

**STATEMENT OF OBJECTIVES AND
NEEDS OF PROPOSED
STRATIGRAPHIC HOLE
*SHITTIM 1***

LEAMAN, D.E.

MICROFILMED

FICHE No. 013368

NOVEMBER 1994

EL 1/88

**CONDOR OIL INVESTMENTS PTY
LTD AND LEAMAN GEOPHISICS**

TCR 94-3651

CONDOR OIL INVESTMENTS PTY. LTD.**A.C.N. 055 403 515****84 Wells Parade
Blackmans Bay, Tasmania 7052****Telephone: 002 29 6576****Facsimile: 002 29 2153**

19th November, 1994.

Ms Carol Bacon,
Mineral Resources Tasmania,
P.O. Box 56
ROSNY PARK Tas. 7018

Dear Carol,

Thank you for your attendance with myself, Dennis Burgess and Mr. Hazell on site, Murrayfield, Bruny Island, thursday November 17th, to inspect the site of shittim - 1, Condor's first stratigraphic well. Appendix (1) and (3) comply with your requests of your letter, dated 14th November, 1994, included as Appendix (2).

I note your comments that with the drilling of a purely stratigraphic well our current Bond of \$30,000 is adequate and that once you had received Appendix (1) we would have automatic same day approval for our hole. Further, at your request, I have included a copy of the Notice of Intention to enter Private Land, given to Robert Hazell, with a copy of "Land Holders Position" as Appendix (4) which you will note Robert Hazell has signed.

I have also given Robert Hazell a copy of the relevant Drilling Pads Section of the Mineral Exploration Code of Practice Manual.

Tony Yeates, the Project co-ordinator for the "TASGO" 3 million dollar project (appendix 5) has also indicated that he views the drilling of shittim 1 as being vital to the processing of new seismic data and the possible re-processing of old data as it will provide the only down hole seismic in the State to calibrate the results correctly.

In regard to your comments on pre-collaring the first 100 metres of the hole, I would simply point out that at Smithton, where a 700 metre deep wild cat well for gas was put down by your Department on known gas seepages composed in part of explosive methane, without Blowout Prevention gear, on structure, the hole was pre-collared to a depth of 150 metres by a different rig to that used to drill the hole. It is standard industry practice as stated by ex Mines Department Chief Driller (Kerry Richardson) and Peter Sharp (Diamond Drilling Tasmania) to pre-collar deep

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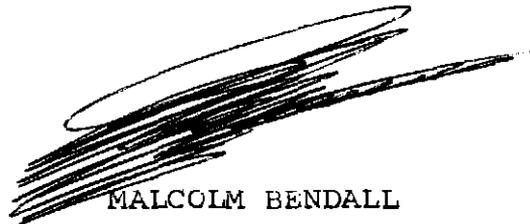
Diamond Drill holes as this practice greatly increases the chances of completing the hole successfully to target depth and also is quicker and half the cost of coring the first 100 metres.

In regard to the hole, shittim 1, the first 100 metres of geology is exposed and readily accessible in the outcrop at Variety Bay. In any case, no geological information not already known will be lost, as we are drilling to find out what we don't know, not that which is already known, it is logically the best practice to pre-collar. We will of course, as a matter of correct scientific procedure, collect the chip samples at three metre intervals, so as anybody interested in the hole may examine them.

Finally, I appreciated your comments that the Department wants this hole drilled as much as I do. I hope that a sorry series of events such as outlined graphically in my letter of the 15th November, 1994, are not allowed to re-occur. In the end, the people of Tasmania are the ones who will suffer from any continuing pedantic disputes between Condor and the Department.

You are also invited to attend an on site inspection with Peter Sharp and myself at a date to be arranged.

Yours sincerely,



MALCOLM BENDALL
MANAGING DIRECTOR

C.C. Robert Hazell
David Leaman
Ray Groom
Peter Sharp

LEAMAN GEOPHYSICS

Registered office:
3 MALUKA STREET, BELLERIVE, TAS. 7018
All correspondence to:
GPO BOX 320 D, HOBART, TAS. 7001
Telephone: (002) 44 1233
Fax: (002) 44 6674

November 21, 1994

Ms C A Bacon,
Managing Geologist,
Hydrocarbons and Tenements,
Mineral Resources Tasmania,
PO Box 56,
Rosny Park Tas 7018

Dear Ms Bacon,

Mr M Bendall, of Condor Oil, has asked me to prepare a statement about the objectives and needs of his proposed stratigraphic hole "SHITTIM 1" for you.

The following summary essentially restates what was included in my prognosis for this hole. That prognosis was prepared, and the hole specified, on the following bases only.

1. The hole is to be diamond-drilled at core sizes H or equivalent pre collar(near surface) and N (remainder).
2. It is to be drilled for stratigraphic purposes only and to permit geophysical logging and seismic velocity tests.
3. No specific hydrocarbon target is proposed or inferred; nor can any be defined at present.
4. There is no expectation that drilling characteristics in this hole, or hydrocarbon encounters, will differ in any material way from comparable stratigraphic holes previously drilled in SE Tasmania.

The prognosis fully discusses these issues.

Any major change, by the company or driller, of hole type (other than of any pre-collar), depth range, drilling method or objective might well change these presumptions. I have indicated to Mr Bendall that I would prefer he avoided the use of a pre-collar since some shallow information might be lost in the subsequent dependence on down hole logging methods near surface. Full chip samples should be retained if a pre-collar is drilled.

Yours faithfully,



Dr. D.E. Leaman



Enquiries: Ms C A Bacon
Phone: (002) 33 8326
Your Ref:
Our File: CAB420.94:NW

848005

14 November, 1994

Mr M Bendall
Director
Condor Oil Investments
84 Wells Parade
BLACKMANS BAY TAS 7052

Dear Sir

WORK PROPOSAL EL 1/88

Thank you for the report entitled 'Condor Oil Investments, North Bruny Island, a prognosis for a well'.

As discussed with the Registrar of Mines and myself on Thursday 10 November 1994, Mineral Resources Tasmania would be willing to consider approving the drilling of a stratigraphic borehole on Bruny Island under the same conditions as are required for drilling stratigraphic holes elsewhere in the State.

Your company should write to Mineral Resources Tasmania requesting approval to drill a stratigraphic hole. The work programme should include a signed statement from an acknowledged expert (such as your consultant Dr D E Leaman) that:

- The hole is to be a stratigraphic borehole to be drilled solely to obtain subsurface information on sediments, structure, etc.
- No specific petroleum/gas target or source is proposed.
- The likelihood of encountering gas or liquid hydrocarbons is no greater than in any other previously drilled stratigraphic hole in the south-eastern Tasmania region.

- In the opinion of the expert no blowout prevention equipment is necessary.

If there is any suggestion that Condor Oil Investments intend to drill any **other** sort of hole, or intend to drill for oil or gas or drill into a suspected petroleum reservoir than **all** the requisite provisions of Schedule C must be followed.

There is a considerable difference between drilling a hole **for oil or gas** and drilling a stratigraphic hole.

You have been advised previously that EL 1/88 will not be renewed unless the agreed work programme has been substantially completed by the renewal date of 31 December 1994.

This gives very little time to implement the proposed programme.

Yours faithfully



C A Bacon
MANAGING GEOLOGIST
HYDROCARBONS & TENEMENTS

CONDOR OIL INVESTMENTS

NORTH BRUNY ISLAND

A PROGNOSIS FOR A STRATIGRAPHIC HOLE

INTRODUCTION

The well defined and described in this prognosis is the first well to be drilled by Condor Oil Investments in Tasmania.

The site chosen stands above Variety Bay on the eastern coast of North Bruny Island and overlooks Storm Bay. See Figure 1.

Location: 533 900 mE
 5215 000 mN
 25 mASL

BACKGROUND INFORMATION

Petroleum products have been reported on North Bruny Island for several decades and active exploration was undertaken more than sixty years ago.

Several wells have already been attempted in the Great Bay and Big Lagoon region. All have been limited by the funds and equipment available. The details of this drilling and the companies involved were described by Bendall (1991).

The most important of these wells was Johnstone's Well drilled in 1929. The site is shown in Figure 1. Although it reached a depth of less than 50 m and no reliable records of formations or hydrocarbons encountered have survived some oil was recovered. It was a light oil and was stored in drums at the site. It was not analysed and none has been preserved. Its source is unknown. The well did not penetrate deeply into the Permian succession due to jamming.

The deepest drilling in the area, at the north end of the isthmus, was to 135 m and this does not appear to have encountered the thick dolerite sheet which could have been expected at this approximate depth.

Any hydrocarbons found in the area, or these holes, must have drained from, or through, the Deep Bay and, more probably, the Minnie Point Formation which includes porous sandstones.

A number of other seepages have been reported in this same general area and all occur in rocks at about the stratigraphic level of the Minnie Point Formation. All these units are Permian in age. Many of these seepages, and tar coatings, have been found around Variety Bay.

The knowledge of this old drilling programme and the company behind it was forgotten for nearly sixty years. As were the seepage reports.

Exploration was renewed by Conga Oil in 1984. The new exploration incorporated an initial literature search and relocation of reported seepage sites. The site of Johnstone's Well was found and samples taken of muds, soil and local fluids. These confirmed the trace presence of hydrocarbons and the chemistry was consistent with a source within the Ordovician Gordon Group limestones of southern Tasmania. Unfortunately the trace amounts recovered do not permit any definite conclusions or complete appraisal of the oil - as might a small jar of the actual oil.

The exploration was expanded to include regional gravity and magnetic surveys (Figures 2, 3) which were interpreted to suggest that possible source rocks may exist to the west and southwest but were most unlikely beneath North Bruny Island itself (Figures 5, 7). This was essentially confirmed by the trial seismic traverse along the ridge from Trumpeter Bay to Church Hill (Figure 4). The geophysical analyses were primary and regional but did provide an understanding of the setting of the region, possible locations of critical structures and older basins, and a context for migration paths (Figure 6). Some work was begun to crystallize the detailed local setting of North Bruny Island but this work was never funded nor completed. Samples of the initial analyses are reproduced in Figures 8 and 9 and this incompleting evaluation provides the information used for location of the present well proposal. Complete details of the status of exploration studies (geophysical and geochemical) actually completed may be found in Leaman (1990, 1991 and Carne, 1992).

There remains scope for much more work but further work would be enriched by some new control information; including depth to basement and seismic velocities.

The seepages recorded in the area can be understood in terms of the structures described regionally. A reservoir to the west, sealed by the base Permian unconformity, may leak up dip to the large dolerite feeder near Ford Bay or the faults marginal to Storm Bay which were reactivated throughout the Tertiary. Given the thermal history of the region it is possible that actual generation did not commence until the Cretaceous and may still be occurring (see Carne, 1992).

Earlier drilling programs may have intersected some near surface migration paths. As would the newer fault fracture systems. All leakage appears to occur slowly and there is no evidence of any high pressures. The association of seepages with seismic activity also suggests a tight, low volume system above the unconformity or seals.

Consequently any new well drilled in the North Bruny region must have a conceptual or stratigraphic basis with the direct aim of further sampling any migration paths and confirmation of sequence.

Such a well would provide proof that oil is indeed migrating through a viable fracture net and that either generation is continuing or that there may be a large reservoir nearby. A reasonable sample would also resolve many of the source and generation issues since it would allow exhaustive chemical analysis.

These are the primary objectives of this well.

HISTORY OF PROPOSALS

Conga Oil proposed re-drilling of the Johnstone's Well site in 1987 in order to prove the veracity of the old records, obtain a small sample and complete chemical appraisals. The recovery of even a small sample from a fracture or bedding seepage would also have been of considerable financial benefit to both the project and the company since it would have established that parts of Tasmania do have petroleum potential - a possibility that had been long dismissed in both large company and government circles and whose attitudes made financing of the exploration difficult indeed. The company itself had sufficient confidence in the project to employ a drilling engineer, review used equipment in North America, and to purchase a rig with a capacity in excess of 2500 m. This equipment was never imported into Australia for reasons beyond the scope of this prognosis and became the source of considerable financial loss to the shareholders.

Drilling of the site was again proposed in 1991 (Bendall, 1991).

Final stage evaluation of the geophysical and structural information available, however, did indicate that the Johnstone's Well site may not provide an optimal stratigraphic section. The nearness of a dolerite feeder and the risk of thickened dolerite coupled with a higher stratigraphic level meant that any hole at the old site may be several hundred metres deeper than one across the hill. This issue became important to the company felt the loss of its own drilling equipment and funding became more restricted in the 1990-1993 period.

WELL PROGNOSIS

Any drilling programme is dependent on the exploration undertaken and in this case only limited regional analysis has been completed.

Site selection has been judged, therefore, on the basis of minimum depth to basement (in order to establish the stratigraphy of the region), the loci of seepages (in order to maximise opportunities to sample the migration path) and good drilling conditions.

No formation older than the Deep Bay Formation outcrops on North Bruny Island and the site selected lies near the top of this formation.

The prognosis for the well is

Surface to 20 m	Minnie Point Formation	sandstone/siltstone
20 - 50 m	Deep Bay Formation	foss. mudstone
50 - 400 m	dolerite	
400 - 450 m	Deep Bay Formation	foss. mudstone
450 - 550 m	Bundella Formation	foss. mudstone
550 - 700 m	Woody Island Siltstone	mudstone
700 -1000 m	Truro Tillite	tillite
	unconformity	
1000 -	Precambrian schists	

Some key unknowns are included in this prediction.

- a) Thickness of dolerite. 350 m is an average estimate.
- b) Only one dolerite sheet is presumed. Two are possible but a basal sheet may be relatively thin.
- c) Thickness of tillite. This may vary from nil to 700 m.
- d) Thickness of the Deep Bay and Bundella Formations. The estimates are representative of local formations but a variation of up to 50% is possible.

Items c) and d) depend upon the location of this site with respect to the basin deposition axes. All formations older than the Minnie Point Formation may occupy active rift stages and their thickness thus depends on the location of this site with respect to the block rotation of the rift. Insufficient work has been completed in southern Tasmania to establish this with certainty but if older structures have been rejuvenated then it is possible that this eastern location is comparable with Glenorchy where the tillite was absent.

Hydrocarbons seepages could be encountered at any level and very careful monitoring of fluorescence within the core recovered will be essential. The site itself has been selected with regard not only to the position of exposed faults disturbed along the Storm Bay coast during the Tertiary but also the likely Jurassic disposition of faults - several of which are either no longer exposed or disguised by intrusions. A comparison of Figure 8 and the regional geological map of the area (Kingborough) will indicate some of these differences. The surface geological map is not, in itself, a reliable guide to fracture foci or faults. The coalescence of structures east of Church Hill and south of Variety Bay may well account for the number of small seepage sightings in this part of the island.

The well will also be used for seismic velocity tests in order to permit review and reprocessing of seismic data.

WELL REQUIREMENTS

Type of well:

Two types of petroleum-related wells may be defined (e.g. Carne, 1991):

1. Exploration well (wildcat) is one drilled to discover whether previously untested trap conditions contains oil or gas, and
2. Stratigraphic well drilled solely to obtain subsurface information on sediments, structure, organic maturity and provide control for geophysical purposes.

The proposed well falls within the second category.

No specific target or source is proposed; indeed, all regional work suggests that the primary target for wildcat drilling lies several kilometres to the west.

The well will be a small diameter diamond hole ('N') which will be continuously cored (a shallow pre-collar may be prepared - option).

A diamond hole to a depth of 1000 m needs few special requirements beyond those normally specified for control of drilling fluids, access and landholder compensation.

Comments on equipment experience:

The history of all previous drilling of this type within Tasmania supports this view. No Mines Department diamond drilling has ever required any special equipment, including the 1000 m hole at nearby Woodbridge. No problems have ever been encountered with high pressure hydrocarbons including the Douglas River hole drilled by the department, and which is still flowing gas. Other drilling in regions with oil shale, whether for the shale or for groundwater, have ever posed pressure problems. The much deeper mineral exploration holes in western Tasmania have, likewise, not presented any experience of problem conditions even though gas risks may increase with depth in any basement type.

The Variety Bay area is not noted for large seepages, or very gassy ones, and there is no ground for any expectation of incidents. The load of a full drill stem in a limited diamond hole is clearly safe given all past experience. Were special regulations to be imposed on this hole, as has been suggested to the company, then this company would respectfully insist that they should also be applied to every water bore in Tasmania and all mineral holes in western Tasmania as well. It would also ask why government drilling did not operate to comparable standards.

Quite different requirements might well apply to a hole aimed directly at a fully investigated petroleum reservoir structure drilled using standard exploration open hole mud-control methods. This is not such a hole.

Detection of hydrocarbons:

It is expected that fluorescence methods will be required to detect any hydrocarbons in the hole/core since no large flows are anticipated in any formation given the seepage styles and seismicity relationships.

HOLE NAME

The name designated for this well is SHITTIM-1.

This name has a number of important connotations - for both the company and the area.

The name has historical significance as the place where both a new start and a turning point was achieved. This is clearly what is hoped for on North Bruny and for the company. It might also mean a new start for the way in which this state is viewed by petroleum explorers. It is also the name of an attractive tree whose relatives are common in this country and which produces a useful light oil.

Prognosis submitted on behalf of Condor Oil Investments

by

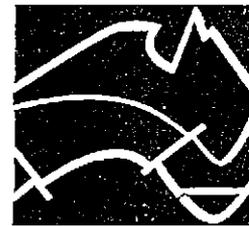
N. Reaman
Reaman Geophysicist 19/11/94



TASMANIA
DEVELOPMENT
AND RESOURCES

Appendix (5)

AGSO



AUSTRALIAN
GEOLOGICAL SURVEY
ORGANISATION

848013

TASMANIA NGMA PROJECT "TASGO":

Geological Framework of an "Island State with Potential"

Mineral Resources Tasmania (MRT)

and the

Australian Geological Survey Organisation (AGSO)

*Draft Proposal for a new National Geoscience
Mapping Accord (NGMA) Project 1994 to 1997*

Second Draft, 29 July 1994.

EXECUTIVE SUMMARY

The National Geoscience Mapping Accord (NGMA) is a cooperative arrangement between the Commonwealth and the States, through AGSO and State/Northern Territory Geological Surveys, to provide a new generation of geoscience maps and data sets for Australia through the utilisation of state-of-the-art technologies and the collaboration of Governments, the minerals and petroleum industries, and universities.

This draft document gives an outline of a 3-year NGMA Project designed to increase exploration, development and investment in Tasmania. A strategy, work plan and multidisciplinary activities to improve the definition of Tasmania's minerals and petroleum potential is proposed.

This is to be achieved largely through the acquisition and interpretation of new state-of-the-art geophysical data, supplemented by some review work to provide a framework at depth for the surface mapping to fit into and for the State's mineral and petroleum potential to be reassessed through the better understanding that will emerge.

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OUTCOMES

Increased exploration, development and investment in Tasmania through

- improved definition of minerals and petroleum prospectivity zones, especially those not being explored,
- more efficient exploration in strategic prospectivity zones
 - based on a better understanding of Tasmania's deep structure, its known mineralisation, and a better understanding of the potential for petroleum.

PREAMBLE

Tasmania has a good coverage of geological maps (Attachment 1). The State is richly endowed with world-class deposits of copper-zinc-lead-silver-gold, significant tin, tungsten, gold and iron, and lesser platinum group-metal deposits (Attachment 2). This extensive suite of mineral deposits is located in a small land mass, more than adequately serviced by towns, roads, power and other necessary infrastructure.

Not surprisingly, the 1993 Commonwealth Government's Task Force on Regional Development considered Tasmania's best opportunity for growth to be in minerals processing. Legislative, regulatory and policy changes recently enacted and initiated by "Tasmania-Development and Resources", emphasise the State's pro-development platform.

Geological maps are the primary information source that minerals and petroleum companies use to begin their assessments of risk associated with exploration. The maps are also a key data set used in resource assessments, helping to underpin Government decisions on multiple land use issues.

It is clear that the current availability of quality geological maps alone is insufficient to sustain the level of exploration activity required for a healthier State economy with considerable minerals processing potential. In consequence, more scientific innovation to supplement the mapping effort is required. It now seems a good time *to place this mapping in a framework* through the acquisition of new information on the State's geology *at depth*.

It is proposed that this be via high-technology studies. The character of Tasmania's principal geological structures *at depth* cannot be uniquely determined from surface mapping. Several models exist for some key structures, but they vary considerably. They must be tested before they can reliably used to generate new ideas for exploration.

It is known that the land mass of Tasmania is made up of several "provinces" of old rocks between which lie narrower geological "troughs" with slightly younger rocks (Attachment 3). Both the provinces and the troughs contain mineralised belts (Attachment 4). These features are now anchored to the Earth's deep crust by a pedestal of unknown rocks through which fluids containing the minerals have passed. The pathways of these former fluid systems also need to be defined, where possible.

Covering the junction of two major provinces is the Tasmania Basin. It has considerable coal resources and would be prospective for petroleum if its strata are sufficiently thick. However, this basic information on the basin's thickness is not known with sufficient certainty, largely due to the cover of younger rocks.

Offshore, younger basins adjoin Tasmania's western and northern margins but these are poorly explored. Their known geological histories appear similar to the oil-generative Gippsland Basin which has sustained much of Australia's petroleum needs for a long time.

The Tasmania NGMA Project has been designed to provide some answers and to find missing links. If successful, a *framework* for understanding the relationships of the various "bits" that make up Tasmania at depth will emerge. Ideally, present and future geological mapping can then be placed in and integrated with this framework.

If so, the State's minerals and petroleum systems can then become better understood, hence the importance of this project for exploration, development and investment in Tasmania.

OBJECTIVE

Define and characterise the large scale structure of Tasmania to provide a framework for existing mapping, thereby

- constraining models for the State's geological evolution

- as an input to improved minerals and petroleum exploration strategies
- for developing new insights towards the understanding of the State's minerals and petroleum resources.

STRATEGY

The project will place Tasmania in its regional southeast Australian context. The building blocks of Tasmania will be defined. How the mineral and petroleum systems fit into this framework will be ascertained. The specific steps in this strategy are illustrated in Fig. 1 (overleaf) and outlined as follows:

- Define and explain Tasmania's place within the continent
- Determine the size, shape and distribution of the tectonic elements which comprise the geology of Tasmania
- Define the internal structure of the tectonic elements and characterise the boundaries between them
- Examine if there is a relationship between known mineralisation and major structures, and resolve the shape, direction and dip of the major structures
- Define the fluid flow paths of mineral systems and build models for exploration
- Highlight features pertinent to understanding the petroleum potential of Tasmania.

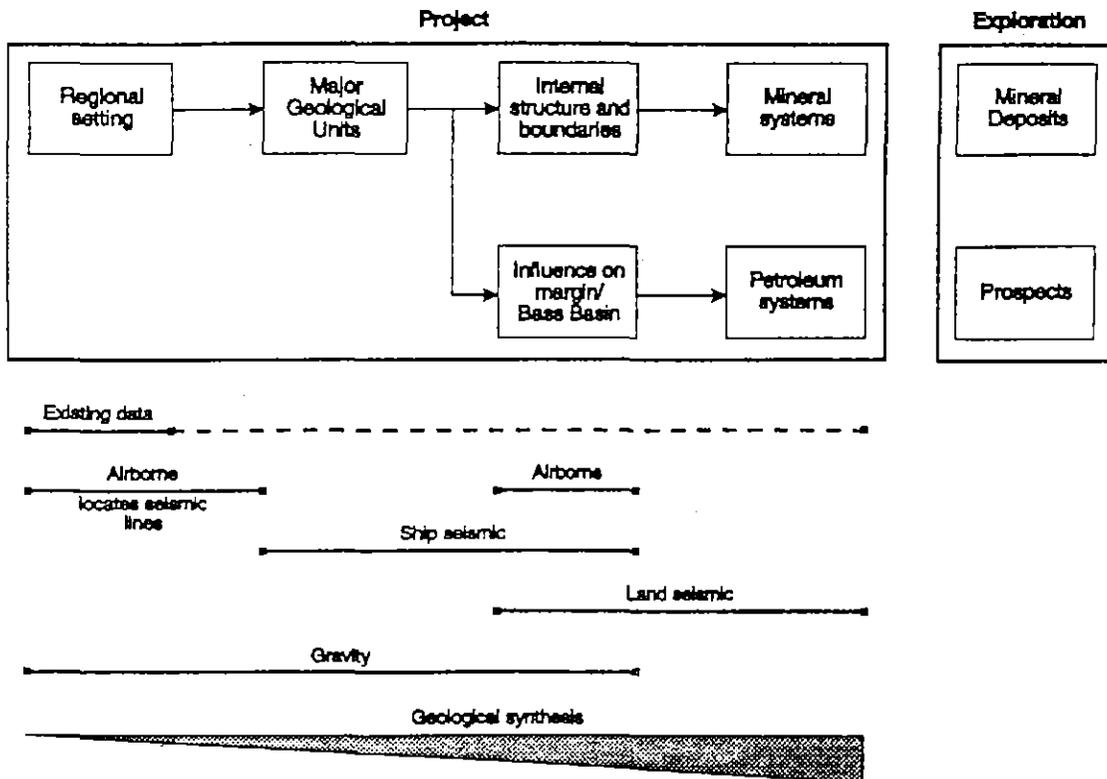


Fig. 1: Project Strategy

WORK PLAN

Collate the existing geophysical (particularly gravity and magnetic), geochronological and geological data to

- define the main geological events that built Tasmania
- relate the events in time and effect to those observed on the mainland and along the continental margin.

Collect new quality airborne magnetic data around the margins of Tasmania (Attachment 5) in order to

- better define the main tectonic elements
- position a number of regional seismic reflection profiles offshore.

Collect regional seismic reflection profiles along the northern, western and southern margins (Attachment 6) to

- define the structure in the upper 10 to 20 km of the crust
- characterise the internal structure of major crustal blocks and the geometry of their boundaries including the Dundas Trough and Arthur Lineament.

Continue profiling along the eastern margin to allow a piggyback refraction/tomographic experiment in order to

- define the structure of the lower crust.

Record seismic reflection profiles onshore across tectonic element boundaries and mineralised zones (Attachment 6) and in particular

- the Dundas Trough and its relationship to the adjacent Rocky Cape and Tyennan Blocks in west Tasmania
- structures associated with gold mineralisation in the northeast
- experimental recording to attempt to image Permo-Triassic sedimentary rocks of the Tasmania Basin beneath Jurassic dolerite cover in central and eastern Tasmania.

TIMETABLE

The project will take 3 years. It will comprise a number of linked sub-projects as outlined below and with timing of key elements indicated in Fig. 2.

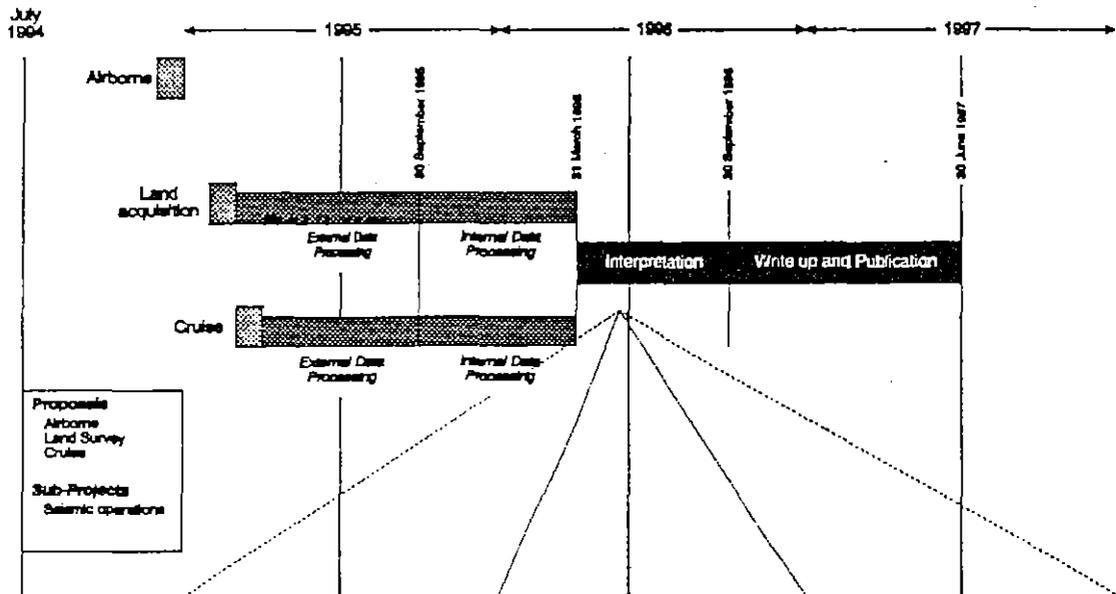


Fig. 2: Project Timetable

SUB-PROJECTS

1. Geological Synthesis at Plate/Framework and Element Scales.

The sub-project will be a compilation and review of existing knowledge and concepts. Its objective is to define, within logistic constraints, the optimum positions for seismic reflection and refraction profiles along the northern, western and southern coastlines.

The primary products of the sub-project will be a new 1:500,000-scale strato-tectonic map for Tasmania and time-space plots of depositional, igneous, mineralising and deformational events for each tectonic element.

These products will be comprehensive new style summaries of Tasmania's geology valuable for anyone wanting to explore or study Tasmania. They will be updated during the life of the project. The first editions are expected to be available from December 1994 as computer-generated, date-stamped paper copies printed at cost on demand.

2. Dating Tasmania's Geological Events.

Recent zircon dating has revealed the presence of a previously unknown basement beneath the rocks exposed at the surface. The significance of this basement will be assessed especially during interpretation of the seismic surveying.

More dating by this technique will be carried out where such work can be justified in terms of the project's purpose. Priority will be accorded to dating that can constrain the timing of poorly dated tectonic events and which can improve the geochronological timescale through ascertaining the duration of key fossil zones.

3. New Aeromagnetic Data Acquisition and Interpretation

New aeromagnetic data, mostly at 500m line spacing, will be collected over up to four areas: the northeast, northwest, west and south (Attachment 5). The coverage will extend from the onshore areas to the continental shelf. This will provide geological correlations between areas covered by shallow water and help to position marine seismic reflection profiles (see below). The outputs of this sub-project will be new airborne magnetic maps and images, each with an interpretation. Fieldwork is scheduled for the second half of 1994.

4. Three Dimensional Control of Models of the Tasmanian Crust

Estimates exist for the thickness of the crust for many of Tasmania's tectonic elements but they need to be confirmed. The internal structure of the various tectonic elements and the nature of the boundaries between them are poorly known at depth. The main outcomes of this sub-project will be well constrained 3-D models of the Tasmanian crust and key structures.

This is to be achieved through the acquisition and interpretation of new seismic reflection profiles and gravity surveys along these traverses. The marine seismic profiles will be shot along the northern, western and southern margins.

Prior to the marine surveying, an array of refraction recorders will be established across Tasmania to acquire data for an experimental tomographic and 4-D modelling study by the Australian Geodynamics Cooperative Research Centre.

Onshore, seismic surveying will be undertaken in the Dundas Trough, across the Arthur Lineament and across another lineament that may have significance for gold mineralisation in the northeast. Experimental recording to determine the thickness of the Tasmania Basin will also be attempted.

Weather conditions will be a substantial limiting factor so fieldwork is scheduled for summer and early autumn of 1995. Data processing will begin when fieldwork is complete. Preliminary sections will be available about six months after fieldwork and final sections a further six months later.

5. Tectonic Synthesis of Tasmania

The tectonic synthesis sub-project will effectively take over where the first sub-project finishes. It will take the tectonics elements map and test it with the results of geophysical interpretations. A final version of the proposed new 1:500,000-scale stratotectonic map will then be produced with cross sections incorporating the results of seismic interpretation.

6. Reviews

It is planned to carry out some additional review work of existing information to provide impartial and dispassionate constraints (or the

elimination of existing constraints) as baseline information for taking into account when the results of the new geophysical work are being interpreted.

Such summary reviews will be available in draft form in readiness for the interpretation of the seismic data and are currently planned as follows:

- the degree of biogeographic provincialism (if any) in Tasmania's palaeontological record
- geochemical characteristics of Tasmania's mafic and ultramafic rocks, their degree of similarity to others in the Tasman Fold Belt System and the "affinities" of such compositions
- geochemical characteristics of Tasmania's calc-alkaline rocks and a comparison with that in other parts of the Tasman Fold Belt System and the southwest Pacific islands
- an historical review of models proposed for the tectonic evolution of Tasmania and the tectonic significance of structures if known
- a summary of the distribution, mineralogy, intensity and geochemistry of hydrothermal alteration
- a summary of any potential petroleum habitat information.

Where the expertise or knowledge required in these undertaking resides outside of AGSO and MRT, scientists from other organisations will be invited to collaborate.

7. Mineral Systems of Tasmania

Key information revealed from the interpretation of new geophysical surveys will be combined with information compiled from the relevant reviews above to define and characterise Tasmania's mineral systems. Emphasis will be placed on depth characteristics and any areas outside the main prospectivity zones found to be suitable for exploration. This information will be available towards the end of the project.

8. Petroleum Systems of Tasmania

The Larapintine, Gondwanan and Austral Petroleum Systems (defined by Marita Bradshaw, AGSO, *PESA Journal* 21, p. 43-53, 1993) are all present in Tasmania. Information acquired during the project will be added to existing knowledge to provide more information about each system and their potential in and around Tasmania. The outcome of this study will also be available towards the end of the project.

PARTICIPATING ORGANISATIONS

A list of the organisations and the nature of their possible involvements is outlined below to give an impression of the extent of collaboration being proposed. It is emphasised that talks and negotiations are either still at an early stage or have not yet been undertaken in some instances.

AGSO

- project coordination
- geochronology
- airborne geophysics and interpretation
- land seismic and gravity surveying, and interpretation
- marine seismic and gravity surveying, and interpretation
- review studies, geological syntheses and map compilation.

MRT

- geological synthesis, map compilation and review studies
- magnetic, gravity and seismic interpretations
- databases.

Australian Geodynamics Cooperative Research Centre

- Tomography
- 4-D Modelling (technological aspects; to be confirmed).

Centre for Ore Deposit and Exploration Studies (CODES)

- ore deposit modelling and ore environment geochemistry (to be jointly discussed and confirmed)

University of Tasmania and other Universities

- contributions of first-hand knowledge and information on tectonics, gravity, mineral deposits, maturation, heat flow and other disciplines deemed to be relevant (to be discussed and confirmed).

Companies

- the project hopes that exploration companies will make contributions to the work plan. CRA, RGC, Pasminco and Aberfoyle are known to be currently active in Tasmania.

FURTHER PROJECT INFORMATION

Dr Tony Brown
State Chief Geologist
Mineral Resources Tasmania
P O Box 56
ROSNY PARK, TAS., 7018

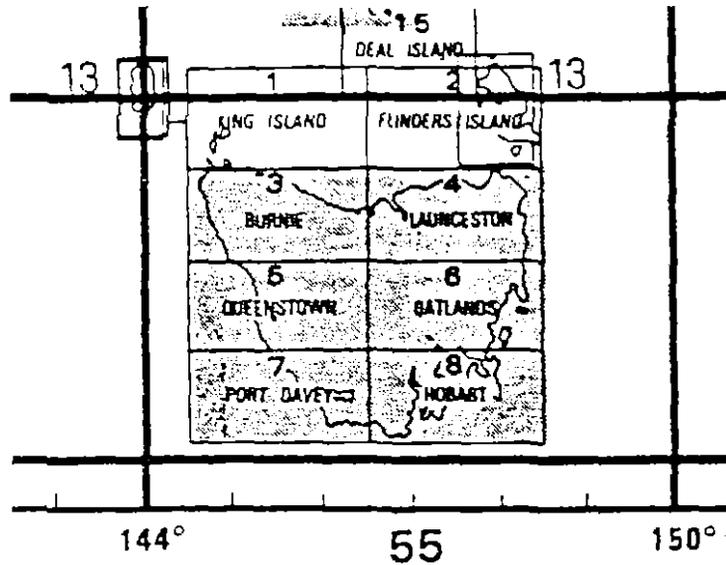
Telephone: (002) 338 365
Fax: (002) 338 338.

Mr A N (Tony) Yeates
Project Coordinator
Australian Geological Survey Organisation
GPO Box 378
CANBERRA ACT 2601

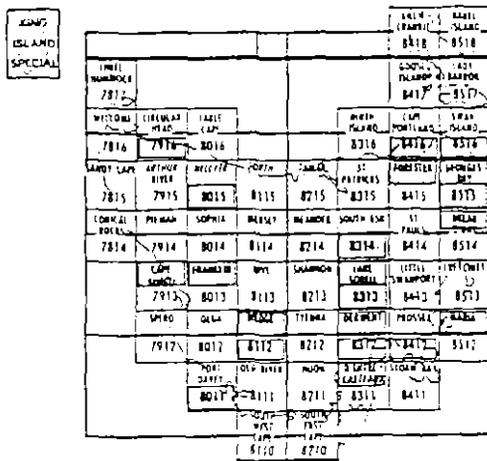
Telephone: (06) 249 9335
Fax: (06) 249 9983.

ATTACHMENT 1: Series Geological Mapping Coverage of Tasmania

(a) 1: 250,000 Scale (There is complete Coverage)



(b) 1: 50,000 Scale Coverage



Blue Tier	8515-I,IV	Padder	8112-II,III
Boobyalla	8416-II,III	Ringarooma	8415-I,IV
Brighton	8312-I,IV	Saint Helens	8515-II,III
Davey	8011-II,III	Saint Marys	8514-I,IV
Eddystone	8516-II,III	Saint Valentines	8015-II,III
Hobart	8312-II,III	Smithton	7916-II,III
Huntley	8112-I,IV	Sorell	8412-II,III
Kingsborough	8317-I,IV	Strehan	7913-I,IV
Lake Mary	8314-II,III		
Lake Sorell	8313-I,IV		
Lyll	8013-I,IV		
Maria	8512-I,IV		
Oatlands	8313-II,III		

Note: Several areas are also covered by non-serial Special Maps (e.g. Mt. Read Volcanics 1: 100,000 Scale; Corbett et al., 1988).

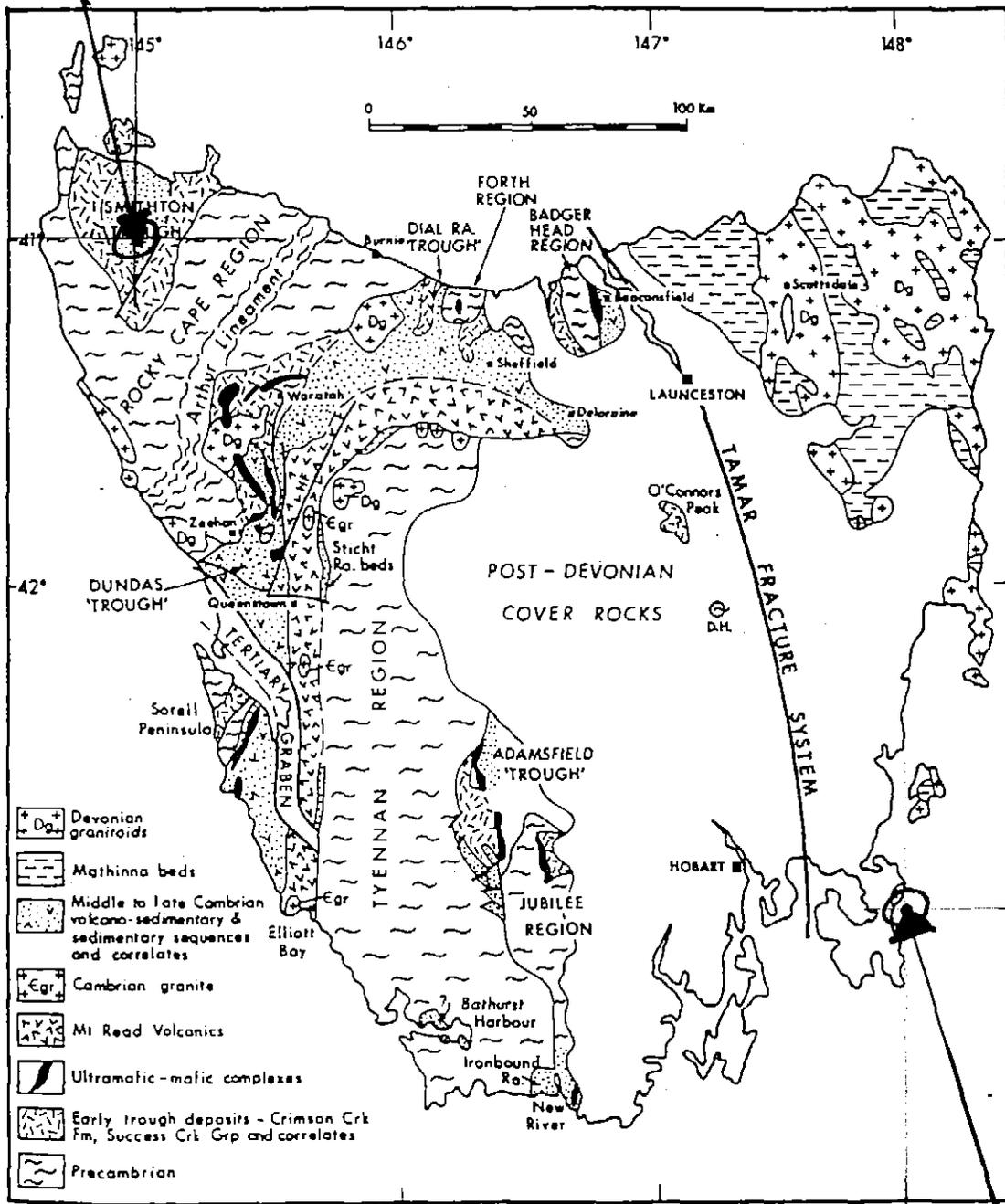
ATTACHMENT 2: Chronology of Lithogenesis, Events and Mineralisation in Tasmania (Collins & Williams, 1986).

Age	Sedimentation and volcanic activity		Tectonic and igneous activity	Mineralization
Quaternary	Fluvial and coastal deposits Widespread glaciation			
	----- Erosion -----			
Tertiary	Shallow-marine sand Basalt lava flows Terrestrial clay, sand, gravel			Alluvial Sn, Au, Os-Ir; Chromite, lateritic Ni
Cretaceous	----- Erosion -----		Formation of troughs and separation of Australia and Antarctica	
Jurassic			Syenite intrusion (SE Tasm.) Epeirogenic deformation Intrusion of dolerite	Au in syenite
Triassic	Terrestrial sandstone, coal measures			
Permian	Shallow glacio-marine mudstone, sandstone, minor oil-shale, terrestrial coal measures Widespread glaciation (tillite)			Sn in "fossil" placers
Carboniferous			Lateral movement along Tamar fracture system	
			Granitoid intrusions (high level, mainly S-type)	Granitoid-related mineralization Sn greisen (<i>Anchor</i>); Sn, W vein (<i>Aberfoyle, Storeys Ck, Oakleigh Ck,</i> <i>Interview R.</i>); W skarn (<i>King Is.,</i> <i>Kara</i>); Sn carbonate-replacement (<i>Renison, Cleveland, Mt. Bischoff</i>); Ag-Pb-Zn vein (<i>Zeehan, Mt. Farrell,</i> <i>Magnet</i>); Au reef (<i>Baconsfield,</i> <i>Lefroy, Mathinna</i>)
Devonian	Local cave deposits in Gordon Lime- stone	<i>NE Tasm.</i> <i>Dacitic ignimbrite,</i> <i>intra-caldera sheet</i>		
	----- Unconformity -----		OROGENY (correlated with Tabberabberan)	
Silurian	Shallow marine quartz sandstone, mudstone, minor limestone	<i>Deep marine</i> <i>turbidite</i> <i>quartzwacke,</i> <i>mudstone</i>		
Ordovician	Shallow marine limestone (Gordon Limestone) Shallow marine and terrestrial quartz sandstone, conglomerate	<i>Mudstone, minor</i> <i>turbidite</i> <i>quartzwacke</i> -----?-----	Thermal event	Stratabound veined and disseminated Pb-Zn sulphides (<i>Zeehan</i>) in Gordon Limestone
	Local turbidite quartzwacke and volcanic- volcaniclastic sequences	----- Unconformity -----	Local deformation associated with emergence of Tyennan geanticline	
Cambrian	Mudstone, turbidite lithic-wacke, chert conglomerate (<i>Dundas Group</i>)	<i>Rhyolitic-andesitic,</i> <i>subaerial-</i> <i>subaqueous</i> <i>volcanics and</i> <i>volcaniclastics (Mt.</i> <i>Read Volcanics)</i>	Subvolcanic granitoids and porphyritic intrusions in <i>Mt. Read Volcanics</i>	Volcanogenic massive sulphide deposits Disseminated Cu-Ag-Au (<i>Mt. Lyell</i>) massive, bedded Zn-Pb-Cu-Ag- (<i>Rosebery, Hercules, Que River,</i> <i>Hellyer</i>) in <i>Mt. Read Volcanics</i>
	----- Erosion -----	-----?-----	Local erosion Emplacement of mafic-ultramafic masses during mild compression	Os-Ir, Ni sulphides, Cr in serpentinized ultramafics; Cu-Ni sulphides in gabbro (<i>Cuni</i>)
Eocambrian	Deeper marine mudstone, turbidite lithic-wacke, basaltic volcanics, chert, limestone (<i>Crimson Creek Formation</i>) Shallow-marine quartz sandstone, dolomite	----- Unconformity -----	Development of narrow depositional troughs during tension	Cu in basalt
	----- Structural hiatus -----		PENGUIN OROGENY - local metamorphism (<i>Arthur Lineament</i>), granitoid intrusion (S-type, <i>King Is.</i>)	
Late Proterozoic	Turbidite quartzwacke, mudstone, minor basaltic volcanics, dolomite-magnetite (<i>Burnie, Oonah Formations</i>) Shallow-marine quartz sandstone, mudstone (<i>Rocky Cape Group</i>)		Dolerite intrusion, mafic-ultramafic emplacement	Volcanogenic massive magnetite- pyrite - associated with basaltic volcanism (<i>Savage River</i>)
	----- Structural/metamorphic hiatus -----		FRENCHMAN OROGENY Mafic intrusions (now amphibolite), eclogite	
	Metamorphosed successions derived from shallow-marine quartz sandstone, mudstone (<i>Tyennan region</i>)			

Pre-Carboniferous data for western Tasmania is shown in normal type and for northeast Tasmania in italics.

ATTACHMENT 3: Tectonic Elements (Corbett & Turner, 1989).

AM 9
332000E
5460000N



41

42

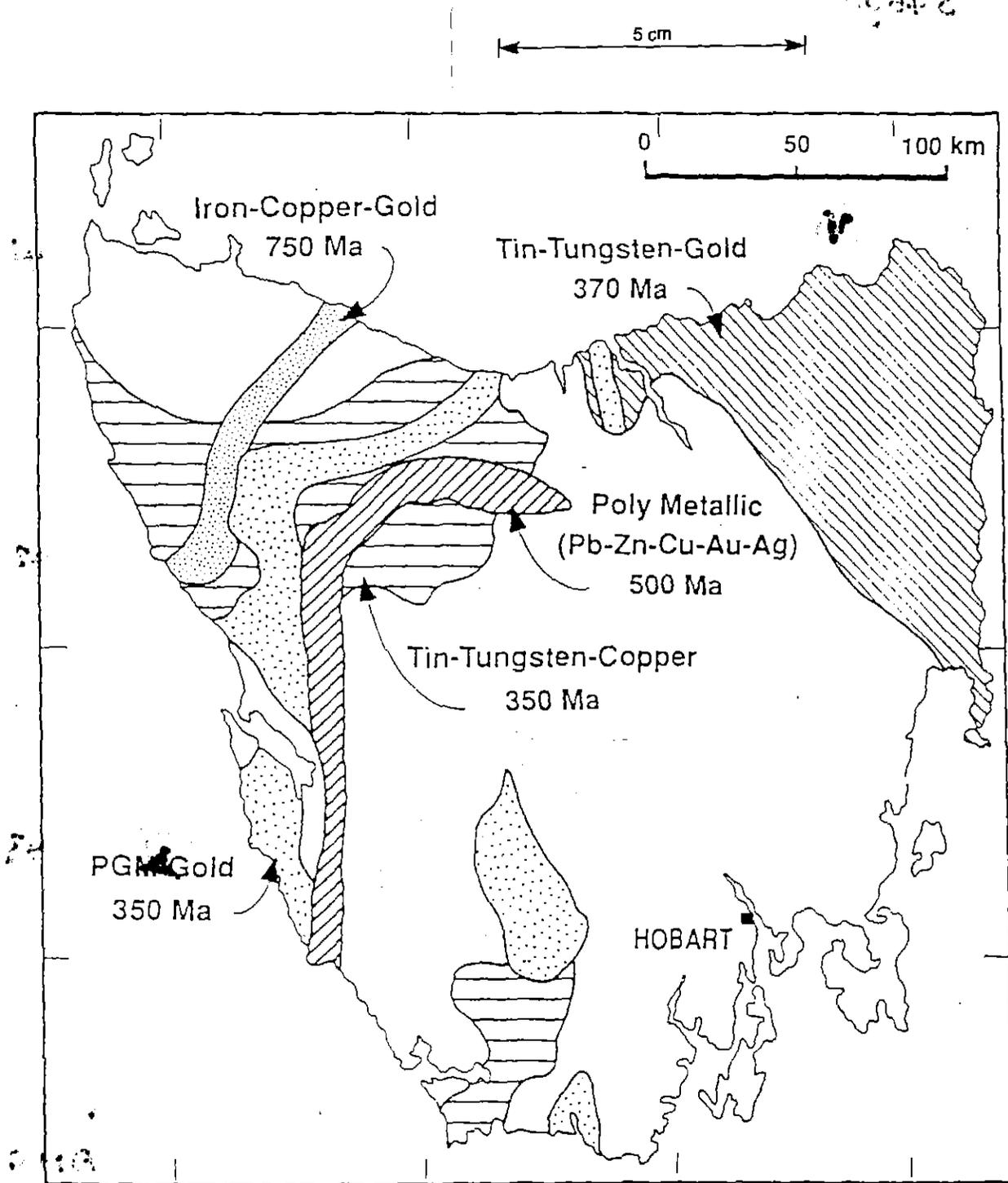
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5 cm

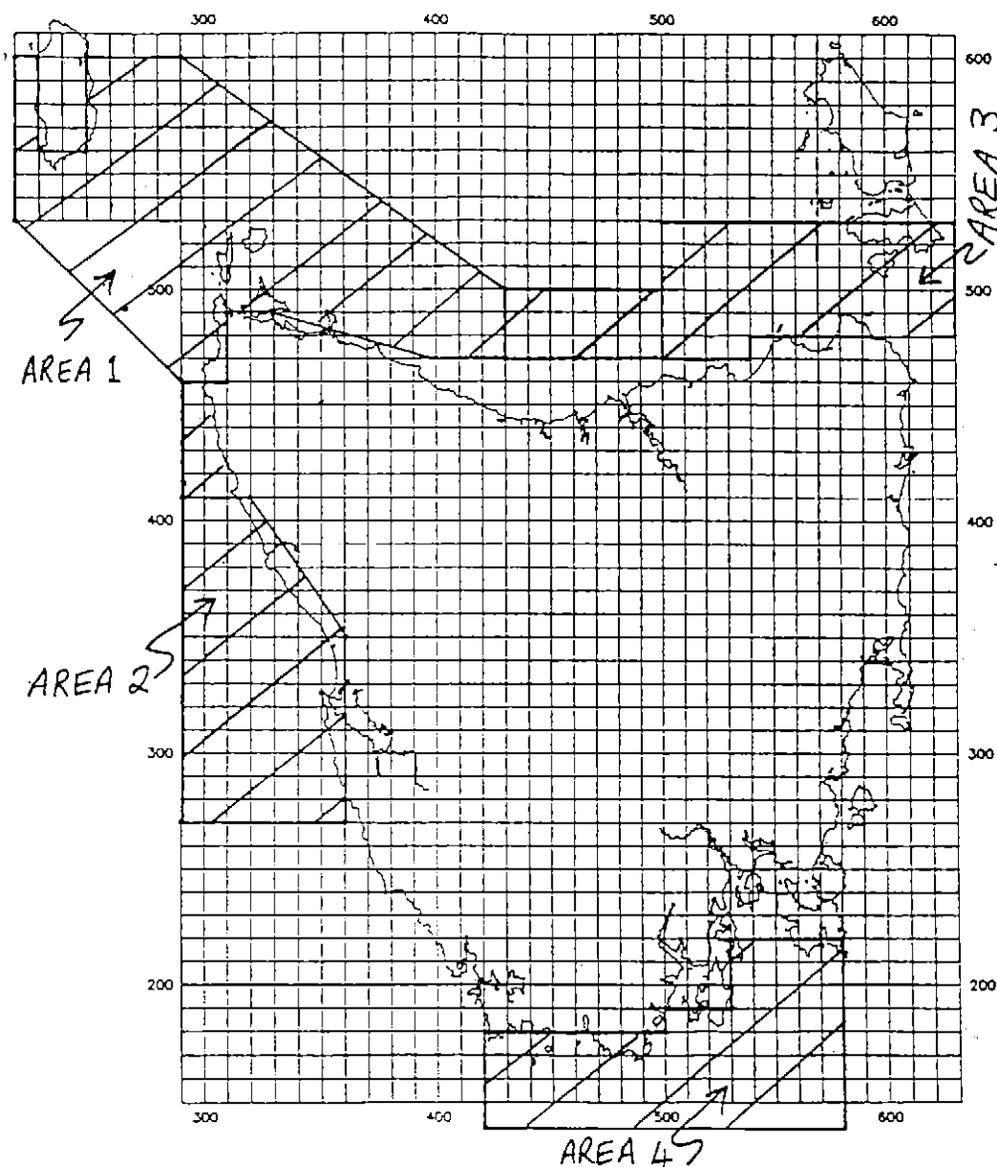
AM 9
581500E,
5238500N

AMG REFERENCE POINTS ADDED

ATTACHMENT 4: Major Mineral Belts in Tasmania and their Ages
(ABARE: National Agricultural and Resources Outlook Conference 1992).



ATTACHMENT 5: Locations of Indicative Aeromagnetic Surveying; Areas are ranked in order of priority. Note: Areas 1, 2 and 3 have now been joined.



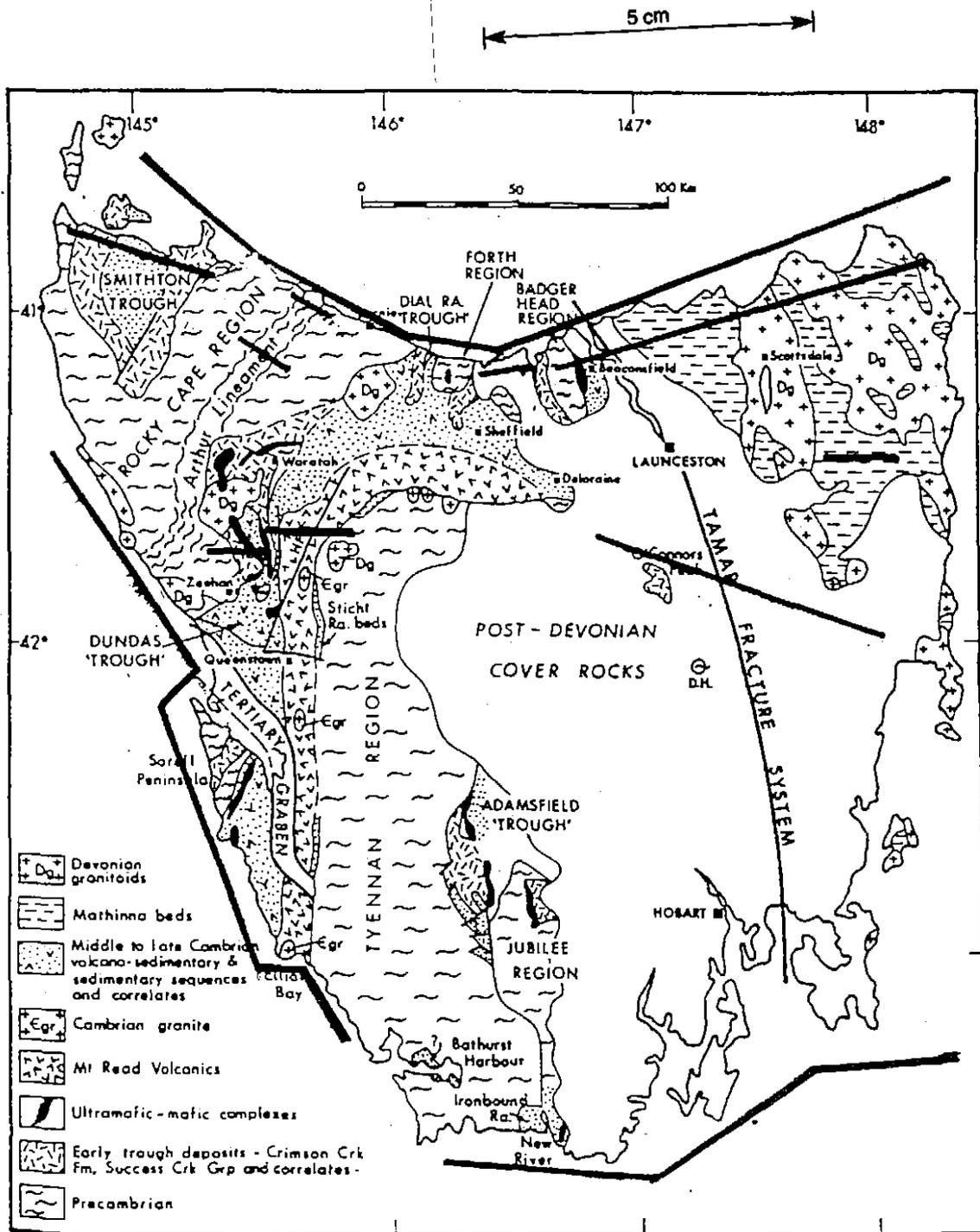
AREA 1: to survey relationship of Smithton Trough and Arthur Lineament to Precambrian Blocks

AREA 2: to survey the contacts of the Arthur Lineament and Dundas Troughs where they abut Precambrian Blocks.

AREA 3: to survey the east and west Matthina Beds contact and two contrasting regions of granitoids and the "Tamar Lineament".

AREA 4: to survey a possible basement disjunction beneath the Tasmania Basin and obtain an estimate of the basin's thickness.

ATTACHMENT 6: Locations of Indicative, Logistically Feasible Seismic Traverses to Examine the Internal Structure of Tectonic Elements and the Relationships Between Elements at Depth (Base Map after Corbett & Turner, 1989).



————— logistically feasible seismic traverse