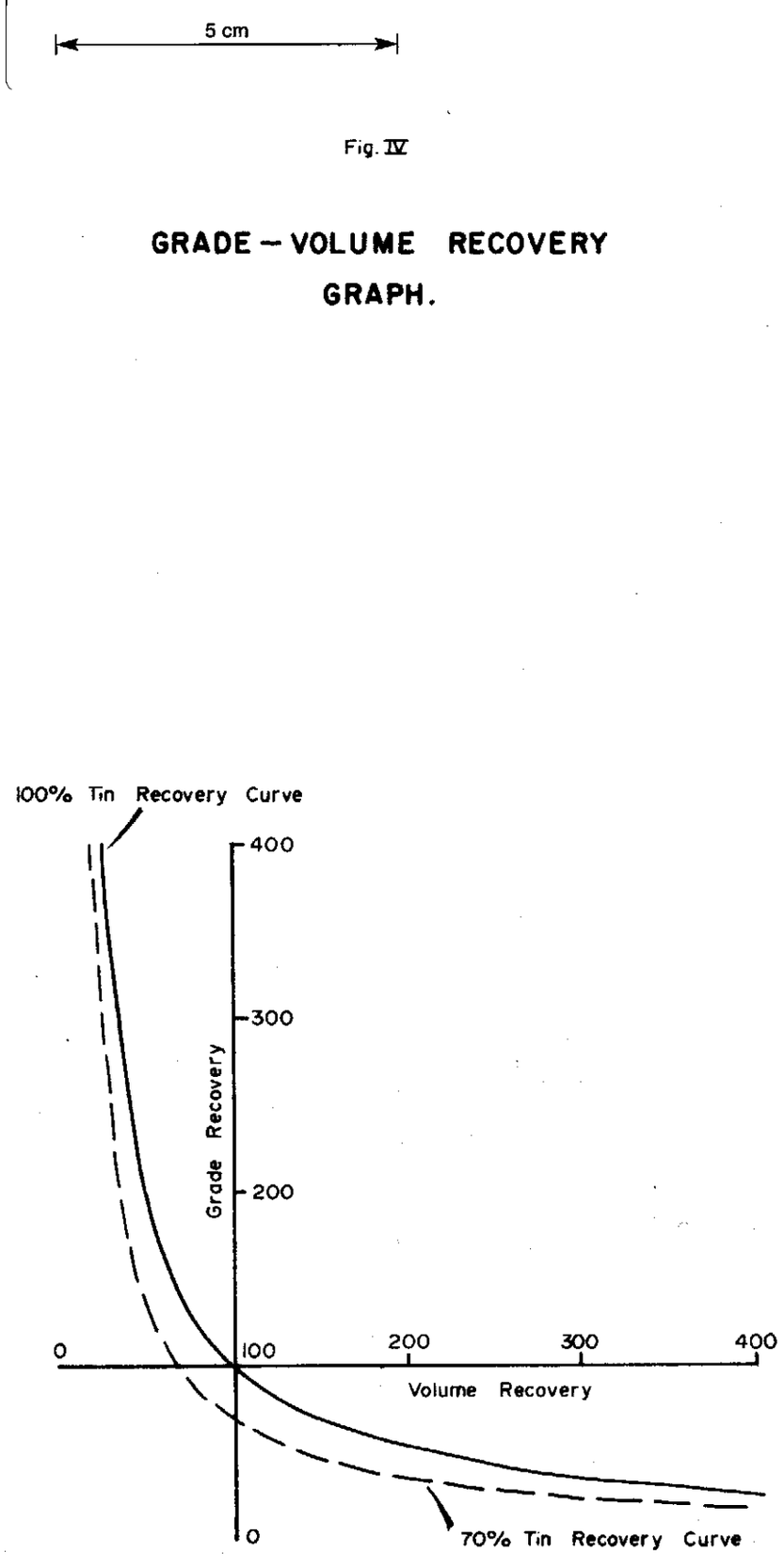
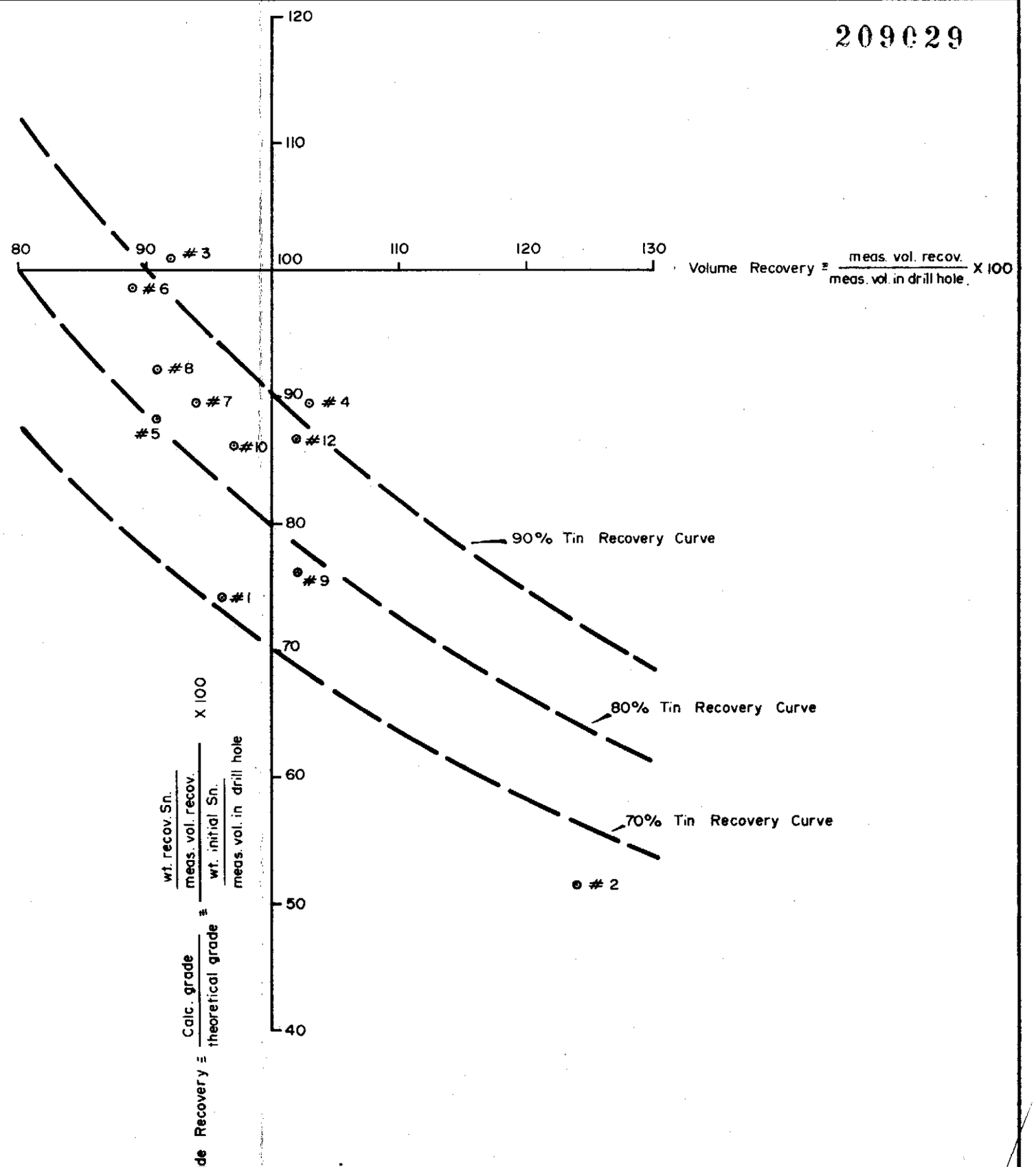
5 cm

Fig. IV

GRADE – VOLUME RECOVERY GRAPH.





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The graph incorporates three parameters, any two of which will enable the point position of any sample to be plotted. The three parameters are:

Volume recovery
Percentage tin recovery
Grade recovery.

The grade correction which must be applied to any sample to give the true grade can be estimated from the graph if any two of these parameters are known.

CRADLE TESTING ON CAPE BARREN ISLAND

Tests were carried out to determine the tin loss which occurs during the cradle operation. The retention of tin behind each riffle within the cradle was also studied.

Statistical Results - Appendix II.

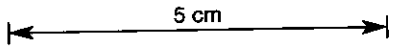
Riffle Recovery (Fig. V): The distribution of the recovered tin is in the order of a 6 : 3 : 1 ratio for the first, second and last riffles. No testing was carried out to determine the effect of tin grain size and sample composition on the tin distribution in the riffles.

Tailings Loss (Fig. VI): A continuous series of tests (50) were carried out during the field operations to determine the tin loss from the cradle. Many barren tests were conducted, but a sufficient number of results were obtained to give a clear indication of the general trend of the tin losses.

The tin losses shown by the riffle test samples were much higher than those for the tailings tests. This may have been caused by:

(a) Fine grained barren sand was used for the samples. The initial fine grained sand through the cradle packed down solidly behind the riffles, and the later material moved across the riffles in a thin high specific gravity layer. This layer could have taken off a high percentage of the fine grained tin.

(b) Treatment plant losses. Losses in the sampling shed would report as a tailings loss.



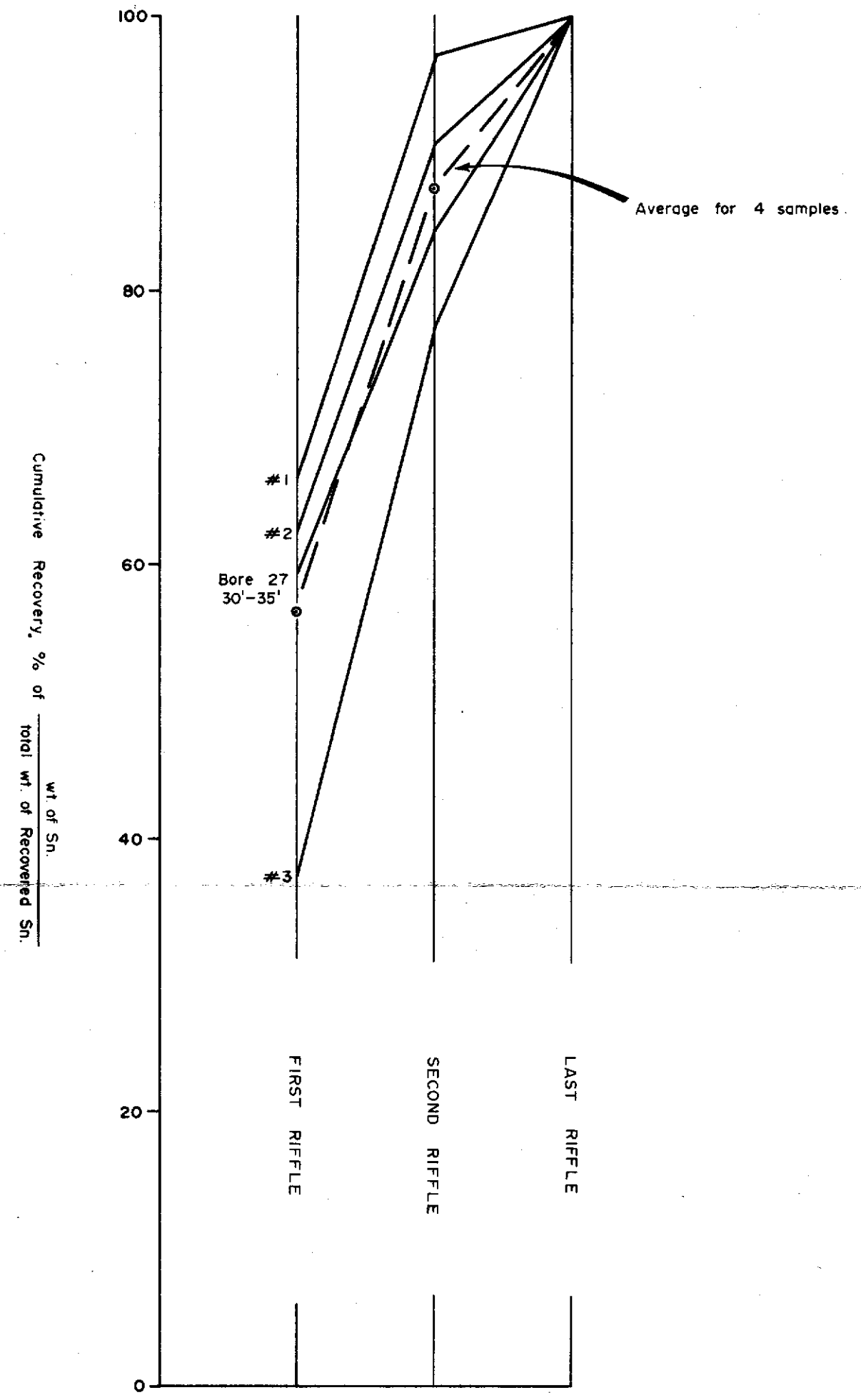


Fig. XI

GRAPH SHOWING CUMULATIVE RECOVERY OF TIN ON THE CRADLE RIFFLES.

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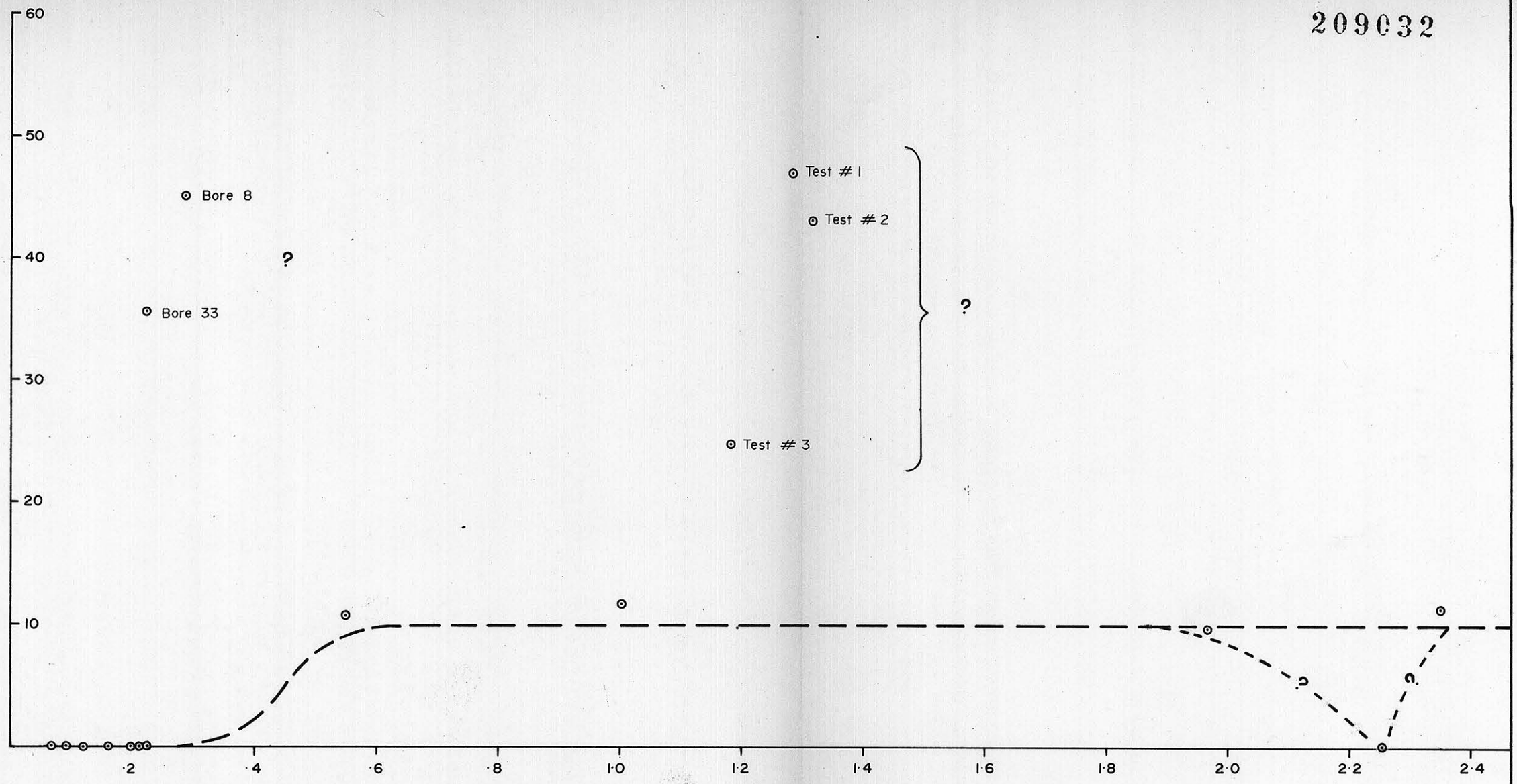

50 TESTS

21 tests with Sn. present — 6 with Sn. in tailings.
15 with no tin in tailings.

3 test samples.

Fig. VI

CRADLE LOSSES –
CAPE BARREN ISLAND.

5 cm

Drawn by B. Madex.

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(c) Incorrect analysis. An increase of 0.1% in the analytical assays of the sample concentrates would give the following decreases in the percentage loss of tin:

No. 1	10%
No. 2	5%
No. 3	5%

High anomalous tin losses, Bore 8 and Bore 33, may have resulted from incorrect cradling caused by:

(a) Too much water passing through the cradle.

(b) Too slow a cradling motion, resulting in scouring along the sides of the cradle.

(c) Unbalanced cradling motion, resulting in scouring of one side of the cradle.

(d) Too high a sample feed rate banking up the riffles and allowing the sample to pass straight through the cradle.

(e) The tailings tin loss for grades up to 0.4 lb Sn/cu.yd. was generally 0% (14 bores). The tailings tin loss for grades above 0.6 lb Sn/cu.yd. can be expected to be 10%+. (The anomalous result shown at 2.25 lbs Sn/cu.yd. occurred in 55 - 60 ft. sample of Bore 34, in which coarse-grained tin was observed. It would appear from this that losses for coarse-grained tin will be low).

Tailings loss can be kept to a minimum by an experienced and responsible cradle operator. Losses could be further reduced by re-cradling the tailings and adding this to the initial concentrate.

FACTORS INFLUENCING GRADE CALCULATIONS OF TEST SAMPLES

The factors influencing the grade calculations are:

(1) Tin recoveries; and
(2) Volume recoveries.

Tin losses may occur during the drilling operation or the sample preparation, but it has not been possible to accurately break down the overall loss into individual constituents.

(1) Tin Recoveries.

Treatment Plant Losses: Tests 13, 14 and 15 were designed to show the losses which occur during the sample preparation.

(a) Tabling: The tabling procedure was not specifically tested during the current programme, but four earlier tests gave a maximum tin loss of 1%.

(b) Sample Preparation: If the table losses were 1% for the three test samples, the resulting sample preparation losses would be:

No. 13	16.9%
No. 14	2.3%
No. 15	7.1%

These losses are very high for a part of the test procedure where close control can be applied. They suggest, in fact, the possibility that plant losses may account for the major part of the total losses in the tests.

The losses may be caused by:

Losses during screening in the trommel.

Careless washing of sample containers.

Analytical errors - incorrect sample weighing, incorrect assays.

It is not possible to assess the relative effect of losses through these three causes. Unfortunately, at this time a relatively inexperienced plant operator had to be used, which may partly account for the unexpected variation in the three tests. It is also worth noting that small analytical errors can greatly affect results; a change of 1% in the assay for the tin concentrate used in the tests would change the tin loss by 1%; a change of 0.1% in the final concentrate assay would change the tin loss by 1.5%. While it is recognised that sample treatment losses will occur, and will report as drilling losses in other tests, no correction has been made for this, because the variation shown by these three tests is considered too large to make the determination of an average possible.

Losses from Tin Analyses: Analytical checks have been carried out by Australian Mineral Development Laboratories (Adelaide) and the Mines Department (Launceston) on split samples, and the Mines Department has also done several checks on previously assayed samples (see Appendix 1, Table K).

Ten early analytical checks carried out by AMDL (Adelaide) and the Mines Department (Launceston) showed random variations of 0.09% to 11.4% Sn (see Appendix 1, Table J). Since no standard was available, and the Mines Department had had considerably more experience in assaying for tin, it was decided at the time to accept the values given by them.

Twenty-eight checks on previously assayed samples by the Mines Department showed two major errors and some minor variations. The minor variations were considered acceptable as they ranged from 0.02% Sn to 0.60% Sn, with most of these in the 0.05% to 0.1% Sn range.

Two major errors with variations of 2.3% and 16.3% Sn were found by the Mines Department to have been due to an incorrect laboratory procedure (Appendix 1, Table J). As a result, a number of critical assays from the drilling programme were re-assayed.

Fourteen assays of the tin concentrate used in the recovery checks showed a maximum variation of 2.8% Sn (Appendix 1, Table L). The variations in assay results, which have had to be accepted, is large enough to quite markedly influence apparent losses, both in drilling and the treatment plant.

Drilling Losses: The loss of tin during the drilling operation is due to the downward settlement of tin. This may occur when the casing is being driven or when the drive pump or bailer is used. When the casing is being driven, the stanniferous wash may fail to enter. When the drive pump or bailer is being used, the tin may move down under the influence of gravity, once the ground has been disturbed. This settling tin may report in lower samples or may move out of line and be lost.

Losses due to Physical Characteristics of Tin or Sample:

(a) Tin Grain Size: Tin losses are related to the proportion of fine-grained tin present in any sample. There is no apparent evidence from the tests conducted that variation from medium to coarse-grain size has any effect on the tin recovery during the drilling (see Fig. II, Tests Nos. 6, 7 and 8). Increasing grain size would appear to reduce losses from the cradle.

(b) Sample Composition: The sample composition over the range tested has only a very minor effect on tin recovery. If tin were present in sandy clay or clayey sand, the percentage tin recovery would decrease; the decrease being dependent on the stiffness of the clay and on the tin grain size.

(2) Volume Recoveries.

An accurate volume recovery is required if grade corrections are to be applied. Volume recovery is a measure of the amount of material lost, and/or the degree of compaction or expansion of the sample material. The accuracy of volume recovery values is dependent on the accuracy with which measurements of depth in the hole and volume at the surface can be made. It is also affected by changes of sample volume during the drilling or during transport of the sample. Volume recoveries are examined below.

(a) Depth Measurements: Depth measurements within the drillhole were made with a weighted line. For Tests 1 and 2, the measurement was made immediately after the sample was tipped into the hole. This gave low values as the fines had not had time to settle and consolidate. In all later tests the measurements were made after waiting half an hour to allow the fine material to settle.

(b) Volume Measurements: Volume measurements for the drummed samples are made to the nearest $\frac{1}{4}$". Errors can be caused by:

Bumps or hollows in the bottom of the sample drums.
Unconsolidated sludge at the top of the sample.
Operator error.

(c) Volume changes during Drilling or Transport: Suspension of fine material in the drillhole water, or sample compaction, can lead to low volume recoveries. The first is particularly likely where sand and silt or clay are thinly interbedded. The volume recovery for the plug section of the samples ranges from 90% to 102%, compared to volume recovery for the complete samples which ranges from 89% to 103% (excluding Test 2). These plug sections contain no -60 mesh material, and would not be affected by fines in suspension to the same extent as the wash samples. Recoveries of the plug sections will also be improved by material remaining from the overlying wash sections.

It is probable that the degree of compaction of Tertiary alluvial material in situ was not reproduced in the test work. However, it was assumed that the

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compaction occurring when the sample was poured into water in the hole approximated to the natural condition. The dry samples showed a compaction varying from 71% to 93% of their measured volume at the surface when they were introduced into the drillhole.

ADJUSTMENT OF FIELD RESULTS.

The object of the drilling programme was to obtain an accurate estimate of the yardage and grade of various alluvial areas by accurate estimation of the grade and length of stanniferous sections in drillholes. The object of the testing programme was to assess the degree of reliability and accuracy of the field results in order to adjust these to give a truer picture of the actual yardages and grades available.

The difficulties inherent in alluvial boring of these sequences are a direct reflection of the physical character of the rocks of which they are formed. In particular these are extreme, frequent and unpredictable changes in texture, degree of compaction, degree of lithification, and degree of water saturation of the rocks, which means that they are not all equally amenable to a single drilling technique. In grain size the rocks vary from clay through silt, fine to coarse sand, and gravel to boulder gravel; and complex random interbedding of these different lithologies can and does occur. Drilling will at best be a compromise as a method suitable for one lithology is most unlikely to be really suitable for one of the others.

The large difference in specific gravity occurring between the cassiterite mineralisation and the general alluvial material adds a further variable when drilling alluvial sequences.

The degree to which any drilling is successful in overcoming these difficulties can be quantitatively expressed in terms of (1) Volume recoveries and (2) Tin recoveries. The test work was designed to assess these two factors with a view to adjusting the field results, however an insufficient number of tests was completed to cover all the unexpected difficulties which were encountered in the drilling programme. Because of the nature of the ground, it was not possible to completely reproduce the natural conditions, and the factors as determined from the test work are not typical and can only be applied with reservation.

An indication of the correction which should be applied to the grades established during the drilling to approximate the grades existing in the ground is contained in a factor here termed Grade Recovery, which has been determined for the test samples. Grade Recovery may be defined by the following relations:

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$$\text{Grade Recovery:} = \frac{\text{Calculated grade (grade from drilling)}}{\text{Theoretical grade (grade in the ground)}} \times 100$$

$$= \frac{\dfrac{\text{wt. of recovered tin}}{\text{measured volume recovered}}}{\dfrac{\text{wt. of initial tin}}{\text{measured volume in the drillhole}}} \times 100$$

$$= \frac{\text{Tin recovery}}{\text{Volume recovery}}$$

The relationships between these factors for the test results are shown graphically in Figs. II and IV.

Grade recovery can be determined for the test results because tin recoveries are known, and volume recoveries can be calculated from direct measurements. For the results of field drilling, tin recovery is unknown but appears from the test results to vary with grade, and may be estimated from Fig. II.

Volume recoveries in the field drilling were calculated as:

$$\text{Field volume recovery:} = \frac{\text{Volume recovered}}{\text{Volume expected from length penetrated by casing.}}$$

Volume recoveries calculated in this way are not directly comparable with volume recoveries from the test results, because no measurement of material in the drillhole was recorded during the field drilling. Field grade calculations were based on the assumption that whatever material was inside the casing, whether more or less than the expected volume, was representative of the material through which the casing had been driven.

To give a comparison between field volume recoveries and the volume recoveries of the test series, an average field volume recovery for all the Rooks River sample (excluding topsoil, clay and silt) was calculated. This gave 77%, which is 20% lower than the average volume recovery for the test samples (97%), and indicates that the casing was "pushing" some of the material aside. All field volume recovery calculations have been increased therefore by 20% to approximate the test sample results.

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Grade Recoveries for results of the field drilling programme were calculated on the basis of the volume recovery (corrected by 20% as shown above) and the tin recovery (estimated from the grade by reference to the graph of Fig. II). Grade recoveries were then used to give a corrected field grade which appears in brackets beside the grades shown in Tables F, G & H. Grade corrections were, however, limited to a maximum of 20%. In the results from Cape Barren Island, an additional initial correction for tailings loss has also been made.

SUMMARY OF TESTING

Testing Techniques.

A number of testing techniques have been employed by the Company, including ground magnetometer and induced polarization geophysics, slimhole auger drilling, rotary sample drilling and cable tool percussion sample drilling. The relative merits of each are recorded in Report No. 135. The early reconnaissance work was attempted with induced polarization geophysics (total of 66, 700 line feet); however, it was subsequently found to have insufficient definition for this particular type of work. The remainder of the reconnaissance work was carried out with a slimhole (3") solid flight auger drill (total of 23, 427 ft. completed). This drill gave a quick and relatively accurate picture of the alluvial section and the basement profile at low cost (48¢/ft.), particularly where the lithology remains nearly constant.

In Test Area No. 11, where the lithology is very inconsistent, the method did not prove as satisfactory as had been hoped.

No reconnaissance auger drilling was done on Cape Barren Island, as the proposed programme called for testing the alluvial section in a well defined valley with hard granite sides.

The sample drilling was commenced using a modified Failing 1500 rotary rig (see Report No. 135); however, this proved completely unsatisfactory, and the Company reverted to one, and sometimes three, cable tool percussion drills. These were known to have limitation as qualitative sampling tools, but were relatively cheap to operate and had fair access to most localities in the area. Throughout the programme, a vacuum pump was used to clean up the bottom of the holes.

N. E. TASMANIA (Exploration Licence EL. 6/63)

A. Summary of testing in each area.

Test Area 1 - Southern Ringarooma: No further testing has been carried out subsequent to the presentation of Report No. 135 in November. To summarise, three leads were originally proposed, (1) the Arba Lead, (2) Ruby Flat, Mt. Joseph Lead, and (3) Valley Lead. The more promising and easier to test Arba Lead was chosen for initial exploration in this area. A total of 26, 200 line feet of induced polarization geophysics, 344 ft. auger drilling, and 378 ft. of sample drilling were carried out to locate the northern extension of the lead. The geophysics was largely completed prior to the commencement of drilling, and was shown to lack the definition required for this work (for discussion, see Report No. 135). Three sample drillholes were abandoned at 93 ft., 130 ft. and 155 ft., without intersecting any significant stanniferous horizons, and without reaching the base of the lead.

The conclusion drawn is that although the Arba Lead may be present in this area, it is deeper than anticipated and is unlikely to be rich enough to be mined economically.

Test Area 2 - Edina-Lawry's: The initial proposal in this area anticipated the testing and probable development of a number of smaller mines which would be worked in conjunction to form one economic operation. Three areas were subsequently tested, and the results are recorded in Report No. 135

In summary, Area (1): drilling at Edina showed only very limited extensions of the stanniferous wash previously worked at this area.

Area (2), Watts Lead: a well defined Tertiary lead with strong basal wash was located and traced for approximately 5, 000 ft. by both auger and sample drilling; however, only trace amounts of tin were recorded throughout the section.

Area (3): one sample hole was abandoned in hard sandstone in a possible north-east trending lead at the head of Harden's Ravine. This encountered no significant stanniferous values.

No further drilling was proposed, since there appeared little likelihood of locating sufficient stanniferous gravels to warrant an operation.

Test Area 3 - Scotia-Lochaber: This area occurs as a Tertiary-covered, flat to undulating plain into which the present Ringarooma River is incised to basement (Mathinna metasediments). A Tertiary deep lead (Scoloch Lead)

was defined in the area by the Department of Mines in a drilling programme during 1935-1944, which entailed approximately 78,000 ft. of sample drilling. The lead was found to extend over a distance of $2\frac{1}{4}$ miles, and vary in depth from 60 ft. to 160 ft. The drilling indicated in excess of $4\frac{1}{4}$ million cu. yds. of material at a grade of 0.34 lb Sn/cu. yd. Since the area covering the limits of this lead was held by Storey's Creek Tin Mining Company, the proposal set out in Report No. 135 was to test for tributary drainage to the Scoloch Lead from the south and west. It was hoped this would be at shallower depth, and being nearer the source area, of a higher grade.

In all, 45 holes totalling 1,417 ft., completed with the reconnaissance auger drill, showed that the majority of the area was underlain at very shallow depth, generally less than 10 ft., by "Mathinna" metasediment. One small tributary of the Scoloch Lead was delineated having a basal sub-rounded quartz wash in excess of 4 ft. thick at a depth of 80 ft. below ground surface (see Plates 2 and 3).

Because of the very limited extent of this tributary drainage, no sample drilling was proposed.

Test Area 4 - Endurance-Pioneer: At the time of submission of Report No. 135, the Company had completed 4,138 ft. of auger drilling and 872 ft. of sample drilling in this area, and had proved the existence of very deep alluvial ground with only poor values to the north of Corduroy Creek (see Plate 4). From the results of the sample drilling to that date, the ground was shown to be too deep to be economically interesting, and a search was made for shallower tributary leads on the eastern and south-eastern edge of the area. Reconnaissance auger drilling was then commenced in the Swains Creek Area (see Test Area 12) and the Eastern Leads area. In the Eastern Lead area (Plate No. 4), 47 auger holes totalling 2,072 ft. were put down to define a narrow, rather sinuous basement depression over a distance of 4,000 ft. Subsequently, some 10 sample drill holes were put in to test the lead. The section consists of an upper horizon of clayey sand, varying up to 15 ft. in thickness (see Plate 5) with basal $\frac{1}{2}$" birdseye wash, overlying approximately 50 ft. of coarse grained clayey sand. At the base of this section, a sub angular to sub rounded wash to 9 ft. in thickness lies on decomposed granite. This basal wash was found to be completely devoid of tin; however, the upper stanniferous horizon gave an average for the 10 holes of 0.36 lbs Sn/cu. yd. to 6 ft. depth. The area might contain 500,000 cu. yds. of this grade material, and should be an economical proposition for a small syndicate that possesses the necessary equipment to mine it.

Test Area No. 5 (Mussel Roe River Swamp): This area is a broad linear heavily wooded river swamp approximately 6 miles in length and 1,000 ft. in width, which is rather deeply incised into a more extensive Tertiary covered area (see Plate 6). The Mussel Roe River is entirely restricted to the swamp, and in winter flood flows the full width at shallow depth, and in the drier summer period it has a meandering channel seldom greater than 20 ft. wide and 2-10 ft. deep. Positive granite basement rocks bar both ends of the swamp, and the river passes through these bars in joint controlled V section valleys. A number of granite restrictions pinch off the swamp along its course.

Only one limited hand boring programme, carried out by the Department of Mines in 1954, has been recorded in the swamp. This included 99 holes at $1\frac{1}{2}$ chain spacings on three lines 4 chains apart. Other small drill programmes have been carried out on the adjacent river flats by the Department of Mines and Storey's Creek Tin Mining Co. N.L.; however, only sketchy results are available.

The original proposal was put forward to test the swamp as a possible dredging proposition, and called for drilling on five lines at approximately equal 4,000 ft. spacing. However, due to the nature of the swamp itself, which in part is heavily timbered with abundant fallen logs, and part open reed swamp with still water up to 5 ft. deep, the cost of clearing traverse lines suitable for a drill rig is high. This factor, coupled with the very limited summer period when there is less risk of flooding, led to the clearing and subsequent drilling of only 3 lines.

The three lines were sited as shown on Plate 6. The northern line MR. 2 was placed slightly obliquely to the Mines Department drilling in an effort to compare results, and the centre line MR. 3 and southern line MR. 1, were placed where access permitted. The drilling covers only approximately 8,000 ft. length of swamp, while a further 18,500 ft. remain untested.

In all, 38 holes totalling 1,106 ft., 11 with values greater than 0.10 lb Sn/cu.yd., were completed in the swamp, and a further 31 holes, totalling 1,138 ft., were drilled to extend the drill lines on the adjacent river flats (see sections, Plate 7).

Results of the drilling showed the alluvial section in the swamp to vary in depth from 16-47 ft., and consists of complexly interbedded coarse grained sands, silty sands and clay, with in part a thin basal stanniferous wash on granite basement. The basement tends to be decomposed and even on Line 2, and hard, unweathered and rather uneven on Lines 3 and 1.

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Previous drilling in this area has indicated two distinct ages and types of Tertiary fluviatile sediments. (1) Early Mussel Roe (stage 1) leads are characterised by basal coarse sub-rounded quartz wash, abundant marcasite and lignite, and a thick section of carbonaceous siltstone. These were formed in steep walled V shaped or U shaped bedrock depressions, now generally highly decomposed. (2) An "Upper Tertiary" section (stage 2) characterised by a thinner and more extensive cover of kaolinitic clays and clayey sands and small well rounded wash, exhibiting extensive cut and fill characteristics. This is more typical of flood plain deposition, has no easily traceable channels, and was deposited over basement and stage 1 material alike.

From the present drilling, it is now obvious that the Mussel Roe Swamp has been formed by deposition in a third stage Mussel Roe River, which has cut down through stages 1 and 2 and has in part penetrated to unweathered granite bedrock below the original stage 1 channel (see section MR. 1, Plate 7). This third stage may be associated with the swampy sections of other main rivers; for example, the Boobyalla River and Ringarooma River. (The Dorset Flats on the Ringarooma River which averages 30 ft. in depth).

The deeply cut Cybele Creek and river terrace area opposite its mouth, together with Elizabeth lead north of the Elizabeth workings, might also be associated with this stage 3 river. This association appears to be the only one carrying any significant concentrations of tin.

The early Tertiary lead (stage 1) is now rather discontinuous, and appears to have suffered severe faulting with blocks dropped successively to the south Faulting may have again occured later than the stage 3 river since the gradient between the northern lines 2 and 3 is approximately equal to that of the present river, while the deepest part of the southern line 1 is 12 ft. below line 3, and equal to line 2 some 8,000 ft. upstream.

From association only, a further correlation with the Wood's Mussel Roe River Mine can be made. Both the swamp and Wood's Mine have the following general similarities:

(1) Both are broad alluvial filled river swamps with a flat to undulating soft to hard granite floor.

(2) The river enters and departs from the swamps through hard granite bars.

(3) A similar thickness of alluvial material exists in both.

(4) A general similarity in lithology of the section encountered in line MR. 1 to that of Wood's Mine.

(5) The occurrence of significant tin concentrations in both swamps.

No palynological examination has been made of the carbonaceous clays in the Mussel Roe River Swamp, and hence no positive correlation can be made with clays in other areas. A preliminary palynological investigation made by J. Douglas (University of Melbourne, 1964) on clays from the Wood's Flat and Eastern Terrace areas revealed two slightly differing spore assemblages which indicated a probable Miocene or later age for Wood's Flat, and Eocene to lower Miocene age for the Eastern Terrace. No stratigraphic relationship could be determined in the field to substantiate this point. W.K. Harris (1965 a&b), in a further investigation of clays from these and other areas, did not distinguish between the assemblages of Wood's Flat, the Eastern Terrace and Watts Lead to the north, and considered a lower Miocene to upper Oligocene age was indicated.

If the Mussel Roe River Swamp can be correlated with the Wood's river swamp, severe post Miocene block faulting must have occurred to give the present dislocations both between the two swamps and at their ends. Also, since the Mussel Roe River Swamp is obviously later than the Watts Lead and Wood's Eastern Terrace, this may add weight to Douglas' impression that Wood's swamp was younger than the Eastern Terrace lead.

The source of the cassiterite in the Mussel Roe Swamp is rather uncertain, and the following possibilities have been put forward:

(1) From Primary Sources:

(a) Fly-by-night Greisen. This area is situated on the eastern end of the Mt. Cameron ridge some 4 miles west of the swamp. At present the greisenous zone has very limited extent; however, it would appear the obvious source of tin in the "Scoloch" lead (Test Area No. 3), which might have contained 2,000 tons of metallic tin. Also, reports of early mines in this vicinity quote the presence of coarse nuggety tin (Empress Lead), indicating proximity to source, and therefore a rather more extensive source than is apparent today. However, the majority of the cassiterite appears to have moved in the early Tertiary leads, which in the area of the swamp are relatively barren. Therefore, any concentrations in the swamp would necessarily have to be re-worked from the early leads of other areas.

(b) Weldborough District. This source area has undoubtedly been of considerable size, perhaps supplying the majority of the tin in the Pioneer Lead (production 9,000 tons) and supporting numerous lode tin mines; e.g. Anchor Mine, which produced 2,365 tons metallic tin. However, it is some 16 miles to the south of the Mussel Roe swamp. Furthermore, no stanniferous alluvial areas (disregarding Wood's swamp) occur to the south between the swamp and the Weldborough source, though the headwaters of the present Mussel Roe River do reach to the source area.

The cassiterite concentrate of Wood's swamp is generally coarse grained, and varies to rounded nuggets $\frac{1}{4}$" diameter. This was thought to have been derived from a close source which is no longer obvious. However, it may also have been derived from the Weldborough area, and may in fact be a re-working of earlier stanniferous alluvial deposits of these areas.

In either case, the Mussel Roe swamp is unlikely to have a grade higher than that of Wood's swamp. If there is a direct association between the Mussel Roe swamp and Wood's swamp, there is a possibility that a grade approaching that of Wood's will be achieved towards the southern end of this Test Area No. 5.

2. Secondary source:

Re-working of lower and upper Tertiary alluvial deposits (stages 1 and 2). Neither the stage 1 nor stage 2 Tertiary alluvial deposits contain large quantities of tin concentrate. Numerous small operators have worked large areas of the upper Tertiary (stage 2) material, but grades have generally been low. Only low concentrations of cassiterite are known in the lower Tertiary leads (stage 1), and no significant mining of this has taken place.

If the source of the tin is solely from the re-working of these Tertiary deposits, the reserves are likely to be low, since only moderate areas of upper Tertiary has been moved, and no extensive re-working of the lower Tertiary has taken place beyond that directly below the swamp itself.

Test Area 6 - Hasties: Testing was proposed in this area to try and locate a southerly extension of the exposed Hasties Lead. Fifteen reconnaissance auger holes were sited on two lines to the west of the Hasties pit (see Plates 8 and 9); however, only Line 71 immediately west of the pit intersected the deep lead typified by carbonaceous siltstone, lignite and marcasite. Only

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minor wash was encountered in one auger hole, and since the lead would appear to be trending northwards into ground over which we hold no mineral title, no sample drilling was carried out. The southern extension of the lead appears to back up on to high granite basement, and has no immediate promise.

Test Area 7 - South Anson's Bay Road: A drilling programme was set out to test an area where it was thought that a series of generally linear disconnected reed swamps might indicate an ancestral drainage. A total of 32 reconnaissance auger holes were put down on three lines, and defined a broad flat floored channel approximately 4,000 ft. wide, and in excess of 3,000 ft. in length, containing a maximum of 135 ft. of Tertiary fluviatile sediments. (see Plates 10 and 11). 19 sample holes were put down to test the section, which consists of an upper and lower sand and gravel horizon, separated by a continuous blanket of carbonaceous siltstone up to 60 ft. in thickness. The upper horizon has a maximum thickness of 45 ft., and consists of clayey coarse grained quartz sands, with an erratic basal wash up to 10 ft. in thickness. This massive siltstone contains nodular marcasite to 4" diameter, particularly in the vicinity of the upper surface, with some lignite horizons, although extensive logs or tree trunks were not encountered. The basal section resting on highly decomposed biotitic granite consists of up to 40 ft. of fine to coarse grained, highly marcasitic sands, with erratic wash horizons containing rounded quartz pebbles generally less than $1\frac{1}{2}$" diameter.

Only very sporadic values were recovered from the upper section, none of which were associated with the recognisable wash horizons. The maximum value recovered from any 5 ft. section was 0.05 lb Sn/cu. yd. In the basal section, minor tin was recovered from the section directly on granite basement; however, the values were never greater than 0.19 lb Sn/cu. yd. for any 5 ft. sample, and the value of any hole was never more than a trace.

Because of the low values encountered in this area, and equally low values in other areas in this general vicinity where basically the same lithological section was encountered, viz:

(1) Watts Lead (Test Area 2). Trace values in the basal wash.

(2) Test Area 5, line 1. Highest section 0.36 lb Sn/cu. yd. over 5 ft.

(3) Wood's Eastern Terrace. Highest section 0.80 lb Sn/cu. yd. over 4 ft.

There seems little likelihood of this ancestral drainage containing economically mineable quantities of tin. No further drilling was proposed to test this particular lead.

During the earlier stages of the drilling programme at Test Area 7, the ancestral drainage defined was considered to be part of the long proposed "Old Mussel Roe River" lead; however, subsequent drilling tends to indicate that the lead is part of a much more extensive river system which was draining in a general north-westerly direction, and receiving tributary drainage from Watts lead, the "ancestral" Mussel Roe Lead, and perhaps even as far south as the Frazer River area and the "Frazer River lead".

A further extensive area of Tertiary cover, having a similar chain of reed swamps, occurs immediately to the south-east of Test Area 7, and this may indicate a continuation of the Tertiary drainage which appears to be barred from actually joining it by a granite bedrock high. Strong lineaments trending E-W and WNW-ESE in this area might be the surface expression of post Tertiary faults which may have dislocated the old lead.

The old Tertiary channel (Mussel Roe, stage 1) defined on line 1 (Test Area 5, Plate 7), bears a strong similarity to that at Anson's Bay Road, in the channel configuration, lithology and width (approximately 4,000 ft.); however, there does not appear to be any physical connection between the two, and we must assume that post Tertiary faulting has caused this disruption. This seems likely in view of the fact that we appear to have had even later movements in this vicinity, giving a disruption of the basement below the later Mussel Roe River swamp (Mussel Roe, stage 3) between lines 1 and 3 (see Plate 7, Test Area 5).

Test Area 8 - Amber Hill: The Amber Hill pits are part of a narrow sinuous lead situated on the north side of a large horseshoe shaped Tertiary alluvial area. Later erosional processes have cut well down into granite bedrock, and the base of the dissected lead is now perched above present creek level.

The aim of the programme in this area was to test both for extensions of the Tertiary lead and for tributary drainage to it. A total of 58 reconnaissance auger holes were put down to define two short sections of lead, the northernmost being tributary to the Amber Hill Lead, and the southern section, though not directly connected, is thought to be related (plates 12 and 13). The section consists of 60-80 ft. of slightly clayey coarse grained quartz drift on highly decomposed feldspathic granite basement. Basal wash was recognised in only one hole of fourteen drilled into the leads.

No sample drilling was carried out since the volume of material available is small, and the grade, from the sporadic intersection of wash, will probably be less than from the Amber Hill pits (approximately 0.4 lb Sn/cu. yd.).

Test Area 11 - Boobyalla Area: This area occurs as a large, generally flat alluviated area approximately $2\frac{1}{2}$ miles by 2 miles, which for the purpose of our exploration was bounded by the Ringarooma River on the east and north, the Boobyalla River on the west, and positive basement on the south (see Plate 14). No basement rocks outcrop within the area, though intrusive dolerite is seen in the south-east corner, and at one locality along the northern edge. The area is covered by a thin mantle of fixed Pleistocene wind blown dune sands, generally aligned E-W along the direction of the present prevailing winds. An erratic distribution of small to large reed swamps probably indicates late stage stranded drainage. Two small mines, Delta and Dugarde Creek, have operated in the past on the eastern and southern edges of the area, where tin values might have been locally higher, and where permitted by convenience of water for sluicing and ease of access for tailings. Production records are incomplete; however, it is thought that neither mine produced more than 40 tons of tin.

There has been considerable past drilling and prospecting in this vicinity; however, results are generally not available, and are rather sketchy and conflicting.

Five shallow hand bores were put down by Riotinto Aust. (1958) in the vicinity of the Delta and Dugarde Creek Mines (Rattigan, 1958). One bore, at the eastern face of Dugarde mine, gave 0.22 lb Sn/cu. yd. to 16.5 ft., the others nil. An extensive hand boring programme was carried out by Endurance Tin Mining Co. N. L. (see Plate 14 for approximate position); however the results are not available. Mr. Pitchford of Endurance Tin Mining Co., who supervised the drilling, has said that no values above a trace were recovered, and that the deepest bore put down penetrated to 93 ft.

Considerable drilling has been carried out by many companies in the Foster's Marsh area immediately to the east of Test Area 11. An early programme put down by Delta Tin Mines N. L. consisted of 33 randomly located holes, totalling 1,938 ft., and covering an area 2,000 ft. x 4,000 ft. The exact location of these holes is not definite. Twenty-four holes intersected tin values varying from 0.23-1.37 lb Sn/cu. yd., with an average value of 0.62 lb Sn/cu. yd. over 61 ft. The remainder gave nil and trace. The average value of the 33 holes is 0.47 lb Sn/cu. yd. at a depth of 59 ft. Neither the type of drill used nor the reliability of the drilling is known.

Subsequently, a programme of 50 holes was completed by Burma Malay Tin Ltd., apparently designed to verify the previous drilling. Twenty-five holes gave values above 0.10 lb Sn/cu.yd. at 47 ft. depth, and the value of all stanniferous holes is 0.15 lb Sn/cu.yd. at 47 ft. depth. The value of all 50 holes drops only to 0.13 lb Sn/cu.yd. A later, widely spaced drill programme by Storey's Creek Tin Mining Co., which presently operates a bucket dredge some $1\frac{1}{2}$ miles south-east of Test Area 11, consisted of 42 holes, many of which covered the same area as the two previous drilling programmes. The result of this drilling is not available; however, Rattigan (1957) quotes from a drill summary possible reserves of 60,000,000 cubic yards at a grade of 0.133 lb Sn/cu.yd. This is the same figure produced by Burma Malay Tin Ltd. from their drill programme.

The Company proposed to test the area as a possible dredging target, and accordingly a broad scale reconnaissance auger programme, totalling 100 holes (3,816 feet) on three major and four minor lines was followed by wide spaced sample drilling totalling 27 holes (1,506 ft.) (see Plates 15 and 16).

The auger drilling was found to be less definitive in this general area, due mainly to the extremely variable nature of the lithology, the predominence of coarse cobble wash, which slowed considerably and at times completely stopped progress of the drill, and finally the depth to bedrock, which in the majority of holes was below the limit of our drilling (restricted to 80 ft. depth). For the greater part, spacing of auger holes was maintained at 400 ft.

Sample drilling was commenced on line 53 (see Plate 15), to test the channel configuration indicated by the auger drill; however, the interpretation was found to be unreliable, and hole spacing was increased to 800 ft., and later 1,200 ft. on line 55, in an endeavour to cover a larger area. In general, the section consists of an upper 10-60 ft. of very fine grained, probably wind blown sands above an unknown thickness of rapidly varying generally grey green coarse grained cobble wash, coarse grained quartz sand, silty sand and wash, silt, and in two bores (74 and 79), up to 12 ft. of carbonaceous siltstone. This carbonaceous siltstone contained abundant marcasite and lignite, and is typical of the siltstone encountered in the deep leads of, for example, Watt's lead and Test Area 7 of the Tertiary Mussel Roe River system. Abundant disseminated and cemented marcasite was seen generally below 50 ft. The deepest Company bore reached 104 ft. (Bore 67). Thereafter bore depth was restricted to 80 ft.

Stanniferous wash was encountered erratically throughout the alluvial section from 0-68 ft. in depth. Particular wash horizons were often found to be

more or less continuously stanniferous over a depth of 20-40 ft., while another, apparently similar wash, might be completely barren. Lone 5 ft. stanniferous sections were uncommon.

Six sample holes encountered stanniferous values greater than 0.10 lbs Sn/cu.yd. The highest individual value recovered was 1.99 lbs Sn/cu.yd. Bore 64, from 25-30 ft., which produces the highest stanniferous section, 0-30 ft., 0.44 lb Sn/cu.yd.

With bore spacing from 400 ft. to 1,200 ft. in this area, even the broadest lithological correlation is exceedingly difficult, and correlation of respective stanniferous wash horizons is not possible.

The section has the appearance of being dumped from a fast flowing (boulders well rounded to 24" diameter) strongly meandering river (cut and fill characteristics). Considering the possible time span of deposition from middle to early Tertiary to present, it seems likely that the area would have suffered some marine or estuarine action; however, no evidence of this was detected.

Five short reconnaissance auger lines, 55A, 73, 74, 75 and 76, were sited two west, and three east of Dugarde Pit, to test the possibility that a deep lead might exist in this vicinity adjacent to the granite bedrock high, similar, for example, to the Endurance Lead on the southern side of Mt. Cameron. Drilling showed no distinct lead, although a granite bedrock shelf or terrace was defined some 1,000-1,500 ft. wide at a depth of 40-50 ft. Six sample holes were drilled, and encountered thick cobble wash with poor tin values, the highest section being 0.53 lb Sn/cu.yd. (Bore 71, 25-30 ft.) immediately west of Dugarde Pit, giving a value of 0.16 lb Sn/cu.yd., 0-30 ft. It is thought that the grade of material mined in Dugarde Pit was in fact higher than this figure.

In Bores 82 and 83 (line 75) in this area, an unusual reddish brown silty clay with angular fragments of sandstone, shale and milky quartz, was encountered to a depth of 60 ft. below the alluvial section. This particular clay had not been intersected in any of the Company's previous drilling, and is thought to have two possible origins:

1. An intensely sheared zone in the "Mathinna" metasediments at the contact with intrusive granite, or perhaps

2. A previously untested section of Permian sediments, which outcrop as sandstones and conglomerates, some 2 miles north-east.

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Jurassic dolerite is known to outcrop to the south-east of the area near the Dry Cut pit, and is seen in the floor of the Delta pit. It probably forms a fairly extensive subsurface bedrock high in the south-east corner of the area south of Bores 64 (line 53) and A358 (line 54). Dolerite was also intersected at 10 ft. in Bore A381 (north end of line 55) and therefore the deeper alluvial section is restricted to approximately 6,000 ft. width in this area.

Test Area 12 - Swains Creek: The Swains Creek area is an alluviated area to the east of the Dorset Flats and forms part of a more extensive flat floored drainage off the "Blue Tier" to the south-east of the Dorset Flats (see Plate 4).

Testing was proposed in the area because it appeared to represent the shallow expression of a lead trending eastwards from Test Area 4, which had proved too deep to be of economic interest (see Test Area 4 - Endurance-Pioneer Area).

Thirty-two reconnaissance auger holes were drilled on three lines across the alluviated area (see Plate 17). These defined two broad, flat floored basement depressions with approximately 30 ft. of alluvial cover consisting of a basal 10 ft. of fresh sub-rounded "Mathinna" cobble wash overlain by 20 ft. of clays and clayey sands. Since there is no known "Mathinna" bedrock in the area immediately east and south, the most obvious explanation is that it forms part of a stranded course of a downcutting Ringarooma River. Because of the similarity of the basal wash to that occurring in the nearby Dorset Flats, it seems probable that the grade might also be similar (dredged grade of the Dorset Flats is 0.135 lb Sn/cu. yd.), unless there has been extensive reconcentration by the present creeks. This seems doubtful in view of the fact that shallow workings and numerous prospect pits in the area had failed to locate any extensive payable deposits.

No sample holes were drilled since the volume of material available is unlikely to be above 4,000,000 cu. yds., and the grade of this material could be low.

B. Appraisal of drilling results in areas of interest.

Test Area 5 - Mussel Roe River Swamp: From the results of our drilling on lines MR. 1, 2 and 3, together with the results of three Mines Department lines at MR. 2, it is obvious that the basal stanniferous wash, particularly in the northern part of the swamp, occurs as irregular discontinuous "runs" or "pools" (see Plate 21).

At present, with the limited amount of drilling completed, no prediction can be made of the position of stanniferous runs within an area; however certain areas can be predicted to contain little tin; for example, bedrock bars across the swamp (line MR. 3). It is also likely that there will be a local enrichment behind such bars, though such positions would be exceedingly difficult to test in view of the deep water and heavy growth generally present.

The drill results on the northern line (MR. 2), drilled obliquely to three previous Mines Department lines, bear a strong resemblance to the results achieved by the Mines Department, both in grade and positioning of stanniferous runs. Of 13 holes drilled in the swamp at 100 ft. spacing, four holes have values above 0.1 lb Sn/cu. yd., with a maximum of 0.58 lb Sn/cu. yd. over 30 ft. depth at Bore 105 (see Plate 18). Subsequently, in four holes drilled at 50 ft. spacing about Bores 105 and 110, two produced values greater than 0.1 lb Sn/cu. yd. (Bores 189 and 192). The average value of holes penetrating stanniferous "runs" is 0.23 lb Sn/cu. yd. at 25 ft., while the value over the 1,320 ft. of swamp is 0.02 lb Sn/cu. yd. at 25 ft. Drilling on the eastern river terrace failed to intersect significant stanniferous values, while drilling on the western terrace (Bores 112-115) intersected an upper stanniferous horizon in the section 0-15 ft., which has a very limited aerial extent.

Drilling on the centre line MR. 3 intersected only sporadic basal wash with poor stanniferous values. Of seven holes drilled in the swamp, none intersected values greater than 0.10 lb Sn/cu. yd. The line was extended 2,300 ft. to the east on the adjacent river terrace with holes at 200 ft. spacing; however, again only very sporadic stanniferous wash was encountered. Bore 165, sited near the eastern edge of the river terrace, gave a value of 0.11 lb Sn/cu. yd. over 42 ft. This may be a deserted channel of the down-cutting Mussel Roe River, but is thought to be more likely a past tributary to it trending off the granite high to the south-east, and perhaps reconcentrating upper Tertiary tin.

Drilling on the southern line MR. 1 shows particularly well the relationship of the three stages of Tertiary river fill (see Plate 7). Twelve holes were drilled in the swamp at 100 ft. spacing, and defined an uneven hard granite floored channel with basal stanniferous wash generally in the gutters. Three holes produced values in excess of 0.10 lb Sn/cu. yd., with the highest value in a perched gutter on the eastern side (Bore 182) giving 0.80 lb Sn/cu. yd. to 28.5 ft. Of two further holes sited at 50 ft. east and west of Bore 182, only one (Bore 198) on the western side gave a value of 0.17 lb Sn/cu. yd. over 25.5 ft. The average value of holes penetrating stanniferous "runs" is 0.32 lb Sn/cu. yd. over 30 ft., while the value over the 1,000 ft. of swamp is 0.11 lb Sn/cu. yd. over 30 ft.

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TABLE F

POSSIBLE RESERVES - MUSSEL ROE RIVER SWAMP
(Test Area 5.)

	Average depth	Reserves/100' length of swamp (lbs Sn/c.y.)	Possible reserves/ 4,000' length of Swamp.	Grade lbs Sn/c.y.	Gross return /cub.yd.* (Ac.)	(U.S.¢)
NORTHERN SECTION						
Stanniferous "runs" only.	25	19,300	772,000	0.23 (0.25)	31	34.5
Total width of swamp (1320')	25	122,000	4,880,000	0.02	2.7	3.0
SOUTHERN SECTION						
Stanniferous "runs" only.	32	18,200	728,000	0.32 (0.31)	43	48
Total width of swamp (850'.)	33	104,000	4,160,000	0.11	14.7	16.5

*Assuming a price of A$3,001.60 U.S. $3,360 per long ton metallic tin (A$1.34 & U.S.$1.50 per pound.)

(0.25) Corrected figure after applying result of recovery checks on drill and plant performance.

Drilling immediately adjacent to the swamp both east and west penetrated stage 1 Tertiary material having a moderately stanniferous basal wash, and it is conceivable that the tin in the bottom of the Mussel Roe Swamp at this line could be reconcentrated from a locally enriched stage 1 basal stanniferous wash in this vicinity. Drilling further east on the adjacent terrace penetrated an increasing thickness of Stage 1 material; however, the basal gravel was almost devoid of tin.

A summary of the results of all Company sample drilling in this test area is given in Appendix III. Calculations of volume and grade are also included, and are based on a "sphere of influence" about a stanniferous drillhole. A figure of $\frac{1}{4}$ bore spacing between stanniferous and unstanniferous holes has been used for "sphere of influence".

The Possible Reserves in the Mussel Roe River swamps and the adjacent river terraces have been considered separately, and the reserves for the actual swamp have been divided into two parts, the northern section (immediately north and south of line MR. 2) and the southern section (immediately north and south of line MR. 1) (see Table F).

Possible Reserves calculated for stanniferous areas on the adjacent terraces are as follows:

Mines Department Drilling, 1953:

East Cybele Creek Terrace:

90,000 cu. yds., 0.31 lb Sn/cu. yd., 12.5 tons metallic Sn.

Garfield Creek:

30,000 cu. yds., 0.29 lb Sn/cu. yd., 3.9 tons metallic Sn.

Storey's Creek Tin Mining Co. Drilling:

West Browns Bridge Terrace:

1,500,000 cu. yds., 0.12 lb Sn/cu. yd., 80.4 tons metallic Sn.

UDC Drilling, 1965:

Line MR. 2, west side Bores 112-115 (surface length of 200 ft.):

51,900 cu. yds , 0 20 lb Sn/cu yd., 4 5 tons metallic Sn.

Mining Consideration.

Dredging: Since a minimum dredging width is probably in the order of 60-70 ft., and the majority of the stanniferous runs are 30-40 ft. wide, a 50% cut in grade would have to be applied to the calculated figure. This figure would then have to be further reduced to allow for barren ground between "runs". The recovery of a dredge would also be adversely affected when operating over a hard granite basement, as, for example, the major part of lines MR. 1 and 3.

Sluicing: Sluicing operations would require drainage of the river swamp and removal of the thick timber from the stanniferous areas. As the swamp is subject to season flooding, river diversion and flood control systems would be necessary. Existing water races cannot deliver year round water supplies, and a storage reservoir would have to be developed.

Test Area 11 - Boobyalla Area: A summary of the results of all Company sample holes in this area is included in Appendix III.

Reconnaissance drilling has indicated an alluvial filled channel some 6,000 ft wide, probably 10,000 ft. plus in length, and with a depth in excess of 100 ft. In the area generally the lithology is seen to vary considerably, and the whole section has the appearance of extensive "cut and fill" deposition. The stanniferous horizons present will also occur as highly irregular and discontinuous "pools" or "runs". Therefore, a very intensive programme of sample drilling would be necessary to fully evaluate such an area.

At present spacing, it is neither possible to trace individual lithologies nor distinct stanniferous horizons between successive holes, and therefore calculations of possible volume and grade of material have little real meaning and are dependent entirely upon "spheres of influence". A "sphere of influence" of $\frac{1}{4}$ has been used between stanniferous and barren holes for calculating the figures of volume and grade presented in Table G. A separate calculation has been made in the event of the stanniferous horizons being continuous between Bores 77 and 78A, line 55 (1,200 ft. spacing). There is also a possible continuation of the stanniferous horizon between Bores 71 and 72 (line 73) and Bore 83 (line 75), for which a further calculation has been made. Based on the Company's drilling results and previous experience in this area, it is now believed that the most favourable reserves available in Test Area 11 will not exceed 30,000,000 cu. yds. at a grade of 0.20 lb Sn/cu. yd.

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TABLE G

POSSIBLE RESERVES - BOOBYALLA AREA.
Area 11.

	Area sq. ft.	Av. Depth ft.	Volume cub. yds.	Grade lbs. Sn/c. y.	Gross return / cub. yd.* Ac.	Gross return / cub. yd.* U.S. c.
Line 53 Bore 64-87	122,500	32.5	147,500	0.26(0.29)	35	39
Line 55 Bore 77	160,000	40	237,000	0.15(0.16)	20	22.5
Bore 78A	160,000	55	325,900	0.13(0.15)	17.4	19.5
Line 73 Bore 71-72	90,000	23.5	78,300	0.15(0.16)	20	22.5
Total	532,500		788,700	0.16(0.18)	21.4	24
Line 55 Bore 77-78A	1,960,000	47.75	990,400	0.14(0.16)	18.8	21
Line 73 Bore 71-72-83	600,000	26	577,800	0.12(0.14)	16	18
Total with combined areas.	2,682,500		1,715,000	0.14(0.16)	18.8	21

*Assuming the price of $3001.6 (Aust), $3,360 (U.S.) per long ton metallic tin. ($1.34 Aust, $1.5 U.S. per pound).

(0.29) Corrected figure after applying result of recovery checks on drill and plant performance.

Mining Considerations.

The Boobyalla area is amenable to both sluicing and dredging operations. The fine grained surface sand would afford easy sluicing and dredging, and the wash horizons are generally sandy and loose but may contain boulders to 24" diameter. No extensive blankets of clay were encountered. The high water table in the area would ensure water retention in a dredge pond, and water for sluicing could be obtained from the Fosters Lagoon area.

FURNEAUX GROUP ISLANDS (Exploration Licence EL. 2/65).

A. General Review:

Following a reconnaissance by Mr. Don King, the Company applied for an Exploration Licence of 3,300 square miles covering the Furneaux Group Islands and the immediate offshore areas. This Licence was granted on February 24, 1965.

The Furneaux Group is situated in the eastern Bass Strait, north-east of the Tasmanian mainland, and is made up of two main islands, Flinders Island (approximately 800 square miles) and Cape Barren Island (approximately 170 square miles), plus numerous smaller, closely associated islands (see Plate 18).

Flinders Island: Flinders Island is approximately 40 miles in length and 20 miles in width, and has a semi-continuous high, narrow, rugged range (Mt. Strzelecki, Mt. Belstead, the Darling Range, Mt. Boyes and Mt. Killiecrankie) running north-south almost the full length of the island. The highest point, 2,558 ft. above sea level, is in the southern Mt. Strzelecki-Mt. Belstead Range. This narrow backbone is displaced west of centre, and is flanked by a narrow coastal plain to the sea on the western side, and a broad, gently shelving coastal plain on the eastern side.

The basement rocks are similar to those occurring in the Company's area in north-east Tasmania, with moderately folded, fine grained sandstones and shales of probable Silurian age (the "Mathinna Beds" of north-east Tasmania) intruded by Devonian granite. These basement rocks are variously overlain by fluviatile Tertiary rocks, and later, marine Tertiary limestone.

Tin was first reported on Flinders Island in 1871 (Blake, 1935). Production was recorded from Tanners Bay in the north-west in 1882, and from Patts River in the central west of the island in 1898. Spasmodic production has

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continued from these areas to the present day, but individual records of production are not available. Minor amounts of both alluvial and lode tin have been reported from other localities on the island.

The total recorded production from the Furneaux Group Islands is about 104 tons metallic tin, the major portion of which is thought to have been mined on Cape Barren Island.

Following a review of available literature, Richard D. Ellett and W. R. Appleby made a reconnaissance of the Flinders Island area in late August, 1965. Both the Patts River and Tanners Bay areas were inspected, together with the probable stanniferous source areas in the headwaters of the two leads.

The alluvial sections in the two areas above, where seen, are relatively thin, (maximum of 20 ft.), and consist of coarse grained angular clayey sands overlying coarse sub-angular to sub-rounded quartz wash to 4" diameter. Some carbonaceous siltstone and marcasite is seen at the base of the section in the Tanners Bay area. In both areas the leads appear to have been mostly exhumed by the present creek systems, and only disconnected remnants are preserved. A palynological examination conducted by Harris (1965) on carbonaceous clay from the Tanners Bay area indicated that this material was later in age than carbonaceous material examined from leads in north-east Tasmania and Cape Barren Island, and might be Pliocene or possibly younger. It is thought that the Patts River lead is of similar age.

Extrusive Tertiary basalt occurs in the southern half of the Island, probably confined to the older alluviated valleys. The age of these basalts is now known with certainty; however, they are probably of similar age to the Tertiary basalts of the north-east Tasmanian mainland (post middle Miocene) which also overlie varying thicknesses of fluviatile sediments, in part stanniferous, of older Tertiary age (e.g. Cascade lead at Derby).

A basalt flow some 50 ft. in thickness, commencing on the west side of the Darling Range $2\frac{1}{2}$ miles east of Whitemark, and continuing probably to Petrifaction Bay 11 miles to the south-east near Lady Barron, may overlie older Tertiary, possibly tin-bearing, fluviatile sediments. Blake (1935) quotes an occurrence of clayey gravels to 15 ft. in thickness, composed of large boulders of quartz and smaller pebbles of quartz and granite beneath this basalt at a locality east of Whitemark. No report of cassiterite is made by Blake, and it must be assumed that the lower gravels at this point are unstanniferous. There is, however, a report of coarse tin in a large boulder wash in a 90 ft. adit driven into a sub-basaltic lead at O'Doherty

Creek east of Whitemark in 1898. The basal gravels were reported to be narrow and too thin to be mined, and probably indicate extreme headwater drainage. No production is known from this lead.

Other basalts remnants are seen on the eastern fall of the Darling Range on the north and south of an alluviated valley. This may indicate the presence of another older Tertiary valley flowing easterly beneath the eastern coastal plain.

The eastern coastal plain (Blake, 1935) is underlain by a considerable thickness of horizontal beds of limestone, arenaceous limestone, calc-sandstone, clays, sands and fine gravels probably associated with a late Tertiary marine transgression and regression. In 1931, F. Chapman (then Commonwealth Palaeontologist) dated shells obtained from a bore 80 ft. deep in the Five Mile Lagoon area of the north-east plain, as upper Pliocene. This is a similar age to that indicated by palynological examination of the clays from the Tanners Bay lead. Nowhere has interfingering between the marine and fluviatile sequences been reported. A reported occurrence of similar marine sediments on the west side of the Darling Range some 500 ft. above sea level cannot be attributed to change in sea level, and must indicate block uplift of post Pliocene age.

The area of Exploration Licence EL. 2/65 was reduced to 1,575 square miles on March 2, 1966, to cover only Cape Barren Island, the southern part of Flinders Island, and the immediate offshore areas, as work in the northern part of Flinders Island had indicated:

1. There appeared little chance of locating new leads or extensions of known leads at shallow depth.

2. The source area appears to have been restricted, with little likelihood of its producing large high grade cassiterite concentrations.

In addition, the Company was already committed to a very extensive exploration programme in other more prospective areas.

Cape Barren Island: During the early part of 1965, a geological reconnaissance of the western part of Cape Barren Island was carried out by Mr. P. W. Goscombe (Geologist). His recommendations for further testing were presented in Report No. 133 (Goscombe, 1965).

Cape Barren Island is approximately 20 miles by 8 miles, with its largest dimension east-west. Two strongly elevated granite masses, Mt. Munroe-

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Double Peaks (central west), and Mt. Kerford-Hogan Hill (south-east), rise to 2, 348 ft. and 1, 644 ft. above sea level respectively. Between the two granite masses and along the east coast, broad depressed alluviated areas occur. In these alluviated areas, while undoubtedly Tertiary fluviatile sediments occur filling valleys, it is doubtful whether any extensive marine sediments comparable to those of the east coast of Flinders Island occur.

The oldest basement rocks are moderately folded, fine grained sandstone, shale and slate, in part carbonaceous, of Silurian age (the "Mathinna Beds" of north-east Tasmania) which have been intruded by Devonian tin bearing granites. The outcrop of "Mathinna" metasediments is now restricted to the perimeter of Cape Barren Island. Throughout the whole island, the granite is intensely sheared and faulted; however, as in north-east Tasmania, the direction and extent of displacements along individual faults is difficult to estimate.

Cassiterite has been reported associated with greissenous zones and quartz veins from the Mt. Munroe-Double Peak area, and some lode mining is reported from the Mt. Kerford area. Blake (1935) reports the occurrence of a stanniferous pegmatite intruding "Mathinna" metasediments in the centre of Clarke Island. The pegmatite can be traced over a length of 800 ft., and varies in width from 1-8 ft. Some mining of this lode took place about 1915, and 10 tons of ore averaging 0. 5% was reported shipped to Victoria. This block of metasediments on Clarke Island is a thin roof pendant, almost completely surrounded by intrusive granite.

A greissenous zone is developed at the contact of aplitic granite and coarser porphyritic granite on the south-eastern edge of the Rooks River Valley, and two small adits have been commenced at some time here. No cassiterite was seen at this locality; however, minor pyrite and molybdenite mineralisation was visible.

The main positive granite areas are deeply dissected, and are drained by rivers such as the Rooks, Lee and Dover Rivers on the north of the island, and the Modder, Rocky Head, Battery Creek and Rice Rivers on the south. The majority of these rivers are seasonal, and carry no more than spring seepage for the drier half of the year. In part, the rivers flow across remnants of older valleys filled with Tertiary fluviatile sediments. These sediments are gravels, coarse to fine quartz sands and clays which may contain lignite and abundant marcasite. In the Rooks River valley, the total depth of material is in excess of 120 ft., and depths greater than 70 ft. are also known in the Ransom Creek-Lee River Valley, and near the mouth of the Dover River. This would put the base of these leads well below sea

level at the present coast. Similar equivalent thicknesses may well occur within the valleys on the south side of the island.

Palynological work by Harris (1965) suggests that material from the Rooks River lead is of similar age to that from Tertiary leads in north-eastern Tasmania; i.e. lower Miocene to upper Oligocene.

From the results of the initial investigation, Goscombe (1965) proposed a limited drilling programme (4,320 ft.) be carried out in the Rooks River and Modder River Valleys. Drilling commenced in the Rooks River valley in early August, 1965, using a Conrad Stork Pioneer drill. However, this was abandoned when only 400 ft. was completed to January, 1966. A heavier Cable Tool Percussion drill commenced in February, 1966, and completed 1,113 ft. to May 7, 1966, when the commencement of winter rains made the ground impassable. At this stage, 34 holes totalling 1,513 ft. had been drilled in this area.

B. Summary of Testing and Results (Rooks River Valley):

Drilling carried out at 200 ft. spacing on four lines across the alluvial section of the Rooks River valley has indicated a deep Tertiary stanniferous lead varying in width from approximately 600 ft. near the head of the lead to 1,000 ft. plus near the present coast (see Plate 19).

Due initially to the light weight of the first drilling plant, and subsequently to the very deep alluvial section encountered, no holes penetrated the base of the lead on any line, though Bore 31 penetrated to 118 ft. on line CB. 3, and had not reached basement at this depth (see Plate 20).

The alluvial section generally consists of an upper 30 ft. of light coloured fine to medium grained clayey quartz sands, with interbedded thin horizons of well rounded $\frac{1}{2}$" diameter quartz pebbles. At the base of this upper part, a narrow channel with sub rounded boulders of granite to 12" diameter occurs overlying the lower Tertiary deep lead. The deep lead section consists of complexly interbedded coarse grained marcasitic quartz sands and thin fawn to dark brown carbonaceous siltstone with some marcasite and lignite. Only minor wash has been recorded, though in some horizons a large proportion of the individual quartz grains are greater than $\frac{1}{4}$" diameter.

The lead appears to trend in a north-easterly direction off the granite mass of the Mt. Munroe-Double Peaks area, and has been traced over a length of 4,000 ft. In the south-western part, the channel appears to be assymetrical with a low angle N.W. wall, and a high angle S.E. wall. However, at line CB. 3, and probably to the north-east, it has a more symmetrical V shape.

Cassiterite is distributed throughout the upper 30 ft. of the section, with higher concentrations towards the base, particularly where a basal wash is present. Below this upper stanniferous horizon, large thicknesses of barren material occur. Higher stanniferous concentrations again occur close to the base of the section directly above granite basement.

The drilling completed is insufficient to allow areas of higher grade to be definitely outlined, or to allow a conslusive interpretation of the geology. Significant amounts of tin have been discovered in both the upper and lower wash horizons, and our experience elsewhere suggests that better values can be expected from the lower horizon, which was not fully penetrated by the majority of holes.

The drilling suggests that the lower stanniferous horizon may have formed in a lead whose predominant direction was north-easterly rather than parallel to the direction of the present Rooks River. If this is so, the south-west end of the old deep lead has been cut off and uplifted by movement of a block of granite, which now forms the southern edge of the alluviated part of the Rooks River valley. The cut off south-west end of the deep lead may in fact now be represented by a perched flat floored valley in the granite to the south-west, formed as the deep lead valley was exhumed by present drainage.

The upper wash horizon contains both coarse granite boulders and "birdseye" quartz wash, and this seems to reflect weathering of a freshly exposed granite source, and at the same time, re-working of the older Tertiary gravels once part of the deep lead. Two explanations of its distribution are possible. The first is that it was laid from a meandering stream whose essential direction was close to that of the old deep lead (N. E.) or of the present Rooks River. The second is that the wash horizon was laid down by a series of small north flowing creeks running off the granite to the south. This second explanation is partially supported by the distribution of the old workings which may be following small gutters with these trends.

Indicated and possible reserves for the Rooks River area have been calculated on the basis of the limited drilling available. Thirty-one holes penetrated the upper horizon; 20 holes partially penetrated the lower. The volume calculations given in Table H are unlikely to be greatly changed by further drilling, but the grade calculation might be considerably improved by further intersections of the lower stanniferous horizon.

Indicated Reserves have been based on drill results to date, and include chiefly upper and some lower tin between lines CB. 4 and CB. 1. Possible

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TABLE H

INDICATED AND POSSIBLE RESERVES - ROOKS RIVER AREA CAPE BARREN ISLAND.

Area sq. yds.	Av. Depth ft.	Volume cub. yds.	Grade lbs. Sn/c.y.	Tonnage tons Sn.	Gross return / cub. yd.* A¢.	U.S.¢.
INDICATED RESERVES.						
57,700	32.9	632,600	0.28(0.33)	78(94)	41(44)	46(49.5)
POSSIBLE RESERVES.						
Area A:						
155,100	79.5	4,110,000	0.24(0.265)	440(486)	32(35.5)	36(40)
Area B:						
102,667	116.7	3,760,000	-	-	-	-

*Assuming a price of $3001.6 Aust. $3360 U.S. per long ton metallic tin. ($1.34 Aust. and $1.50 U.S. per lb.)

(0.33) Corrected figure after applying result of recovery checks on drill and plant performance.

Reserves have been based partly on drill results, and partly on projected basement profiles, and include both the upper and lower tin horizon.

Possible Reserves have been divided into two separate areas (see Plate 19):

Area A: This includes both the upper and lower tin horizons in the area from line CB. 4 (extended 400 ft. S. E.) to line CB. 3. The total depth of alluvial material in this area should not be in excess of 145 ft. The area between Webb's and Clarke and Davis' pits has been excluded, since Bore CB. 1 indicates that this is probably barren.

Area B: This area adjoins Area A at Line CB. 3, and extends north-easterly to the coast, 500 ft. N. E. of line CB. 2. Since the drilling programme has given little information on shape, depth or grade of the lead in this area, a volume of material only is calculated, using the figure of 400 ft. width (lead at Line CB. 3), and a maximum depth of 150 ft.

No calculation has been made for "batters" in figures given for areas A and B.

Mining Considerations.

The ground is readily amenable to a sluicing operation, and the only difficulty that might be expected is in the vicinity of CB. 4, where sub horizontal hard silicified beds up to 6" thick occur near the surface. Some lignitised tree trunks and roots could also be expected, particularly at the upper surface of the deep lead material.

The stanniferous wash is generally highly marcasitic, and the method of final concentration would have to give good separation between the cassiterite and marcasite. The cemented marcasitic ore has in the past been left to oxidise before treatment to recover the tin.

The supply of water from the Rooks River is limited, and would be too inconsistant to supply a large sluicing operation; therefore, sea water might have to be used. A water storage reservoir would have to be developed in the immediate area. Only minimum services are available on the island, and wharf facilities are poor. At the present jetty, a maximum depth of approximately 12 ft. depth of water is available to boats at high tide.

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TABLE J.

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Comparison of Analyses of Sample Splits by Department of Mines Laboratories, Launceston and Australian Mineral Development Laboratories, Adelaide.

Sample No.	Mines Dept. % Sn	A. M. D. L. % Sn	Actual Variation % Sn	Variation of AMDL with Mines Dept. Expressed as %.
1	0.56	0.65	0.09	+7.4
2	1.45	1.19	0.26	-21.8
3	5.94	6.40	0.46	+7.2
4	9.16	11.1	1.94	+17.5
5	24.2	17.5	6.7	-38.3
6	14.1	18.4	4.3	+23.4
7	31.5	33.0	1.5	+4.5
8	22.2	33.6	11.4	+33.9
9	41.5	44.2	2.7	+6.1
10	51.5	52.0	0.5	+1.0

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APPENDIX I.

TABLE K.

Check of Analyses carried out by The Mines Department Laboratories, Launceston

Sample		Initial Assay % Sn	Check Assay % Sn	Actual Variation % Sn	Variation of check assay from initial assay as %
Bore CB. 30	50-55'	1.3	1.3	-	-
Bore 64	25-30'	2.0	1.95	0.05	-2.5
Bore CB. 12	20-25'	2.10	2.10	-	-
Bore 175	4-.45'	2.2	2.10	0.10	-4.5
Bore CB. 27	35-39'	2.20	2.20	-	-
Bore 195	15-18'	2.40	2.45	0.05	+2.0
Bore CB. 8	20-25'	2.40	2.50	0.10	+4.2
Bore 71	0- 5'	2.60	2.60	-	-
Bore CB. 6	5-10'	2.65	2.70	0.05	+1.9
Bore 30	75-80'	2.80	0.5	2.30	-82.1
Bore 178	25-29'	3.00	3.10	0.10	+3.3
Bore CB. 7	20-25'	3.90	4.00	0.10	+2.6
Bore 30	55-60'	4.20	4.20	-	-
Bore 198	20-25.7'	4.45	5.05	0.60	+13.5
Bore CB. 8	15-20'	4.62	4.60	0.02	-
UDC No. 9404		5.25	5.30	0.05	+1.0
Bore 175	35-40'	6.20	6.50	0.30	+4.8
Bore 182	25-28.5'	6.90	6.75	0.15	-2.2
Bore 71	30-35'	7.00	7.00	-	-
UDC No. 9369		7.30	26.6	16.30	+264.0
Bore 30	100-105'	7.90	7.9	-	-
Bore CB. 8	25-30'	9.31	9.50	0.19	+2.0
Bore CB. 11	22-22.5'	9.35	9.1	0.25	-2.7
Bore 193	30-31.5'	14.9	15.0	0.10	+0.7
UDC No. 9357		63.7	63.7	-	-
UDC No. 9358		66.5	66.7	0.20	+0.3
UDC No. 9354		75.8	76.1	0.30	+0.4
UDC No. 9355		77.5	75.6	1.90	-2.5

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Analyses of Tin Concentrate used in Tests

1. Concentrate used for Sample Tests Nos. 13 and 14
Riffle Tests Nos. 1, 2 and 3.

	Assay % Sn.	Average Assay	Max. variation as %
Sample Split	71.6		
" "	71.9	71.9	0.7
" "	72.1		

2. Concentrate used for Sample Tests Nos. 1-10, 12 and 15.

	Assay % Sn	Average Assay	Maximum variation (% Sn)	Maximum variation as %
Grab Sample -60 mesh	75.4			
" " -60 mesh	75.6	76.1	1.7	2.8
Split Sample -60 mesh	75.8			
" " -60 mesh	77.1			
Grab Sample +60 mesh to -30 mesh	63.7			
" " "	64.0	64.9	2.8	4.4
Split Sample +60 mesh to -30 mesh	65.4			
" " "	66.5			
Grab Sample +30 mesh to -10 mesh	70.3			
Split Sample +30 mesh to -10 mesh	68.5	69.2	1.8	2.6
" " "	68.7			

CRADLE RECOVERY CHECKS

Loss of Tin in Tailings:

Bore No.	Section	Wt. of Sn in Concentrate (lbs.)	Calculated grade of section (lbs Sn/cu. yd.)	Wt. of Sn in tailings (lbs)	Loss of Sn-%.
8	20-25'	0.0094	0.284	0.0077	45.0
	25-30'	0.0785	1.964	0.0086	9.9
9	25.5-30'	0.0037	0.117	-	-
30	30-35'	0.0005	0.019	-	-
	60-65'	0.0009	0.028	-	-
	90-95'	0.0009	0.030	-	-
	100-105'	0.0647	2.349	0.0074	11.4
31	35-40'	0.0009	0.025	-	-
	40-45.5'	0.0334	0.549	0.0036	10.8
	45.5-50.5'	0.0063	0.201	-	-
	90-95'	0.0084	0.221	-	-
32	25.5-30'	0.0005	0.016	-	-
	55-60'	0.0008	0.042	-	-
33	20-25'	0.0079	0.219	0.0028	35.4
	25-28'	0.0040	0.162	-	-
34	25.5-30'	0.0024	0.067	-	-
	30-35'	0.0032	0.089	-	-
	40-45'	0.0060	0.211	-	-
	45-50'	0.0093	0.408	-	-
	50-55'	0.0392	1.006	0.0046	11.7
	55-60'	0.0770	2,252	-	-

CRADLE RECOVERY CHECKS

Distribution of Tin on Riffles:

		Wt. metallic Sn. (lbs)	Distribution of tin recovered (%)
Test 1:	Dummy Sand	-	
	1st Riffle	0.0230	66
	2nd Riffle	0.0107	31
	3rd Riffle	0.0010	3
		0.0347	
	Wt. Tin added	0.0510	
	Recovery	68.04%.	
Test 2:	Dummy Sand	-	
	1st Riffle	0.0229	62
	2nd Riffle	0.0103	19
	3rd Riffle	0.0034	9
		0.0366	
	Wt. Tin added	0.0524	
	Recovery	69.85%.	
Test 3:	Dummy Sand	-	
	1st Riffle	0.0158	37
	2nd Riffle	0.0171	40
	3rd Riffle	0.0097	22
		0.0426	
	Wt. Tin added	0.0531	
	Recovery	80.23%.	
Bore 27 Sample 30-35':			
	1st Riffle	0.0019	59
	2nd Riffle	0.0008	25
	3rd Riffle	0.0005	16
		0.0032	

071

209072

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APPENDIX III.
(Page 1)

RECORD OF U. D. C. SAMPLE DRILLING (EXPLORATION LICENCE EL. 6/63)

Bore No.	Depth (ft.)	Depth to basement	Highest stanniferous section Depth(ft.)	Value(lbs Sn/c.y.)	% Recy. of Sn section	Depth valued (ft.)	Grade (lbs Sn/c.y.)	Remarks
Test Area 1:								
20	93	U/B	0 - 5	0.10	100	93	-	
21	130	U/B	30 - 35	0.44	81	130	0.03	Auger drilling comp-
200	155	U/B	90 - 95	0.19	75	155	0.01	leted 344 ft. in 4 holes.
Test Area 2:								
1	11.5	8.0	0 - 5	0.12	100	10	0.06	Auger drilling comp-
2	12.0	6.0	-	-	-	6	Nil	leted 6,021 ft. in
3	26.6	16.0	5 - 10	0.02	100	16	Tr.	6,021 holes.
4	16	9.5	-	-	-	9.5	Nil	
5	18	10.0	-	-	-	10	Nil	
6	16	10.0	-	-	-	10	Nil	
7	10	8.0	5 - 9	0.14	100	9	0.06	
8	14	5.0	-	-	-	5	Nil	
9	30	29.0	25 - 30	1.33	100	30	0.24	
10	31.7	29.0	25 - 30	1.37	100	30	0.25	
12	17.75	U/B	0 - 5	0.33	100	15	0.17	
12a	51.6	U/B	-	-	-	15-50	Nil	
22	78	70.0	40 - 45	0.03	109	72	Tr.	
23	57	U/B	40 - 45	0.02	100	57	Tr.	
23a	106	99.-	-	-	-	99	Nil	
24	40	U/B	-	-	-	35	Nil	
25	115	110	-	-	-	110	Nil	
26	126	122	113 - 115	0.05	442	126	Tr.	
27	126	121	70 - 76	0.22	161	126	0.01	
28	118	112.5	60 - 65	0.05	153	118	Tr.	
29	128	123	65 - 70	0.05	148	128	Tr.	
30	75	70	30 - 35	0.04	97	75	Tr.	
31	60	55	20 - 25	0.16	88	60	0.03	
32	80	75	-	-	-	80	Nil	
33	82	74	30 - 35	0.05	148	82	Tr.	
34	93	89	45 - 50	0.17	97	93	0.01	
35	90	84	20 - 25	0.13	130	90	0.01	
36	105	99	-	-	-	105	Nil	
37	80	72	70 - 72	0.08	116	80	Tr.	
57	45	37	5 - 10	0.05	139	45	Tr.	

(Cont'd)

072

209073

Report No. 139.

APPENDIX III.
(Page 2)

Bore No.	Depth (ft.)	Depth to basement	Highest stanniferous section Depth(ft.)	Value(lbs Sn/c.y.)	% Recy. of Sn section	Depth valued (ft.)	Grade (lbs Sn/c.y.)	Remarks
Test Area 2 (cont'd):								
58	55	52	5 - 10	0.20	139	55	0.03	
59	60	55	0 - 5	0.01	100*	60	Tr.	
60	45	40	5 - 10	0.02	141	45	Tr.	
61	13	8	-	-	-	13	Nil	
Test Area 3:								
No sample drilling carried out. Auger drilling totalled 1,417 ft. in 45 holes.								
Test Area 4:								
13	12	Nil	-	-	-	-	Nil	
14	15	2	0 - 5	0.02	100	5	0.02	
15	5	Nil	-	-	-	-	Nil	
16	39	29	0 - 5	0.02	100	35	Nil	
17	28	25	14 - 20	0.02	225	28	Nil	
18	32	29.5	5 - 10	0.20	95.5	32	0.05	
19	50	U/B	0 - 5	0.02	100	40	Nil	
201	130	113?	65 - 70	0.10	59	115	Tr.	Auger drilling completed 4,208 ft. in 45 holes.
202	145	U/B	60 - 65	0.08	62	145	0.01	
203	145	U/B	105 - 110	0.06	75	145	0.04	
204	136	130	100 - 105	0.07	46	136	Tr.	
205	135	129	-	-	-	135	Nil	
206	85	55	0 - 5	0.71	100	60	0.06)	
207	75	62	0 - 5	0.16	100	65	0.02)	
208	48	39	0 - 5	0.14	100	45	0.02)	
209	52	33	0 - 5	0.14	100	34	0.02)	Eastern Lead
210	51	46	0 - 4	0.20	100	51	0.03)	Auger drilling completed
211	66	61	0 - 5	0.22	100	66	0.02)	2,072 ft. in 47 holes.
212	54	49	10 - 15	1.35	120	54	0.19)	
213	62	57	0 - 5	0.34	100	62	0.03)	
214	53	48	0 - 5	0.08	100	53	Tr.)	
215	64	59	0 - 5	0.23	100	64	0.02)	

U/B - Unbottomed.
* - Sludge recovered - 100% recovery assumed.

(Cont'd)

080

209074

Report No. 139.

APPENDIX III
(Page 3)

Bore No.	Depth (ft.)	Depth to basement	Highest stanniferous section Depth(ft.)	Value(lbs Sn/c.y.)	% Recy. of Sn section	Depth valued (ft.)	Grade (lbs Sn/c.y.)	Remarks
Test Area 5 - Line MR. 1:								
120	37	32	25-30	0.25	97	33	0.08)	Western river terrace.
119	25	20	15-20	0.25	74	21	0.08)	
118	27	24.5	15-20	0.05	74	25.5	0.01)	
175	47	46.5	35-45	0.85	127	47	0.22)	
176	48	44.5	35-40	0.02	74	44.5	Tr.)	River Swamp.
177	47.75	43.5	35-40	0.13	93	44.5	0.02)	
178	33	29	25-29	0.80	116	30	0.13(0.14))	Average Value 0.11 lbs Sn/c.y. at 30 ft.
179	39	39	25-30	0.05	100*	39	0.02)	
180	23	22.5	20-23	0.05	169	22.5	0.01)	
181	20	20	-	-	-	20	Nil)	
198	25.75	24.5	20-25.75	0.76	86	25.5	0.17(0.19))	
182	28.5	28.5	25-28.5	6.65	53	28.5	0.82(0.80))	
197	25.5	25.5	21-25.5	0.05	79	25.5	Tr.)	
183	27	27	25-27	0.17	93	27	0.01)	
184	25	25	-	-	-	25	Tr.)	
185	15	17.5	-	-	-	17.5	Nil)	
169	26.5	25	-	-	-	25	Nil)	
170	32	27	25-27	0.68	70	27	0.09)	
171	45.5	40	-	-	-	40	Nil)	
172	47	41.5	40-42	0.06	70	41.5	Tr.)	Eastern river terrace.
173	25	U/B	abandoned	-	-	-	-)	
173A	56.5	52	49-52	0.15	100	53	0.02)	
174	45	U/B	0- 4	0.08	145	4	0.05)	
186	83	78	-	-	-	78	Nil)	
Test Area 5 - Line MR. 2:								
115	35	30	5-10	0.62	111	10	0.38)	
114	45	40	0- 5	0.19	150	5	0.19)	
113	58	53	35-40	0.21	120	15	0.13)	Western terrace.
112	15	10	10-15	0.14	130	11	0.12)	

(Cont'd)

Bore No.	Depth (ft.)	Depth to basement	Highest stanniferous section Depth(ft.)	Value(lbs Sn/c.y.)	% Recy. of Sn section	Depth valued (ft.)	Grade (lbs Sn/c.y.)	Remarks
Test Area 5 (Cont'd):								
111	25	20	-	-	-	20	Tr.)	
196	30.5	25.5	15-20	0.11	28	26.5	0.03)	
110	28	23	20-23	1.55	100*	24	0.36)	
195	23	18	15-18	0.62	54	19	0.22(0.23))	
109	23	18	15-18	0.85	46	19	0.16)	
108	25	17	-	-	-	17	Tr.)	
107	28	23	20-23	0.09	185	24	0.01)	
106	28	23	5-10	0.03	104	24	0.01)	
193	36	31	30-31.5	4.84	224	32.5	0.31(0.32))	River Swamp
105	30	25	20-25	2.90	109	26	0.58)	
194	30	25	25-30	0.04	167	25	Tr.)	
104	32	27	25-27	1.12	70	28	0.10)	
103	33	27	25-28	0.25	115	28	0.03)	
102	33	28	25-28	0.33	115	29	0.07)	
101	31	26	25-31	0.02	100*	26	Tr.)	
187	36	31	30-31	0.13	185	31	Tr.)	
188	33	28	25-28	0.05	185	28	Tr.)	
Average in Swamp - 17 holes - 24.4 ft.								
189	28	23.5	20-23	0.13	93	24.5	0.03	
190	42.5	37.5	35-37.5	0.04	83	37.5	Tr.	
191	32.5	26.75	25-27	0.11	231	27.75	0.01	
192	32.5	27.5	-	-	-	27.5	Nil	
Average on Terrace - 8 holes.								
Test Area 5 - Line MR.3:								
117	17	12	-	-	-	12	Nil	Western Terrace.
116	26	25	20-25	0.15	167	26	0.03)	
151	26	20	-	-	-	20	Nil)	
152	26	25.5	20-25	0.10	100*	26	0.02)	
153	16.5	15.5	10-15	0.22	123	16.5	0.09)	River Swamp
154	18.25	18	-	-	-	18	Nil)	
155	24	23.75	20-24	0.01	163	24	Tr.)	
156	28	28	25-28	0.05	154	28	Tr.)	

(Cont'd)

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APPENDIX III.
(Page 5)

Bore No.	Depth (ft.)	Depth to basement	Highest stanniferous section Depth(ft.)	Value(lbs Sn/c.y.)	% Recy. of Sn section	Depth valued (ft.)	Grade (lbs Sn/c.y.)	Remarks
Test Area 5 (Cont'd):								
157	25.5	25	25-25.5	0.04	100*	25	Tr.)	
158	28	27	25-28	0.10	100*	28	0.02)	
159	22.5	20	-	-	-	20	Nil)	
160	34.5	29.5	20-30	0.24	52	30.5	0.08)	
161	39	34	-	-	-	34	Tr.)	
162	40	35	33-35	0.05	186	35	Tr.)	Eastern Terrace
163	40	34.5	25-30	0.02	100*	34.5	Tr.)	
164	44	39	30-35	0.17	86	39.5	0.03)	
165	47	42	35-40	0.46	65	43	0.11)	
166	41	36.5	36.5-41	0.06	134	37.5	0.02)	
167	32.5	27.5	-	-	-	27.5	Nil)	
168	22.5	22.5	-	-	-	22.5	Tr.)	
Test Area 6:								
No sample drilling carried out. Auger drilling completed 508 ft. in 16 holes.								
Test Area 7:								
38	115	111	-	-	-	115	Nil	Auger drilling completed 3,042 ft. in 36 holes.
39	126	123	120-126	0.02	100*	126	Tr.	
40	120	115	110-115	0.06	130	120	Tr.	
41	98	95.5	80-85	0.05	100*	98	Tr.	
42	83	78	-	-	-	83	Nil	
43	115	U/B	10-15	0.02	100*	115	Tr.	
44	100	95	88-90	0.02	185	100	Tr.	
45	102	U/B	85-90	0.04	150	102	Tr.	
46	100	95?	-	-	-	100	Nil	
47	120	115	-	-	-	120	Tr.	
48	123	118	-	-	-	123	Tr.	
49	137	132	125-130	0.13	100*	132	Tr.	
50	123	118	115-120	0.10	76	123	Tr.	
51	115	110	100-105	0.11	127	115	Tr.	
52	142	136	135-137	0.19	100*	142	Tr.	
53	132	127	125-127	0.12	100*	132	Tr.	

(Cont'd)

Bore No.	Depth (ft.)	Depth to basement	Highest stanniferous section Depth(ft.)	Value(lbs Sn/c.y.)	% Recy. of Sn section	Depth valued (ft.)	Grade (lbs Sn/c.y.)	Remarks
Test Area 7 (Cont'd):								
54	110	105	95-100	0.10	120	110	Tr.	
55	137	132	-	-	-	130	Nil	
56	117	110	-	-	-	110	Nil	
19 holes, 2,215 ft. average.								
Test Area 8:								
No sample drilling carried out. Auger drilling completed 1,933 ft. in 50 holes.								
Test Area 11 - Line 54:								
86	42	U/B	5-10	0.08	100*	10	0.04	Auger drilling completed 3,816 ft. in 50 holes.
85	46.5	U/B	15-20	0.15	318	20	0.06	
Test Area 11 - Line 53:								
68	72	U/B	-	-	-	72	Nil	
69	80	U/B	65-68	0.03	215	80	Tr.	
67	104	U/B	25-30	0.07	139	30	0.01	
63	33	U/B	30-33	0.51	92	33	0.06	
62	62	U/B	-	-	-	62	Nil	
64	48.5	?U/B	25-30	1.99	65	30	0.44	
87	35	U/B	30-35	0.43	93	35	0.10	
65	31.5	U/B	15-20	0.23	88	20	0.06	
66	42	U/B	-	-	-	42	Tr.	
Test Area 11 - Line 55:								
81	20.75	U/B	-	-	-	20.75	Nil	
80	41.25	U/B	20-25	0.05	125	41.2	Tr.	
79	80	U/B	45-50	0.25	100*	50	0.03	
78	46.75	U/B	45-46.75	0.27	79	46.75	0.03	
78A	58.7	U/B	40-45	0.40	130	50	0.13	
77	75	U/B	30-35	0.72	100*	40	0.15	
76	75	U/B	60-65	0.11	19	75	0.02	

(Cont'd)

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Bore No.	Depth (ft.)	Depth to basement	Highest stanniferous section Depth(ft.)	Value(lbs Sn/c.y.)	% Recy. of Sn section	Depth valued (ft.)	Grade (lbs Sn/c.y.)	Remarks
Test Area 11 (Cont'd):								
75	80	U/B	20-25	0.17	74	25	0.03	
74	75	U/B	40-45	0.33	46	60	0.05	
73	50	U/B	15-20	0.05	83	20	0.01	
Test Area 11 - Line 75:								
82	76	U/B	5-10	0.05	100*	15	0.04	
83	65.25	U/B	25-30	0.38	100*	30	0.08	
84	21.25	U/B	20-21.5	0.16	560	21.25	0.03	
Test Area 11 - Line 73:								
72	52	47	15-18	0.22	108	18	0.14	
71	63	58	25-29	0.53	35	29	0.16	
70	30	26	10-15	0.04	100*	15	0.01	

U/B - Unbottomed.
* - Sludge recovered - 100% recovery assumed.
(0.19) - Corrected figure after applying results of recovery checks on drill and plant performance.
(0.12) - Corrected figure after applying results of recovery checks on drill and plant performance.

Test Area 12:

No sample drilling carried out. Auger drilling completed 839 ft. in 32 holes.

073

209079

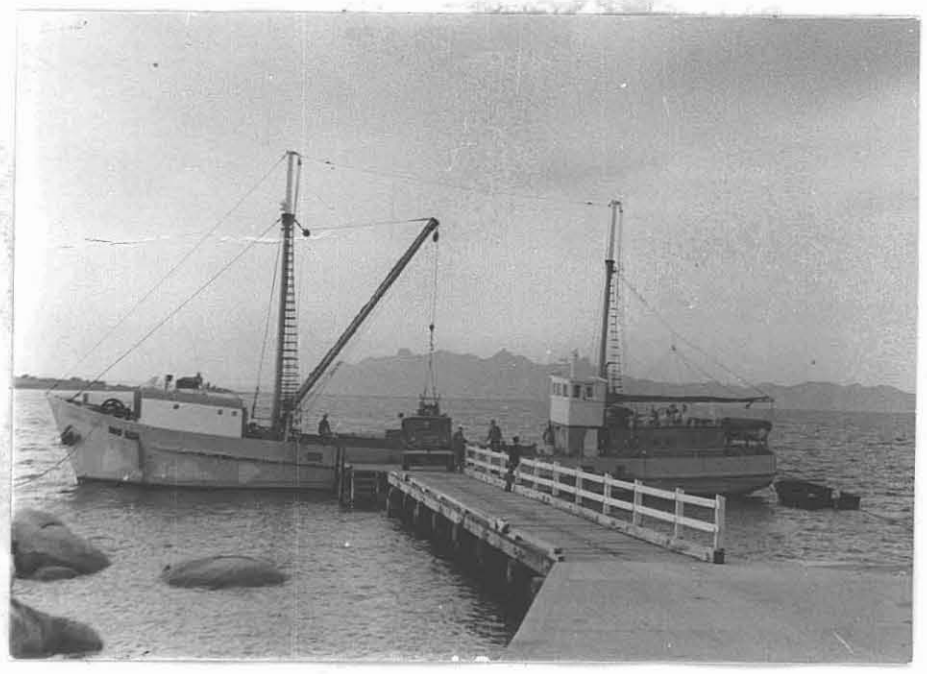


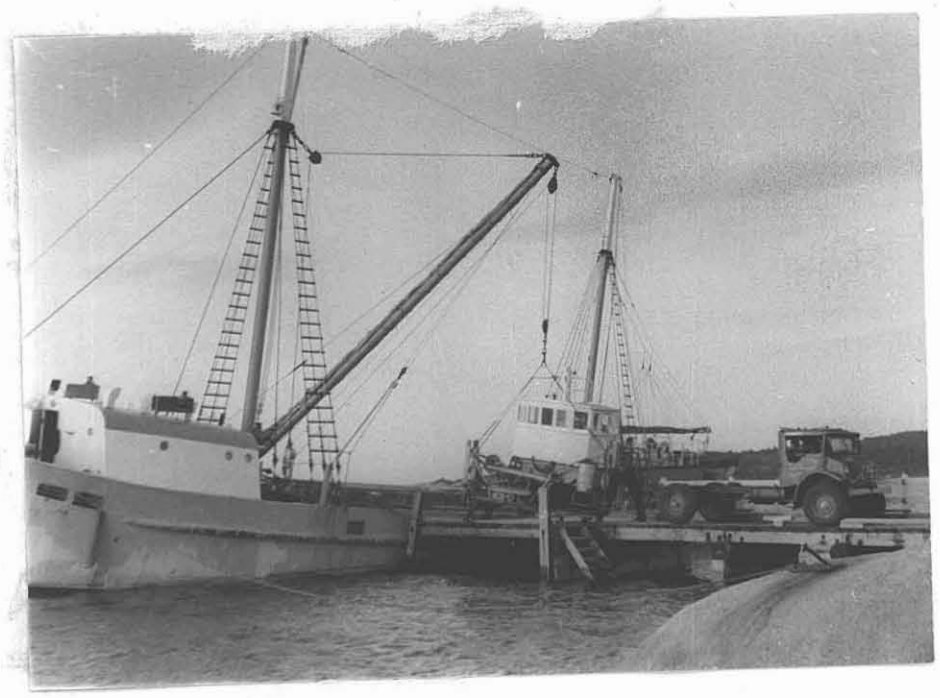


Initial concentrating of drill samples, using a cradle (Cape Barren Island).

074

209080





Loading drill rig onto the Island vessel "Flinders Trader" at Cape Barren Island. Maximum lift of the ship's boom is 3 tons; granite peaks of Flinders Island in the background.

075

209081

Report No. 139.

APPENDIX IV.

RECORD OF U. D. C. SAMPLE DRILLING (EXPLORATION LICENCE EL. 2/65) - Rooks River Area.

Bore No.	Depth (ft.)	Depth to basement	Highest stanniferous section Depth(ft.)	Value(lbs Sn/c.y.)	% Recy. of Sn section	Depth valued (ft.)	Grade (lbs Sn/c.y.)	Remarks
1	63	58.5	0 - 6	0.12	100*	63	Tr.	
2	43	U/B	20 - 25	0.48	100*	25	0.18	
3	65	60.5	40 - 45	0.36	99	45	0.13	Bores 3 & 9 are adjacent.
4	31.5	U/B	15 - 20	0.95	100*	20	0.29	
5	70	U/B	25 - 30	2.18	98	40	0.48	Bores 5 & 8 are adjacent.
6	80	U/B	20 - 25	0.65	80	35	0.24	
7	47	U/B	20 - 25	1.81	117	30	0.34(0.35*)	
8	45	U/B	25 - 30	2.18	98	40	0.48	
9	45	U/B	40 - 45	0.36	99	45	0.13	
10	36.5	30.0	5 - 10	0.07	88	10	0.07	
11	22.6	U/B	20 - 22.5	1.73	243	22.5	0.22	
12	30.6	27.0	25 - 29	0.21	68	29	0.08	
13	55	50.0	20 - 25	0.09	94	30	0.03	
14	95	U/B	80 - 85	0.15	67	95	0.02	
15	50	U/B	-	-	-	50	Nil	
16	50	U/B	-	-	-	50	Nil	
17	50	U/B	-	-	-	50	Nil	
18	50	U/B	-	-	-	50	Nil	
19	50	U/B	30 - 35	0.04	51	50	Tr.	
20	31	26.0	20 - 31	0.06	87	31	0.02	
21	38	32.0	30 - 32.5	0.06	74	32.5	0.03	
22	32	27.0	15 - 20	0.05	79	15	0.02	
23	15	15.0	-	-	-	15	Nil	
24	18.5	18.5	15 - 18.5	0.03	100*	18.5	Tr.	
25	27	U/B	20 - 25	0.02	100*	27	Tr.	
26	50	45.0	15 - 20	0.04	100*	50	Tr.	
27	39	36.0	35 - 39	0.30	100*	39	0.04	
28	39	29.0	-	-	-	39	Nil	
29	60	52.0	0 - 5	0.02	167	5	0.02	
30	112	107.0	100 - 105	2.62	67	108	0.20(0.18*)	
31	118	U/B	45 - 45.5	0.61	134	118	0.08	
32	65.5	60.0	55 - 60	0.04	46	65.5	Tr.	
33	28.5	27.0	20 - 25	0.30	88	28	0.10	
34	60	57.5	55 - 60	2.25	107	60	0.36	

U/B - Unbottomed.

* - Sludge recovered - 100% assumed.

(0.35*) and (0.18*) - Corrected figures after applying result of recovery check on drill and plant performance.



General View of S. W. Flinders Island showing rugged granite peaks of the Strzelecki Range



General view looking upstream in the Rooks River Valley. Mt. Munroe is in the background.

209083

220



Reconnaissance drilling for Tertiary leads in areas of extensive soil cover, using a Gemco Auger drill. (Test Area 4) N. E. Tasmania.



Heavy tree cover of the Mussel Roe River Swamp. (Test Area 5) Subject to frequent flooding.

4283

BASS STRAIT

RINGAROOMA BAY

Foster I.

Cape Portland

BOOBYALLA (Delta Dugarde) E.L.6/63

MUSSEL ROE BAY

RUSHY LAGOON

Bowlers Lagoon

FOSTERS LAGOON

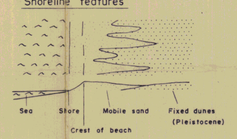
MUSSEL ROE SWAMP E.L.6/63

LEGEND

QUATERNARY & RECENT

- Mobile shore sand
- Stabilized (Pleistocene?) dune system.
- Reed swamps, river flats, tree swamps, shallow water.
- Alluvium, generally button grass flats.

Shoreline features



TERTIARY

- Sand and pebbles apparently derived directly from weathering unconsolidated Tertiary sediments.
- F.T. Surface rubble of iron cemented sands etc, derived from Tertiary sediments.
- S.T. Siliceously cemented sand etc., generally indicating a shallow bedrock.
- Basalt.

JURASSIC

- Dolerite.

PERMIAN

- Sandstone, shale – fossiliferous in places

DEVONIAN

- Granitic intrusives

SILURIAN

- MATHINNA Group – shale, sandstone, very fine sandstone metra-sediments.

- Fault, joint, photo-lineament.
- Open workings.
- Tailings.
- Roads.
- Tracks.
- Railway.

BOOBYALLA

SHALLAMAR FLATS

Monarch

White Rocks

BROOKS CK.

MT. CAMERON

Old Star Hill

Browns

JEWEL FLATS

Purdue

Arcadia

Lanka

Ambrs Hill

Endurance

STH. MT. CAMERON

ENDURANCE FLATS

Hasties

Rainbow's Banka

Swains

DORSET FLATS

Eastern Leads

Pioneer

PIONEER

Sth. Pioneer

HERRICK

WINNALEAH

Echo

MOORINA

HASTIES E.L.6/63

Dobsons

Delta

Beltz

MacGregor

Taylor

Canary

ABERFOYLE HILL

Richardson's

Black Duck

Aberfoyle

Vulcan

Native Lass

Doone

Newhaven

Lochaber

Scotia

GLADSTONE

Empress

Lawrys

Cybele

Traceys

New Edna

Edina

NORTH MUSSEL ROE SWAMP

Eastern Terrace

WOODS FLAT

Woods

Briseis

Lone Brother

DERBY

Valley

Arba

BRANXHOLM

Mt. Joseph Mine

Briseis Dam

Ruby Flat

Mt. Paris

LEGERWOOD

UTAH DEVELOPMENT COMPANY

66-430

GEOLOGICAL MAP, N.E. TASMANIAN TINFIELD.

PLATE I

209084

Scale 1 inch to 1 Mile

Mile 1 1/2 0 1 2 3 4 5 Miles

5 cm

4283

Sept, 1966
Report No. 139

4284

N

AREA EXEMPT FROM THE MINING ACT FROM 31-1-1938

BLOCK No.6
585,166 cub.yds at 0·30 lbs Sn/cub.yd indicated

BLOCK No.5
1,259,871 cub.yds at 0·29 lbs Sn/cub.yd indicated

BLOCK No.4
258,964 cub.yds at 0·45 lbs Sn/cub.yd indicated

BLOCK No.3
1,384,525 cub.yds at 0·39 lbs Sn/cub.yd indicated

BLOCK No. 2
579,687 cub.yds at 0·32 lbs Sn/cub.yd indicated

BLOCK No.1
315,000 cub.yds at 0·31 lbs Sn/cub.yd indicated

No drilling information available

Road approximate only

Stirling Creek

Cameron water race

Disused section

DAM

LINE 70

LINE 69

LINE 56

LINE 57

LINE 58

Shallow "Mathinna" basement

DOONE WORKINGS
Shallow workings (45') on bedrock

MURRAY AND RICHARDS
(Workings about 20' deep on bedrock)

LOCHABER MINE

MALLINSON'S WORKINGS

NEWHAVEN WORKINGS

SCOTIA MINE
Only very thin cover on Mathinna bedrock

Pig and Whistle Creek

RIVER

RINGAROOMA

Tailings

B13 B15 B16 B17 B18 B19

3f 3cl

LEGEND

TIN VALUES OF BORES

- Nil and trace
- Less than 0·1 lbs Sn/cub.yd
- 0·1 - 0·2 lbs Sn/cub.yd
- 0·2 - 0·4 lbs Sn/cub.yd
- 0·4 - 0·6 lbs Sn/cub.yd
- 0·6 - 0·8 lbs Sn/cub.yd
- 0·8 - 1·0 lbs Sn/cub.yd
- Greater than 1·0 lbs Sn/cub.yd

RECENT
- Alluviated areas - button grass flats.
- River flats, swamps.

TERTIARY
- Drift, wash, fine sand, clay.

SILURIAN
- Mathinna beds - slate, shale, fine grained siliceous meta-sediment - generally soft, deeply weathered and not exposed except in old workings.

Workings.

200 Approx. basement surface contours (assumed data).

B17 Areas of previous drilling - See Table "L" Report No.130

UTAH DEVELOPMENT COMPANY 66-430

GEOLOGICAL MAP TEST AREA No.3

209085

PLATE 2

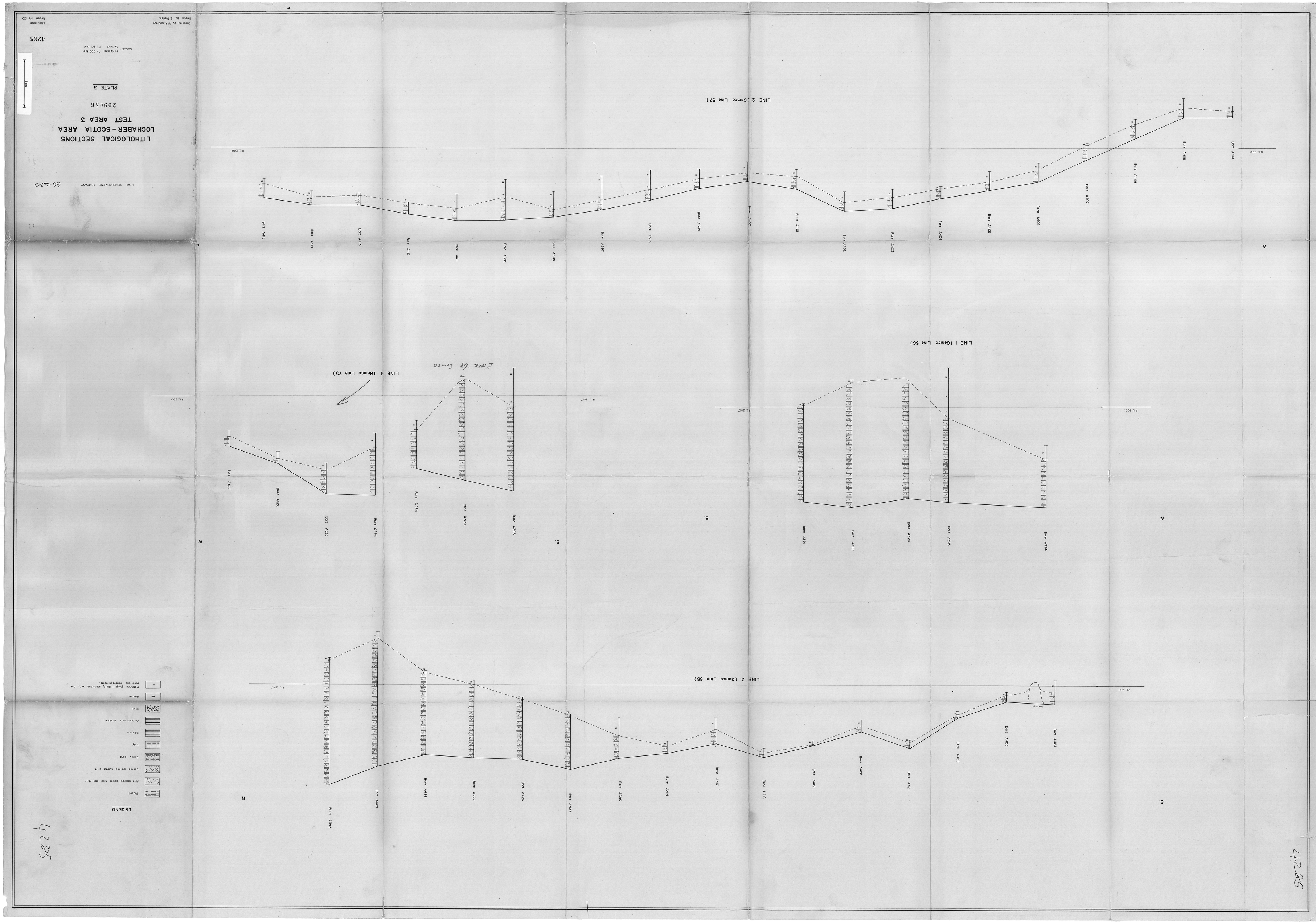
SCALE : 1 inch = 400 feet

5 cm

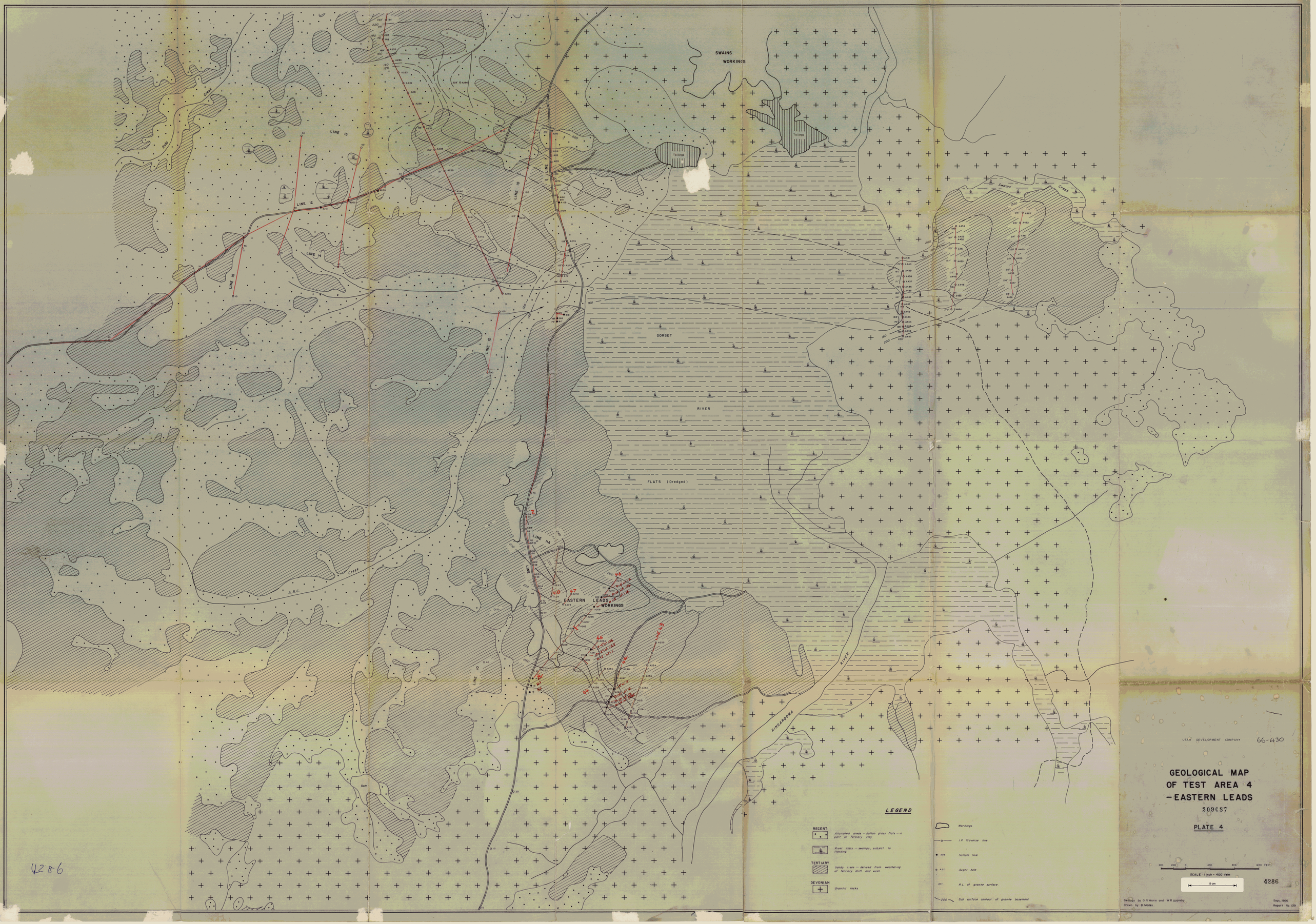
4284

Geology by O.N.Warin and W.R.Appleby.

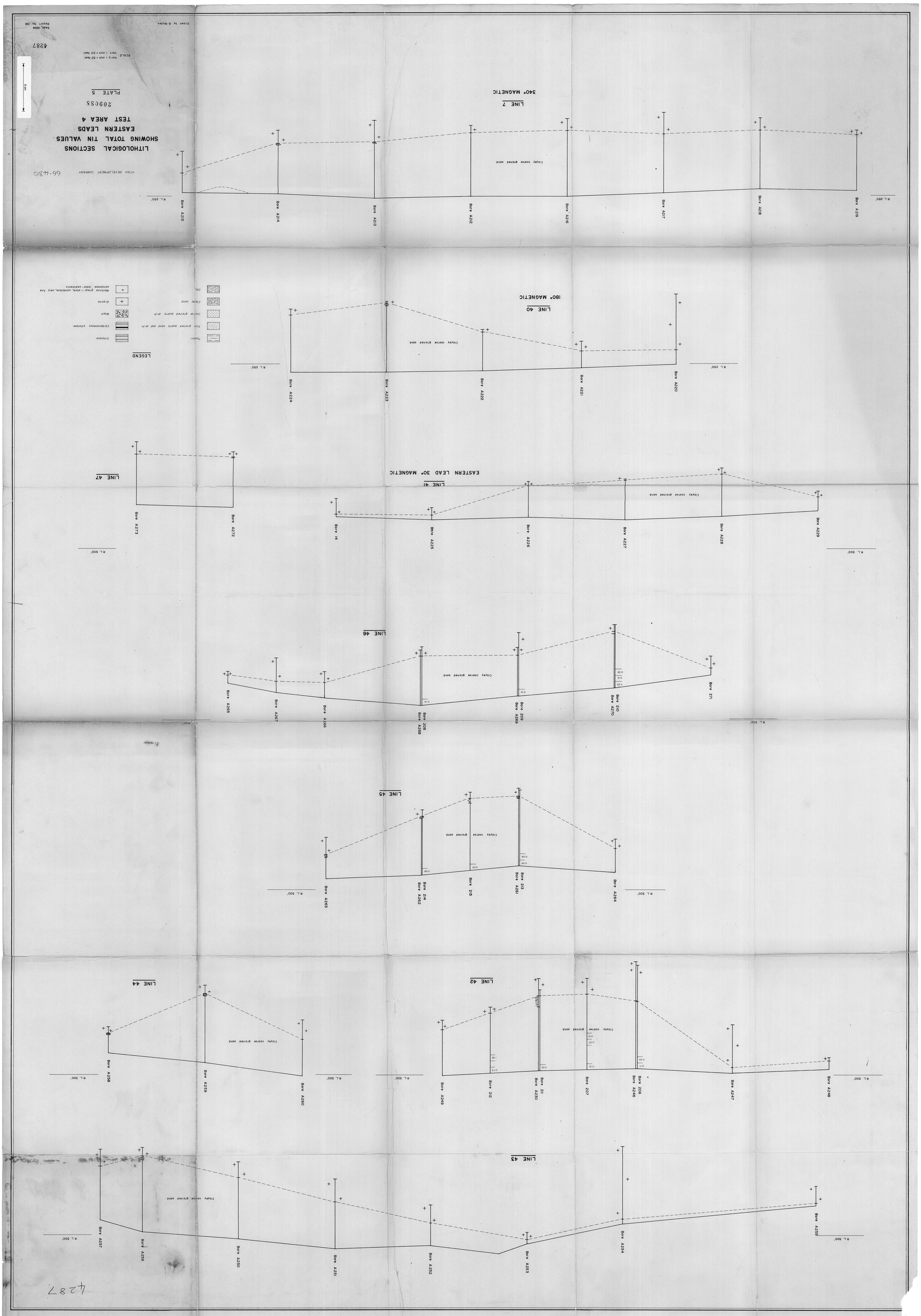
Sept, 1966
Report No.



LITHOLOGICAL SECTIONS
LOCHABER-SCOTIA AREA
TEST AREA 3
209636
PLATE 3
UTAH DEVELOPMENT COMPANY
66-430
SCALE Horizontal 1" = 200 feet
Vertical 1" = 20 feet
Compiled by W.R. Appleby
Drawn by B. Moder
Sept, 1966
Report No. 139
4285
LINE 2 (Gemco Line 57)
LINE 1 (Gemco Line 56)
LINE 4 (Gemco Line 70)
LINE 3 (Gemco Line 58)
LEGEND
Topsoil
Fine grained quartz sand and drift
Coarse grained quartz drift
Clayey sand
Clay
Siltstone
Carbonaceous siltstone
Wash
Granite
Mottled group — shale, sandstone, very fine sandstone, meas-sediments



SWAINS WORKINGS
Tailings
Tailings
LINE 13
LINE 12
LINE 14
LINE 15
LINE 10
LINE 7
LINE 11A
DORSET
RIVER
FLATS (Dredged)
EASTERN LEADS WORKINGS
A.B.C. Creek
RINGAROOMA RIVER
Swains Creek
Dam
LEGEND
RECENT
Alluviated areas — button grass flats — in part on Tertiary clay
River flats — swamps, subject to flooding
TERTIARY
Sandy rises — derived from weathering of Tertiary drift and wash
DEVONIAN
Granitic rocks
Workings
I.P. Traverse line
Sample hole
Auger hole
R.L. of granite surface
Sub surface contour of granite basement
UTAH DEVELOPMENT COMPANY
66-430
GEOLOGICAL MAP OF TEST AREA 4 - EASTERN LEADS
209087
PLATE 4
SCALE 1 inch = 400 feet
5 cm
4286
Geology by O.N. Worin and W.R. Appleby
Drawn by B. Modex
Sept. 1966
Report No. 139
4286



LITHOLOGICAL SECTIONS
SHOWING TOTAL TIN VALUES
EASTERN LEADS
TEST AREA 4
PLATE 5
UTAH DEVELOPMENT COMPANY
66-430
4287
LINE 7
340° MAGNETIC
LINE 40
180° MAGNETIC
LINE 41
EASTERN LEAD 30° MAGNETIC
LINE 47
LINE 46
LINE 45
LINE 44
LINE 42
LINE 43
LEGEND
Clayey coarse grained sand
R.L. 250'
R.L. 300'

Drilling by Storey's Creek Tin Mining Co. N.L.
Indicating approx. 1,500,000 cu.yd. at 0·12 lbs. Sn/cu.yd.

Drilling by Department of Mines, 1953
(See F1, Table J, Report No. 130)

Drilling by Department of Mines, 1953
Indicating 90,000 cu.yd. at 0·3 lbs. Sn/cu.yd.
(See E, Table J, Report No. 130)

ELIZABETH

TRACEYS

Granite Bedrock High

Bedrock High

Probable Granite Bedrock

Possible Bedrock High

Tailings.

Mainly tailings.

Line MR 1

Line MR 2

Line MR 3

A200 115 A201 113 101 183 190 192

A585 A584 A583 A582 A581 A580 A579 120 118 180 181 186

117 T.T. 159 165 168

T.T.

F.T.

Garfield Creek

Cybele Ck

Water-race

Great Mussel Roe River

North Mussel Roe Swamp

Mussel Roe River

EASTERN TERRACE

LEGEND

- Alluvium, generally button grass flats
- Basalt
- Swampy ground with high timber
- F.T. — Ferruginous tertiary
- T.T. — Mainly lower timber, ti-tree, swamp etc.
- Granitic intrusives
- Distinct river channel
- Open workings
- U.D.C. drill holes. — A585 Auger drilling. 120 Sample drilling.
- Previous drill holes by Dept. of Mines and Storey's Ck. Tin Mining Co. N.L.
- Trend of Lower Tertiary (Stage 1) deep lead (definite)
- Trend of Lower Tertiary (Stage 1) deep lead (Inferred)
- Trend of Upper Tertiary (Stage 3) leads (definite)
- Trend of Upper Tertiary (Stage 3) leads (Inferred)

UTAH DEVELOPMENT COMPANY 66-430

PHOTO-GEOLOGICAL MAP TEST AREA 5, NORTH MUSSEL ROE SWAMP.

209089

PLATE 6

SCALE 1 inch = 1,000 feet.

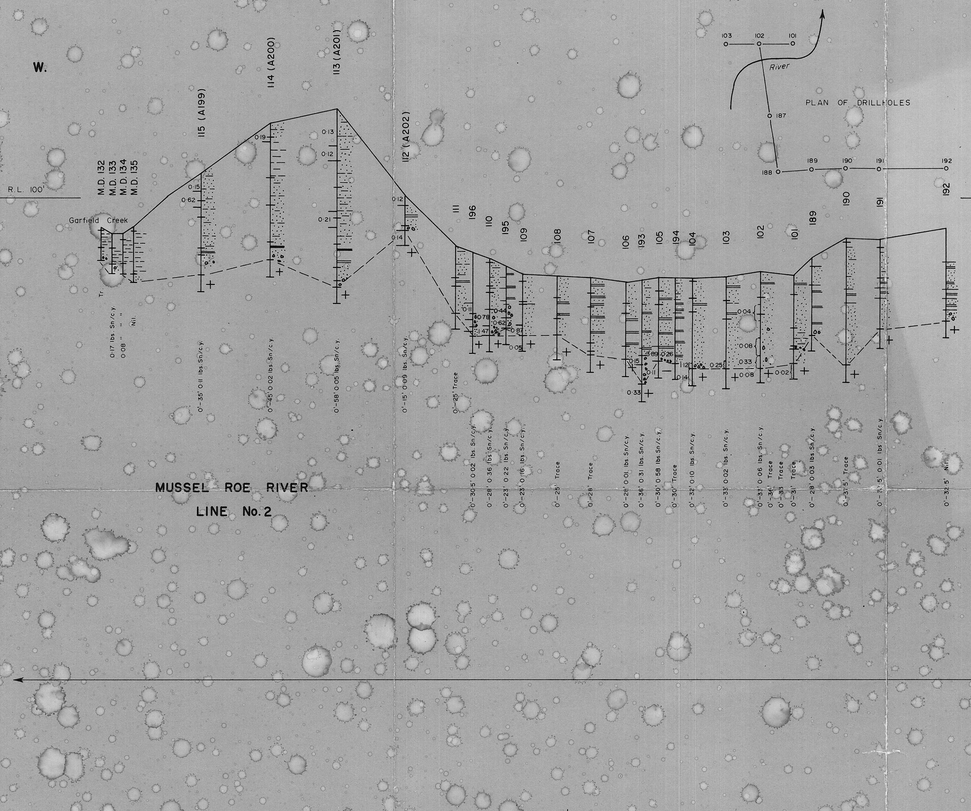
1000 500 0 1000 2000 3000 FEET

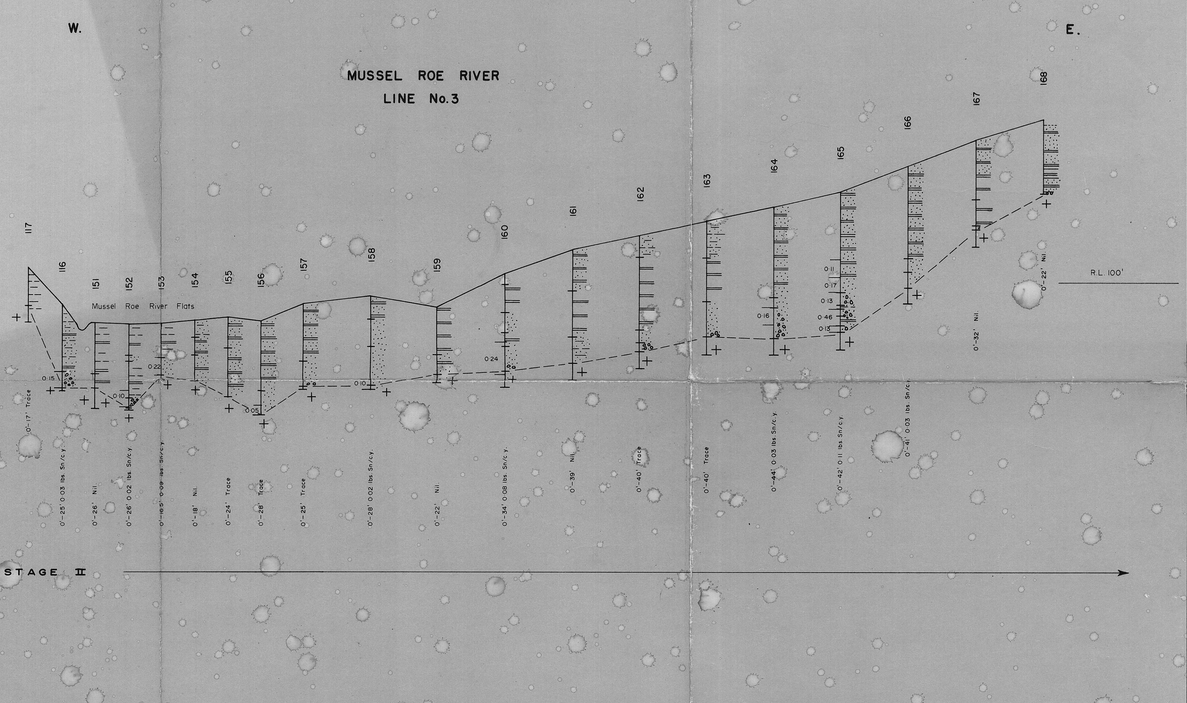
5 cm

4288

Geology by O.N. Warin and W.R. Appleby.
Drawn by B. Madex.

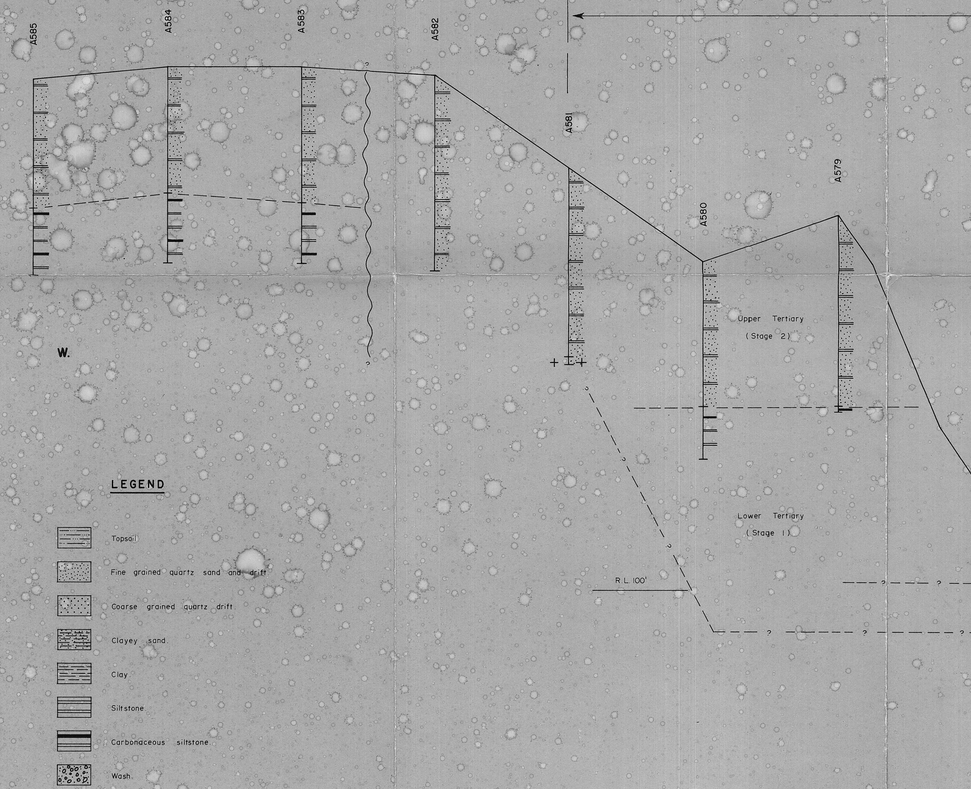
Sept, 1966
Report No. 139





MUSSEL ROE RIVER — STAGE II

MUSSEL ROE RIVER — STAGE I



LEGEND

- Topsoil
- Fine grained quartz sand and drift
- Coarse grained quartz drift
- Clayey sand
- Clay
- Siltstone
- Carbonaceous siltstone
- Wash
- + Granite
- M Mathinna group – shale, sandstone, very fine sandstone meta-sediments.

UTAH DEVELOPMENT COMPANY 66-430

LITHOLOGICAL SECTIONS MUSSEL ROE RIVER SWAMP. LINES 1, 2 & 3.

209090

PLATE 7

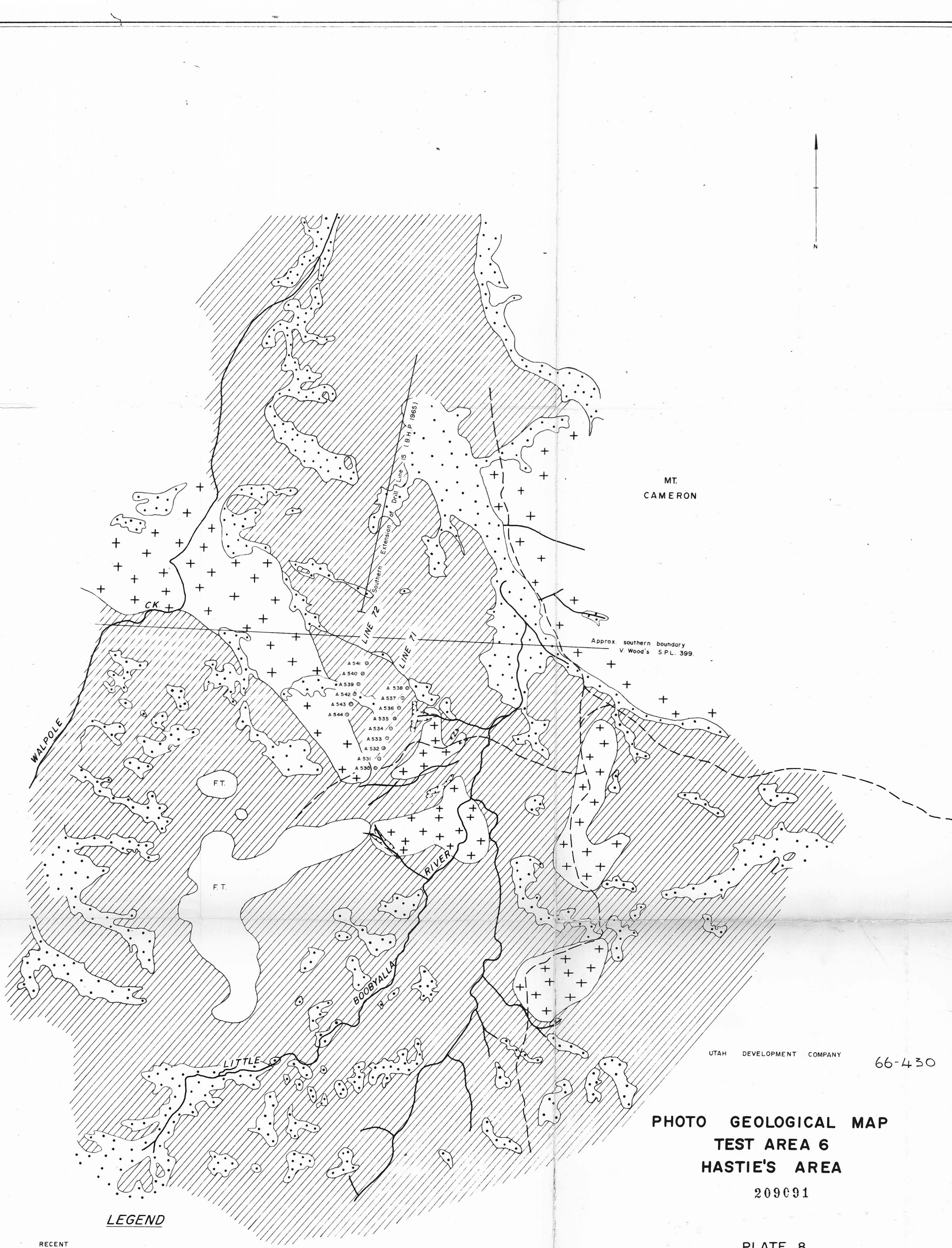
SCALE Horiz. 1 inch = 200 feet.
Vert. 1 inch = 20 feet.

5 cm

4283

Compiled by W.R Appleby,
Drawn by B. Madex.

Sept, 1966
Report No. 139.



LEGEND

RECENT

Alluviated area - button grass flats in part on Tertiary clays

TERTIARY

Sandy rises - derived from weathering of Tertiary drift and wash

F.T. — Ferruginous Tertiary

DEVONIAN

\+ — Granite rocks

UTAH DEVELOPMENT COMPANY

66-430

PHOTO GEOLOGICAL MAP
TEST AREA 6
HASTIE'S AREA

209091

PLATE 8

5 cm

SCALE 1inch = 1,000 feet

1000 500 0 1000 2000 3000

4290

Geology by : W.R. Appleby.
Drawn by : B. Wilson.

Sept, 1966
Report No. 139

S.

N.

Bore A530

Bore A531

Bore A532

Bore A533

Bore A534

Bore A535

Bore A536

Bore A537

Bore A538

Assumed R.L. 200'

Assumed R.L. 200'

HASTIES AREA
LINE 1. (GEMCO LINE 71)

S.

N.

Granite outcrop at surface

Assumed R.L. 200'

Bore A544

Bore A543

Swamp

Bore A542

Bore A539

Bore A540

Bore A541

Assumed R.L. 200'

HASTIES AREA
LINE 2. (GEMCO LINE 72)

LEGEND

- Topsoil
- Fine grained quartz sand and drift
- Coarse grained quartz drift
- Clayey sand
- Clay
- Off white to light grey siltstone to claystone
- Carbonaceous siltstone
- Wash
- Granite
- M — Mathinna group — shale, sandstone, very fine sandstone meta-sediments

UTAH DEVELOPMENT COMPANY 66-430

LITHOLOGICAL SECTIONS
HASTIES AREA
Gemco Lines 71 & 72

209692

PLATE 9

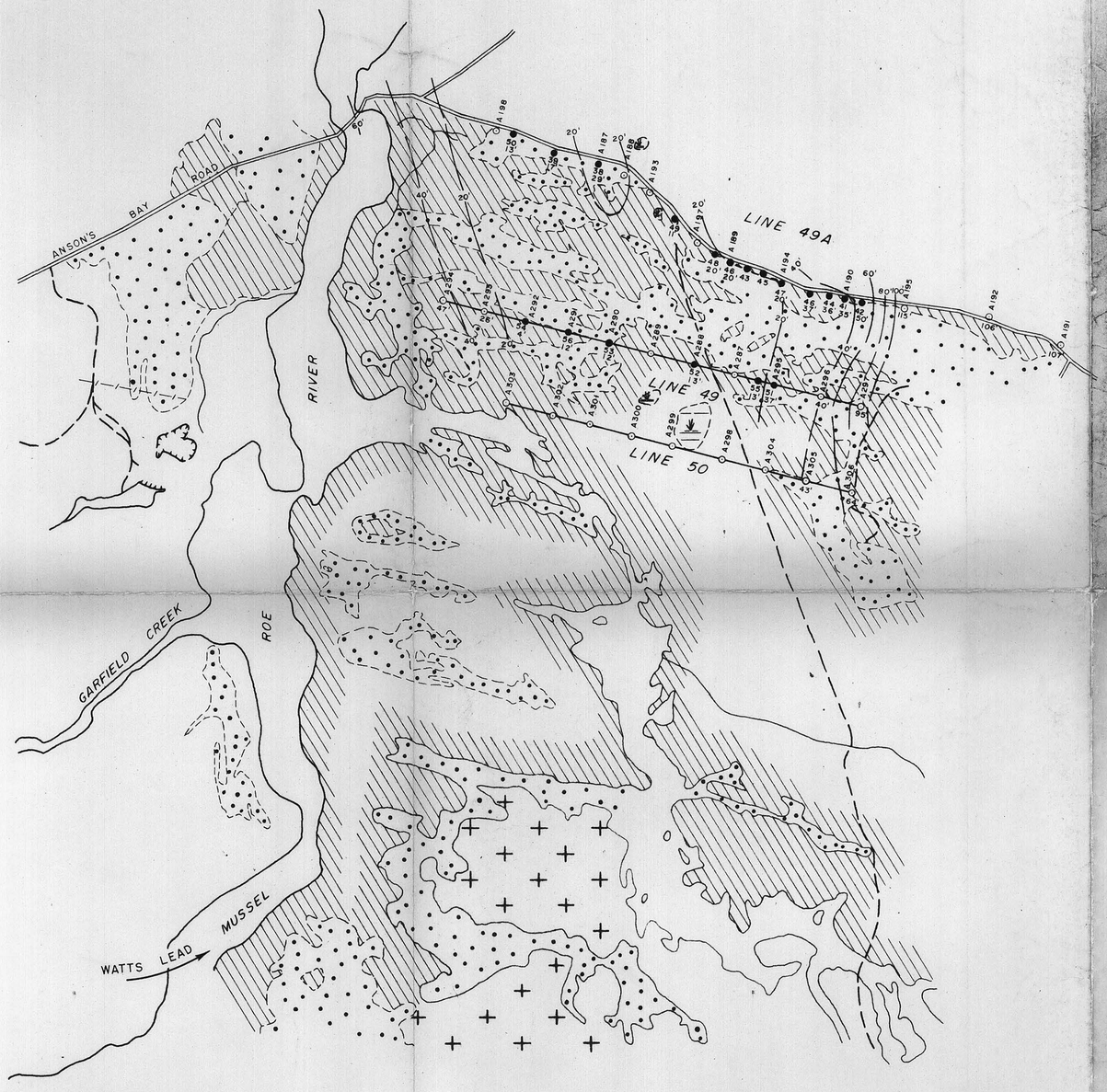
5 cm

SCALE: Horiz. 1 inch = 50 feet.
Vert. 1 inch = 20 feet.

Compiled by W.R. Appleby
Drawn by B. Madex

4291

Sep, 1966
Report No. 139



LEGEND

RECENT

- Alluviated area - button grass flats - in part on Tertiary clays.
- River flats - swamps, subject to flooding.

TERTIARY

- Sandy rises - derived from weathering of Tertiary drift and wash

DEVONIAN

- Granite rocks.
- ⊙ A298 Auger drill holes.
- ● 51 Sample drill holes.
- 13' R.L. of subsuface of Granite basement.
- Subsuface contours of Granite basement.

UTAH DEVELOPMENT COMPANY 66-430

GEOLOGICAL MAP
TEST AREA 7
SOUTH ANSONS BAY ROAD

209093

PLATE 10

5 cm

SCALE: 1 inch = 1,000 feet

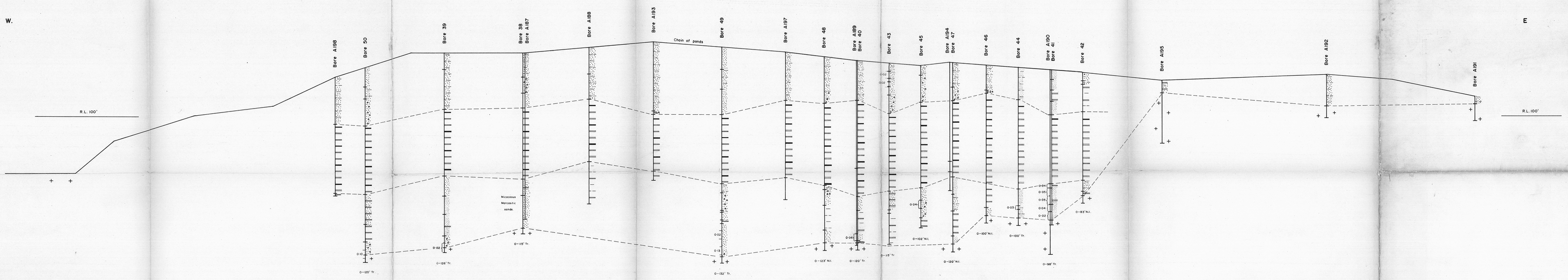
1000 500 0 1000 2000 3000

4292

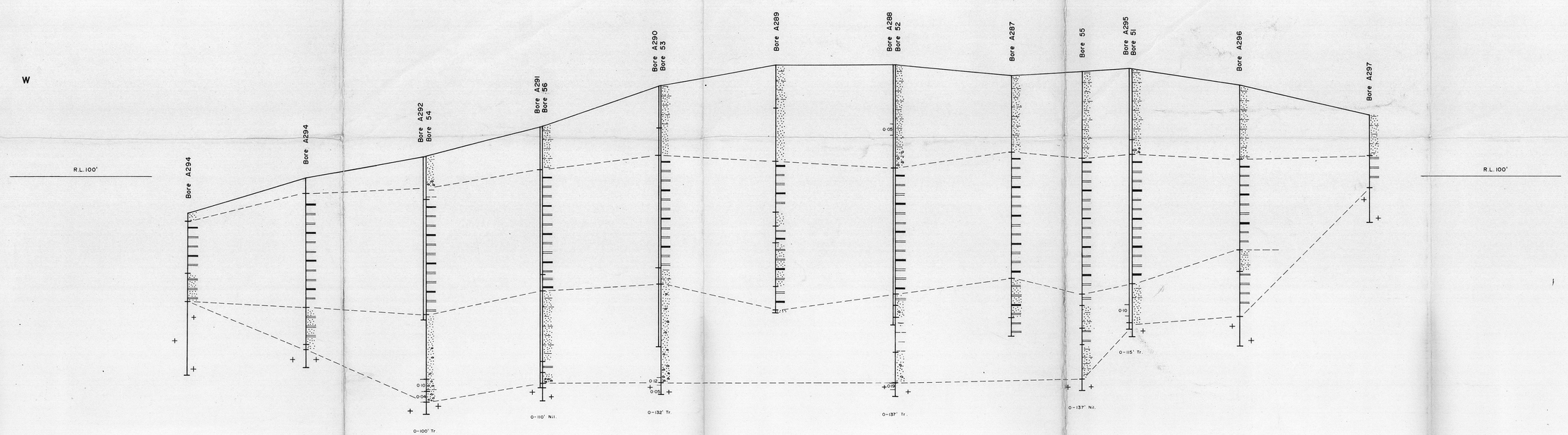
Geology by : W. R. Appleby.
Drawn by B. Wilson.

Sept, 1966
Report No. 139

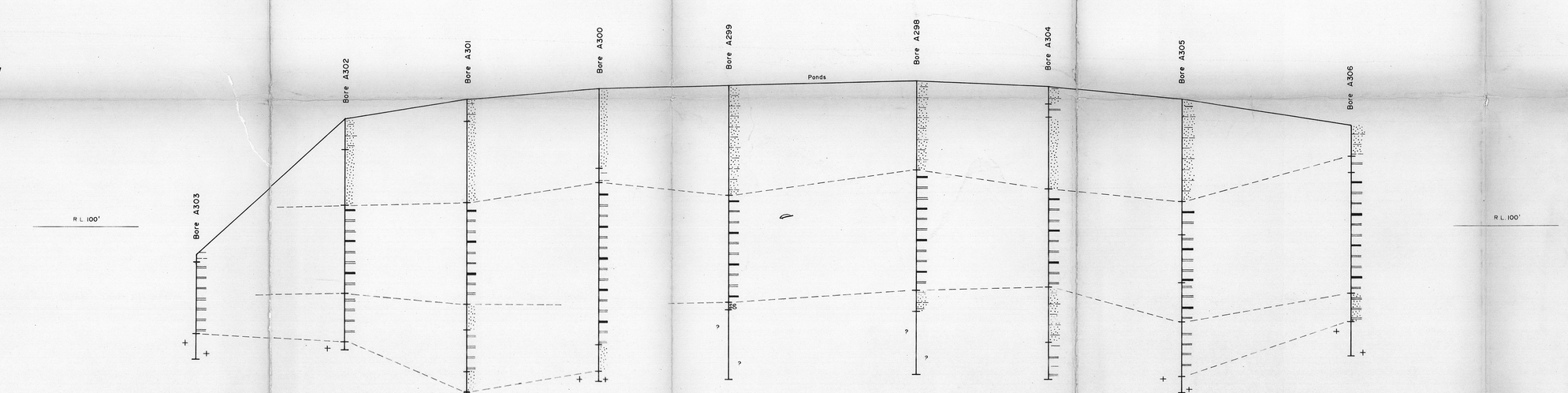
4293



LINE 49A



LINE 49



LINE 50

4293

LEGEND

- Topsoil
- Fine grained quartz sand and drift.
- Coarse grained quartz drift.
- Clayey sand.
- Clay.
- Siltstone.
- Carbonaceous siltstone.
- Wash.
- Granite.
- M Mathinna group – shale, sandstone, very fine sandstone meta-sediments.

UTAH DEVELOPMENT COMPANY 66-430

LITHOLOGICAL SECTIONS SHOWING INDIVIDUAL SECTION AND TOTAL TIN VALUES TEST AREA 7, SOUTH ANSONS BAY ROAD.

209094

PLATE II

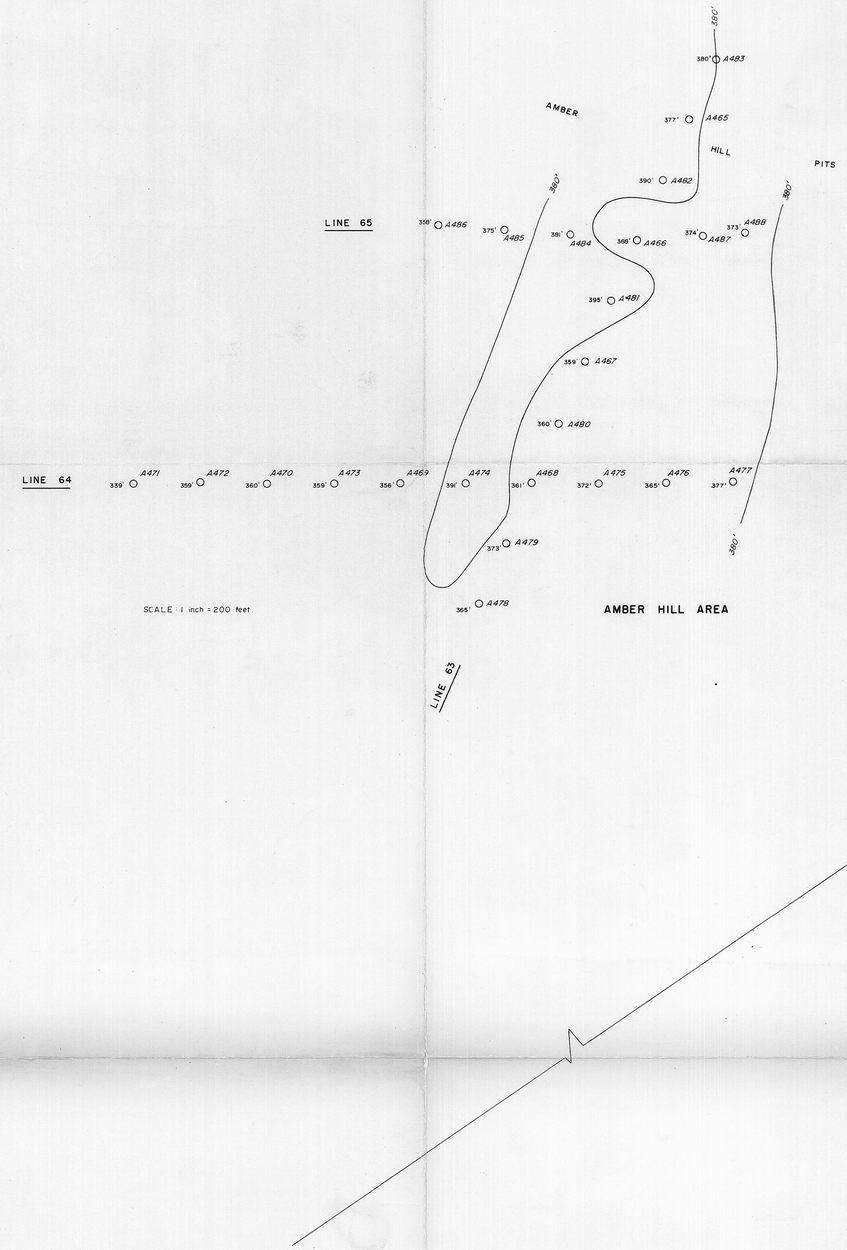
SCALE Horiz 1 inch = 200 feet
Vert 1 inch = 20 feet

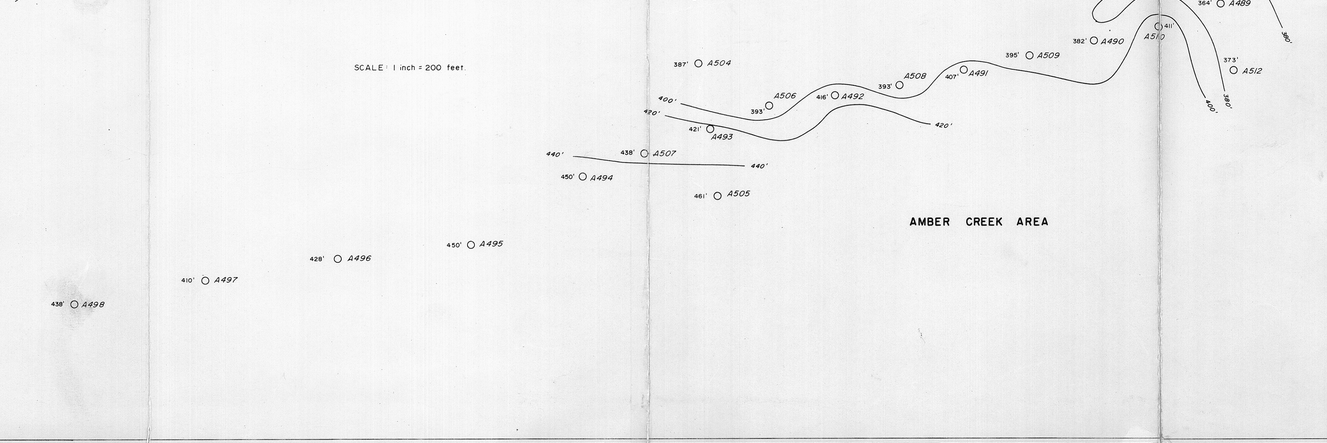
5 cm

4293

Drawn by B. Modex.

Sept, 1966
Report No. 139





LEGEND

RECENT

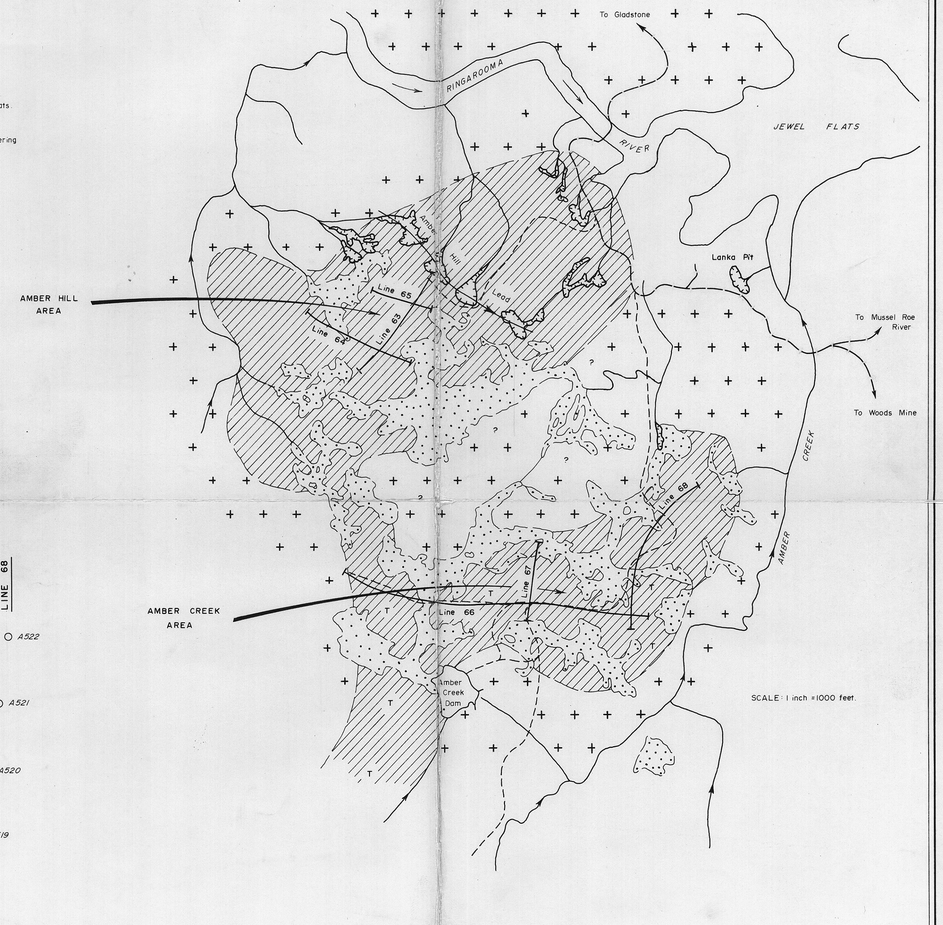
Alluviated areas — button grass flats.

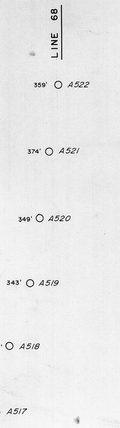
TERTIARY

Sandy rises — derived from weathering of Tertiary drift and wash.

DEVONIAN

Granitic rocks.





UTAH DEVELOPMENT COMPANY 66-430

PHOTO-GEOLOGICAL MAP AND SUBSURFACE BASEMENT CONTOUR PLAN AMBER HILL AND AMBER CREEK AREA.

209095

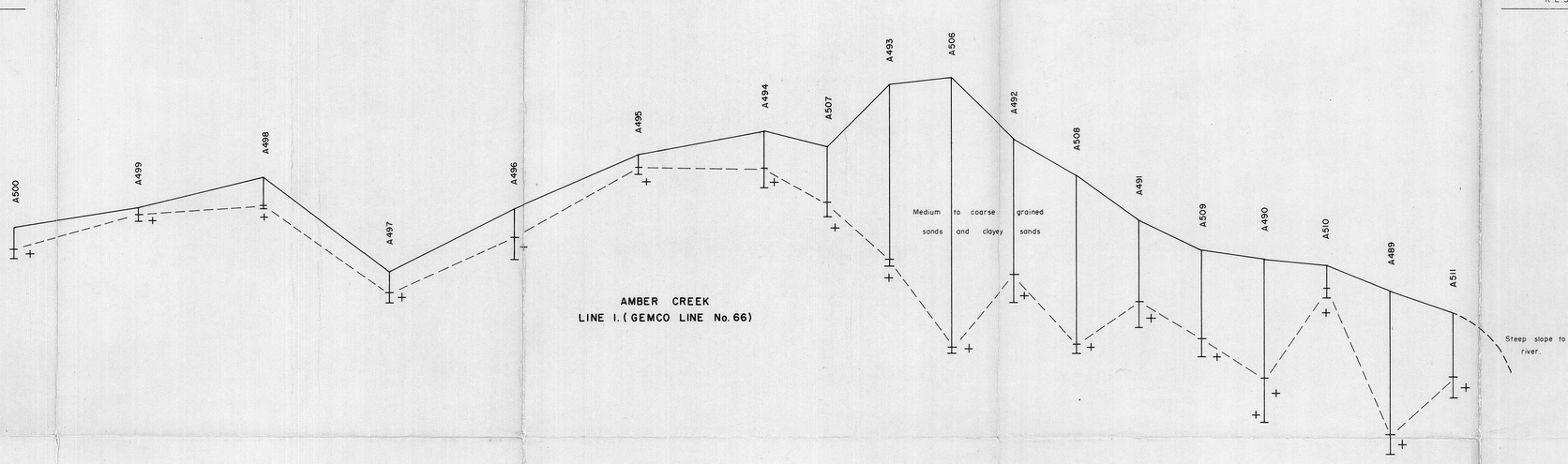
PLATE 12

5 cm

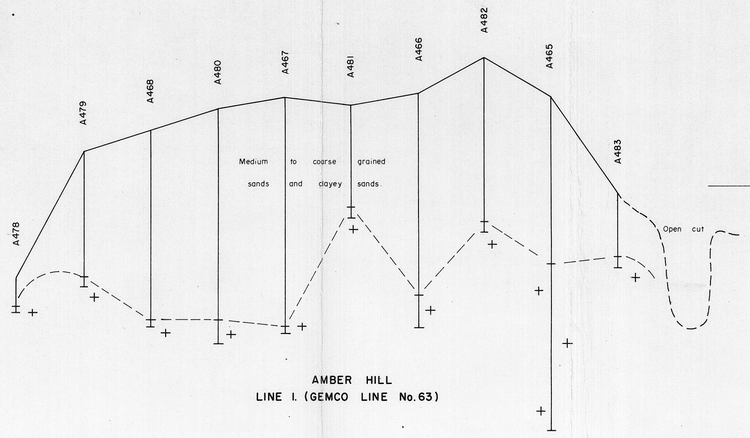
4294

Compiled by W.R.Appleby
Drawn by B.Madex

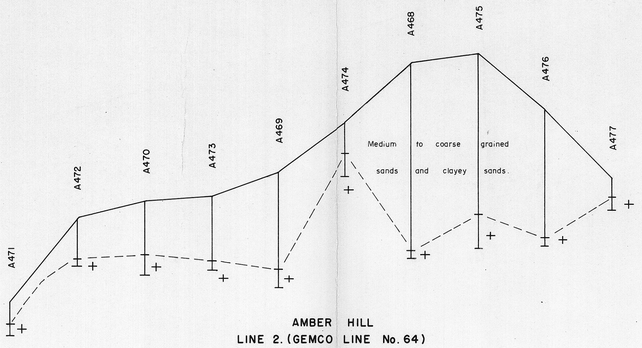
Sept, 1966
Report No. 139



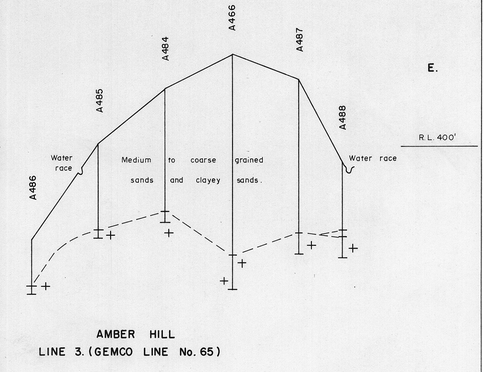
AMBER CREEK
LINE 1. (GEMCO LINE No. 66)



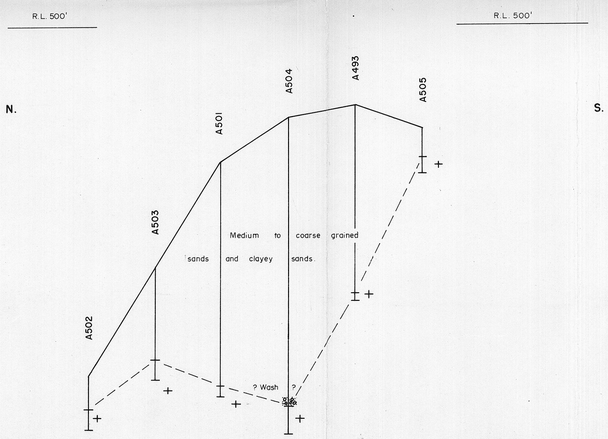
AMBER HILL
LINE 1. (GEMCO LINE No. 63)



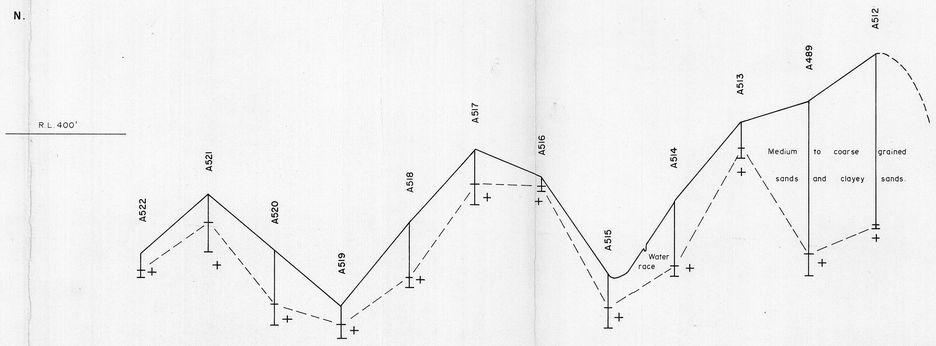
AMBER HILL
LINE 2. (GEMCO LINE No. 64)



AMBER HILL
LINE 3. (GEMCO LINE No. 65)



AMBER CREEK
LINE 2. (GEMCO LINE No. 67)



AMBER CREEK
LINE 3. (GEMCO LINE No. 68)

UTAH DEVELOPMENT COMPANY 66-430

RECONNAISANCE AUGER SECTIONS TEST AREA No. 8 AMBER CREEK (LINES 66, 67 & 68) AND AMBER HILL (LINES 63, 64 & 65)

209096

PLATE 13

SCALE Horiz 1 inch = 200 feet
Vert 1 inch = 20 feet.

5 cm

4295

Compiled by W.R. Appleby
Drawn by B. Madex

Sept, 1966
Report No. 139

FOSTERS

LAGOON

DELTA

DUGARDS

BOOBYALLA RIVER

RINGAROOMA RIVER

LINE 76

LINE 73

LINE 55A

LINE 74

LINE 75

LINE 55

LINE 54

Approximate position of Storeys Creek E.L. 11/65

LEGEND

QUARTERNARY and RECENT

- Mobile shore sand.
- Stabilized (Pleistocene?) dune system.
- Reed swamps, river flats, shallow water.
- Alluvium, generally button grass flats.

SILURIAN

- Mathinna group — shale, sandstone, very fine sandstone meta-sediments.

DEVONIAN

- Granitic intrusives.
- Tailings.
- Workings.

- A570 Auger drill hole.
- 70 Sample drill hole.
- Approx. position of Endurance drill lines — bore spacing 2 chain.
- Approx. bore positions Storeys Ck. Tin Mining Co. N.L. program.
- Approx. bore positions Burma-Malay Tin Ltd. program.

UTAH DEVELOPMENT COMPANY 66-430

GEOLOGICAL MAP
TEST AREA No. 11
BOOBYALLA
(Delta Dugards)

PLATE 14

209697

SCALE: 1 inch = 1,000 feet

1000 500 0 1000 2000 3000

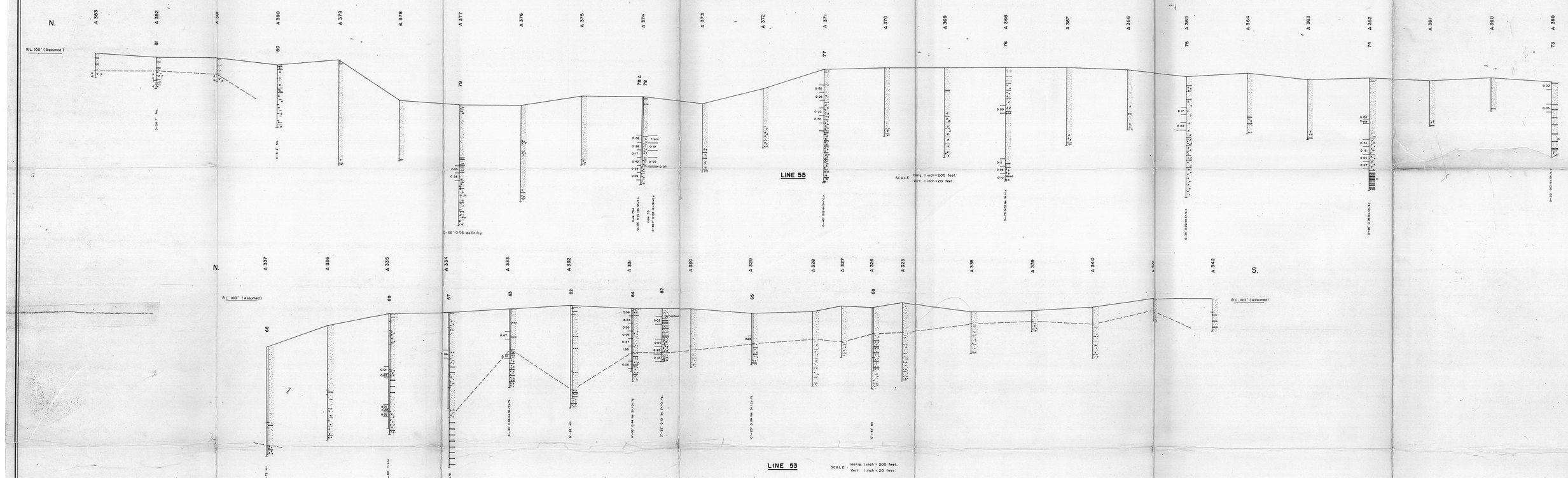
5 cm

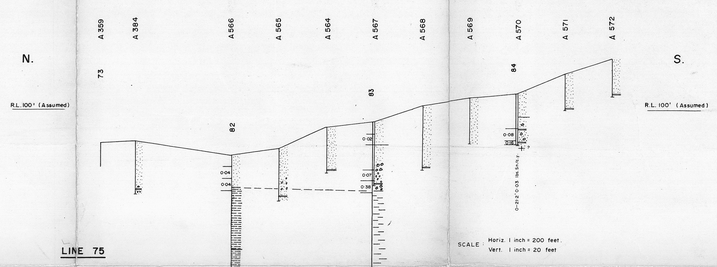
Drawn by B. WILSON

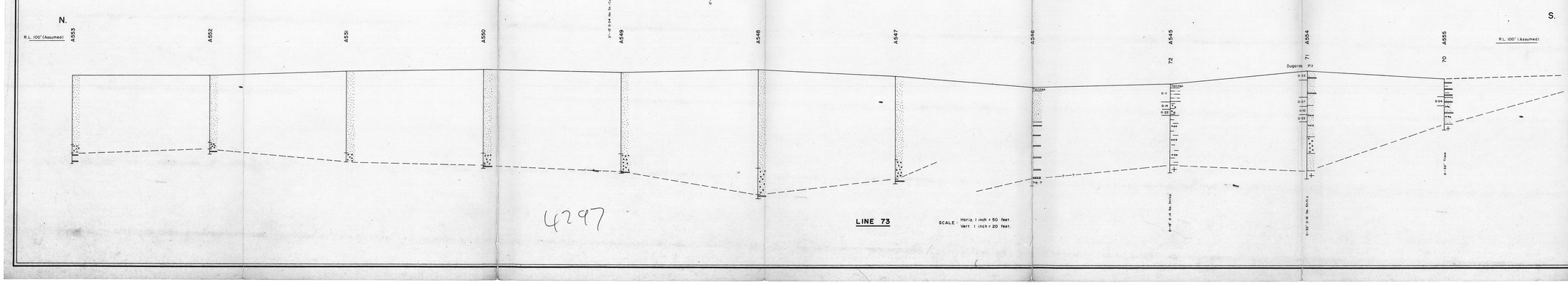
4296

Sept, 1966
Report No. 139

4297







LEGEND

- Topsoil
- Fine grained quartz sand and drift.
- Coarse grained quartz drift.
- Clayey sand.
- Clay.
- Dolerite
- Off white to light grey siltstone to sandstone.
- Carbonaceous siltstone.
- Wash.
- Granite.
- M — Mathinna group – shale, sandstone, very fine sandstone meta – sediments.
- Marcasitic.

UTAH DEVELOPMENT COMPANY 66-430

LITHOLOGICAL SECTIONS
BOOBYALLA
(Delta Dugarde's)
TEST AREA No. II
LINES 53,55,73 & 75

209098

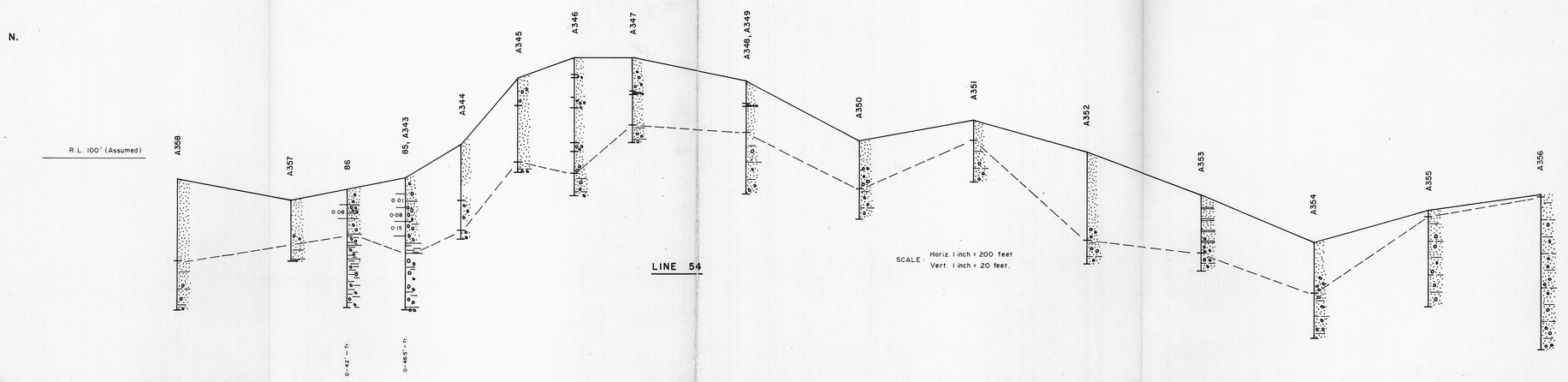
PLATE 15

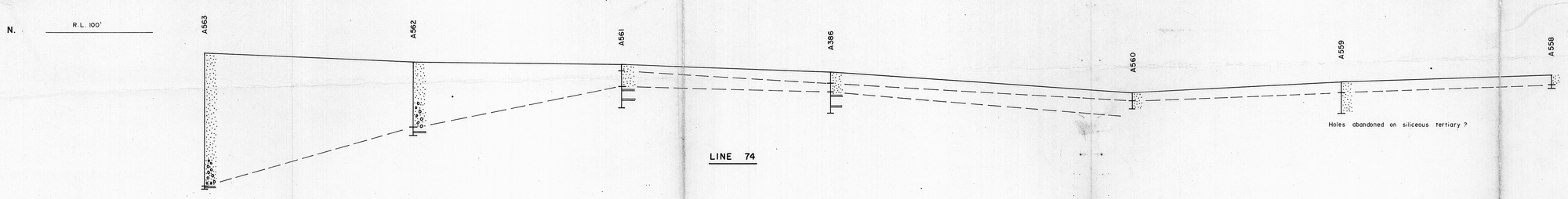
5 cm

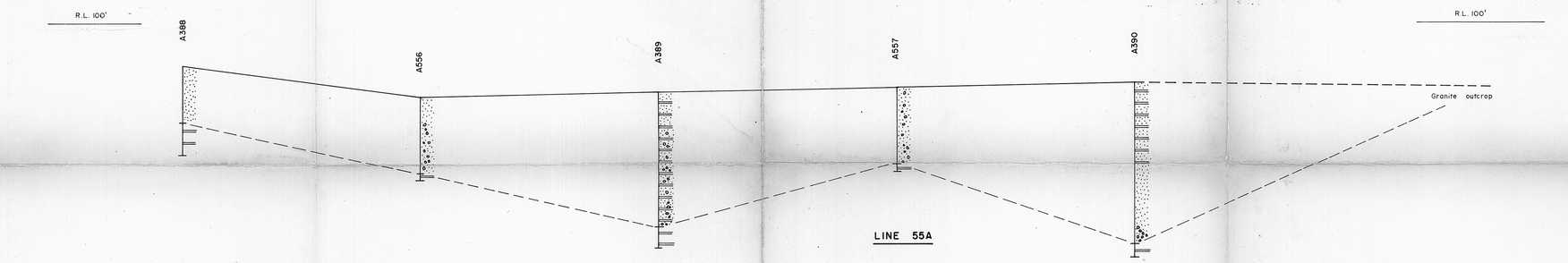
4297

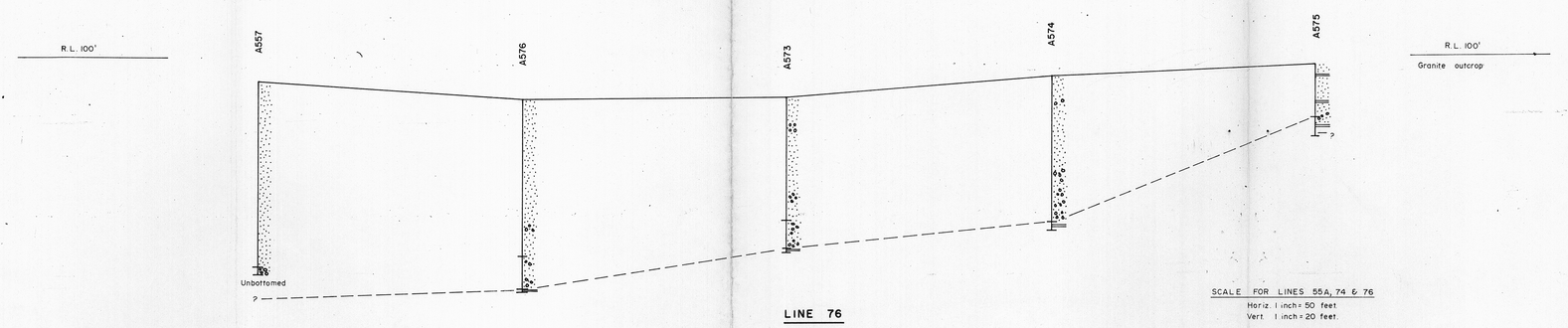
Compiled by W.R.Appleby
Drawn by B.Madex

Sept. 1966
Report No. 139









LEGEND

- Topsoil.
- Fine grained quartz sand and drift.
- Coarse grained quartz drift.
- Clayey sand.
- Clay
- Siltstone
- Carbonaceous siltstone.
- Wash.
- Granite.
- M — Mathinna group — shale, sandstone, very fine sandstone meta-sediments.

UTAH DEVELOPMENT COMPANY 66-430

LITHOLOGICAL SECTIONS BOOBYALLA AREA.

(Delta Dugarde's)

Lines 54, 55A, 74 & 76

209699

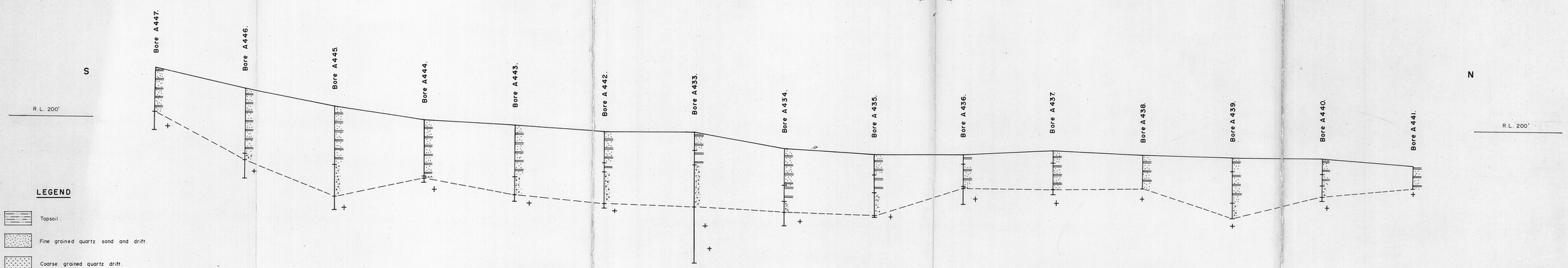
PLATE 16

5 cm

4298

Compiled by W.R. Appleby
Drawn by B. Madex.

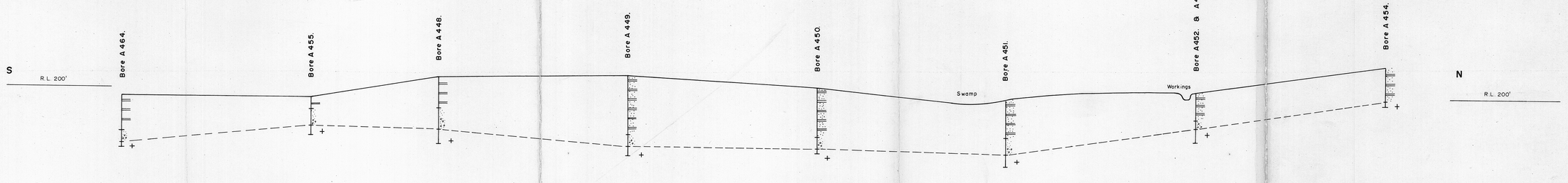
Sept, 1966
Report No. 139



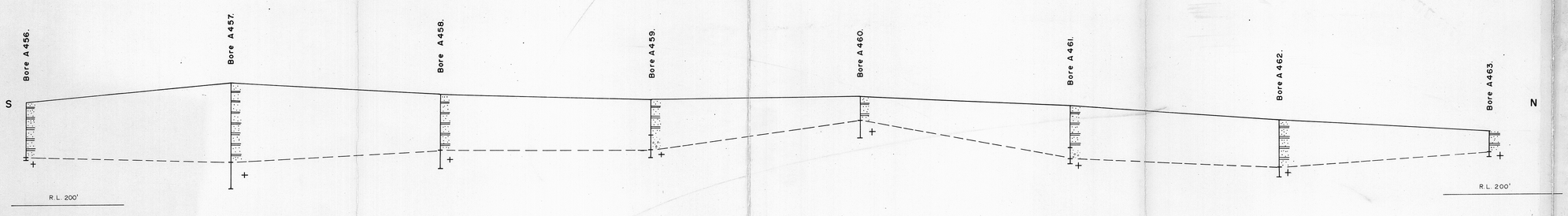
SWAINS CREEK AREA
LINE 1. (GEMCO LINE No. 60)

LEGEND

- Topsoil.
- Fine grained quartz sand and drift.
- Coarse grained quartz drift.
- Clayey sand.
- Clay.
- Siltstone
- Carbonaceous siltstone.
- Wash.
- Granite.
- M — Mathinna group — shale, sandstone, very fine sandstone meta-sediments.



SWAINS CREEK AREA
LINE 2 (GEMCO LINE No. 61)



SWAINS CREEK AREA
LINE 3. (GEMCO LINE No. 62)

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LITHOLOGICAL SECTIONS
TEST AREA No. 12
SWAINS CREEK
GEMCO LINES 60, 61 & 62

209100

PLATE 17

SCALE: Horiz. 1 inch = 50 feet.
Vert. 1 inch = 20 feet.

5 cm

4299

Drawn by B. Wilson

Sept., 1966
Report No. 139

147°45' 148°00' 148°15' 148°30'

39°45'

40°00'

40°15'

40°30'

40°45'

41°00'

Palana
MT. KILLIECRANKIE
Killiecrankie
MT. BOYES
Cape Frankland
Tanners Bay
Marshall Bay
FLINDERS ISLAND
Emita
Babel Island
FURNEAUX GROUP
Prime Seal Island
Patts River
DARLING RANGE
WHITEMARK
Ranga
Samphire Ck
MT. STRZELECKI
LADY BARRON
Petrifaction Bay
MT. BELSTED
Chappell Islands
Cape Barren Island Settlement
Rooks R.
Ransom Ck.
Dover R.
Rice R.
CAPE BARREN ISLAND
Batters Ck.
Moodet R.
MT. KERFORD
HOGAN HILL
Rocky Head River
CLARKE ISLAND
BANKS STRAIT
E.L. 2/65
Cape Portland
Jd
Jg
Mussel Roe Bay
BOOBYALLA (Delta Dugarde)
RINGAROOMA BAY
Cape Naturaliste
E.L. 6/63
MUSSEL ROE SWAMP
Mussel Roe River
Great Musselroe River
GLADSTONE
Eddystone Point
HASTIES
South Mt Cameron
Boobyalla River
Ringarooma River
Pioneer
Herrick
Winnaleah
DERBY
BRANXHOLM
Ansons Bay
Ansons River

LEGEND

RECENT TO TERTIARY

- Near shore shelly sandstones
- Alluvium – generally sand and pebbles may be derived from weathering unconsolidated tertiary sediments; also includes mobile and stabilised dune sands.
- Basalt.

JURASSIC

- Dolerite

DEVONIAN

- Granitic intrusives.

SILURIAN

- Mathinna group.

- Lineaments.
- E.L. 2/65 Exploration Licence.

5 4 3 2 1 0 5 MILES

1:250,000

5 cm

GEOLOGICAL SKETCH MAP OF N.E. TASMANIA AND THE FURNEAUX GROUP.

209101

PLATE 18

UTAH DEVELOPMENT COMPANY 66-430

Geology by W.R. Appleby.
Drawn by B. Madex.

4300

Sept, 1966.
Report No. 139

High Water Mark

MAGNETIC NORTH

Road to Settlement

Thin soil cover on granite bedrock

Rooks River

FISHERS

LEAD

RIVER

ROOKS

TERTIARY

WEBB'S

CLARKE & DAVIS

WATSON'S

M.L. 63M/61

M.L. 64M/61

Line C.B.1

Line C.B.2

Line C.B.3

Line C.B.4

LEGEND

- Topographical contour — 60'
- Subsurface basement contour (indicated) — 80'
- Water race
- Track
- Pits in stanniferous alluvium — WEBB'S
- Indicated reserves
- Possible reserves
- Granite boundary (approx.)

5 cm

UTAH DEVELOPMENT COMPANY

209102

STADIA SURVEY OF THE ROOKS RIVER VALLEY CAPE BARREN ISLAND

BY W.R. APPLEBY
& I.R. McEWAN

PLATE 19

200 100 0 200 400 FEET

SCALE : 1 inch = 200 feet

Drawn : J.J. Weber

4301

Sept, 1966
Report No. 139

4302



4302

UTAH DEVELOPMENT COMPANY 66-430

LITHOLOGICAL SECTIONS SHOWING INDIVIDUAL SECTIONS AND TOTAL TIN VALUES, ROOKS RIVER, CAPE BARREN ISLAND.

5 cm

PLATE 20

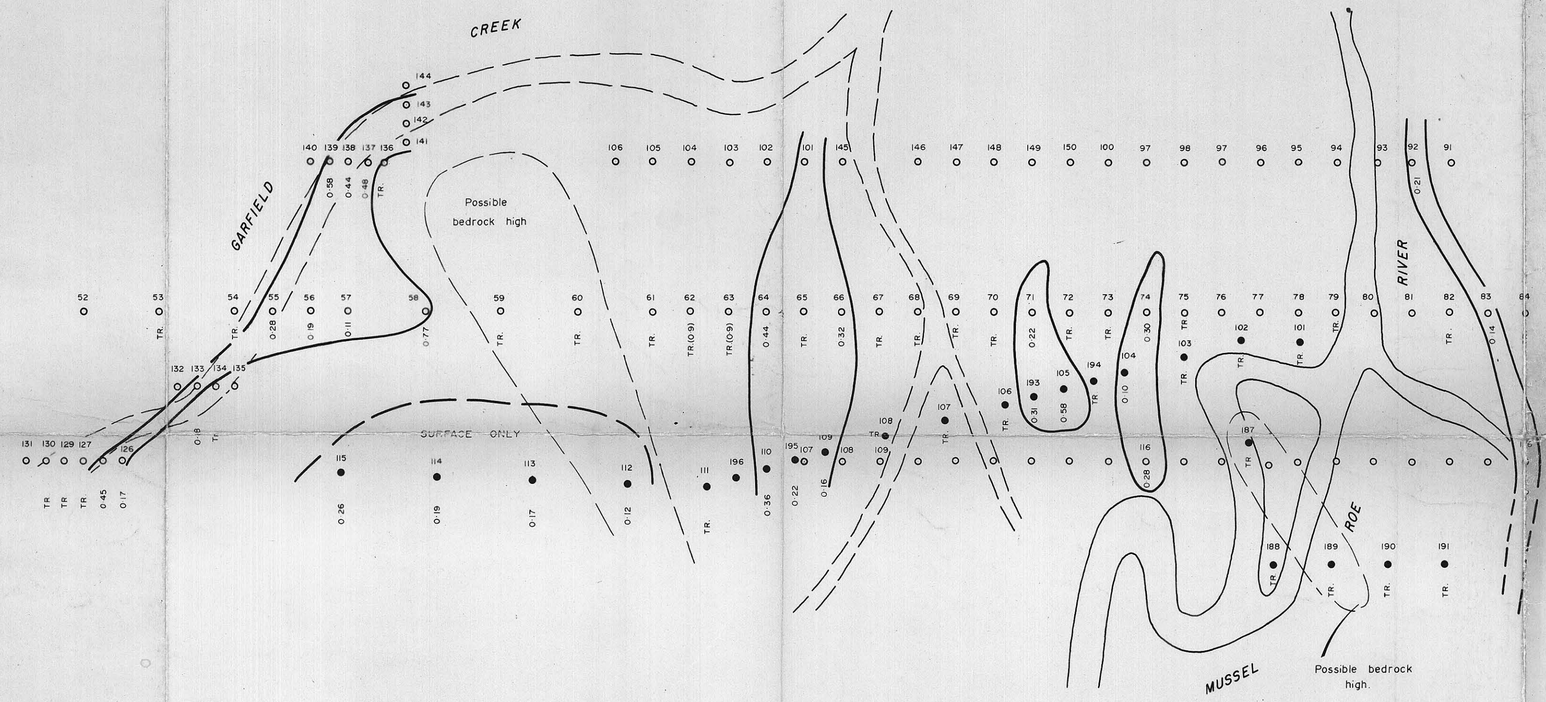
209103

SCALE Horiz. 1 inch = 50 feet
Vert 1 inch = 20 feet

4302

By W.R. Appleby and I.R. McEwan.

Sept. 1966
Report No. 139



LEGEND

- Stanniferous runs - definite.
- Stanniferous runs - approx.
- Mines Dept. Drilling 1953
- U.D.C. Drilling Mussel Roe Swamp Area - Line M.R. 2.

UTAH DEVELOPMENT COMPANY

SKETCH MAP
OUTLINING STANNIFEROUS RUNS IN THE MUSSEL ROE RIVER SWAMP — GARFIELD CK. AREA.

209104

PLATE 21

SCALE
165 0 165 330 495 FEET

5 cm

4303

Drawn by B. IMadex.

Sept, 1966
Report No. 139