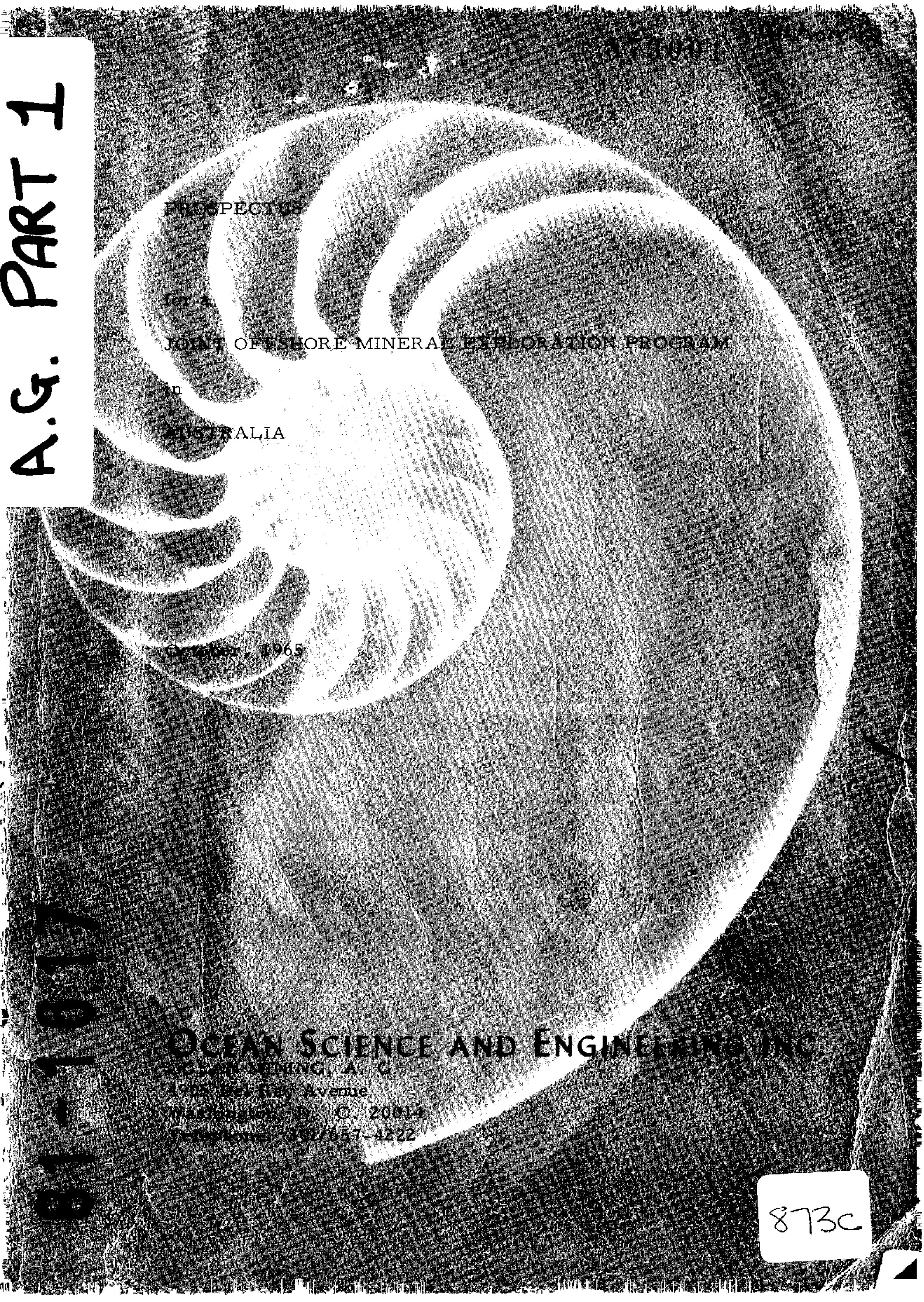

PROSPECTUS

for a

JOINT OFFSHORE MINERAL EXPLORATION PROGRAM

in

AUSTRALIA

October, 1965

OCEAN SCIENCE AND ENGINEERING INC

OCEAN MINING, A. G.
[illegible] Del Ray Avenue
Washington, D. C. 20014
Telephone: 301/657-4222

PROSPECTUS

for a

JOINT OFFSHORE MINERAL EXPLORATION PROGRAM

in

AUSTRALIA-TASMANIA

October, 1965

Ocean Mining, A. G. Part 1
Francois J. Lampietti, Executive Director
4905 Del Ray Avenue
Washington, D. C. 20014
Telephone: 301/657-4222

Summary

Ocean Mining A. G., a subsidiary of Ocean Science and Engineering, Inc. has obtained mineral prospecting permits on several areas off the coast of Australia and Tasmania totaling 1,500 square miles. Applications for additional areas will probably be granted soon. These concessions, covered by water mostly less than 150 ft. deep, may possibly contain valuable alluvial deposits of tin, gold, tungsten, or phosphate.

Ocean Mining A. G. and its parent have a highly trained scientific technical staff possessing considerable experience in undersea prospecting, using the best of modern geophysical and drilling equipment, much of which they have developed themselves. Both companies are experienced in the operation of prospecting ships and the logistic support of field parties.

This prospectus outlines a six month prospecting program and estimates its cost at $500,000. In order to spread the exploration risk and improve the chance of financing any mine that may be discovered, Ocean Mining offers to share its concession rights and know-how with a few selected mining companies. The work will be carried out in 1966 under the direction of the Ocean Mining staff assisted by scientist-observers representing the various participants.

We believe that there is a great future in shallow water undersea mining and that our concessions have considerable promise. Although this is admittedly a risky pioneering venture in which huge areas must be sampled by techniques which are not fully developed, the cost of participation is a relatively inexpensive way of obtaining the know-how necessary to evaluate future undersea prospects.

TABLE OF CONTENTS

2. INTRODUCTION

Modern mining authorities (See Engineering & Mining Journal May-August 1965 and IMM Alluvial Mining Symposium November, 1964) believe there is considerable economic potential in the mineral deposits of the continental shelf. But, whereas the land prospector can venture forth alone, the offshore prospector must equip a ship and go to sea with a well-trained crew, a party of scientists, and a battery of sophisticated equipment.

Offshore mineral exploration must be more like the large-scale methods of petroleum exploration in order to cover the large areas of the continental shelf where the bonanza deposits, which exist there now as they once did on land, may be discovered. The joint offshore mineral exploration program proposed here therefore generally follows the example of petroleum exploration in the North Sea.

Regarding the overall favorability of the continental shelf, in the case of Australia for example, the total land area is of the order of three million square miles and the total surrounding area of continental shelf (to the 100 fathom depth) is of the order of 1.2 million square miles. Between 1870 and 1900 seven major tin discoveries (having produced a total of about 400,000 tons of concentrates), and nine major gold discoveries (having produced a total of some 120 million ounces) were made within the continental limits of Australia (See Appendix A Table I). Therefore it seems reasonable that a proportional number of discoveries (say one-third as many) could be expected on its continental shelf.

OMAG geologists have already spent many months studying and exploring various coastal areas of Australia where the prospects of economic mineral deposits offshore appear promising. Exploration permits have been taken out or requested over several thousand square miles of offshore areas near Tasmania in Bass Strait.

As shown in Appendix D at the end of this report, offshore mining is a reality in such widely spread areas of the world as Thailand, South West Africa, Japan and Indonesia. For present purposes, it will be assumed that a sufficiently rich offshore alluvial deposit could be profitably mined by dredging through depths of 150 feet.

In order to make an undersea mining venture attractive, it is clear that the possible returns must be large for the risks are heightened by the many uncertainties. Therefore, we have attempted in Appendix E to determine the minimum requirements of ore bodies worth searching for. In the case of tin, this would, for example, be a deposit containing 5,000 to 6,000 tons of cassiterite. We feel there are reasonable expectations in a large regional program such as this to discover at least a deposit of that size if not one much larger.

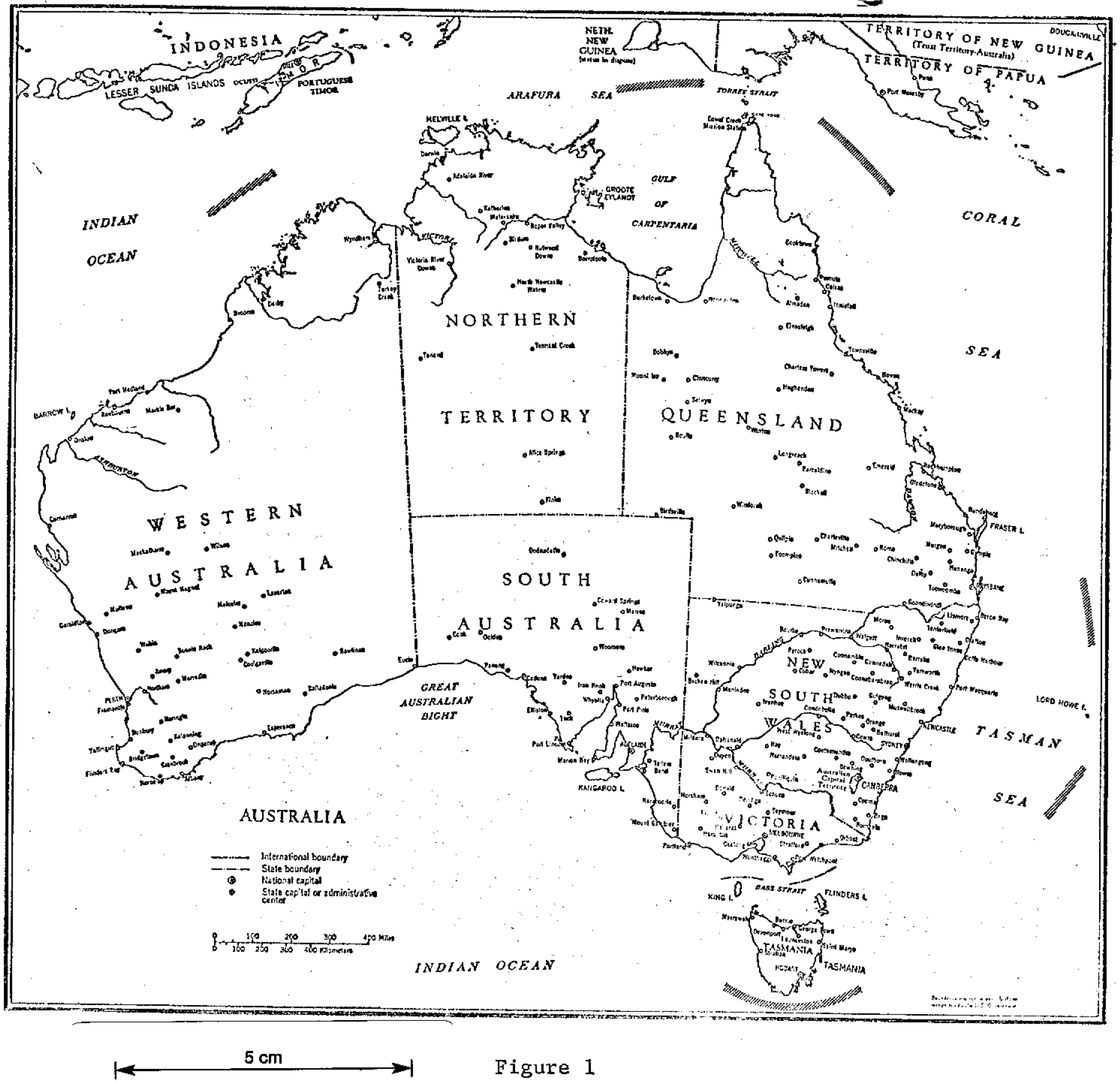
INDONESIA
LESSER SUNDA ISLANDS
PORTUGUESE TIMOR
NETH. NEW GUINEA
ARAFURA SEA
TORRES STRAIT
TERRITORY OF NEW GUINEA
TERRITORY OF PAPUA
MELVILLE I.
GROOTE EYLANDT
GULF OF CARPENTARIA
INDIAN OCEAN
CORAL SEA
NORTHERN TERRITORY
QUEENSLAND
WESTERN AUSTRALIA
SOUTH AUSTRALIA
NEW SOUTH WALES
VICTORIA
TASMANIA
GREAT AUSTRALIAN BIGHT
TASMAN SEA
LORD HOWE I.
KANGAROO I.
BASS STRAIT
KING I.
FLINDERS I.
AUSTRALIA
International boundary
State boundary
National capital
State capital or administrative center
INDIAN OCEAN
5 cm

Figure 1

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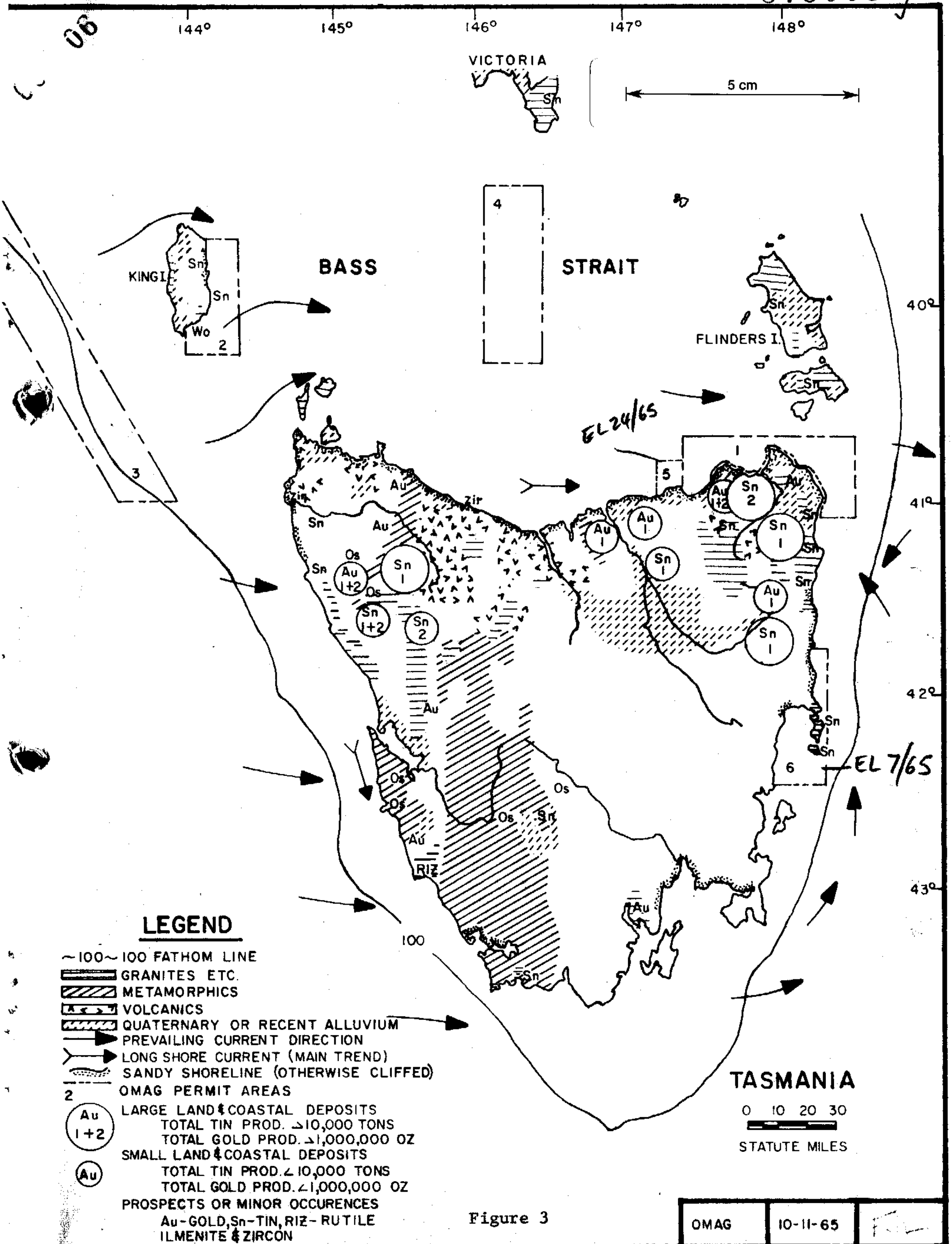
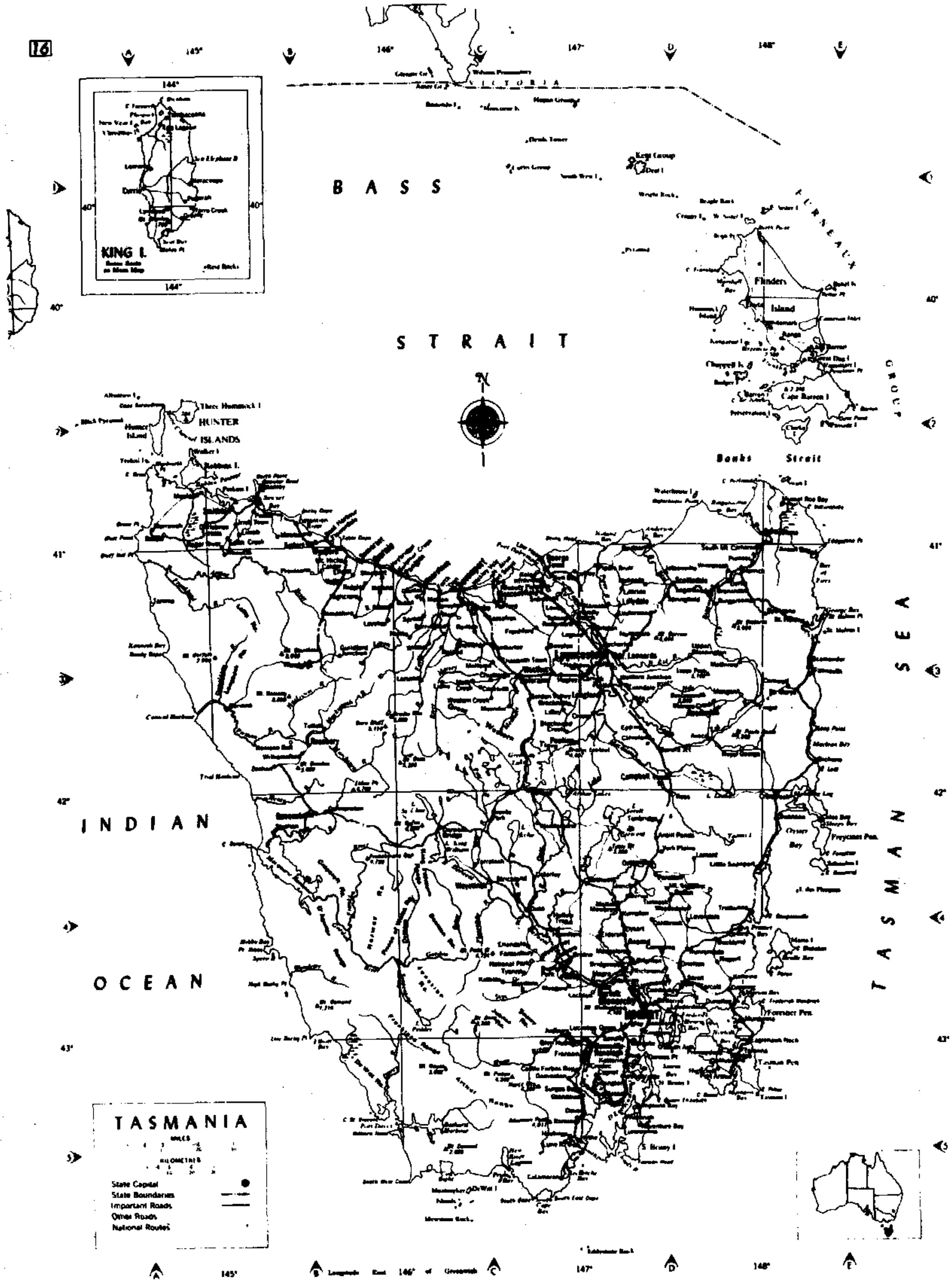


Figure 3


BASS STRAIT
INDIAN OCEAN
TASMAN SEA
TASMANIA
KING I.
Flinders Island
HUNTER ISLANDS
Banks Strait
N
145°
146°
147°
148°
40°
41°
42°
43°

5 cm

Figure 4

3. PROSPECTS

On the whole, the subcontinent of Australia is a landmass of low relief consisting of large areas of granitic Pre-Cambrian and Paleozoic rocks with which a major portion of presently known metallic deposits is associated. The subcontinent is surrounded by a large expanse of continental shelf connecting it to the islands of New Guinea and Tasmania in the southeast.

The island of Tasmania which lies across the shallow Bass Strait has a total land area of approximately 26,000 square miles. It contains numerous mineral deposits including minor gold, platinum and several tin occurrences having produced a total of some 165,000 tons of metallic tin. These are related to Devonian granite bodies which outcrop in both eastern and western Tasmania, on small islands across Bass Strait and continue into Victoria at Wilson's Promontory.

Bass Strait, though a periodically stormy body of water which is swept by substantial currents, seems to be no worse a place to operate than areas already being mined and explored elsewhere in the world. In fact, the existence of waves and currents is essential to the natural concentration of the minerals we seek.

Various other areas in Australia including Queensland, New South Wales and Western Australia have been the object of reconnaissance by OMAG geologists during the past year. Information on the favorability of these areas will be made available to the participants in the joint exploration program in the event that additional targets are needed after the Tasmania program.

3A N. E. TASMANIA

OMAG PERMIT AREAS 1 and 5

(Refer to Map on Fig. 4)

Geologic Setting

Paleozoic (Devonian?) granites intruding slates and quartzites and outcropping in large massifs of moderate relief. Ancient erosion surface and deeply cut drainage system partly masked by Tertiary basalts. Indented rocky shoreline backed by poorly developed coastal plain with dune belts in Anderson and Ringarooma Bays.

Sea Level Changes

Bass Strait origin pre-Miocene followed by several major sea level fluctuations. No conspicuous raised marine terraces on land.

Mineral Deposits

Much primary tin and some gold mineralization associated with tops of granite bodies as veins or disseminated deposits within 15 to 20 miles of coast. Secondary tin mined in ancient river channels (Ringarooma deep leads) and from decomposed granites. Traces of tin reported near mouth of present Ringarooma river. Total production to 1955 50,000 tons tin for an area of 3,000 square miles. Traces of tin and granites extend across Bass Strait to Clarke and Flinders Islands.

Oceanographic Data

Moving shore sediment is well sorted quartz sand with minor content black minerals. Longshore current trends eastward. Extensive shelf to Flinders Island with depths less than 20 fathoms. Some kelp and coarse sand reported on charts. 3 KT tidal currents in Bank strait.

Targets

1. Submerged extensions of present river channels or coastlines (10/13 fathom scarp). 2. Alluvial fans were sorted and the heavy minerals reconcentrated during marine transgression. 3. Zones of decomposed granite with disseminated tin concentrated in situ as in Indonesia.

Exploration to Date

Extensive literature* investigation followed by ground and aerial reconnaissance. Permit applications. 450 linear miles of detailed bathymetric survey completed.

Active land exploration by other companies; some offshore mineral activity.

Favorability - Good

Widespread tin-bearing granites extend northward across Bass Strait similar to Malay-Peninsula. Long erosion cycle favorable to uncovering mineralized areas. Good submarine topographic evidence of targets.

Permits

900 mi^2 granted, May 1965

100 mi^2 under application since August, 1965

* The geological information presented in these and the following accounts of possible prospects is extracted from a larger report made by OMAG entitled "Preliminary Report on Tasmania" which was compiled from all available literature.

3B. WESTERN BASS STRAIT - KING ISLAND

OMAG PERMIT AREA 2

Geologic Setting

Island 30 miles long NS, 10 miles wide EW. Low relief - granite outcrops and dunes inland along west coast - thin cover of recent alluvium over slate and schist across center of island - recent marine deposits along arcuate eastern coast. Minor drainage to the east.

Sea Level Changes

Recent marine transgression over eastern side.

Mineral Deposits

Secondary tin prospects in north central part of island and on beaches of eastern coast. Primary scheelite deposit on southeastern coast (Grassy), alluvial gold prospect in center - zircon and sapphire showings with tin concentrate.

Oceanographic Data

Shoal on central eastern side - Depths 0-20 fathoms, 5 miles off eastern coast. Currents 1 to 2 Kts.

Targets

Submerged beach or areas where there has been concentration by scour and wave action in natural topographic traps.

Exploration

OMAG literature search to determine history of land exploration for tin and scheelite. Ground and aerial reconnaissance. Eastern beaches presently held under permit by another company.

Favorability - Good

Good topographic trap area 9 to 12 fathoms deep off eastern coast opposite tin-bearing beaches. Possible extension of Tasmania west coast mineralized district.

Permits

600 mi^2 granted May, 1965.

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3C. FREYCINET PENINSULA - SCHOUTEN ISLAND - OYSTER BAY

OMAG PERMIT AREA 6

Geologic Setting

Bold red granite cliffs bordering the sea on eastern flank Freycinet Peninsula and Schouten Island. Clean quartz sand beaches to the north. Estuarine sedimentation in Oyster Bay.

Sea Level Changes

No data.

Mineral Deposits

Cassiterite in present beach, in creeks and in flat on eastern side of Schouten Island. Large barren quartz reef and weathered granite.

Oceanographic Data

Oyster Bay depths less than 20 fathoms. Steep slopes on east side Freycinet Peninsula. Currents near Schouten Island from east. Exposure to S.E. waves but shelter in Oyster Bay.

Targets

To be identified by seismic programme.

Exploration

OMAG coastal reconnaissance and permit applications. Others did some prospecting on Schouten Island in the past.

Favorability - Moderate

Extension of N. E. Tasmania granite-tin belt. Oyster Bay fair trap area.

Permits

500 mi^2 under application, August 1965.

3D. PHOSPHATE POTENTIALS IN BASS STRAIT & VICINITY

OMAG PERMIT AREAS 3 and 4

On the basis of the world-wide distribution of phosphorite nodules with respect to latitude, there is a very high probability that phosphorite nodules will be found in the Bass Strait, provided that other environmental conditions are satisfied. Of these other conditions, two important ones are fulfilled on the western side of Bass Strait. First, divergent upwelling of cold, bottom water from the South Australian Basin could precipitate tri-calcium phosphate along the edge of the shelf west of King Island. This line, which extends southward into the South Tasmanian Ridge, lies normal to the direction of flow of the phosphate-rich water. Secondly, the continental edge is an abrupt feature, having a steep slope and a shallow, flat shelf. This condition allows a rapid precipitation of phosphate colloids at the topographic break, rather than a slow one. This would, therefore, produce nodules and not phosphatic sediments.

In addition, there is also the possibility that fossil phosphate deposits formed in the Miocene (during which several of the large existing U. S. phosphate deposits were found) may outcrop on the floor of Bass Strait.

The shelf west of King Island is reported to be very rocky. This is interpreted as a condition of non-deposition. The absence of deposition of detrital material is another prerequisite of phosphorite nodule formation.

The depths of water found along this shelf area are in accord with those necessary for the nodules, viz., greater than 100 feet. The continental slope is steep west of King Island; for a horizontal distance of about 40 miles the depth increases from 100 to 1,000 fathoms. This type of slope is ideal for high concentrations of nodules in a narrow belt. This narrow belt would strike a N. W. - S. E. direction and would be only a few miles wide, if that.

Permits

1,425 mi^2 requested, August 1965

2,000 mi^2 requested, August 1965

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4 PROGRAM -- General

OMAG has already begun work on its concessions in accordance with the prospecting agreements with the Australian-Tasmanian government. Geologist Robin Harvey, Geological Engineer Fred Libby; and Geophysicist Robert Warren are already operating out of a field office at Launceston, Tasmania. Two small chartered fishing vessels, the Malvisa and Yellowtail, have been equipped with echo sounders and simple sampling tools and set to work making hydrographic maps and preliminary bottom surveys. Geophysical equipment has been shipped from the U. S. which will be installed on Malvisa and used for preliminary work.

By January 1, 1966, OMAG will have spent about $60,000 in preliminary prospecting. If our company does not find associates willing to join in the venture proposed here, it will continue alone -- at a reduced scale -- to carry out the program described here.

If we do find associates to contribute the necessary capital, Ocean Mining A. G. will proceed with the following program: Additional personnel will be assigned and moved into the Bass Strait area. These will probably include Dr. Wynford Davies, Wendell Gayman and Andrew Stancioff, marine geologists as well as technicians and engineers experienced in navigation and sampling.

A ship will be chartered in the United States and converted for prospecting. (We have investigated the possibilities in Australia and so far found no suitable vessels). This will be at least equivalent in size and capacity to our new ship OCEANEER. This vessel will be equipped with suitable power plant, air compressor, pumps, drilling and sorting equipment and staffed with a competent crew. It will be dispatched to Australia in May, 1966 to begin sampling on arrival.

The actual exploration-sampling will be carried out for a period of six months (or as long as funds are available) and will be staged from a Tasmanian port, probably Burnie. It will consist of cruises each eight to twelve days in length during which a specific objective will be accomplished.

For convenience, the program is divided into three phases which will yield specific results.

Phase I will be a geologic and geophysical reconnaissance using seismic profiler, a magnetometer if practical and geochemical analyses of bottom samples. The objective of Phase I will be to select targets for more detailed exploration and drilling-sampling.

Phase II will be the sampling and detailed exploration of these targets. The objective of the sampling program will be to prove the existence of commercial minerals, and, if possible, to outline the limits of ore bodies.

It is our plan to adhere to the drilling program laid out for each target, even if the results from the first few holes are not favorable.

In the absence of a sufficient number of targets at the end of Phase I, the program for Phase II will be reviewed and OMAG will provide data for consideration of favorable areas elsewhere in Australia.

<u>Phase III</u> (not budgeted or described in detail here) will be the more detailed evaluation and development of any ore deposits found. This will assure the most efficient use of ships and men if further work is necessary.

Upon conclusion of that program, the ship and personnel will be demobilized -- either returned to the United States or possibly deployed elsewhere at a cost saving to the participants.

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4A. TIME ESTIMATES

SUMMARY

Bass Strait - Tasmania Area

Work in OMAG Offshore Concession Areas

(Supporting Data in Appendix E)

	Working Days at Sea	Total Days including Time in Port
Phase I		
850 miles geophysical traverse 95 stations (clamshell/diving)	44	62
Phase II		
250 drilling-sampling stations,	84	
Phosphate exploration program		131*
50 dredge lowerings	10	

* If, in the exploration manager's judgement, confirmatory drilling of targets is not required, a surplus time of 25 working days or more will be available for operations elsewhere in Australia.

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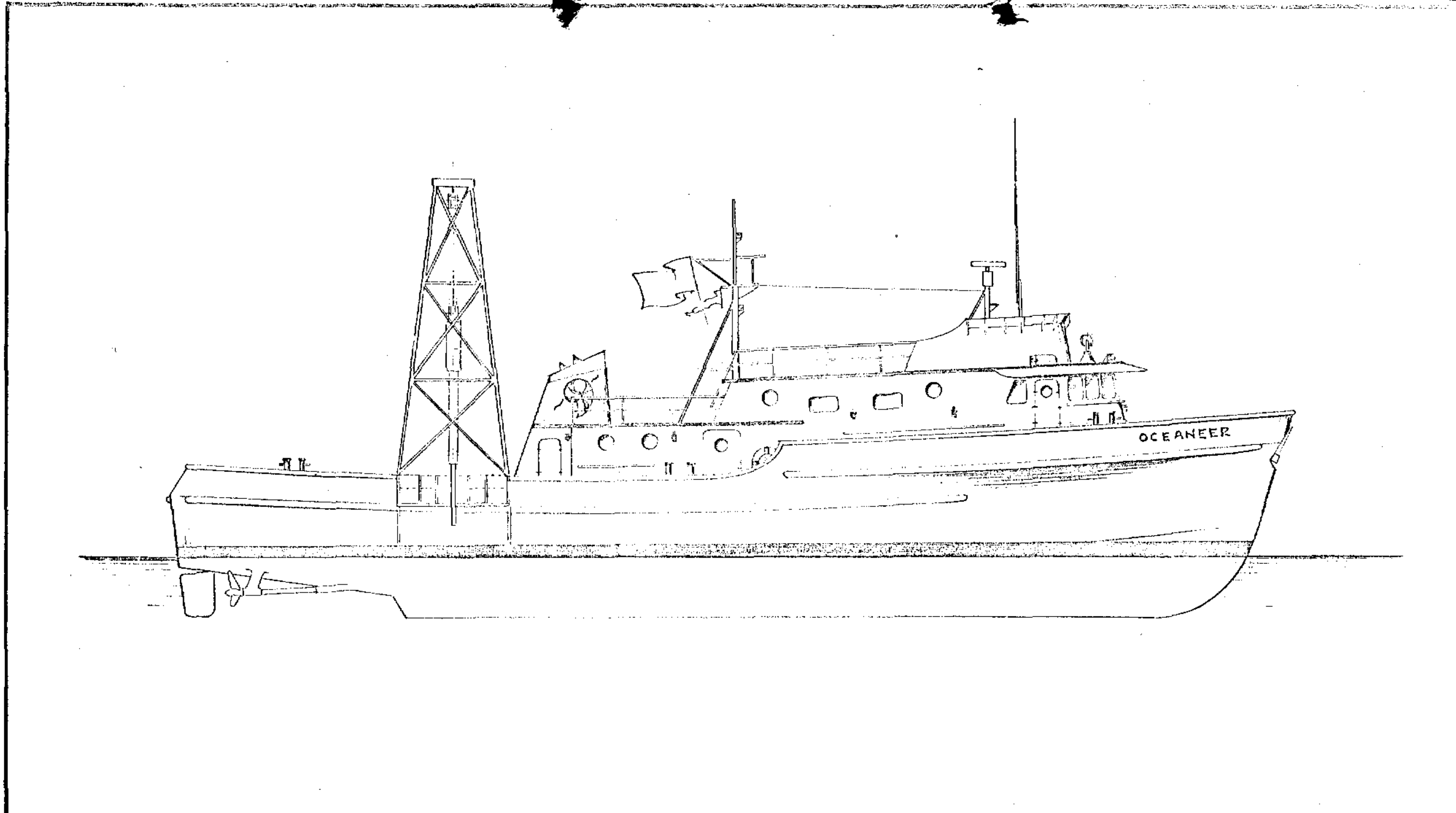
4B. EQUIPMENT -- PHASE I

The equipment will be carried on board a small vessel (about 60 feet long) to be chartered locally. Items of geophysical equipment will include a recording echo sounder, a seismic profiler, and possibly a magnetometer. Positioning will be by means of a Hi-fix system with master station and track plotter installed on board ship and two portable stations ashore. Support equipment will include snap and grab sampler, geochemical identification kit, vibro-corer and diving apparatus.

PHASE II will be carried out from a larger vessel such as the OCEANEER (100 feet long, 24 feet beam, 100 ton capacity) a new prospecting and survey ship owned by Ocean Science and Engineering. It will be rigged to carry a Becker hammer drill and a sample processing plant; it has excellent quarters and ample laboratory and plotting space. Hi-fix navigation will be used to position the ship for sampling over ore targets located by the Phase I work.

Additional data on specific items of equipment are provided in Appendix B.



R/V OCEANEER

HULL PARTICULARS:
LENGTH – 100 FT
BEAM – 24 FT
DRAFT – 6 FT
DIESEL, TWIN SCREW, 1,000 hp
RANGE – 5,000 MILES
SPEED – 13 KNOTS
ENDURANCE – 30 DAYS
7 – CREW 8 SCIENTIST

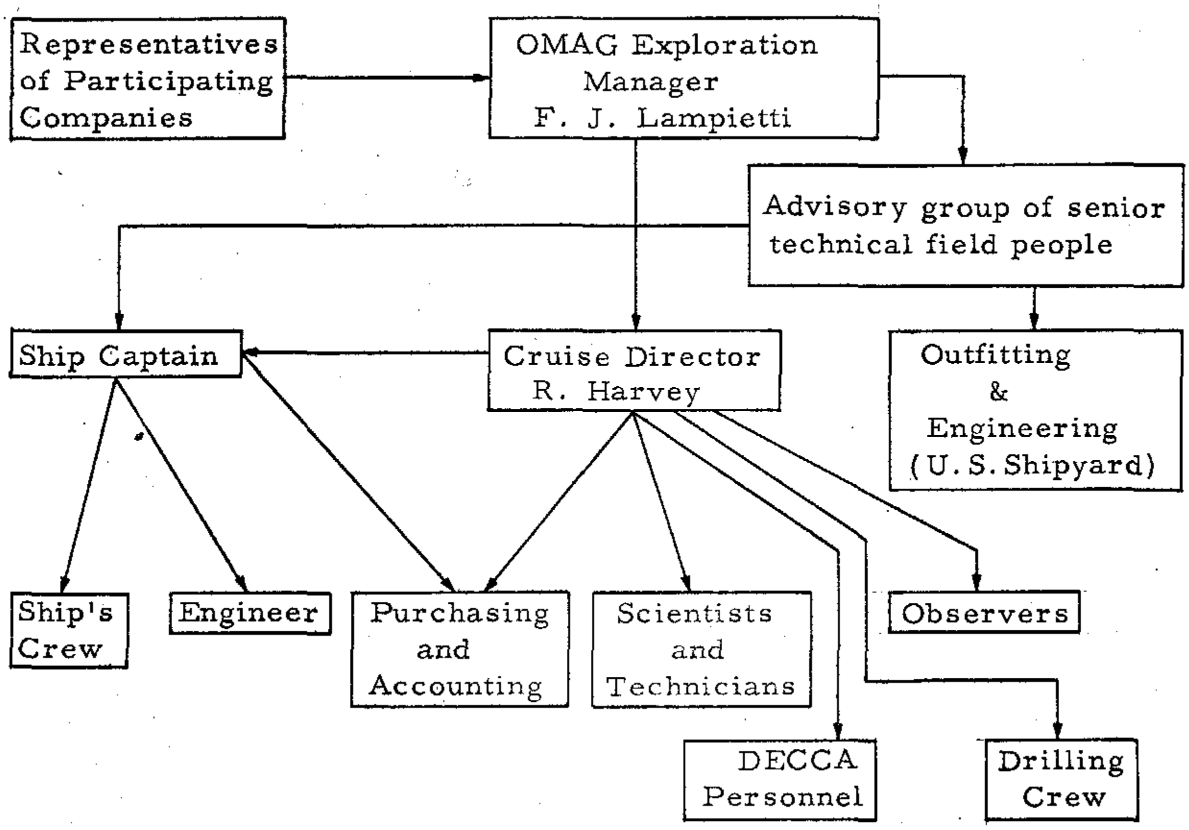
BECKER DRILL PARTICULARS:
DRIVE – DIESEL HAMMER
CONTINUOUS CORE RECOVERY
AIR AND JET LIFT
PIPE – DOUBLE WALLED
5 1/2" O.D., 3" I.D.
PENETRATION DEPTH – TO 250 FT

Figure 5

873024

4C. ORGANIZATION AND PERSONNEL

This joint exploration program, like other complex field programs, requires clear lines of command and responsibility. It is therefore essential that overall supervision and operational decisions be retained by the managing and operating group. The following is an outline of the project organization and describes the various personnel involved and their functions. In cases where major departures from the exploration program described herein are warranted, the exploration Manager will discuss the matter with the representatives of the participating companies. To assure that all those in the field are acquainted with current plans the exploration Manager will hold weekly coordinating meetings with the senior technical staff and observers.



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PHASE I

Personnel	No.	Functions
Exploration Manager	1	Overall supervision, organization, report to participants, planning of operations.
Senior Marine Geologist (Cruise director)	1	Senior scientific authority; supervision of collection of data; operational decisions.
Ship Captain	1	Ship Safety, maintenance and operation
Scientists (May include observer)	3	Collection; interpretation & reduction of geophysical, sampling and oceanographic data; maintenance and operation of instruments.
Ship's Crew (60 ft. seismic survey vessel) 1 Mate 1 Cook 1 Diver Tech.	3	(depending on the ship used) Operate shipboard equipment, support scientific party in sampling, small boat operations, diving, etc.
Clerk-plotter & Draftsman	2	Supplies ashore; payroll; taxes; bills; bi-monthly bookkeeping & statements. Drafting of charts.
Decca Hi-Fix crew	2	Senior Hi-Fix engineer responsible for system operation & emplacement; shipboard operator, maintenance.
TOTAL	13	

PHASE II

OMAG Employees

Personnel	No.	Functions
Project Manager	1	As in Phase I
Senior Marine Geologist (Cruise Director)	1	As in Phase I
Scientists & Technicians (May include observers)	4	As in Phase I, plus sample handling and processing
Accountant-clerk		As in Phase I plus secretarial work.
Draftsman	3	
TOTAL:	9	

Contract Personnel

Personnel	No.	Functions
Decca Hi-Fix Crew	2	As in Phase I
Becker Drill Crew	2	Operation and maintenance of hammer drill
Captain & ship's crew	6	As in Phase I but for OCEANEER or equivalent
TOTAL:	10	

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Participating Companies' Personnel

Representatives	Appointed by each company to discuss program. (Not necessarily in Australia.)
Observers	From each company on an optional basis. Rotation on board for two-week periods or for cruise. Hopefully will be working scientists.

SUMMARY:

PHASE I

Shipboard	7	(With observer)
Ashore	6	
TOTAL:	13	

PHASE II

Shipboard	14	(With observers)
Ashore	5	
TOTAL:	19	

The experience of Ocean Mining A.G. relevant to this type of program is summarized in Appendix C and a roster of personnel is given.

4D. RESULTS

All data recorded during the exploration program will be processed on shipboard and further collated and interpreted ashore. As much as possible the scientists aboard will attempt to produce daily plots of sample locations and preliminary geologic interpretation and other pertinent results. The data obtained will then require a minimum of further handling ashore and could be easily coded for use on data handling or automatic computation machines, if required. This will allow prompt reporting of results.

These results will be summarized monthly in a progress report accompanied by statement of expenditures.

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5.0 ESTIMATED COSTS

SUMMARY

Phase I		
Fixed Costs	$25,000	
Monthly Costs @$34,000		
2 months	68,000	
		$93,000
Phase II		
Fixed Costs	$165,000	
Monthly Costs @$65,000		
4.0 months	260,000	
		425,000
		$518,000
Probable total required	U. S.	$525,000

These costs are itemized below under appropriate headings. It is understood that no profit is included for any OMAG services. Service personnel and equipment rental charges are based on specific commercial quotations to OMAG or OSE. Contingency allocations represent an experience or risk factor.

Breakdown of Estimated Costs

Phase I -- Geological & Geophysical Reconnaissance

Fixed Costs -- Mobilization & demobilization		U.S.$.	U.S.$.
Travel -- 4 men -- Calif.-Tasmania rt	$4,800		
Personnel & equipment mobilization and demobilization, 3 weeks	9,500		
Freight -- geophysical equipment	2,500		
Licenses, permits & dutiable items	2,000		
Vessel mobilization & demobilization (60 ft. local boat)	1,000		
Special vessel outfitting (plotting board, lights, auxiliary power)	2,500		
		$22,300	
Contingencies		2,700	
			$25,000

Monthly Costs

Management	$ 3,200
Project manager in U.S.A., transportation, communications and administrative support (including benefit of OSE management)	
Personnel:	
1 Senior Marine Geologist -- field manager	1,050
2 Geophysicist & Electronic Technician	1,750
1 Cruise geologist (alternate)	875
2 Clerk-plotter & draftsman	800
4 Crew: Captain, mate, diver, cook	2,500
30% Estimated Overhead(Australia & USA)	2,100

(Phase I Monthly Costs Continued)

	U.S.$.	U.S.$.
(Personnel Continued)		
Per Diem	1,500	
		$10,575
2 Hi-Fix engineer plotter & shoreman (including per diem)(contractor's men)	3,860	3,860
Equipment:		
Bare boat charter of 60' vessel	3,500	
Food	850	
Fuel & Lubes	850	
Expendables	1,000	
Hi-Fix positioning	2,300	
Geophysical & coring equipment	2,500	
		11,000
Ship support:		
Office, shore transporation communications and services		1,500
Total		$30,135
With contingency allocation per month		$34,000

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Phase II -- Fixed Costs

Mobilization and Demobilization

Engineering, planning & supervision	$5,000	
Vessel immobilization (20 days in yard)	10,000	
Install rig, air compressor, sampling plant	18,000	
Special anchoring system (3 point)	10,000	
Demobilization (ship time & work)	6,500	
		$49,500

Equipment

Becker drill rental in transit	$22,000	
Air compressor	5,000	
Sample handling & processing plant	6,500	
Workboat, motor & special tools	3,000	
		36,500

Ship Transit

M/V OCEANEER or equivalent, Long Beach, California -- Burnie, Tasmania rt with crew and fuel 15,000 miles @11 kts. 65 days @ 850	$55,250	
Port fees, taxes, etc.	2,500	
		57,750

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(Phase II -- Fixed Costs Continued)

	U.S.$.	U.S.$.
Miscellaneous		
Travel (4 men) Calif.-Tasmania rt.	$4,800	
Licenses, permits & dutiable items	3,000	
Personnel demobilization, final reports	7,000	
		$14,800
		$158,550
With contingencies, say	U.S.	$165,000

Phase II Monthly Costs

Management:		
Project Manager, USA-Australia, transportation, communications and administrative support		$ 3,200
Personnel:		
1 Senior Marine Geologist-Field Mgr.	$1,050	
2 Cruise geologists	1,500	
2 Diver-technician-sample handler	1,000	
3 Accountant-clerk-draftsman	1,500	
30% Estimated Overhead	1,500	
Per Diem Allocations	1,500	
		8,050

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(Phase II Monthly Costs Continued)
(Personnel Continued)
Contract Personnel:

2 Becker drill crew	$4,000	
2 Hi-Fix engineer, plotter & shoreman (incl. per diem)	3,860	
		$7,860
Equipment:		
OCEANEER charter (with crew)	26,400	
Becker drill	10,000	
Hi-Fix Positioning	2,272	
Shipboard consumables:		
Food(scientific party rations say 10 men @$3/man-day)	900	
Expendables, drilling supplies marker buoys, maintenance, chart paper, port fees, compressor fuel	2,500	
		$3,400
Shore Support:		
Office and storage	250	
Vehicles & fuel	500	
Secretarial	250	
Services & communication	250	
Incidentals	250	
		1,500
		$62,682

With contingency allocation, say - per month U.S. $65,000

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6 PARTICIPATION

In order to obtain funds to carry out both Phase I and Phase II of the Bass Strait exploration program outlined here, Ocean Mining, A. G. offers to share the risks and possible successes with three prominent mining houses. We propose a joint venture association along the following lines:

Ocean Mining, A. G. will contribute the following items in return for a 15% share in the venture.

1. Concession rights (or prospecting permits) to 1,500 square miles of promising territory in Bass Strait good for all minerals except oil.

2. A team of professional geologists and engineers with specific experience in undersea prospecting.

3. Expenditures of $60,000 on the Bass Strait concessions in 1965 which will guide future work.

4. Previous expenditures totalling about $250,000 for studying geological background, training people, developing geophysical tools and sampling devices.

5. This plan for using specific ships, equipment and personnel; the management of that plan; and the use of our name in Tasmania (already registered).

The cost of this program is estimated at $525,000. Divided between four principals the cost will be about $131,000 each. Ocean Mining, A. G. will make one of the four contributions.

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Thus we are seeking three associates who will contribute $131,000 each in return for 21.25% of the venture. (Payment may be made in Australian pounds).

In essence, we are offering shares in the possibility we will find valuable deposits of tin (or other materials) in our Bass Strait concession. If we find valuable minerals, each company will be permitted to participate in the capital financing of a new group which will mine the concession (prorated in accordance with the original contribution).

Each participating company will appoint a representative who will sit on an overall planning and review board and each company is entitled to have a liaison man (hopefully a working scientist or engineer) on the ship as space permits who can directly report field developments to his company (salaries and expenses of these men are not in this budget and will be paid by their own company).

Records and data will remain the property of OMAG, but will be made available to the participants. All operations and transactions will be carried on in the name of OMAG, but separate books and accounts will be kept from the start of the venture.

Capital equipment will be the property of OMAG, and will either be sold or deducted at its depreciated value and accounted in the venture at the end of the operations.

Funds pledged by the participating companies will be called for according to a cash flow schedule and deposited with the First National City Bank of New York under a drawing account. In case of surplus or of curtailment in the program, these funds will be returned after complete demobilization and closing of books has been effected.

Each participant will agree that until such time as the exploration program is completed, all his offshore exploration efforts in Australia will be under the terms of the agreement and carried out by OMAG. Application for new offshore permits in Australia will be made in OMAG's name with ownership prorated among the participants.

At any time during the program, OMAG will, if required by the other participants, apply for leases on the properties held under permit.

These proposed terms are open for discussion and modification. Their object is to provide an equitable basis for beginning talks.

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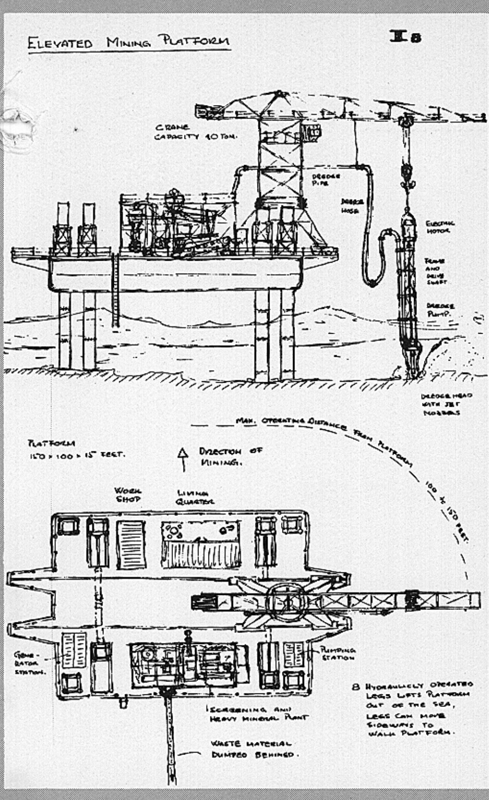
7. SCHEDULE

Assuming decisions and agreements can be reached before the end of 1965, the following schedule could be observed:

December, 1965	--	Companies nominate representatives.
		Final participation arrangements concluded.
		Detailed scheduling conference.
January, 1966	--	Mobilization and Deployment for Phase I
February, 1966	--	Start Phase I
April, 1966	--	Phase II Mobilization; Phase I complete
June, 1966	--	Start Phase II
October, 1966	--	Complete Phase II
November, 1966	--	Repatriate ship

M. V. ROCKEATER, owned by Ocean Science and Engineering Inc. is the world's first ship designed and built for ocean mineral prospecting.

"ROCKEATER" SAMPLING DIAMOND GRAVELS OFF SOUTHWEST AFRICA



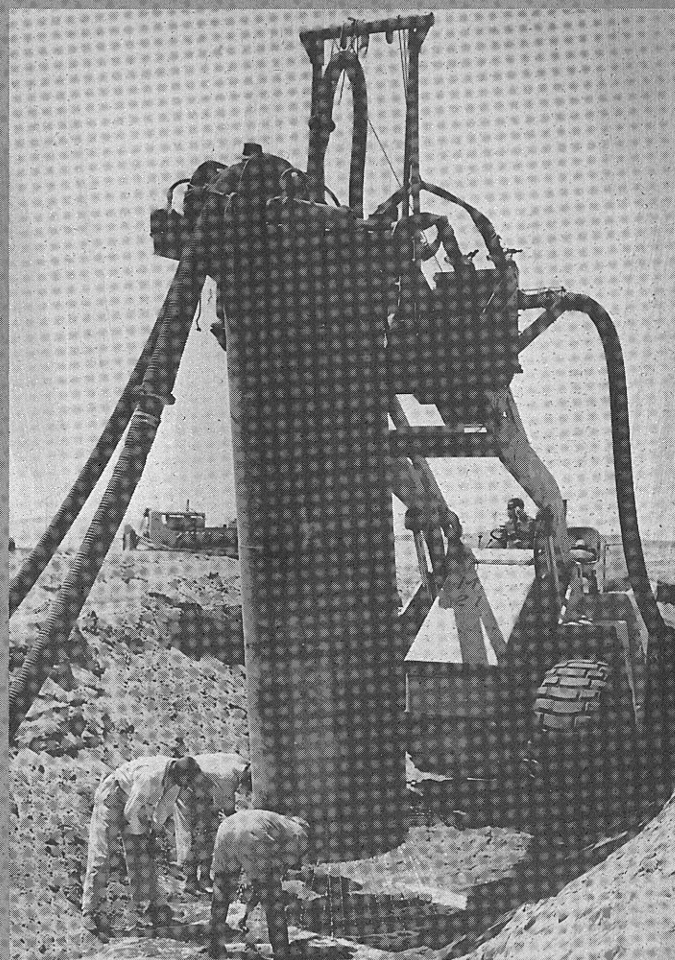
Ocean Science and Engineering Inc. prospects for minerals on the sea floor with newly developed geophysical techniques and by sampling and dredging with equipment of its own invention. Mining methods are then designed and operated in accordance with local needs.

They asked us how we did it, and we gave 'em the scripture text,
"You keep your light so shining a little in front of the next"
They copied all they could follow, but they couldn't copy our minds
And we left 'em sweating and stealing a year and a half behind.

Ocean Science and Engineering's motto, adapted
from "The Mary Gloster" by Rudyard Kipling

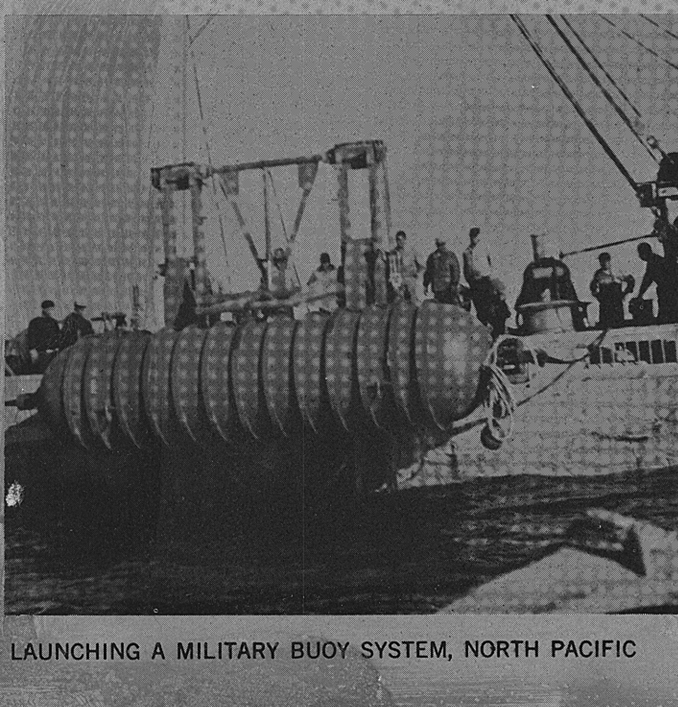
PLANNING A SHIP FOR THE UNITED NATIONS

. . . designs special ships for drilling, prospecting, handling heavy loads, laying cable, searching the sea floor . . . . . .



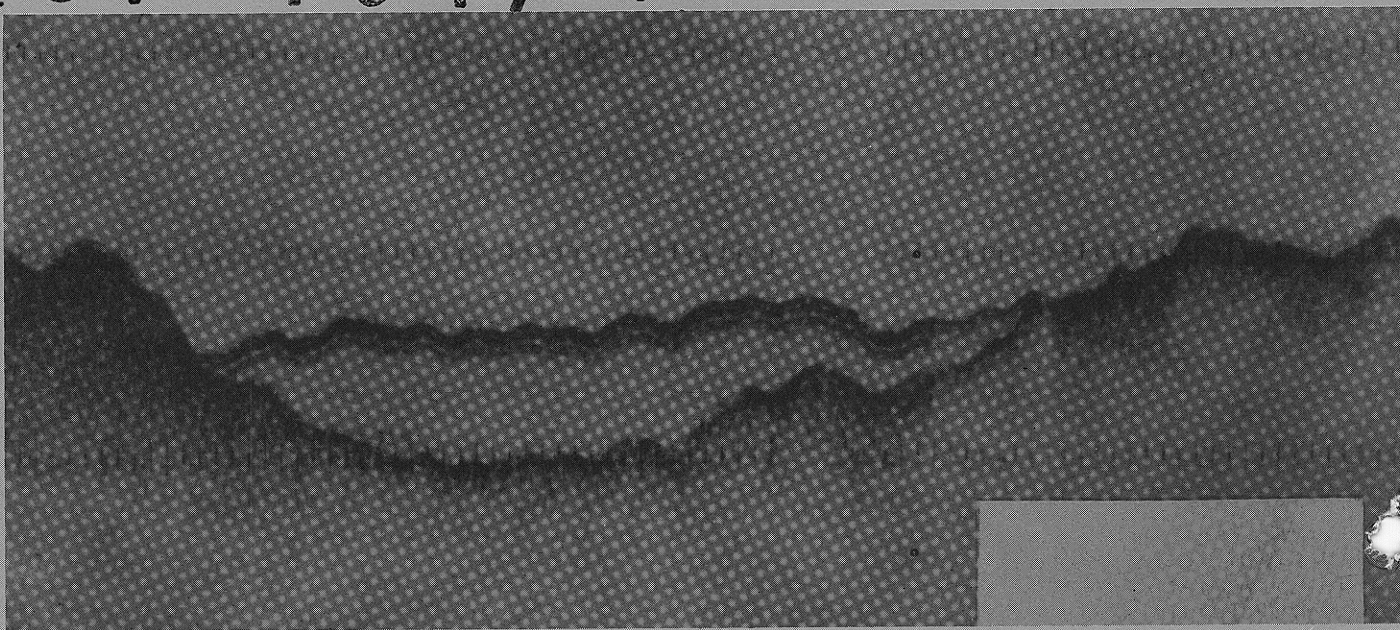
DEVELOPING A NEW BEACH CORING TOOL, SOUTHWEST AFRICA

. . . designs special machines for unusual jobs . . . .

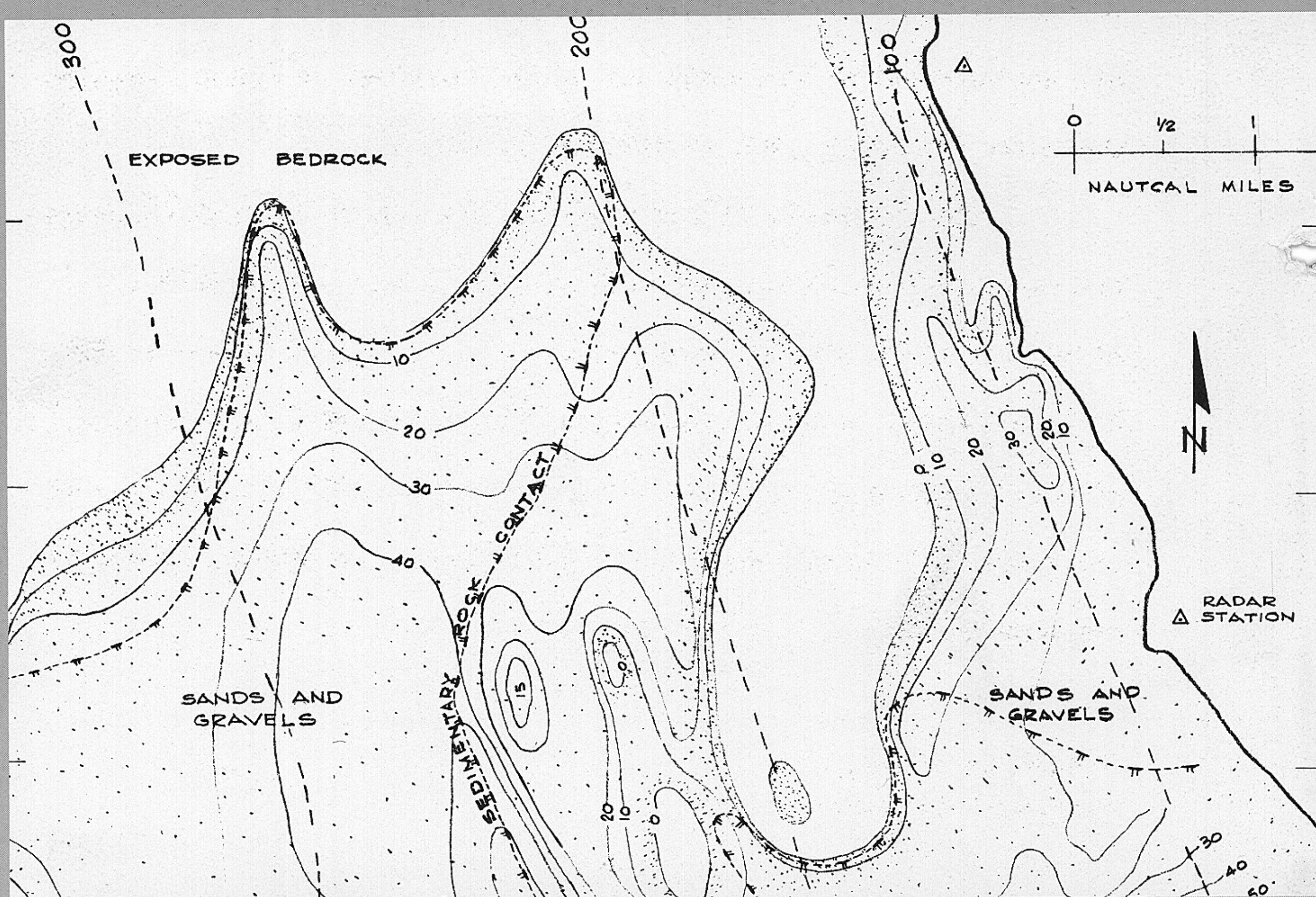


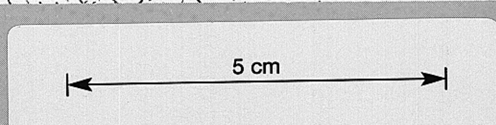
LAUNCHING A MILITARY BUOY SYSTEM, NORTH PACIFIC

. . . designs, builds, installs buoy systems for measuring oceanic and man-made phenomena.



Ocean Science and Engineering's "Overburden Recorder" sees bedrock clearly through thirty feet of subsea sand and gravel. From its records charts are made of diamondiferous gravels overlying sediments and schists.





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APPENDIX A

AUSTRALIA

Australia is a politically and economically stable country in the sterling area. It is organized as a federation of which Tasmania is one of the states. It follows English common law and the mining code and regulations are patterned accordingly. Mineral exploration permits in Tasmania are granted by that state's Chamber of Mines for renewable periods of six months. These exploration permits can be converted into leases for a fee of 5s/acre/year* upon presentation of suitable evidence of mineral discovery. These leases, at present, are not burdened by Tasmania with either royalties or taxes, although the latter are under consideration for the future.

The Commonwealth of Australia has relatively liberal federal taxation policies with regards to mining which include: exemption of taxes from the sale of mining rights or the proceeds of gold mining; 20% exemptions on net income from mining of ilmenite, monazite, rutile, zircon, platinum and tin; and, deduction of exploration and development costs allowable up to the amount of net income derived from mining in the same year.

* 5s ≅ $0.55 U.S.
£A = $2.24 U.S.

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APPENDIX A. TABLE I

MAJOR AUSTRALIAN PRODUCERS

TIN CONCENTRATE

Primary - Secondary

	Total Prod.-Tons	
Herberton, Qld.	93,144	1872 - 1955
Emmaville, NSW (New Eng. Dist)	73,474	
Tingha, NSW (New Eng. Dist)	67,477	
Mt. Bischoff, Tas. (NW Dist.)	59,141	
Stanthorpe, Qld.	54,536	
Derby, Tas. (NE)	18,358	
Greenbushes, W.A.	11,676	
	377,776	

GOLD (oz)

Bendigo, Vic.	60,000,000	1895 - 1955
Coolgardie, N.A.	29,200,000	
Murchison, W.A.	7,500,000	
Mt. Morgan, Qld.	5,500,000	
Mt. Margaret, W.A.	4,000,000	
Gympie, Qld.	3,400,000	
Yilgara, W.A.	1,700,000	
Ballarat, Vic.	—	
Charters Town, Qld.	6,591,482	
	117,891,482	

APPENDIX B

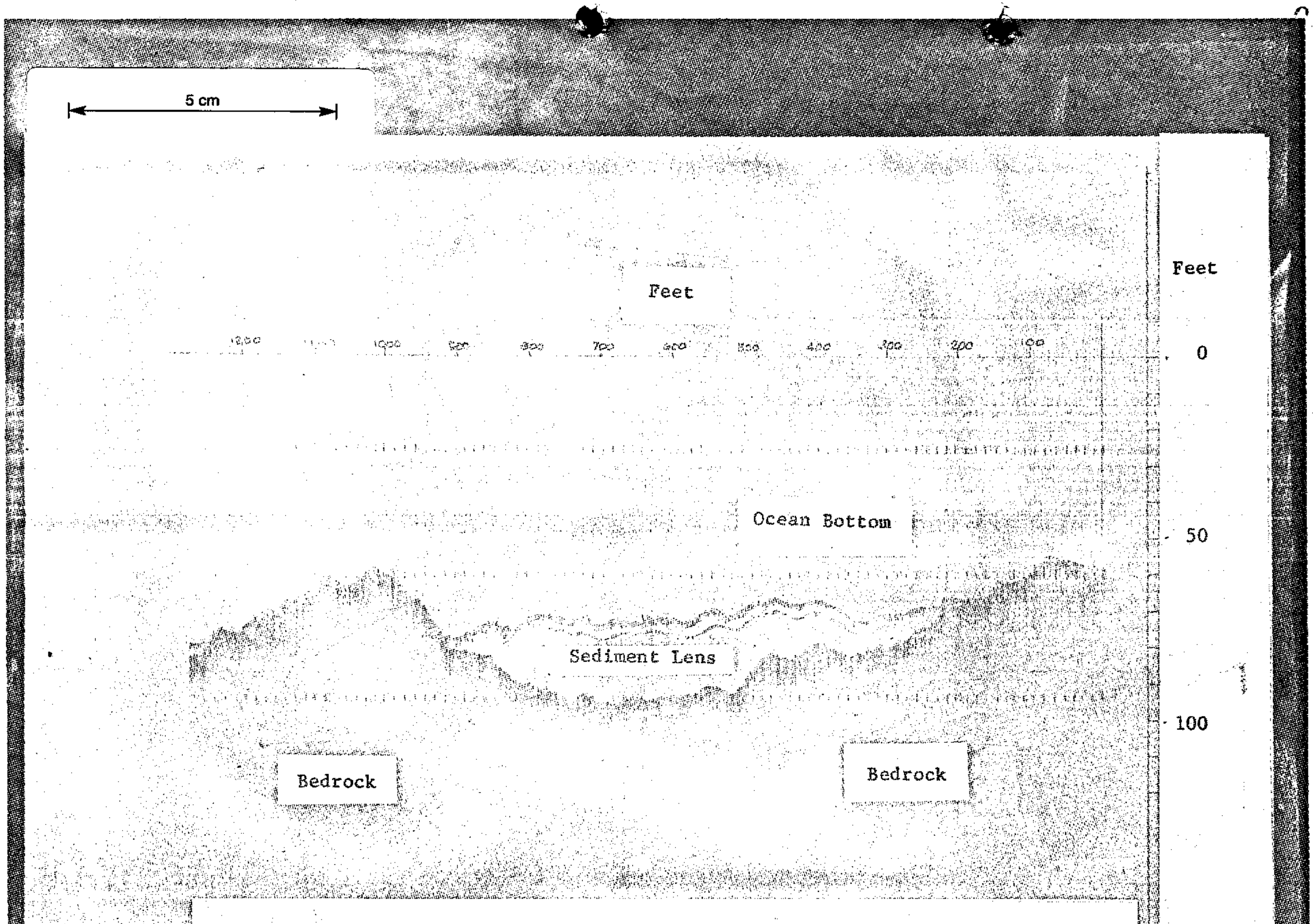
Equipment

1. Sonic Equipment

OSE personnel are familar with sonic surveying equipment across the frequency range of 0.2 kc to 200 kc. Each specific piece of equipment is used to do the job for which it is optimum. The higher frequencies(and shorter wavelengths) give the best definition but do not penetrate into the bottom. Lower frequencies penetrate but give less precise measurements. Our overburden recorder is the best compromise that can be used in mapping gravels less than 100 ft. thick.

In Bass Strait, we plan to use echo sounders operating at 10-12 kc to determine water depth precisely and use one of the OSE Overburden Recorders operating at 1.0 or 3.5 kc to obtain the thickness of the alluvial deposits that overlie the hard rock of the sea bottom. The "Lizard" version has been used with great success to map diamondiferous gravels and proposed harbor areas in South Africa; the 1.0 kc device has been effective in the Alaskan gold gravels.

These devices, which are similar in principle, are mounted in a fish and are towed behind the survey ship a few feet below the sea surface. This minimizes ship and wave noise and reduces the vertical motion caused by ocean swell. An example of a record is attached.



Ocean Science and Engineering's "Overburden Recorder" sees bedrock clearly through thirty feet of subsea sand and gravel. From its records charts are made of diamondiferous gravels overlying sediments and schists.

Figure 6

APPENDIX B

2. Decca Hi-Fix Positioning System

General Description:

Hi-Fix is a precise electronic position fixing system. The system is used to determine a ship's position by the intersection of two position circles established by ranges from portable Slave Stations located at known points on shore. Recommended separation of Slave Stations is between 10 and 50 miles and nominal maximum operating range between ship and stations is about 200 miles over water. Distances from ship to Slave Stations are determined with an accuracy of $\pm$ 1.1 meters. Ship's position is displayed aboard by means of Track Plotter which provides an immediate pictorial presentation and a permanent record for future reference.

Equipment: A Master Station and Track Plotter are installed aboard ship and two portable Slave Stations are provided for use on shore.

The Master Station Comprises:	Each Slave Station Comprises:
1 Master Oscillator Unit	1 Receiver
1 Transmitter Unit	1 Transmitter Unit
1 Antenna and Ground	Antenna and Ground
	24 Volt Power Source

Personnel: The above equipment can be rented by the month from Decca who will also furnish two qualified technicians to operate it.

APPENDIX B

3. OSESA Vibrocorer

This vibrocorer was designed by OSE engineers in South Africa for beach and offshore sampling in sandy formation. The vibrating heads weight about 80 pounds and are driven at frequencies of around 60 cycles in such a fashion as to exert large alternating forces on the coring head. The unit takes cores about 3 inches in diameter and 10 to 50 feet long, penetrating at the rate of about one foot per five seconds in beach sand. Cores so taken are vibrated back out of the barrel into thin plastic tubes with little disturbance. This tool has been successfully used on many sand-sampling jobs.

4. Becker Drill

This is a 14,000 lb. unit which drives double-walled pipe by means of a diesel hammer (Figure 6). The sample is in the form of a continuous core pumped by airlift up the inner pipe. The hole diameter is 5 1/2" and the sample recovery 80 to 100%. Drilling depth is a maximum of about 150' from the rig floor (water and/or sediment) and penetration rates of 22' per hour and more have been obtained in gravel, boulder and sand formations. This has been used with considerable success in offshore prospecting for tin in Thailand and for gold off Alaska.

APPENDIX B

5. OMAG Prospecting Kit

This is a small skid-mounted air compressor, pump and winch power unit developed by OMAG for taking samples of shallow gravels in water depths to 150 feet. Water jets free the gravel and injected air lifts the material to the surface -- it has been successfully used to sample gold deposits near Nome, Alaska.

6. Sample Processing Plant

A special plant will be installed on board the vessel to handle the continuous samples from the hammer rig. This plant will basically comprise a dewatering system(cyclone), a screening plant to size the materials and various kinds of gravity separation units. The plant will be designed to receive solids (sand & gravel) in a water mixture. Each sample interval (say 5-10'; 1-2 cubic feet solids) will be handled separately. The volume will be measured and recorded; a fraction of the material retained and the coarse fraction screened out. The remainder will then be washed in a gravity concentration unit (sluice box or knudsen bowl) to provide a concentrate of the heavy minerals. The latter will then be hand panned or further separated as required for identification and weighing.

APPENDIX C

COMPANY CAPABILITIES IN UNDERSEA EXPLORATION

Ocean Science and Engineering, Inc. and its subsidiaries, Ocean Science and Engineering, South Africa (Pty.) Ltd., and Ocean Mining, A.G., have a broad range of experience in the field of oceanographic engineering, research ship operations, and particularly in offshore mineral prospecting. We employ a number of highly trained personnel specialized in various aspects of engineering, hydrography, submarine geology, and geophysics.

Company experience included two years of prospecting for undersea diamonds off the coasts of South and South West Africa. We made a precisely navigated geophysical "sparker" survey of an area over 500 miles long and about 10 miles wide covering four major diamond concessions. We then built the special sampling ship "ROCKEATER" and in 18 months of operation drilled 6,380 sample holes two feet in diameter and penetrating 10 to 20 feet into gravel beneath water 50 to 200 feet deep (total of 40,000 feet of hole in 200 working days). ROCKEATER drilled in swell up to 12 feet high and winds to 40 knots off one of the most desolate shores in the world. Samples were screened and processed aboard in a heavy media plant and if diamonds were present it was known to the geologist aboard while the ship was still at the site. We are very proud of our record of drilling an average of 30 holes a day and maintaining the ship at sea with very little down time. Our small geophysical vessel "KLIPBOK" worked with ROCKEATER, towing the Lizard to make detailed maps of the sub-sea formations.

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APPENDIX C

In the summer of 1964, a similar, but much smaller scale expedition was sent to Nome, Alaska to examine our concessions there. The CALCASIEU carried out 250 traverse miles of geophysical survey and drilled 75 sample holes (finding at least traces of gold in every hole). Divers went down to examine the bottom on 15 occasions.

Ocean Science and Engineering is now prospecting for phosphates off South West Africa and for sand off Israel and California. We have studied underwater springs off the coast of Lebanon and west-coast beaches for the University of California.

We own two new oceanographic survey ships (OCEANEER and WANDO RIVER) and ordinarily we are involved in the operation of several others in various parts of the world. Thus we are familiar with what is feasible and what ship operations cost.

Besides mineral prospecting, Ocean Science and Engineering is primarily a design engineering company -- specializing in unusual oceanic ships, machinery, and buoys.

The following cruise data are given as an example of various types of offshore seismic survey and mineral sampling operations:

S.W. Africa, Xhosa Coast — December, 1963 - February, 1964

Total operating days	33
Total miles seismic traverse	1,425

S.W. Africa, Drilling Vessel "ROCKEATER" — April - December, 1964

Total traverse lines	118
Total sampling stations	1,089
Total holes drilled	3,074
Total feet drilled	21,226
Total volume handled m^3	2,870

APPENDIX C

S. W. Africa, Drilling Vessel "ROCKEATER" - January - March, 1965

Total operating days	63.5
Total traverse lines	51
Total sampling stations	626
Total holes drilled	1,593
Total volume handled m^3	—

S. W. Africa, M/V "KLIPBOK" (60' Seismic Survey Vessel)

January - May, 1965

Total Operating days	40
Total miles seismic traverse	655

Alaska (Bering Sea) M/V "CALCASIEU" - July - September, 1965

Total operating days	32
Total sampling stations	90
Total holes drilled	75
Total feet drilled	650
Total volume handled yd^3	210
Total miles seismic traverse	250

APPENDIX C

Short biographies of some of the OSE/OMAG personnel who will be engaged in the Australia/Tasmania program are given below:

FRANCOIS J. LAMPIETTI
Director
Ocean Mining A.G.

Born: December, 1933

Education: B.S. Engineering, University of California, Berkeley
M.Sc. Mining, University of California, Berkeley

Experience: Mineral exploration and mine investigations in U.S.A., Morocco, New Caledonia, Australia and Africa;
Staff engineer, National Research Council - Mohole deep sea drilling project;
Project Engineer, OSE beach and offshore sampling operations;
Manager, OMAG operations.

S. R. M. HARVEY
Chief Geologist
Ocean Mining A.G.

Born: October 11, 1931

Education: B.S. Geology, University of Cape Town
Ph.D. (requirements completed), Geology, Princeton Univ.

Experience: World-wide experience in reconnaissance and economic geology. Fiji Islands, Zambesi Valley, Venezuela.
Cruise director on drilling vessel "ROCKEATER" in S. W. Africa for offshore diamond prospecting.
Extensive travel for offshore mineral exploration reconnaissance in Australia, New Zealand.

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WENDELL GAYMAN
Senior Geologist
Ocean Mining A.G.

Born: September 23, 1928

Education: B.A. Geology, University of California, Los Angeles
Ph.D. candidate, Scripps Institution of Oceanography with specialization in sedimentation and shore processes.

Experience: Graduate research geologist for Scripps Institution of Oceanography;
Oceanographer, U.S. Bureau of Mines, Marine Technology Center;
Cruise Director on M/V "CALCASIEU" for OMAG offshore reconnaissance in Alaska.

ROBERT E. WARREN
Geophysical Engineer
Ocean Mining A.G.

Born: April 14, 1933

Education: B.S. Geophysics, Colorado School of Mines
M.S. Engineering, Geophysics, University of California, Berkeley

Experience: Geophysical engineer at the Scripps Institution of Oceanography in charge of heat flow program, including sea and land operations. Research engineer on geophysical instrument design.
Geophysicist, M/V "CALCASIEU", OMAG Alaska Operations.

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APPENDIX C

WINFORD DAVIES
Staff Geologist
Ocean Science and Engineering,
South Africa, Pty., Ltd.

Born: 1937

Education: B.Sc. Geology, Nottingham University, Great Britain
Ph.D., Recent Sedimentation, Imperial College of Science and Technology, London

Experience: Lecturer in economic geology at Camborne College, metalliferous mining, Cornwall, Great Britain
Staff geologist with Ocean Science and Engineering, S. A. for propsecting operations in S. W. Africa.

In addition to the above, three of the officers of Ocean Science and Engineering Group will be available for consultation for the duration of the programme:

Willard Bascom, President, Ocean Science and Engineering, Inc.
Mining engineer — oceanographer

Dr. Jack I. McLelland, Vice President for Engineering,
Ocean Science and Engineering, Inc.
Mining and oceanographic engineer

Dr. David Smith, Managing Director,
Ocean Science and Engineering, South Africa
Geologist.

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APPENDIX D

OFFSHORE MINING

For current data available on offshore mining operations, the reader is referred to the recent series of articles in the Engineering & Mining Journal issues of May, June, July and August, 1965. In addition, he is referred to the data which appears in various publications of the Symposium on Opencast Mining - Quarrying and Alluvial Mining - of the Institution of Mining and Metallurgy in November, 1964.

The following tables summarize pertinent data on present offshore mining and alluvial operations in various parts of the world. These data are then used to estimate the minimum economic requirements, exclusive of profit and interest and of the presence of other metals, for the success of the exploration program by discovery of a tin deposit. These are conservatively estimated to be of the order of *5,000 to 6,000 tons* of cassiterite having assumed offshore mining costs at 0.65\$/yd^3 and a moderate grade of 0.80 lb SnO_2/yd^3.

No data are provided for offshore phosphate mining assumptions. The discovery of an offshore phosphate deposit in Bass Strait would require a separate economic study in the light of the present needs of Australia and the Far East.

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APPENDIX D

Estimated Costs of Alluvial Mining

Location	Mineral	Mining Method	Cost per cu/yd $
Canada, Yukon Consolidated Company	Gold	Bucket-dredge	0.25
Alaska	Platinum	Bucket-dredge	0.40
Bolivia	Gold	Bucket-dredge	0.04-0.18
Thailand	Tin	Bucket-dredge	0.20-0.30
U.S.A.	Sand & Clay	Hydraulic dredge	0.15

Approximate Capital Costs of Dredges

Unit	Production yd^3/hr	Approx. Cost U.S.$
1965 Non-propelled bucket-dredge for Indonesia offshore (Simon Lobnitz)	700	$7.7x10^6$
IHC Holland suction dredge for S.W. Africa offshore (no processing plant)	500	$1.3x10^6$
YUBA Bucket dredge with mineral jigs for Nome, Alaska (1957)	400	$1.2x10^6$
Self-propelled new suction dredge, OSE estimate	300	$3.6x10^6$
Bucket dredge conversion to Clamshell or Clamshell barge OSE estimate	250	$1.5x10^6$

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APPENDIX D

Assumed Tin Mining Economics

(Bass Strait, Australia)

Break-even Calculation for Orientation

Capital Items	\$ U.S.
Cost of Dredge	1.5×10^6
Exploration Costs	$.5 \times 10^6$
Development Costs (including Installations)	$.75 \times 10^6$
Total:	2.75×10^6

	U.S.\$/lb.Sn.
Estimated Market Value Sn (over next 6 years)	1.50
Estimated Mining & Production Costs *	1.15
Available for Return of Capital	0.35

Minimum Deposit Yield Requirements

Capital Items $\frac{2.75 \times 10^6}{0.35} = 7.85 \times 10^6$ lb. Sn

7.85×10^6 lb. Sn = 9.95×10^6 lb. SnO_2.

Assume with losses, etc., 5,000 to 6,000 tons of concentrate.

* (Including interest and assuming a grade of ore of 0.80 lb.SnO_2/yd^3 and a mining cost of 0.65\$/yd^3, i.e., a mining cost of about \$U.S.1.00/lb.Sn).

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APPENDIX D

PRESENT OFFSHORE MINING OPERATIONS

Location	Mineral	Depth of Water/Ft.	Mining Method	Capacity
THAILAND				
Phuket Island	Tin-bearing sands	Max.: 120-130' Normal: 60-70'	(Bucket-dredges & Clamshells)	200 yd^3/h
Phuket Island	Tin-bearing sands	Max.: 155' Normal: 155'	"	250 yd^3/h
INDONESIA				
Off N.E. Coast of Sumatra	Tin-bearing sands	Max.: 70'	Bucket-ladder dredges and clamshells	
SOUTH-WEST AFRICA	Diamondiferous Gravels	30-100'	Airlift	–
JAPAN				
Ariake Bay	Iron Sands	Max.: 100'	Clamshell	30,000t/month
ENGLISH CHANNEL	Gravel	50' - 120'	Suction	–

APPENDIX E

EXPLORATION PROGRAMME DATA

We have seen in Appendix D that the minimum economic requirements for an offshore cassiterite deposit are of the order of 10 to 12 million lb. SnO_2. Let us now examine the probability of existence in the permit areas of such a deposit, its possible size and grade configuration, and the requirements for its discovery during the exploration programme.

Two tables are presented showing some size and grade data on various world tin deposits and the production of the largest Australian tin and gold deposits (Table II).

In view of the average abundance of tin (~3-4 ppm) in the earth's crust, its habits elsewhere in the world and the size of deposits found in other granite belts, it is reasonable to expect that a deposit equal to or larger than any of those already known in Tasmania would have been formed in that area. With the present exposure of the granites and known tin deposits there, it also seems fair to expect this deposit under the shallow sea in the extension of the granite belts. Furthermore, with a production of 50,000 tons of Sn for an area of 3,000 mi^2 in the northeastern district of Tasmania alone, there is a good possibility of finding a minimum body of 4,000 to 5,000 tons Sn in the immediate extensions of the district.

APPENDIX E TABLE II

DATA ON SIZE & GRADE OF PLACER TIN DEPOSITS

Country	Locality	Volume yd^3	Grade $LB.SnO_2/yd^3$	Dimensions Aerial
Thailand	W. Coast Phuket island	32×10^6	0.6	
	Phuket Island vicinity	95×10^6	—	2 mi x 8 mi 3 to 10' thick
Australia	Tableland tin Queensland	50×10^6	0.7	
Nigeria	—	—	0.4-3.0	
Belgian Congo	Manono	—	4.0-5.0	¼ mi x 3.5 mi (altered pegmatite lens)
Malaysia	Kinta	10×10^6	0.5	
	—	108×10^6	0.4	
Indonesia (Billiton)	Telok Pring	—	—	10 mi x 3/4 mi
	Manggar	—	—	3 mi x 3 mi
	Pandan	—	—	10 mi x ½ mi
	Tandjung	—	—	2 mi x 1 mi
	Gantung	—	—	2 mi x 1 mi
Tasmania	Ringarooma (deep leads)	—	0.5-1.1	

APPENDIX E

Now, from the data tabulated, it can be seen that a placer concentration of about 0.8 lb SnO_2 per cubic yard (only about 50 times the average geochemical abundance in the crust) is of the right order for middle to low grade deposits in the world.

For a concentration of 0.8 lb of cassiterite per cubic yard the required size of deposit to yield 5,000 to 6,000 tons of SnO_2 would be of the order of 12 to 15 million cubic yards. Assuming that a typical mineable ore body exposed on or near the sea floor in the permit areas will most probably be elongated (submerged river channel or old shore line) or possibly equidimensional (alluvial fan or small deposition basin) we can postulate a likely size of target, i.e., a body of 10 to 50 million cubic yards of gravel with a surface of 1 to 6 square miles and a thickness of 20 feet or less. This would, for instance, be part of a river channel or an alluvial flat 2 miles long by ½ mile wide with a cover of 0-15' of resorted tin-bearing gravel over bedrock.

If we accept that a geophysical and geochemical sampling programme over the combined permits would yield a maximum of 5 areas (one every 3 or 400 mi^2) of, say 30 mi^2 each, the number of drilling-samples required to locate the targets might be of the order of 150 to 200. It it is further assumed that an additional 50 to 100 drilling

APPENDIX E

samples may be required for confirmation and interpretation in the case of discovery, a total of 250 drilling samples appear justified.

The programme which has been proposed is based on the assumption above. It will proceed in the search for tin and other metallic ore bodies by selecting likely topographic traps in the sea floor and underlying bedrock by means of continuous seismic reflection from a small ship. Occasional sampling of the bottom by various methods (clamshell, diver, vibrocorer) will be done to identify bottom material and provide geochemical data. When likely areas have been outlined by this geophysical campaign, they will be evaluated, compared and the decision made to drill there.

The time estimates shown in Table III are based on the preceding assumptions.

APPENDIX E

TABLE III

TIME ESTIMATES

1. OMAG Tin Permits - Tasmania

Total Area		Working days to nearest day
	a. Areas 1 and 5, N.E. Tasmania - Tin	
1,000 mi^2	Phase I *	
	Seismic profiler & magnetometer traverses; 500 linear miles @ 3 mph x 10 hrs/day	17
	Sampling (clamshell/diver/vibrocorer) station; 50 @ 10/day	5
		22
	Phase II	
	Drilling Sampling 3 targets 90 stations @ 3/day	30
600 mi^2	b. Area 2, W. Bass Strait - King Island - Tin	
	Seismic profiler & magnetometer traverses 250 linear miles, @ 3 mph x 10 hrs/day	8
	Sampling (clamshell/diver/vibrocorer) stations, 25 @ 10/day	3
		11

* Transit times to and from port are not included and will take place at night or outside working time. Cruise to be about 10/15 days.

APPENDIX E TABLE III

TIME ESTIMATES

Working days to nearest day

Phase II

Drilling Sampling 1 target

30 stations @ 3/day 10

Total Area

500 mi^2 c. Area 6, E. Tasmania-Freycinet Peninsula - Tin

Phase I

Seismic profiler & magnetometer traverses;

100 linear miles @ 3 mph x 10 3

Sampling stations, 20 @ 10/day 2

5

Phase II

Drilling-sampling: 1 target *

30 stations @ 3/day 10

d. Confirmatory (closely-spaced)drilling-sampling; 100 stations @ 4/day 25

TOTALS:

Phase I 38

Contingency (Bad weather; problems, etc.) 6

Total: 44

Phase II 75

Contingency (Bad weather, etc.) 9

Total: 84

* This target may not show up in this area, but instead in any of the other two.

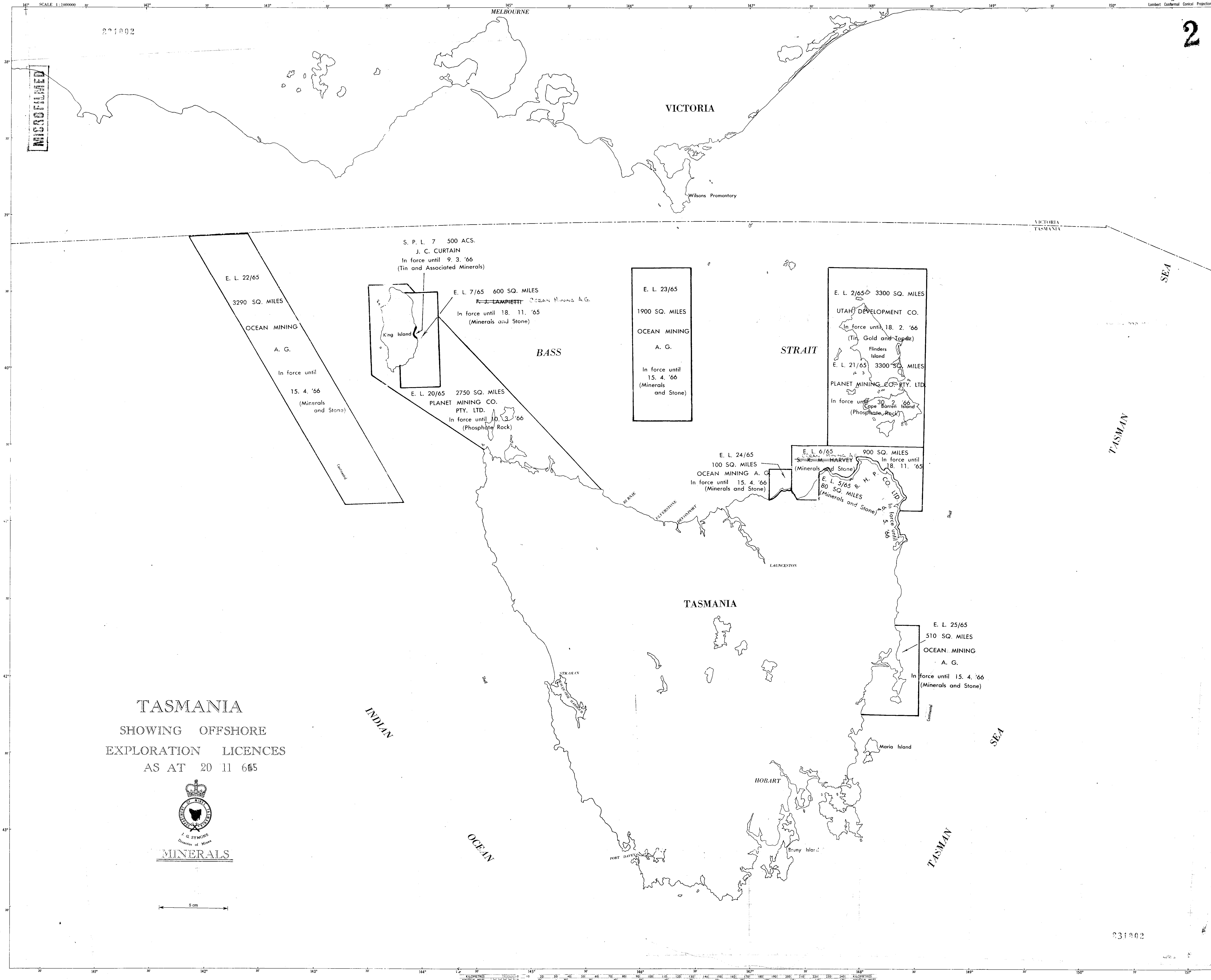
APPENDIX E

TABLE III

TIME ESTIMATES

Total Area			Working days to nearest day
$3,425\ Mi^2$	2.	OMAG Phosphate permits Bass Strait	
		Echo sounder and dredging traverses - (using bucket dredge or clamshell) 50 lowerings @ 5/day from drilling ship.	10

As shown previously in the text, the total time involved in Phase I will be 44 working days, or say 62 days of operation; and, for Phase II, 94 working days (including dredging) or 131 days of operations.



TASMANIA
SHOWING OFFSHORE
EXPLORATION LICENCES
AS AT 20 11 665
MINERALS
J. G. SYMONS
Director of Mines
DEPARTMENT OF MINES TASMANIA
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231002
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SCALE 1:1000000
Lambert Conformal Conical Projection
MELBOURNE
VICTORIA
Wilsons Promontory
VICTORIA
TASMANIA
BASS
STRAIT
TASMAN
SEA
INDIAN
OCEAN
TASMAN
SEA
S. P. L. 7 500 ACS.
J. C. CURTAIN
In force until 9. 3. '66
(Tin and Associated Minerals)
E. L. 22/65
3290 SQ. MILES
OCEAN MINING
A. G.
In force until
15. 4. '66
(Minerals and Stone)
Continental
E. L. 7/65 600 SQ. MILES
F. J. LAMPIETTI
OCEAN MINING A.G.
In force until 18. 11. '65
(Minerals and Stone)
King Island
E. L. 20/65 2750 SQ. MILES
PLANET MINING CO.
PTY. LTD.
In force until 10. 3. '66
(Phosphate Rock)
E. L. 23/65
1900 SQ. MILES
OCEAN MINING
A. G.
In force until
15. 4. '66
(Minerals
and Stone)
E. L. 2/65 3300 SQ. MILES
UTAH DEVELOPMENT CO.
In force until 18. 2. '66
(Tin, Gold and Topaz)
Flinders Island
E. L. 21/65 3300 SQ. MILES
PLANET MINING CO. PTY. LTD.
In force until 30. 2. '66
Cape Barren Island
(Phosphate Rock)
E. L. 24/65
100 SQ. MILES
OCEAN MINING A. G.
In force until 15. 4. '66
(Minerals and Stone)
E. L. 6/65 900 SQ. MILES
S. R. M. HARVEY
In force until
18. 11. '65
(Minerals and Stone)
E. L. 5/65 B. H. P. CO. LTD.
80 SQ. MILES
(Minerals and Stone)
In force until 4. 5. '66
BURNIE
ULVERSTONE
DEVONPORT
LAUNCESTON
TASMANIA
E. L. 25/65
510 SQ. MILES
OCEAN MINING
A. G.
In force until 15. 4. '66
(Minerals and Stone)
STRAHAN
MACQUARIE HARBOUR
Maria Island
HOBART
Bruny Island
PORT DAVEY
5 cm
KILOMETRES
NAUTICAL MILES
STATUTE MILES

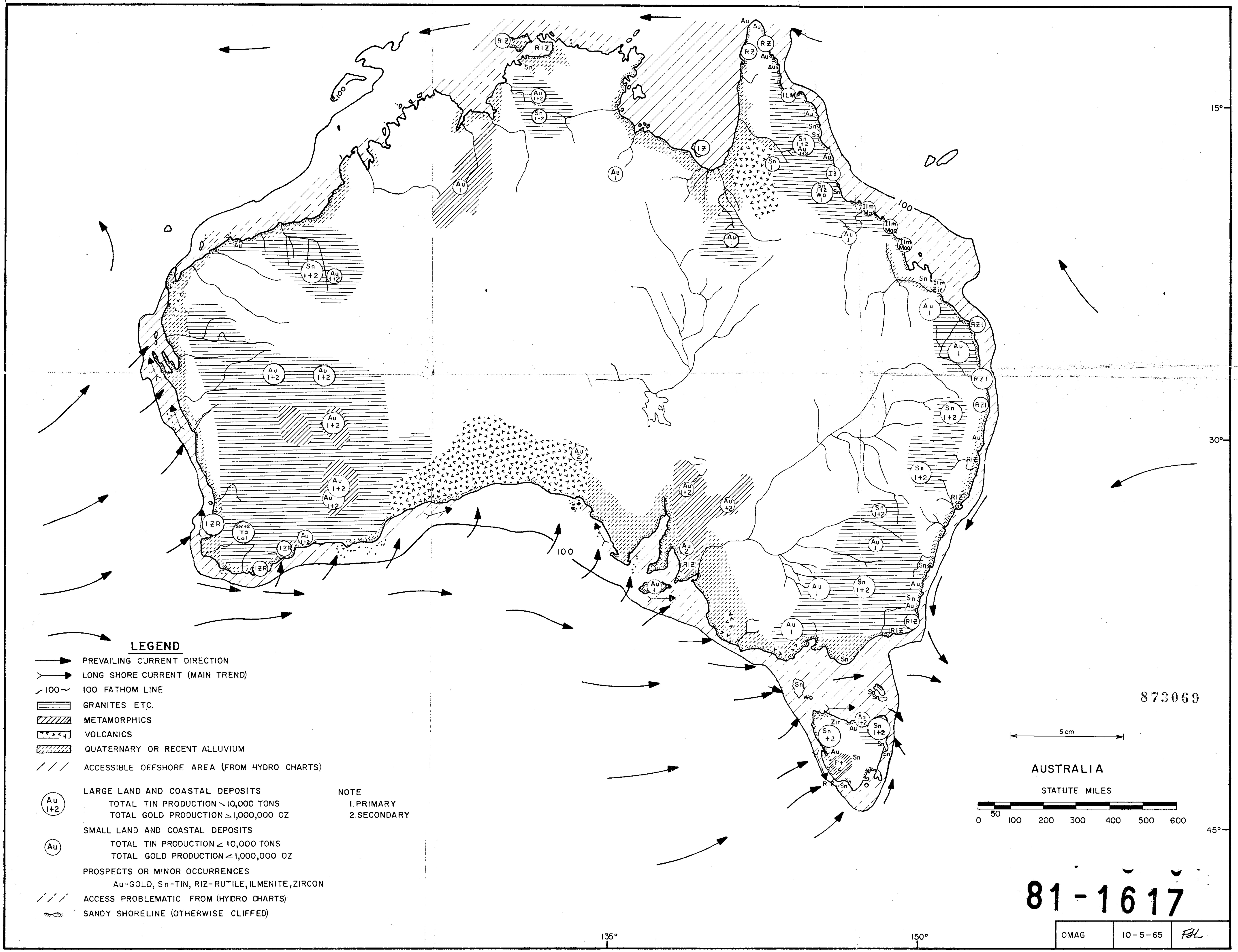
LEGEND
PREVAILING CURRENT DIRECTION
LONG SHORE CURRENT (MAIN TREND)
100 FATHOM LINE
GRANITES ETC.
METAMORPHICS
VOLCANICS
QUATERNARY OR RECENT ALLUVIUM
ACCESSIBLE OFFSHORE AREA (FROM HYDRO CHARTS)
LARGE LAND AND COASTAL DEPOSITS
TOTAL TIN PRODUCTION ≥ 10,000 TONS
TOTAL GOLD PRODUCTION ≥ 1,000,000 OZ
SMALL LAND AND COASTAL DEPOSITS
TOTAL TIN PRODUCTION < 10,000 TONS
TOTAL GOLD PRODUCTION < 1,000,000 OZ
PROSPECTS OR MINOR OCCURRENCES
Au-GOLD, Sn-TIN, RIZ-RUTILE, ILMENITE, ZIRCON
ACCESS PROBLEMATIC FROM (HYDRO CHARTS)
SANDY SHORELINE (OTHERWISE CLIFFED)
NOTE
1. PRIMARY
2. SECONDARY
AUSTRALIA
STATUTE MILES
0 50 100 200 300 400 500 600
5 cm
15°
30°
45°
135°
150°
100
873069
81-1617
OMAG
10-5-65

Fig 6.