RECORD 1982/7

BUREAU OF MINERAL RESOURCES

1982/3 PROGRAM

30-5/32

RECORD 1982/7

BUREAU OF MINERAL RESOURCES
1982/83 PROGRAM SUMMARY

Compiled by Planning Section

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INTRODUCTION

ROLE

The role of the Bureau of Mineral Resources, Geology and Geophysics is

(i) to develop an integrated, comprehensive, scientific understanding of the geology of the Australian continent, the Australian offshore area and the Australian Antarctic Territory, as a basis for minerals exploration; this to be done where appropriate in co-operation with State Geological Surveys and other relevant organisations and having regard to priorities for the search for minerals approved by the Minister for National Development and Energy;

(ii) to be the primary national source of geoscience data and to publish and provide information; and

(iii) to undertake mineral resource assessments in accordance with programs and priorities approved by the Minister for National Development and Energy with the advice of the BMR.

STRUCTURE

To carry out the first part of this role, there are four research divisions - three being concerned with onshore geoscience research programs, and one with offshore research responsibilities. The Baas Becking Geobiological Laboratory also operates within BMR.

The Resource Assessment Division has responsibility for mineral and petroleum assessments and the operation of the national geoscience database.

A Special Projects and Geoscience Services Branch oversights BMR's national and international commitments, including aid projects, and also provides geoscience support services. There is also a Planning and Programs Branch.

BMR will adopt this structure as the basis for its operations in mid 1982.

PROGRAM

The Divisional programs listed in this document have been developed in consultation with State Government Geological Surveys, industry, and universities. Any projects listed in this document which are under discussions with these organisations may be still subject to agreement.

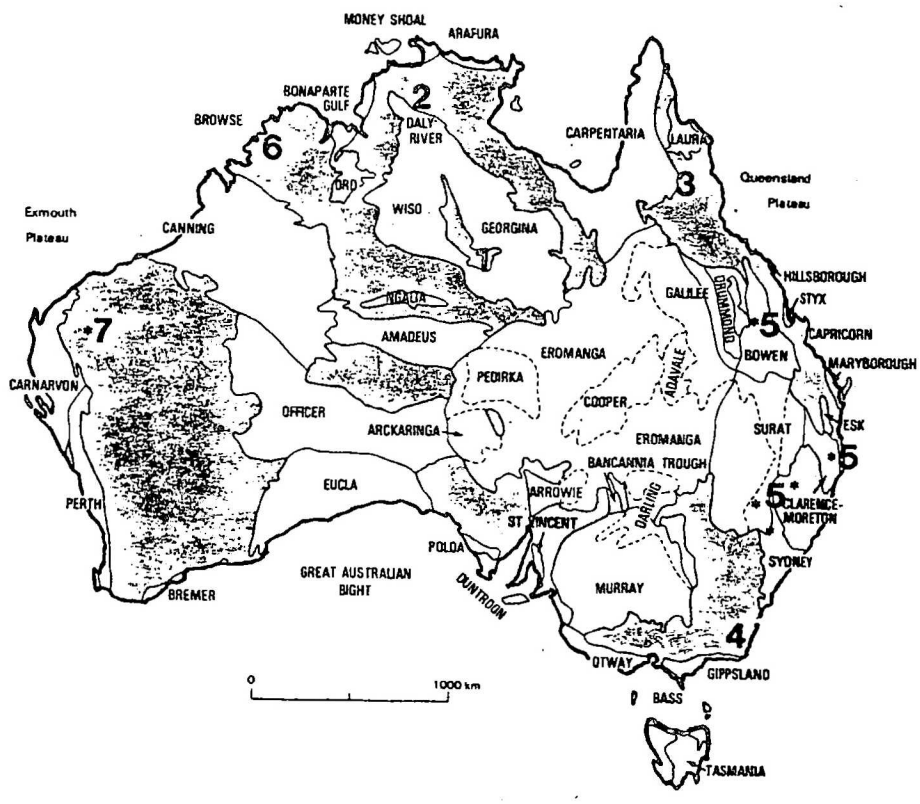
This Record is a summary document which lists projects to be undertaken in 1982/83 and comments on larger projects. A BMR contact officer is nominated for each project and where a number appears after the title it refers to the locality map for the Division.

More detailed reporting of progress of the major scientific programs in 1981 is contained in BMR Reports 238 and 239. A general statement of programs carried out in 1981 is to be found in the BMR 1981 Yearbook.

DIVISION OF PETROLOGY AND GEOCHEMISTRY

The Division of Petrology and Geochemistry undertakes basic geochemical, petrological and mineralogical studies of major sedimentary and igneous rock suites, of the environments of metalliferous deposits, and of the deposits themselves. It also undertakes structural analyses and multidisciplinary studies of metallogenic provinces.

This year the main efforts of the Division are directed towards multidisciplinary studies in the Pine Creek (NT), Davenport Range (NT), and Palmerville (Qld) regions. The map below shows the locations of field projects. A list of projects, with comments on the larger ones, follows.



PETROLOGY & GEOCHEMISTRY 1982/83 FIELD PROGRAM

1. Davenport Block
2. Pine Creek Geosyncline
3. Palmerville lineament
4. Canberra 1:250 000 mapping
5. East Australian volcanism
6. Alkaline ultramafic rocks
7. Turee Ck. uranium deposit

STUDIES OF METALLOGENIC PROVINCES

Arunta Block, NT (R.D. Shaw)

BMR's involvement in the Arunta Block started in 1970 when a program of 1:250 000 geological mapping was initiated. Field work associated with the mapping finished in 1980 and map compilation and reporting will be

completed by the end of 1982. The program was carried out in collaboration with the Northern Territory Geological Survey (NTGS). Several research projects arose from the mapping program. These include petrological and geochemical studies of igneous and metamorphic rocks (Glikson; Warren) and of orebodies and associated rocks (Warren). Laboratory studies and reporting are to continue this year.

Davenport Geosyncline, NT (1) (D.H. Blake)

Study of the Davenport Geosyncline commenced in 1981 as a joint project with NTGS. The objectives are to determine the detailed stratigraphy, structure, geological history and mineral potential of the Precambrian rocks of the Davenport and Murchison Ranges, NT. This year the geological research will be conducted in the Bonney, Ooradidgee, Wauchope, Davenport Range, Hanlon and Elkedra 1:100 000 Sheet areas (June-September).

Pine Creek Geosyncline, NT (2) (R.S. Needham)

The detailed geological investigations in the Pine Creek region commenced in 1971 with a program of 1:100 000 mapping conducted jointly with NTGS. A number of research projects arose from this mapping. The objectives of the current study are to understand the genesis and location of orebodies in relation to the sedimentary, metamorphic and igneous history. Field work in 1982 will be conducted in the Fergusson River, Katherine, Eva Valley and Maranboy 1:100 000 Sheet area. Some drilling is planned for the Noonamah 1:100 000 Sheet area.

Georgetown Inlier, Qld (J.H. Bain)

Study of the Georgetown Inlier was initiated in 1972 and was conducted in collaboration with the Geological Survey of Queensland (GSQ). The objectives were to investigate the stratigraphy, structure, ages and origins of Proterozoic rocks in the western part of the inlier and of the superimposed Upper Palaeozoic intrusive-extrusive assemblages. This project is virtually complete; reporting and map production continue this year. In 1979 a separate study of the metamorphic and intrusive rocks in the southeastern part of the inlier commenced. Reporting and map production are scheduled for this year.

Palmerville, Qld (3) (D.E. Mackenzie)

A new joint project with GSQ to study the metallogenic province of the Palmerville region is aimed at developing an understanding of the numerous mineral deposits associated with volcanic and granitic rocks. Field work in the Featherbed Range is planned for the July-September period.

Araluen Geochemistry, NSW (B.I. Cruikshank)
Canberra 1:250 000 Mapping, ACT and NSW (4) (R.S. Abell)
Yilgarn Block Geological Mapping, WA (R.J. Tingey)

REGIONAL STUDIES OF MAJOR ROCK UNITS
Volcanology (5) (R.W. Johnson)

Studies are being made of Cainozoic volcanism in Papua New Guinea, New Georgia and eastern Australia. The study of volcanism in Papua New Guinea in collaboration with universities and the Rabaul Volcanological Observatory has been a long term project and is nearing completion with the emphasis in 1982-83 on reporting.

The eastern Australian study is in its initial phase. A specialist team will study this unique volcanic province as a fundamental contribution to the understanding of continental volcanism and crustal evolution. Reconnaissance trips are planned to take place during October.

Alkaline Ultramafic Rock Study (6) (A.L. Jaques)

This project is a co-operative venture with the Geological Survey of Western Australia (GSWA). A study is to be made of the geology, geochronology, petrology and geochemistry of kimberlites and lamproites in the West Kimberley region to provide a framework for diamond exploration. Field work this year will be undertaken by GSWA.

Granite Studies, Nicholson - Mount Isa Belt, Qld (L.A. Wyborn)

Isotopic Study of the Precambrian/Cambrian Boundary, Tas (L.P. Black)

Geochronology of the St Marys Porphyrite, Tas (L.P. Black)

Petrogenesis of the Boggy Plain Granitic Complex, NSW (D. Wyborn)

BASIC STUDIES OF SPECIFIC ORE DEPOSITS

Nabarlek Uranium Deposit, NT (G.R. Ewers)

The objective of this study is to gain a better understanding of the genesis of the Nabarlek deposit. The study commenced in 1979 and is nearing completion. A manuscript will be produced in 1982-83.

Turee Creek Uranium Deposit, WA (7) (G.R. Ewers)

It is proposed to carry out a study to determine the factors controlling the emplacement of the uranium orebody at Turee Creek. Field work is proposed for August-September.

Ranger 1 Biogeochemistry and Soil Geochemistry, NT (B.I. Cruikshank)

DIVISION OF CONTINENTAL GEOLOGY

The Division of Continental Geology will undertake studies of sedimentary basins and of sedimentary systems which have continental development in Australia and which may be host to fossil fuels or mineral deposits. It will also undertake studies of the characteristics and origin of fossil fuels, research into the effect of surface processes on the bedrock of the Australian continent, and studies into the development and application of remote sensing techniques.

The basin studies undertaken by the Division are naturally divided according to the geological age of the basins concerned. Basin analysis of Mesozoic and Tertiary Basins is being developed in relation to the occurrence of petroleum, oil shale and coal. The late Precambrian and Palaeozoic basins also have petroleum potential but are also of interest for the occurrence of sedimentary ore deposits such as phosphate and for base metal deposits. The older Precambrian basins are currently of interest for their iron ore deposits as well as base-metals. Basin studies in 1982/83 are being undertaken on various aspects of the McArthur, Georgina, Amadeus, Eromanga and Clarence-Moreton Basins.

Petroleum source rock studies will be integrated with associated basin studies and current emphasis is being placed on central Australian basins.

An understanding of the ways in which surface processes both affect concealed mineral deposits and generate mineral deposits such as bauxite, uranium and opal is especially important rocks of the Australian continent which have been subjected to these processes for long periods. Studies in weathering profiles, hydrogeology and palaeoclimates will be increasingly focussed on an understanding of surface processes and bedrock interactions, and will receive greater emphasis in future BMR programs.

Research into the applications of remote sensing techniques to the work of this and other Divisions will also be undertaken.

Field projects being undertaken in 1982/83 are shown on the map below. A list of projects, with comments on the larger ones follows.

CONTINENTAL GEOLOGY 1982/83 FIELD PROGRAM

1. McArthur Basin
2. Georgina Basin
3. Amadeus Basin
4. Central Eromanga Basin
5. Clarence Moreton Basin
6. Oil Shale methodology
7. Permian coals of east Aust.
8. Cainozoic processes
9. Lake Eyre Basin

OLD PRECAMBRIAN BASINS

McArthur Basin NT & Qld (1) (K.A. Plumb)

A major study of the old Precambrian McArthur Basin is in progress. The basin contains a major lead-zinc deposit at McArthur and the study is directed to understanding the tectonic and palaeogeographic evolution of the basin, its organisms, and their controls on the genesis of its base-metal deposits. BMR research has identified analogies between the ancient sediments of the basin and modern depositional environments and models are being developed for the depositional environments of the basin and its deposits. Concurrent discoveries by BMR and industry have indicated a previously unsuspected hydrocarbon potential far older than any known elsewhere in the world.

Current programs are concentrating on the stratigraphy of the southern McArthur Basin, the sedimentology of the Batten Sub-group and progressive interpretation and synthesis of the geology of the Basin.

LATE PROTEROZOIC TO MID PALAEOZOIC BASINS

Georgina Basin (J.H. Shergold)

A major study of the Georgina Basin is currently near completion and provides an example of the kind of study envisaged for this Division. The Georgina Basin project has been primarily a stratigraphic synthesis, and provides the exploration industry with information on the distribution, age correlation and relationships of formations which are prospective in the search for hydrocarbon accumulations and base-metal deposits. All the major carbonate formations have been studied for their economic potential and a similar study of black shales, potential petroleum source rocks and oil shales, continues. A report incorporating the latest information on structure and stratigraphy is now in preparation.

Palaeontological studies on Late Cambrian and Early Ordovician trilobites, Middle Cambrian phosphatic faunas including phosphatic stromatolites, and late Proterozoic/Cambrian acritarchs, and work on brachiopods and molluscs by outside workers, are being undertaken to provide refined data on the timing of structural and mineralisation events and provide a biostratigraphic framework for the basin.

Sedimentology of key lithofacies associations within the Pertaoorrta Group, Amadeus Basin (J. Kennard)

Detailed sedimentological studies are being undertaken of the Todd River Dolomite and the Chandler Limestone to define their sedimentary facies, their environments of deposition and the relationships between facies. The investigations are primarily aimed at understanding the extent and control that the various facies have exerted on the generation, migration and entrapment of hydrocarbons. Field work on the Todd River Dolomite is planned in mid 1982 and laboratory work on

samples collected from the Chandler Limestone in 1981. Interpretation of organic geochemical analyses from the 1981 drilling program will be undertaken and integrated with existing source rock data on the Cambrian and Precambrian of the Amadeus Basin.

Tasman geosyncline biochronology

Palaeontological studies will continue on Silurian and Devonian conodonts (R.S. Nichol), brachiopods, trilobites and corals (D.L. Strusz) and fish (G.C. Young) and are aimed at improving biochronological control in the Middle Palaeozoic rocks of the Geosyncline.

LATE PALAEOZOIC AND MESOZOIC BASINS

Central Eromanga Basin (5) (see also Geophysics Division)

The Central Eromanga Basin Project includes seismic, gravity, deep crustal, hydrological and source rock studies. The source rock and maturation studies (C. Boreham) will use a range of techniques to identify the more favourable source rock and reservoir zones in the Central Eromanga and underlying basins. These will be subjected to further detailed study to provide data for assessment of hydrocarbon generation potential.

Hydrogeology, isotope hydrology and geochemical studies will be undertaken to assist in identifying possible hydrocarbon migration and stagnation near structural and stratigraphic traps in the Basin. Sampling of flowing artesian waterwells is to be carried out in late 1982.

Palaeotectonic evolution and depositional history of the Clarence - Moreton Basin, Qld & NSW (6) (A.T. Wells)

Field work will be undertaken in 1982 and 1983 to elucidate the tectonic and depositional history of the Basin.

Oil shale methodology - Toolebuc Formation, Qld & NSW (Joint BMR-CSIRO NERDDP Project (7). (S. Ozimic)

The project aims to develop methods which will allow the potential of a widespread sedimentary sequence to be assessed as a future source of oil shale. It is based on the Toolebuc Formation of the Eromanga Basin.

Further drilling will be undertaken in Mid 1982 in the Simpson Desert to investigate facies changes. Laboratory investigations will be carried out on cores and other samples of the Toolebuc Formation collected from this and previous drilling programs.

Permian Coals of Eastern Australia (8) (Joint BMR-CSIRO NERDDP Project) (H.J. Harrington)

The aim of this project is to collate and interpret the very large body of data available in BMR and CSIRO and elsewhere on the nature and occurrence of Permian coals in eastern Australia, with special emphasis on The Sydney and Bowen Basins and with a view to determining: (1) The nature and quality of coal and factors affecting its economic recovery, considered on a regional scale; and (2) The environment of deposition of coal measure rocks and their subsequent geological history. The study will show the geological basis of coal properties and variability on a scale larger than can be considered in connection with a single colliery or even a single coalfield, and will enable the occurrence and nature of coal to be predicted in areas where little or no knowledge now exists. Fieldwork in 1982 will be carried out in the Bowen and Sydney Basins.

Palaeontology and Biostratigraphy

Palynological biostratigraphy of Permo Carboniferous sequences (E.M. Truswell)

Upper Cretaceous nannofossils of the Australian Western margin (S. Shafik)

Devonian and Carboniferous conodont and ostracod faunas of West Australian basins (R.S. Nicoll)

Palynology of Antarctic offshore sediments (E.M. Truswell)

STUDIES OF SURFACE PROCESSES AND CAINOZOIC SEDIMENTS

Neotectonic development of Australia (G.E. Wilford)

This project will analyse the tectonic development of the Australian continent since the end of Middle Cretaceous times to provide a framework for studies of the regolith.

Cainozoic Processes, weathering and salinity in S.E. Australia (R. Evans)

Field work will be carried out in SE Australian region to interpret the variability in continental weathering regimes, determine the origin of saline groundwater and delineate the extent and influence of periglacial processes in the Cainozoic.

Palaeomagnetic investigations of Tertiary weathering profiles (M. Idnurm)

Lake Eyre Basin integrated study (M. Plane)

A synthesis of the Tertiary and Quaternary geology of the basin is to be carried out jointly with scientists from the South Australian Department of Minerals and Energy, Flinders University and the American Museum of Natural History. BMR scientists will co-ordinate the project and contribute to studies of basin palynology, magnetostratigraphy, vertebrate palaeontology and biostratigraphy.

Hydrogeology

Murray Basin hydrogeology (R. Habermehl)

Groundwater and Lake interactions in the Australian environment (G. Jacobson)

Hydrogeology of fractured rock aquifers (R. Abell)

Norfolk Island groundwater study (R. Abell)

Palaeontology and biostratigraphy

Wall textural studies in planktic Foraminifera (G.C. Chaproniere)

Mid Tertiary larger Foraminiferids from eastern Australia (G.C. Chaproniere)

Nannofossils of the Lower Tertiary, Eucla Basin (S. Shafik)

Remote sensing (C.J. Simpson)

The main thrust of remote sensing studies in this Division is toward increasing our understanding of the contribution LANDSAT data can make, in the Australian context, to the solution of geological problems such as structure, distribution of lithotypes, and surface expression of mineralisation. Investigations are being carried out into the analysis of spectral reflectance in the McArthur Basin (NT), a LANDSAT survey of the Litchfield province (NT), and applications of digital analysis and image processing to combine LANDSAT and geophysical data.

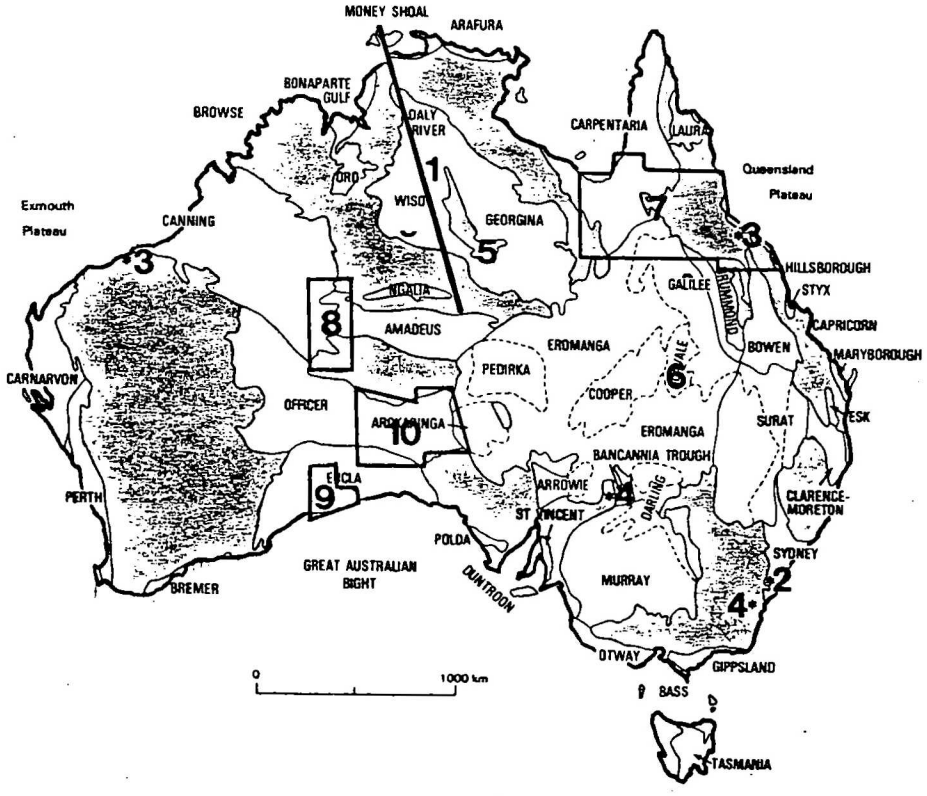
DIVISION OF GEOPHYSICS

The Division of Geophysics undertakes studies of the structure and characteristics of the crust and upper mantle (including observatory aspects of geomagnetism and seismology), relevant to the understanding of the evolution of the Australian continent and its mineral deposits. It also undertakes airborne radiometric and magnetic surveys and their interpretation as a basis for mineral exploration and research into geophysical exploration techniques and their applications.

In 1982/83 deep seismic investigations are being undertaken in a transect from Darwin to Alice Springs to obtain information on lithospheric structure in that region. Further seismic reflection and gravity work will be carried out near Quilpie in the Central Eromanga Basin as part of a major integrated study of the Eromanga Basin and its underlying basins.

Major airborne surveys are proposed for the southeast margin of the Canning Basin, the West Eucla Basin and the Officer Basin. In northeast Queensland airborne radiometric and magnetic surveying will be integrated with ground geophysical studies to provide a detailed geophysical interpretation of the region in relationship to known geological units.

The map below shows the location of field-based projects and is followed by a list of projects undertaken by the Division, with comments on the larger projects.



GEOMAGNETISM AND SEISMOLOGY

Geomagnetism (P.M. McGregor)

The broad objectives of the Geomagnetism program are to provide and publish information on the Earth's magnetic field throughout the Australian region (including offshore areas and Australian territories), to provide international geomagnetic reference standards, and to study regional and local features of the Earth's internal field, particularly in relation to the overall structure of the continent. To meet these objectives, geomagnetic observatories are operated throughout Australia and its territories, and the data recorded, analysed and distributed to meet national and international obligations. These activities will continue during 1982-83. In addition a new magnetic observatory will be commissioned at Charters Towers (Qld), and the site for a new station at Learmouth (WA) will be selected. It is also planned to complete the production of the 1980.0 isogonic maps and to analyse the secular changes which have taken place in the magnetic field in the Australian region.

Seismology (D. Denham)

This program has the broad objectives of providing and publishing information on seismic waves from near and distant earthquakes as a contribution to global seismology, studying the tectonic implications of earthquakes (particularly those in the Australian region), and assessing earthquake risk throughout the Australian continent. During 1982-83, the operation of all the seimograph stations currently recording will continue, and it is planned that two new stations (Ballidu, WA; Nyngan, NSW) will be added to the network. BMR's normal national and international obligations to provide data will be fulfilled. It is also planned to complete the analysis of the focal processes of large earthquakes that have occurred recently in the seismically active zone of southwestern Western Australia to commence a new study of earthquake risk throughout the Australian continent, to study the focal processes and effects of any large Australian earthquake that occurs during the program period, and to undertake a feasibility study of earthquake prediction methods.

CRUSTAL STUDIES

Seismic Investigations of the Deep Lithosphere (1) (D.M. Finalayson)

The principal objective of this project is to investigate seismic velocities within the lithosphere as a contribution towards basic research into the deep structure of the continent. In late 1982, BMR will record seismic shots detonated along a line extending between Darwin and Alice Springs in cooperation with ANU and the Royal Australian Navy.

McArthur Basin Palaeomagnetic Studies, NT (M. Idnurm)

The aim of this project is to define the magnetostratigraphic column for this economically important basin, and to determine the Carpentarian polar wander path. The program for 1982-83 will involve mainly analysis and reporting of data from samples collected in previous years.

Australian Gravity Maps and Gravity Surveying Control (A.S. Murray)

BMR maintains a central depository of gravity information for the Australian region which provides gravity data in various forms required for use by government, industry and others. Bouguer anomaly maps at 1:250 000 and 1:1 000 000 scales will be released progressively. In addition an accurate gravity tie will be established from Australia to Lord Howe and Norfolk Islands.

Stress Measurements and Earthquake Prediction (D. Denham)

This project commenced in 1976. The research in part has been carried out in collaboration with CSIRO. The aims are to determine the stress in the crust by using observations from earthquakes, in-situ stress measurements, and measurements and analysis of well logs. BMR plans to develop a hydrofracturing system for stress measurements during 1982 and 1983 and some tests may be conducted near Canberra in the first half of 1983.

Crustal Strain Measurements (2) (P. Wellman)

This project aims to define areas and rates of present day crustal movement on the Australian continent. During 1982-83, the program will include second order levelling by the Australian Survey Office, and analysis and reporting of relevelling results in the southwest seismic zone of Western Australia.

MAGSAT Data Analysis and Ground Control Observations (3) (J.C. Dooley)

The objectives of this work are to make use of magnetic vector data from NASA's MAGSAT satellite to improve knowledge of the magnetic field in the Australian region and in Antarctica, and to correlate the magnetic field with other geophysical data in order to study the major features of the crust in these regions. In 1982-83, MAGSAT anomaly fields will be compared with third order anomaly fields, and Australian and Antarctic MAGSAT maps will be interpreted in terms of magnetic properties of the crust and regional geology.

Seismic Crustal Studies and Systems Development (D.M. Finlayson)
Australian Regional Gravity Interpretations (P. Wellman)
Plate Tectonic Movements, PNG (D. Denham)
Geothermal Studies and System Development (J.P. Cull)
Magnetotelluric Studies (4) (J.P. Cull)

REGIONAL GEOPHYSICS

Davenport Geosyncline, NT (5) (I.G. Hone)

This study is part of the multidisciplinary Davenport Geosyncline Project. Its objectives are to undertake research into the geological parameters influencing the regional geophysics of the Davenport Geosyncline, and to assist in geological interpretation and resource assessment of the province. Work planned for 1982-83 includes ground surveys, rock property measurements, interpretation of airborne and ground surveys and reporting.

Lachlan Fold Belt, NSW (A.N. Yeates)

The geological parameters controlling the geophysical characteristics of the Fold Belt in New South Wales have been documented. Reporting will be completed in 1982.

Central Eromanga Basin, Qld (6) (F.J. Moss)

A three year survey program commenced in 1980 with the objective of defining the regional structural and depositional history of the central part of the Eromanga Basin and the underlying Adavale, Cooper and Galilee Basins in southwest Queensland. Results from the various surveys and studies are being reported as the work proceeds, and publications are expected to be finalised in 1983. This year it is planned to complete the regional seismic reflection and gravity programs for the project. These include approximately 500 km of six fold CDP seismic reflection traverses over the Adavale Basin area east of the Canaway Ridge. Recording of deep reflections (to investigate the structure of the deep crust and upper mantle) will be carried out concurrently. Gravity measurements will be conducted along seismic lines and roads. Work will also continue on processing and interpreting the 1980-81 seismic and gravity results, integrating the data with previous information, and publishing on the evolution of the area.

Northeast Queensland Geophysical Project (7) (D. Stuart)

The principal aim of this project is to aid geological mapping, mineral exploration and resource assessment by providing a reconnaissance airborne geophysical coverage of northeast Queensland (up to 20 1:250 000 Sheet areas), establishing the geophysical characteristics of the region and contributing to the interpretation of recognised geological problems. Detailed airborne surveys, ground surveys, geological observation, modelling, and laboratory studies will be involved. During 1982-83, existing data will be reviewed, part of the airborne magnetic and radiometric survey will be flown (for details see the airborne geophysics maps), and processing and interpretation of these data will commence.

McArthur Basin Detailed Gravity Investigations, NT (W. Anfiloff)

AIRBORNE GEOPHYSICS (7,8,9,10) (G.A. Young)

This program has, as its broad objective, the completion of Australia-wide airborne reconnaissance geophysical mapping. The 1982-83 period will involve collection, processing and the start of interpretation of magnetic and gamma-spectrometer data from the margins of the Canning Basin, processing and interpretation of Murray Basin and Officer Basin data, collection of additional data from the Officer Basin, processing of data from the Murray/Darling Basins, and collection, checking and editing of the West Eucla Basin field data. The northeast Queensland project is discussed above.

GROUND ELECTRICAL AND MAGNETIC EXPLORATION GEOPHYSICS

High Resolution Proton Precession Magnetometer/Gradiometer Prototype (M. Gamlen)

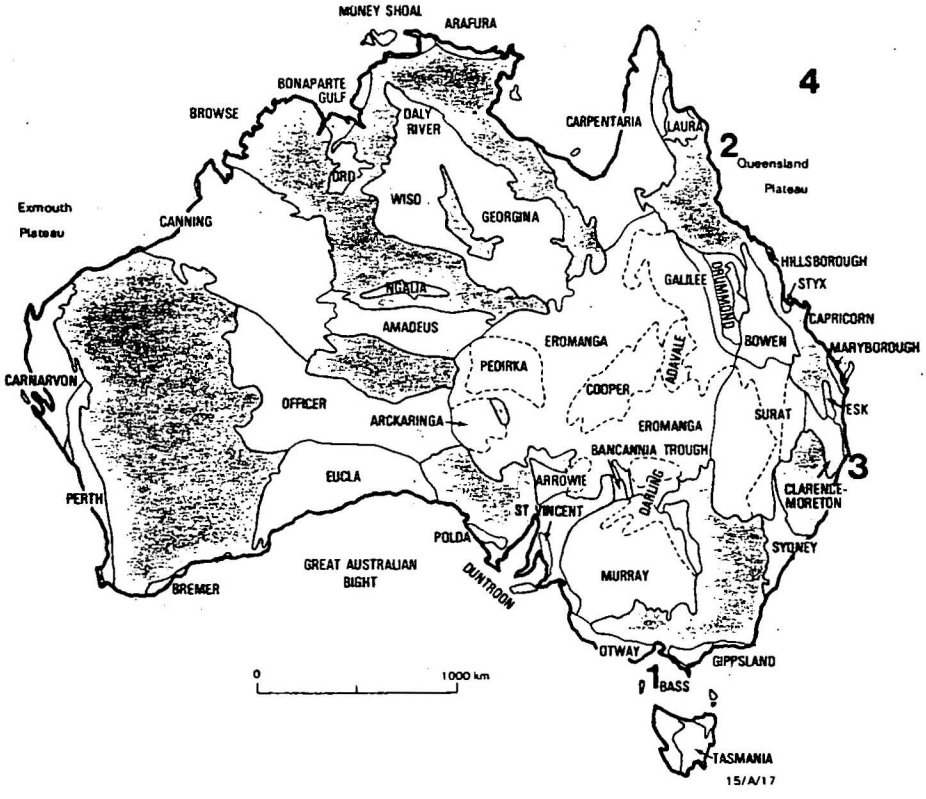
Downhole Geophysical Logging: Application and Testing of Omni-Directional E.M. Probe (R. Cobcroft)

DIVISION OF MARINE GEOSCIENCE AND PETROLEUM GEOLOGY

The Division of Marine Geoscience and Petroleum Geology undertakes research aimed at improving our understanding of the geology of our offshore regions as a basis for future petroleum exploration and assessment and the development of our understanding of the geological evolution of the continent and its margins.

The Division undertakes regional offshore geophysical and geological investigations, interpretations, and analyses of offshore sedimentary basins. A group is currently being developed to manage the vast amount of data accruing from exploration activities and BMR marine surveys.

The main efforts of the Division in 1982-83 will be concerned with a contract geophysical survey of the Bass Basin, a geophysical survey of the Antarctic Continental Margin, and the continuation of geological and geophysical investigations of the Great Barrier Reef. The Division is also involved in the Tripartite (Australia, New Zealand and USA) marine science programs in the southwest Pacific. The map below shows the locations of the Australian projects. A full list of projects, with comments on the larger ones, follows.



MARINE AND PETROLEUM GEOLOGY 1982/83 PROGRAM

1. Bass Basin
2. Great Barrier Reef
3. Eastern Shelf heavy minerals
4. Coral Sea Basin

Bass Basin Contract Geophysical Survey (J.C. Branson)

In 1981-82 BMR reviewed the geological and geophysical data available from the Bass Strait region. Following the review, a geophysical survey was designed to investigate the Bass Basin and its margins with the Otway and Gippsland basins. The survey was carried out by contract in March/April 1982 using extra funds provided by the Federal Government. Interpretation of the data, to commence mid 1982, will lead to a better understanding of the evolution of these basins, their relative prospectivity, and their resource potential.

Great Barrier Reef (P.J. Davies)

BMR's research in the Great Barrier Reef (GBR) is aimed at gaining an understanding of the origin and growth of the GBR in relation to the evolution of the northeastern Australian continental margin. Currently the research is being carried out for the section between Townsville and Cooktown. Geological field work will take place during August/September 1982 and possibly March/April 1983. Geophysical measurements will be made in inter-reefal areas between June and September 1982. The research is being partly funded by a Marine Science and Technology (MST) Grant.

Southwest Pacific Tripartite Project (N. Exon)

The aims of this joint project with scientists from USA and New Zealand are to investigate the regional structural framework of offshore areas of the Solomon Islands, the Fiji Plateau and the northern Melanesian borderland and to assess their hydrocarbon and mineral resource potential . Two sixty day cruises are to be conducted commencing in March 1982. During the cruises seismic, gravity and magnetic observations will be made and geological samples will be collected. This project is partly funded by the Australian Development Assistance Bureau (ADAB) of the Department of Foreign Affairs.

Eastern Shelf Heavy Minerals Sands (J.B. Colwell)

This joint project with the Institute for Geosciences and Natural Resources (BGR) of the Federal Republic of Germany and the Geological Surveys of New South Wales and Queensland, aims to determine the stratigraphic framework for locating possible offshore accumulations of heavy mineral sands. Laboratory studies will be carried out on the surficial deposits collected from the continental shelves of northern New South Wales and southern Queensland in 1981.

Coral Sea Basin (P.A. Symonds)

The Coral Sea Basin geophysical survey undertaken jointly with BGR was completed in 1981. Interpretation and reporting will continue during 1982-83. The project aims to determine the extent, nature and development of rift grabens and the ocean/continent boundary around the Coral Sea Basin, and to obtain information on the lithofacies, age and palaeo-environment of the Mesozoic and Cainozoic sediments in the area. Interpretation and reporting of the data will take place in 1982/83.

Antarctic Surveys (H.M. Stagg)

BMR's geophysical surveys of the Antarctic Continental Margin and the southeastern Indian Ocean will continue. They are part of a program to provide fundamental data on regional structure. Interpretation of data collected on the 1982 survey of the Davis - Mawson region will also be carried out.

RESOURCE ASSESSMENT DIVISION

The Resource Assessment Division has the prime responsibility in BMR for the assessment of Australia's petroleum and mineral resources. The Division studies and reviews petroleum and minerals exploration resources and production in Australia in the context of the world mining industry.

Separate Branches have been created within the Division to deal with petroleum and minerals, and arrangements are in hand to transfer the Uranium Resource Evaluation Unit from the Australian Atomic Energy Commission to the Division. Another Branch is to be established to deal with the vast amount of technical data collected and held by BMR as part of the national geoscience data base.

Petroleum Assessment

A reservoir section is being developed to assess the reserves in existing fields and will undertake studies in areas specifically related to resource assessment such as enhanced recovery of petroleum, source rock studies, organic and physical petroleum chemistry, and petroleum engineering.

An overview of exploration activity in Australia's onshore and offshore sedimentary basins will be maintained, and assessment of petroleum resources carried out, by a petroleum assessment group. In making its assessments this group will be supported by the Reservoir Section and a small methodology research group which will specialise in assessment methodology and estimation of undiscovered resources. Close collaboration with State Geological Surveys and Mines Departments will be essential in the assessment of national resources. Projects and activities to be carried out in 1982/83 include:

- Petroleum reserves evaluation
- Assessment of undiscovered petroleum resources
- Research into the origin and migration of petroleum
- Taroom Trough petroleum source rock study
- Otway Basin petroleum source rock study
- Enhanced recovery of petroleum
- The effect of introduced fluids on clays and mineral fires in pore spaces.

Mineral Resource Assessment

Activities to be undertaken in this area include: studies of aspects of the national and international mineral industry necessary for the assessment of mineral resources of Australia and its Territories; forecasting of trends affecting mineral supply and demand; assessment and classification of resources in known deposits and the assessment of undiscovered resources of geological provinces in Australia and its Territories. The last of these will increasingly draw on the expertise of specialists in province geology, ore genesis geology and probability theory. Projects and activities being undertaken in 1982/83 include a Preliminary Resource assessment of Australian minerals and special assessments of resources of chromite, tantalum and columbium, uranium, vanadium and hard-rock titanium, tin, coal, oil shale and groundwater.

SPECIAL PROJECTS AND GEOSCIENCE SERVICES PROGRAM

Geoscience programs of a national or international character and which often require integration and synthesis of information or coordination of expertise from several research Divisions will be undertaken in a separate Branch of BMR.

Projects such as the compilation of special national and international thematic maps, foreign aid projects and antarctic projects fall into this category. Special projects being carried out in 1982/83 are listed below.

Antarctica (R.J. Tingey)

BMR involvement with Antarctic geology continues although no major land-based field work is planned for 1982/83. Petrological, geochemical and geochronological studies on material from North Victoria Land and the Davis/Prydz Bay region continue. Interpretation of aeromagnetic, ground magnetic, palaeomagnetic and gravity data will also be carried out.

Irian Jaya (J.N. Casey)

This foreign aid project was established to assist the Indonesian Government in undertaking systematic geological and geophysical mapping of Irian Jaya and to train Indonesian geoscientists and support staff in these activities. The project is being carried out through the Australian Development Assistance Bureau (ADAB) and a team of nine BMR officers is seconded to the project.

BMR Earth Science Atlas (E.K. Carter)

The BMR Earth Science Atlas is a loose-leaf publication containing Earth Science maps of Australia, generally at 1:10 million scale, each covering an aspect of geology, geophysics or mineral resources and accompanied by a short commentary. New maps under preparation to be added to the Atlas include maps showing main rock types, tectonic evolution, platform cover correlation, Phanerozoic palaeogeography, coal basins, and Cainozoic history.

Circum-Pacific Map (H.F. Doutch)

Geological Map of the World (W.D. Palfreyman)

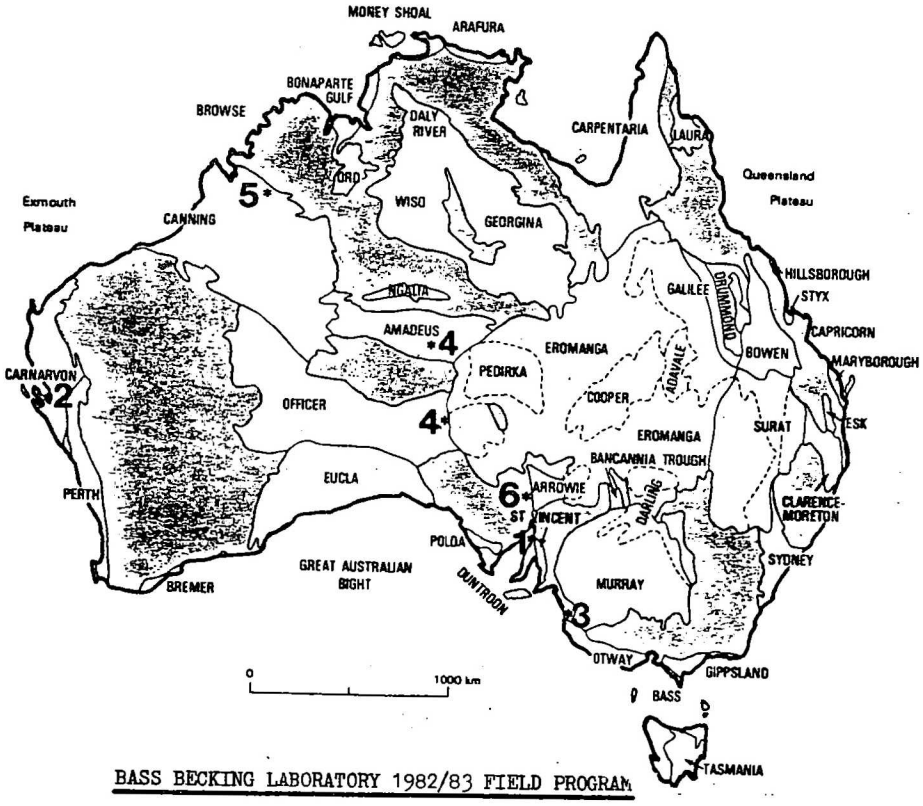
BAAS BECKING GEOBIOLOGICAL RESEARCH LABORATORY

The Baas Becking Laboratory is jointly staffed and operated by BMR and CSIRO scientists and carries out research into the fundamental relationships between sedimentation and biological activity on the one hand and metallogenesis and hydrocarbon generation on the other. Its research is complementary to that of both the Division of Petrology and Geochemistry and the Division of Continental Geology. The Baas Becking research program is partly supported by industry through the Australian Mineral Industry Research Association Ltd (AMIRA), and by grants from the National Energy Development and Demonstration Program (NERDDP) and a Marine Science and Technology (MST) Grant from the Department of Science and Technology.

Current major projects include the study of modern sedimentary and biological systems at Spencer Gulf and Lake Eliza, SA and Shark Bay WA.

These systems elucidate some processes of ore genesis and petroleum source-rock and reservoir-rock development. Comparative studies of the fossil systems are also being undertaken. These include ore genesis studies of the Stuart Shelf SA, Adelaide Geosyncline SA, Amadeus Basin NT, and Lennard Shelf, WA; and research into Precambrian palaeobiology.

The locations of the field-based projects are shown on the map below. A list of projects, with comments on the larger ones, follows.



BASS BECKING LABORATORY 1982/83 FIELD PROGRAM

1. Spencer Gulf, SA
2. Shark Bay, WA
3. Saline lake study
4. Central Australian Basins
5. Lennard Shelf
6. Base-metal ore genesis

Holocene carbonate environments (R.V. Burne)

Spencer Gulf, SA (1)

The current program of research into the modern sedimentary and biological systems in the Spencer Gulf region has almost been completed. Sedimentological, geochemical, biochemical and microbiological investigations have been carried out on material from subtidal, intertidal, and supratidal zones of northeastern Spencer Gulf and from coastal saline lakes around the entire Spencer Gulf coastline. The final writing up of results is scheduled for this year.

Shark Bay, WA (2)

A program of research into the sedimentary and biological environments of the Shark Bay region began in 1981. The region was chosen because of its significance as an analogue for ancient stromatilitic carbonate sequences which have both hydrocarbon and base metal potential.

One important aspect of the research is a study of diagenesis by saline continental groundwater because of its possible role in the evolution of ancient ore-bearing and petroliferous peritidal carbonates.

Field work is planned for July 1982 and laboratory studies will continue throughout the year.

Saline Lakes Study, Lake Eliza, SA (3)

Saline lakes probably provide the closest present day analogues for the origin of Proterozoic and Cambrian hydrocarbon source rocks, as well as for many ore body host rocks. For this reason a research program examining the sedimentological, hydrological, microbiological, chemical and organic geochemical features of modern saline lakes was initiated in 1981. Initially the lakes being studied are in the southern Eyre Peninsular and the Robe region of South Australia. Lake Eliza provides a lacustrine example of a carbonate evaporite environmental that can be contrasted with the marginal marine environments at Shark Bay and Spencer Gulf. Field work will be carried out in mid-1982 and laboratory studies will continued throughout the year.

Central Australian late Proterozoic and Cambrian basins (4) (M.R. Walter)

Field studies will be undertaken in 1982-83 in the Amadeus and Officer Basins as part of a larger program to investigate mineralisation and the petroleum source-rock and reservoir-rock potential of Adelaidean and Cambrian sequences in Australia.

Lead-Zinc and Petroleum genesis, Lennard Shelf WA (5)
(Joint project with GSWA, BHP, Shell) (M.R. Walter)

The Lennard Shelf is of particular interest in that it is host to both lead-zinc mineralisation and petroleum. This project aims to examine the origins of lead-zinc mineralisation on the Lennard Shelf and in particular any relationships between the mineralisation and the development of oil-field brines.

Ore Genesis, Adelaide Geosyncline - Stuart Shelf (6)

The objectives of this project are to examine the effects of alteration processes on evaporites containing sulphate and carbonate minerals in order to determine their importance in base-metal mineralisation. This year detailed petrographic and geochemical investigations including stable-isotope, SEM and fluid inclusion studies are being undertaken. Synthesis of data is being carried out to determine genetic temporal and spatial relationships of hydrothermal events and mineralising episodes. Using all available geological, geochemical and geophysical data the major controls of Adelaidean stratabound mineralisation of the Stuart Shelf-Adelaide Geosyncline will be deduced. An attempt will be made to generalise the findings.

Precambrian Palaeobiology Research (M.R. Walter)

The aim of the research is to elucidate the course of biological evolution, and its geochemical effects, through the Precambrian. The oxygen content of the Precambrian atmosphere merits particular attention because of its great importance in controlling weathering and surficial ore genesis. During 1982-83 laboratory investigations will include micropalaeontology, stromatolite studies and mineralogy.