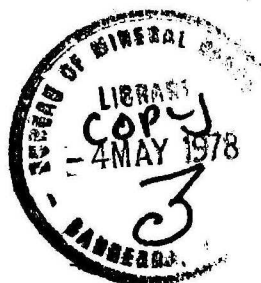


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RECORD 1978/25

BUREAU OF MINERAL RESOURCES 1978 PROGRAM

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BMR
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1978/25
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Record 1978/25

BMR 1978 PROGRAM

Compiled by

R.B. Aronsen

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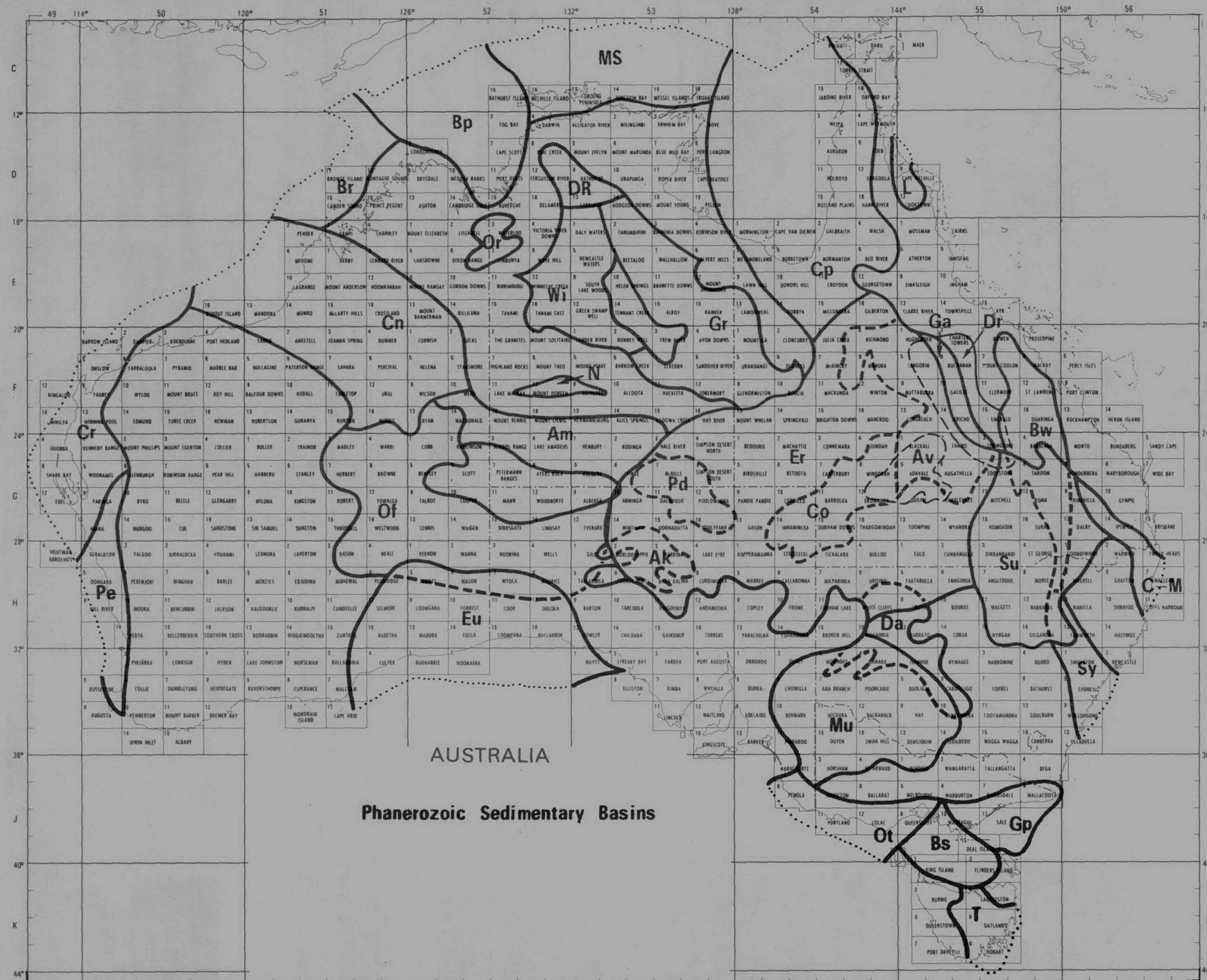
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NOTES

The program does not list the preparation of BMR Records on the results of current projects; however, it can generally be assumed that Records will be prepared for most projects. A list of Records released on Open File is issued regularly by BMR.

The dates given in brackets after each field operation refer to time actually spent in the field. Usually office work on the project continues to the end of the current year or early in the following year.

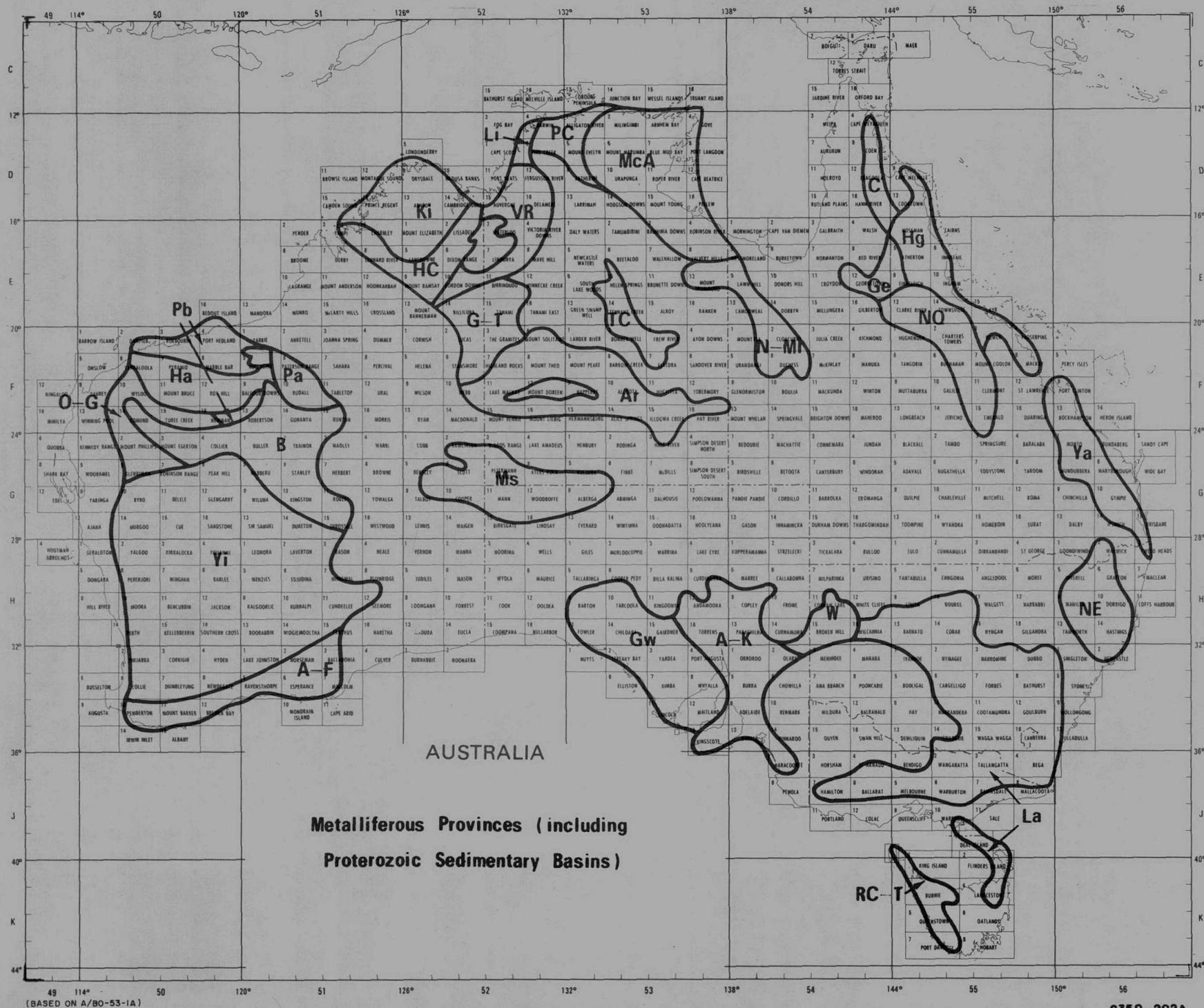


LEGEND

Av	Adavale
Am	Amadeus
Ar	Arckaringa
Bs	Bass
Bp	Bonaparte
Bw	Bowen
Br	Browse
Cn	Canning
Cr	Carnarvon
Cp	Carpentaria
C-M	Clarence - Moreton
Co	Cooper
DR	Daly River
Da	Darling
Dr	Drummond
Er	Eromanga
Eu	Eucla
Ga	Galilee
Gr	Georgina
Gp	Gippsland
L	Laura
MS	Money Shoal
Mu	Murray
N	Ngalia
Of	Officer
Or	Ord
Ot	Otway
Pd	Pedirka
Pe	Perth
Su	Surat
Sy	Sydney
T	Tasmania
Wi	Wiso

AUSTRALIA

Phanerozoic Sedimentary Basins



INTRODUCTION

The fundamental role of the Bureau of Mineral Resources (BMR) is to obtain, study, and publish basic information on the geological framework and mineral resources of the Australian continent, overseas Territories, and offshore areas, as a basis for management decisions and policy formulation at the national level, for assistance to mineral exploration and development, and for further research by other geoscientists. In support of this function BMR undertakes field and laboratory research in geology and geophysics, and undertakes a continuous review of the mineral industry.

Work is primarily directed at building up the scientific knowledge required by Government and industry for the future development of Australia. The information for a particular need may take many years to collect or develop, so broad ongoing programs are maintained; these are aimed at accumulating the basic data for both recognised and potential future needs.

Data collected by BMR serves to increase knowledge of the geology of Australia and its continental margin as an aid in the search for mineral deposits. An assessment of the magnitude of known and potential resources based on these data will provide a quantitative basis for the formulation and administration of national policies relating to those resources.

To achieve its objectives, BMR undertakes multidisciplinary programs where appropriate; these are integrated, where practicable, with the programs of States, universities, and industry. Current BMR programs are:

Reconnaissance surveys designed to provide a broad understanding of the composition, structure, subdivisional units, and tectonic history of the Australian continent and continental margin, and to provide some indication of resource potential and key areas worthy of more detailed study. The results of reconnaissance surveys are usually published as standard 1:250 000 scale maps and associated interpretative reports.

Petroleum resources studies directed at all aspects relating to the origin (source, maturation, migration, entrapment), exploration, and recovery of both onshore and offshore resources, with a view to assessing discovered and potential resources and encouraging further exploration.

Mineral resources studies aimed at assessing the availability of metallic and non-metallic mineral resources on the Australian continent and continental margin. Of prime concern is the relation between mineral occurrences and their geological environment; the main effort of this program is directed at multi-disciplinary province studies, studies of geological factors controlling mineralisation, and commodity studies.

Earth structure and physical properties studies into the geodynamic, gravitational, geomagnetic, and geothermal properties of the Australian region and their relation to similar data from around the world. The studies provide: key information on large-scale structures and tectonic trends with which mineral, petroleum, and geothermal energy resources may be associated; information necessary for establishing earthquake risk; and information for land survey and navigational maps.

Equipment and systems development to improve available technology of data acquisition, processing, and interpretation. This program is directed at improving geophysical techniques used in delineating subsurface geological structures and mineral deposits.

Geotechnical services and hydrogeological studies to provide advice for construction and development projects initiated by Federal Government agencies, and sometimes other authorities, and to provide a basis for water resource assessment and management.

Foreign aid commitments fulfilled by providing advice on technical aspects of foreign aid requests, providing Australian representatives and advisers to international agencies, and direct participation in foreign aid programs.

Information systems and reference collections to disseminate information through formal publication in scientific journals and reports and through the provision of information services, reference collections, and national maps summarising existing knowledge.

Technical and administrative services for management and co-ordination of BMR operations, and for support of scientific investigations.

RECONNAISSANCE PROGRAM

As part of the continuing program to complete systematic coverage of Australia, geological, airborne magnetic, and radiometric surveys are conducted. BMR's reconnaissance geological program is a co-operative program with the State Geological Surveys aimed at providing map coverage of Australia and its Territories at a scale of 1:250 000; the initial coverage is nearing completion. BMR operates two aircraft in its reconnaissance airborne program; some additional work is undertaken by contractors. Palaeomagnetic surveys are conducted as an aid to stratigraphic correlations and to the solution of tectonic problems and age determinations.

Reconnaissance offshore geological surveys are being conducted to study the physical and chemical processes controlling the accumulation of sediments and minerals. Co-operative marine geophysical surveys are programmed and data from previous reconnaissance marine geophysical surveys are being processed and analysed to obtain details of structures within the uppermost few thousand metres of sediments on the continental slope and margin, and to establish regional tectonic trends and basement variations.

GEOLOGICAL SURVEYS

Antarctica

Undertake semi-detailed field research of selected parts of Enderby Land (Jan-Mar). Carry out geochemical, petrological, and geochronological studies of rock samples including continuation of a study of enderbites and associated granulite facies rocks. Conduct palaeomagnetic measurements on samples collected in 1976-77 field season.

Complete publications on previous studies on the Prince Charles Mountains. Prepare 1:250 000 preliminary maps of Enderby Land.

Canning Basin, WA

Joint project with Geological Survey of Western Australia. Prepare first edition 1:250 000 scale geological maps and complete 1977 fieldwork Record.

Carpentaria, Ngalia, Officer, and Wiso Basins

Prepare publications on previous field work.

AIRBORNE SURVEYS

Adelaide Geosyncline, SA and Vic

Conduct an airborne magnetic and radiometric survey of the following 1:250 000 Sheet areas (Sep-mid Nov):

Renmark, Pinnaroo, Adelaide (eastern third), Barker (eastern third), Naracoorte (northern three-quarters), Horsham.

Albany-Fraser and Yilgarn Blocks, WA

Process data from the 1977 airborne survey of the Bremer Bay, Mount Barker, and Pemberton 1:250 000 Sheet areas.

Antarctica

Take airborne magnetic measurements in Enderby Land (Jan-Feb) in conjunction with ice radar survey.

Georgetown Block, Qld

Complete reports on investigation of previous airborne survey data for Forsayth 1:100 000 Sheet area.

Lachlan Belt, NSW and Vic

Process data from surveys over Bega, Mallacoota, and Warburton 1:250 000 Sheet areas.

McArthur Basin, NT

Carry out airborne magnetic and radiometric survey of Mount Marumba, Blue Mud Bay, Milingimbi, Arnhem Bay, and parts of Junction Bay, Wessel Islands, Gove, Port Langdon, Cape Beatrice, and Roper River 1:250 000 Sheet areas (May-mid Aug); begin processing of data from the survey.

Process data from the 1977 airborne survey of Hodgson Downs, Urapunga, Roper River (onshore), Pellew, Mount Young, Tanumbirini, Bauhinia Downs, Calvert Hills, Wallhallow, and Robinson River 1:250 000 Sheet areas.

Officer Basin, WA

Continue supervision of, and processing data from, the aeromagnetic contract survey covering the Scott, Cooper, Bentley, Talbot, Browne, Yowalga, Westwood, Lennis, Waigen, Neale, Vernon, Wanna, Jubilee, and Mason 1:250 000 Sheet areas.

Carpentaria Basin, Qld

Interpret aeromagnetic and radiometric data.

MARINE GEOLOGY

Capricorn/Bunker Reefs, Qld

In co-operation with the Geological Survey of Queensland continue with geological/geophysical investigations to improve knowledge of the pre-Holocene karst surface upon which the reefs lie (Apr-Jun).

Manganese nodules

Investigate the possibility of undertaking reconnaissance for manganese nodules in the Southern Ocean, and en route to and from Antarctica as ship time becomes available..

Australian shelf

Participate in eastern and north-west margins surveys with West German scientists on R.V. Sonne (see marine geophysics).

Continue with detailed study of shelf morphology using RAN and Division of National Mapping data. Continue with interpretation of continental margin geophysical data.

MARINE GEOPHYSICS

Continental margins survey

Continue with analyses and reports of the 1970-73 contract marine geophysical survey of the Australian continental margin. Currently programmed are interpretative reports of the Scott Plateau, Carnarvon Terrace, Ceduna Terrace, Bremer Basin, Queensland Plateau, offshore Perth Basin, and offshore west Tasmania.

Division of National Mapping co-operative projects

Continue with magnetic and shallow seismic reflection surveys with Division of National Mapping's bathymetric surveys on the Western Australia shelf (Aug-Sep and Oct-Nov).

International co-operative projects

Under the Australian-West German Science Agreement, participate in the geological/geophysical survey of Lord Howe Rise, Coral Sea margin, and Exmouth Plateau regions on vessel R.V. Sonne (Oct-Dec). Process data from the 1977 survey of Scott Plateau.

Participate in Lamont-Doherty Geological Observatory survey of Wallaby Plateau, on vessel R.V. Vema (Aug-Sep). Interpret data from the 1977 Lamont survey of the Coral Sea.

Department of Science co-operative project

Investigate the possibility of installing geophysical and bathymetric equipment on an Antarctic ship with a view to undertaking surveys en route to and from Antarctica.

GRAVITY

Antarctica

Continue with gravity survey commenced in 1977 in Enderby Land (Jan-Mar).

Australia-wide

Continue updating the computer-based data bank of gravity survey data. Check data for consistency; adjust values of anomalous stations; where necessary, make field observations to fill in gaps and tie-in existing surveys. For areas in which data are finalised produce free-air and Bouguer anomaly maps using international scale and datum.

Continue interpreting gravity maps of Australia to provide a background for petroleum and mineral search.

PETROLEUM RESOURCES PROGRAM

As part of an on-going program to assist exploration, and towards assessment of Australia's overall petroleum resources, the 1978 program includes: a review of data on specific sedimentary basins, estimations of known and undiscovered resources, and field investigations to upgrade geological knowledge in key areas.

The program is supported by laboratory investigations in petroleum geochemistry and petrophysics, reservoir engineering, and palaeontological studies. Petroleum industry studies are programmed to maintain a continuous review of all aspects of Australian identified petroleum resources, and of exploration and development activities.

BMR has a continuing responsibility with respect to the technical administration of the Petroleum (Submerged Lands) Act and has programmed accordingly.

BASIN REVIEW AND RESOURCE ASSESSMENT

Basin review - regional investigations

Update and complete regional geological and geophysical reviews of the Gippsland, Bass, Capricorn, and Clarence-Morton Basins and of the regions that encompass the Great Australian Bight, the Otway Basin, and the Officer Basin.

Petroleum resource assessment

Complete the assessments of the undiscovered petroleum resources of the Gippsland, Otway, Ngalia, Wiso, Officer (WA), Capricorn, and Clarence-Morton Basins; make assessments of the Officer Basin (SA) and Georgina Basin; continue with and update assessments of the Browse, Carnarvon, and Bonaparte Gulf Basins.

Continue development of the methodology for petroleum resource assessment and for evaluation of petroleum discoveries.

Undertake source rock studies in co-operation with CSIRO.

Forecast production schedules of Australia's oil and gas fields; estimate in-place and recoverable petroleum reserves in reservoirs and fields in Australia; prepare, for publication, quarterly statements on petroleum liquid and natural gas reserves.

Estimate the economics of bringing fields currently non-commercial into production.

Investigate oil shale resources. Conduct basic studies to define state of knowledge and to identify deficiencies in geological knowledge of oil shale deposits.

PETROLEUM TECHNOLOGY

Geochemical investigations

Continue research into the processes of petroleum generation in Australia; research includes source rock studies in the Galilee, Georgina, and Duaringa Basins, and studies of the composition of heavy oil associated with oil shales.

Continue development of an ADP scheme for basin-wide source-rock data.

Investigate methods of identifying source rocks and their maturation history.

Petrophysical investigations

Carry out conventional and special core analyses - porosity, permeability, density, fluid saturation, capillary pressure, and relative permeability of petroleum reservoir and other rocks.

Enhanced recovery investigations

Complete the polymer flood tests on rocks from the depleting Moonie reservoir in co-operation with industry and the Queensland Mines Department.

Examine other possible candidates in Australia for enhanced recovery investigations.

Carry out investigations into recovery of hydrocarbons from Australian reservoirs under various natural drive mechanisms.

PETROLEUM INDUSTRY

Review of industry

Carry out investigations and research into the economics of petroleum exploration, development, and production on land and offshore. Provide specialised technical advice and prepare statistics. Maintain well data card system and petroleum titles data system and implement a computer-oriented data storage system. Prepare the Petroleum Newsletter, Petroleum Exploration and Development Titles Map and Key, and report on drilling of wells in Australia.

Technical administration of legislation

Examine and advise on applications to carry out operations under the Petroleum (Submerged Lands) Act, follow the progress of operations, and examine final reports. Index, store, and make available as appropriate the data received under the Act. Maintain a register of all operations undertaken in offshore areas, and a register of relinquished and current offshore areas. Continue developing a computer-based file of offshore drilling and geophysical operations. Assess the petroleum prospectivity of relinquished offshore title areas and advise on their readvertising. Advise on regulations and directions pertaining to offshore areas.

Prepare directions for and inspect and report on operations on behalf of the Department of the Northern Territory and the Government of Papua New Guinea.

BASIN STUDIES/SURVEYS

Bowen Basin, Qld

In co-operation with the Geological Survey of Queensland and Mines Administration Ltd carry out an experimental seismic survey in the Denison Trough to obtain information in areas of volcanic cover, and deep penetration to basement below thick Permian coal seams.

Duaringa Basin, Qld

Resource study based on interpretation of drilling and logging results. Joint project with the Geological Survey of Queensland.

Eromanga Basin, Qld

Assess petroleum prospectivity of structural traps protected from flushing. Undertake palaeomagnetic studies of weathered profiles.

Galilee Basin

Prepare report on regional interpretation of seismic and other geophysical surveys.

Georgina Basin, Qld (see also Province Studies)

Prepare an operational and an interpretative report on the 1977 seismic survey in the SE Georgina Basin.

Pre-Eromanga Basins, Qld, SA, NT

Review geophysical data in basins underlying the Eromanga Basin to determine limits of the Galilee, Cooper, Adavale, and Pedirka Basins, and to distinguish between overlapping basins.

PALAEONTOLOGY

Provide palaeontological support for field projects and carry out systematic studies of Australian fossils. Projects include study of Precambrian microfossils from the Amadeus, Bangemall, Nabberu and Officer Basins; stromatolites and microfossils from the Georgina Basin; Middle Cambrian Bradoriida from the Georgina Basin; Late Cambrian trilobites from northern and central Australia and Antarctica; Ordovician trilobites from northern Australia, invertebrates from the Wiso Basin, and fish from the Georgina Basin; Silurian

brachiopods from the Lachlan Belt; systematics of the trilobite family Encrinuridae; condonts of the Tasman Geosyncline; Australian and Antarctic Devonian fish and Devonian vertebrates from NSW and VIC; Late Devonian/ Early Carboniferous ostracods from the Canning basin, and systematics/distribution of Carboniferous and Permian miospores of Galilee basin; correlation of the Permian and study of its fossils, climate, and palaeogeography; Permian ichnolites from WA; Mesozoic molluscs of Australia and PNG; Jurassic bivalves and belemnites from the Sula Islands (Indonesia), and dinoflagellates, acritarchs, and palynology of the Carpentaria Basin; Cretaceous spores and pollen of the Carpentaria Basin; palynology, spores, pollen, and dinoflagellates of the Eromanga Basin and NT; Upper Cretaceous of the WA margin; PNG and WA Late Cretaceous and Tertiary faunas; palynology of Tertiary lignites (central Australia), and fossil mammals. Other studies include collection of type sections from the Bonaparte Gulf Basin and Canning Basin for conodont and ostracod work, and of conodont samples from Early Palaeozoic formations in the Carnarvon Basin; foraminifera and Globigerina material from Vic; nannofossils from Scott Plateau and Java Trench.

MINERAL RESOURCES PROGRAM

BMR is continuing its program of upgrading basic geoscience information on metalliferous provinces to assess Australia's total mineral resources and assist exploration and development. Multi-disciplinary investigations will be conducted in seven metalliferous provinces. Additional research is being carried out to define more accurately factors influencing the genesis and localisation of mineral deposits within particular geological regions.

Trends in the exploration for minerals, and in mining, processing, trade, and consumption of mineral commodities, are being assessed and reviewed continually. Resource assessment continues with compilation, estimation, and evaluation of identified and undiscovered mineral resources.

PROVINCE STUDIES

Arunta Block, NT

Field research in Quartz 1:100 000 Sheet area (Jul-Sep), including a study of Oonagalabi mineral deposits and their regional setting, and geochemistry of the stratigraphic interval containing these deposits.

Undertake granulite studies and report on stream sediment geochemical surveys of Edwards Creek area and Huckitta 1:250 000 Sheet area; conduct palaeomagnetic measurements on Lander Rock beds and dolerite dyke samples collected in 1977; continue with isotopic age determination studies.

Begin assembly, documentation, and critical analysis of geophysical data towards a regional geophysical study in the Arunta Block in 1979.

Prepare reports and publications on previous geological work.

Georgetown Block, Qld (Joint project with Geol. Surv. of Qld)

Field check (Jul-Aug) in previously surveyed areas preparatory to finalising first edition maps; field work includes research on small parts of Abingdon, Esmeralda, and Gilbert River 1:100 000 Sheet areas. Undertake gravity traverses to determine structure of Agate Creek Volcanics; conduct a magnetostratigraphic study (Jul) of the main and eastern Newcastle Range volcanic sequences to assist in correlation across a fault zone.

Study the petrogenesis, mineralisation, and isotopic ages of the igneous rocks of the area, the chemistry and structure of the metamorphic rocks, and the nature and genesis of the gold deposits of the Etheridge Goldfield.

Complete investigations of the Jubilee Plunger gold deposit and the Mount Turner copper-molybdenum deposit. Finish interpretation of results of the geochemical survey of Gilberton and Georgetown 1:100 000 Sheet areas.

Continue to assess the mineral resources and potential of the central Georgetown inlier and develop hypotheses of ore genesis and location which can be tested by exploration.

Georgina Basin, Qld and NT

Undertake sedimentological and stratigraphic studies of the following Late Proterozoic-Early Cambrian units near the southern margin: Mithaka, Ninmaroo, Arrinthrunga (Jun) and Coolibah Formations, Sun Hill Arkose and Sylvester Sandstone, and Tomahawk Beds (Jul-Aug). Continue with petrological study of Georgina limestone.

Palaeontological support includes studies of conodont (Aug-Sep), stromatolite (Jul), trilobite, and fish fauna. Photogeological tasks include interpretation of areas in southern Huckitta 1:250 000 area and production of 1:100 000 scale photogeological maps.

Undertake interpretation of magnetic data from the 1977 airborne survey in the Glenormiston 1:250 000 Sheet area. Commence re-interpretation of magnetic, gravity, and seismic data from the basin; continue with palaeo-magnetic investigations.

Lachlan Belt, NSW and ACT

Continue with geological mapping and stream sediment sampling (Feb-May and Sep-Dec) in the Araluen 1:100 000 Sheet area, and continue with geological mapping of the Canberra 1:100 000 Sheet area (Jan-Aug).

In co-operation with NSWGS and companies, undertake a study of the geophysical characteristics of Cobar orebodies; study includes a program of field work to establish geophysical characteristics of rocks and ores, testing of geophysical methods, and some airborne magnetic traverses.

McArthur Basin, NT

Continue with the study of the stratigraphic, sedimentological, and tectonic evolution of the McArthur Basin, and its application to the genesis of and exploration for base metal ore deposits.

The study includes: geological field investigations in the Mallapunyah-Kilgour 1:100 000 Sheet area (Jun-Oct), a detailed gravity survey (Aug-Sep), and a magneto-telluric experimental survey (Jul-Sep) mainly to locate and define major structures, commencement of a full magnetostratigraphic sampling program (Jul-Aug), and an evaluation of LANDSAT imagery including structural analysis of the McArthur Basin.

Laboratory work includes geochemical analysis and interpretation of orientation stream sediment samples collected in 1977, and completion of measurements on 1977 magnetostratigraphic reconnaissance samples.

Nicholson-Mount Isa Belt, Qld

Mount Isa-Cloncurry, Qld. Begin geological field investigations of Mount Oxide, Mammoth Mines, and Myally, and complete Coolullah and Gregory Downs 1:100 000 Sheet areas with special reference to relations between ore deposits, sedimentology, volcanicity, and structure (Jun-Sep). Investigations will include a systematic geochemical survey of Mammoth Mines 1:100 000 Sheet area, collection and collation of geochemical data on igneous rocks of the region, and continuation of geochronological studies of volcanic and granitic rocks in the Mount Isa province.

Complete the investigation into the uranium-skarn mineralisation at Mary Kathleen.

Lawn Hill, Qld. Complete field research of Gregory Downs 1:100 000 Sheet area (Jun-Sep) and check interpretation of Riversleigh Sheet area.

Duchess, Qld. Undertake field research (Jun-Oct) of Ardmore, Selwyn, and Mount Angelay 1:100 000 Sheet areas including Precambrian areas of Mount Merlin. Tasks will include continued study of igneous rocks of the region together with collection and collation of geochemical data, as part

of the ongoing program of regional studies of petrogenesis and mineralisation. Laboratory support includes isotopic age determination of volcanics and granites.

Pine Creek Block, NT

Undertake semi-detailed field research of Mary River and part of McKinlay River 1:100 000 Sheet areas (Jul-Oct); complete write-up of the 1977 regional geophysical study, and the 1977 detailed geophysical survey in Mundogie 1:100 000 Sheet area; undertake interpretation of geophysical data. Study geophysical characteristics of rocks and ores in the Rum Jungle area (Aug-Sep); continue with reconnaissance sampling for palaeomagnetic studies (Aug-Sep).

Laboratory support includes a geochemical orientation field investigation (Sep), and continuation of isotopic dating.

Undertake a lineament (photogeological) analysis of the Pine Creek region.

ORE GENESIS AND MINERAL CONTROLS

Alkaline ultramafic rocks

Continue with a petrochemical and geochronological study of alkaline ultramafic rocks throughout Australia.

Georgina basin, Qld and NT

Geochemical, mineralogical, and petrographic study of mineralised and unmineralised strata (joint project with Baas Becking Geobiological Research Laboratory).

Mineral sands

Begin assessment of studies of provenance and concentration mechanisms of heavy mineral sands.

Continue the detailed study of shelf morphology; carry out field and laboratory studies on the physical properties of heavy mineral sand deposits in preparation for proposed offshore tests off the east coast in 1979.

Complete analysis of data from previous studies on Pleistocene sea-level changes and the distribution and provenance of heavy mineral sands in southern SA and southwest Vic; continue with palaeomagnetic studies.

Pilbara Block, WA

As part of the International Geology Correlation Program on Archaean Igneous Geochemistry, continue trace-element characterisation studies of Pilbara volcanic rocks, in co-operation with GSWA.

Redbank, NT

Complete studies on Redbank copper mineralisation.

Spencer Gulf, SA

In conjunction with Baas Becking Geobiological Research Laboratory, continue with field and laboratory studies on sedimentation in Spencer Gulf (Feb-Mar). This project includes the study of factors influencing carbonate deposition, production of primary organic matter, and formation, transport, and fixation of base metals.

Stuart Shelf, SA

Conduct mineralogical, geochemical, and petrological investigations in the Mount Gunson, Kapunda, and Myall Creek areas to provide information necessary for consideration of metallogenesis.

Tasmania

Conduct further work on U-Pb isotopic investigations of the Cambrian/Precambrian boundary of western Tasmania and determination of the age of mineralisation.

Uranium mineralisation

Conduct petrochemical, geochemical, and stable isotope studies with particular reference to economic mineralisation.

Volcanology and ore genesis, PNG

Complete writing of reports on geology, petrology, trace elements, and isotopic geochemistry of Quaternary volcanoes in Papua New Guinea.

MINERAL ECONOMICS

Study all aspects of the Australian and global mineral industry. Compile, interpret and publish statistics on production, trade, and consumption. Complete a review of the Australian mineral industry in 1977.

Complete the following: review of developments in the Australian clay industry and of services available from metallurgical laboratories in Australia, study of the iron oxide industry in Australia and of costs and benefits of mineral exploration in Australia, and a survey of the secondary lead/zinc industry in Australia.

Complete a study of the development of a unified approach to commodity studies, and a common approach to storage and retrieval of data.

MINING ENGINEERING

Study the cost structure and economics of the mining industry; provide preliminary mine capital cost and operating costs for various rates of open pit mine production and expand this field of investigation into underground production; complete a mining cost analysis computer program. Develop a computerised data bank of mineral industry equipment types and their capital costs; assess product quotas and performance of various mines.

Advise on end-of-mine design in regard to rehabilitation of mined-out areas. Study uranium waste disposal techniques.

Maintain schedules of State royalties and other charges. Make recommendations to the Department of Foreign Affairs on the feasibility and development of, and assistance for, overseas mining projects.

Participate in the Conference of Chief Inspectors of Mines.

MINERAL RESOURCE STUDIES

Complete an assessment of Australia's identified resources of nickel, tin and arsenic, and continue an assessment of identified copper resources; begin an assessment of Australia's identified resources of lead and zinc. Complete an investigation of methods of geostatistical estimation of demonstrated ore reserves of individual deposits.

Commence a study of subjective probability estimation and its application to the assessment of undiscovered mineral resources. Continue reviewing the methodology of mineral resource assessment; develop and apply methods.

EARTH STRUCTURE AND PHYSICAL PROPERTIES PROGRAM

Deep seismic, gravity, and magnetic surveys and interpretations of seismicity data are being used to investigate the geological structure and framework of the Australian continent and surrounding area, the tectonic processes of the past, and processes which are still active. Studies of heat flow assist in this work and will also help evaluate Australia's geothermal energy potential.

BMR has a major responsibility for the collection of Australian seismological and geomagnetic data, and for the establishment in Australia of internationally defined reference standards for the measurement of the Earth's gravity field; much of this work is done in co-operation with Australian universities and international organisations.

CRUSTAL STUDIES

Lachlan Geosyncline investigations

Continue with determination of the crustal structure beneath southeast Australia. Interpret seismic and gravity data obtained from previous investigations. Undertake seismic recording at stations between Dartmouth and Balranald, Dartmouth and Eden (Apr-May), Marulan and Dartmouth (May), and Newcastle and Condobolin (Oct-Nov).

Pilbara crustal survey, WA

Interpret seismic and gravity data obtained during the 1977 survey.

Regional stress

In collaboration with CSIRO undertake stress measurements in southeast Australia to obtain regional stress patterns in the Australian continent. Up to eight special purpose holes will be drilled (Feb-May).

GEOHERMAL STUDIES

Heat flow measurements

Drill one hole near Berrigan, NSW (Mar-Apr) for later heat flow measurements; log holes in the Mount Gambier area and Murray Basin (Feb-Mar), western Queensland and Cape York Peninsula (Jul-Aug), and the Jugiong, Cooma and Ardlethan areas in NSW.

Theoretical studies

Continue with computer program development and geothermal modelling. Investigate radioactive heat production in surface granites in co-operation with ANU and Wollongong University. Evaluate geothermal energy as potential alternative energy source.

GEOHERMAL OBSERVATORIES

Canberra Observatory Group

Maintain the Australian geomagnetic standards; digitise and analyse magnetograms. Instal automatic digital and long-term analogue magnetographs and ancillary equipment in the east Kowen Forest (ACT) observatory.

Maintain and calibrate seismographs at Alice Springs and Manton (NT), Cooney and Stephens Creek (NSW), Toolangi and Bellfield (Vic), and Kowen (ACT). Instal an SP vertical seismograph at Mount Isa/Cloncurry.

Prepare phase and epicentre data tapes for the International Seismological Centre and produce monthly station and time-sorted phase bulletins. Maintain regional earthquake data files and prepare seismicity maps. Locate regional earthquakes. Analyse seismograms from Alice Springs, Cooney, Stephens Creek, Toolangi, and Bellfield.

Maintain a network of accelerographs and prepare and revise earthquake-risk and seismicity maps. Make field observations of felt/damaging earthquakes and ground accelerations near large explosions. Prepare an atlas of isoseismal maps.

Macquarie Island and Mawson Observatories

Record, analyse, and report geomagnetic and seismological data.

Mundaring Observatory, WA

Continue recording, analysing, and reporting on geomagnetic, seismic, and ionospheric observations obtained at Mundaring and Gnangara. Operate the Seismic Research Observatory at Mundaring/Narrogin. Continue the normal program of SP seismograph recording at Kalgoorlie, Meekatharra, Marble Bar, Swan View, Giles, Kununurra, Christmas Island, and the Gascoyne region.

Instal automatic magnetic observatory at Gnangara and an SP seismograph in the Gascoyne region.

Operate accelerographs at Meckering and Kununurra and make field recordings of felt/damaging earthquakes and aftershocks. Undertake studies of the SW seismic zone on attenuations, travel times, and variations in V_p/V_s ratio. Make accelerograph and refraction recordings of large explosions. Study P-wave residuals and travel times.

Regional gravity

Measure the intensity of earth tides at various sites in Australia (in co-operation with the International Centre for Earth Tides, and Australian organisations).

Regional magnetics

Conduct third-order measurements in Enderby and Kemp Lands, Antarctica (Jan-Feb).

Make first-order measurements at stations in Vic, NSW, Qld, NT, WA, and SA as part of the study of the secular variation of the Earth's magnetic field (Feb-Dec).

EQUIPMENT AND SYSTEMS DEVELOPMENT PROGRAM

The program for equipment and systems development involves upgrading and developing geophysical systems and techniques. New equipment is being designed, constructed, developed, and evaluated and existing techniques and equipment are being evaluated and modified to be suitable for Australia conditions. The work includes developing digital data acquisition and data processing systems which will assist data generation, manipulation, and interpretation.

Magnetic and electrical equipment and systems

Continue development of an omni-directional electromagnetic, multi-frequency borehole probe. Investigate systems for complex resistivity measurements. Develop a test facility for radon sensitivity measurements.

Investigate requirements, and develop if necessary, a borehole gamma-ray spectrometer probe.

Undertake a feasibility study and if possible adapt resistivity/IP and scintillometer probes for shallow offshore work.

Continue investigation and development of continuous-recording magnetometer system.

Airborne systems

Replace the dedicated data logging system in the Aero Commander aircraft with a computer-based data acquisition system. Instal larger spectrometer crystals for higher resolution; construct and/or modify associated equipment, and back-up equipment to minimise aircraft down-time. Upgrade the BMR MFS7 airborne fluxgate magnetometer.

Delineate and measure test sites for airborne spectrometer calibration and investigate the feasibility of constructing test pads.

Crustal study systems

Complete the office playback system for regional structural seismic records and interface this system to the BMR computer system (HP2100).

Carry out a feasibility study and produce prototype components for an improved unattended regional structural seismic recording system.

Seismic systems

Develop a field seismic digital processing system. Investigate the analogue and digital processing systems with a view to providing an all-purpose (land/marine) office playback system. Continue development of an engineering seismic digital data acquisition system.

Marine systems

Continue design and construction of the prototype marine data acquisition system and produce/integrate hardware. Upgrade shallow-profiling seismic equipment. Continue development of non-explosive, high-resolution seismic energy sources for marine and land seismic applications.

Provide a consulting and design construction service for the development of hydraulic-powered, underwater drilling and vibrocoring equipment for marine geology investigations.

Observatory systems

Prepare a system for first-order regional magnetic surveys, and a digital F recording system for use in Antarctica.

Undertake system design of an automatic magnetic observatory at Gnangara, WA, and develop an associated digital controller.

Complete investigations into filter requirements for short-period seismograph systems.

GEOTECHNICAL SERVICES AND HYDROGEOLOGY PROGRAM

Multi-disciplinary studies employing geology, geophysics, groundwater hydrology, and rock and soil mechanics are used to aid civil engineering projects. Activities include investigation of sites for reservoirs, dams, major buildings, and refuse disposal, and surveys of routes of tunnels, sewers, pipelines, and roads. Complementing this work is the compilation of engineering geological maps of Canberra and investigation of soil properties.

Geological, geophysical, chemical, and hydraulic surveys and interpretative studies of the occurrence, distribution, composition, and hydraulic behaviour of groundwater provide the basis for water resource assessment and management.

ENGINEERING GEOSCIENCE

Damsite and reservoir investigations

Provide geological and geophysical services for the construction of Googong Dam ancillary works and pipeline to Canberra, and for the appraisal of alternative sites for reservoirs and watermains.

In conjunction with Department of Construction engineers, carry out safety surveillance inspections of ACT dams.

Environmental and pollution studies

Provide assessment of sanitary landfill sites in the ACT; monitor leachates and assess groundwater pollution. Undertake refuse site investigations as required.

Monitor hydrocarbon pollution in Canberra area and assess effectiveness of remedial works.

Urban and regional development

Conduct geological and geophysical site investigations for major buildings and bridges, and provide specialist advice as required.

Provide geological and geophysical services for planning of the Canberra trunk sewer, for construction of the Ginninderra sewer tunnel and ancillary works, and for Canberra City sewer connections to trunk sewer. Provide services also during construction of the Molonglo Parkway and for other transport routes of the Canberra region.

Conduct research into suitability of excavation methods and prediction of rock conditions and overbreak in hard rock tunnels; investigate potential resources of construction materials; carry out soil stratigraphy studies in the Canberra area; establish geomechanical properties of weathered and fresh rock in Canberra to supply data relevant to future construction projects.

Review technical requirements and world research for disposal of radioactive waste in a geological environment.

Complete oversight of investigations and design report for the Telecom tunnel in Melbourne.

Continue with mapping of the resistivity of the soil and weathered-rock layers in the ACT to provide locations for earth connections (request by Telecom and ACT Electricity Authority).

Continue with compilation of 1:10 000 series of engineering geology maps of the Canberra area.

HYDROGEOLOGY

Australian Capital Territory and environs

Continue with the preparation of a 1:100 000 scale hydrogeological map of ACT and environs.

Undertake hydrogeological research in Yass River Catchment, in conjunction with CSIRO.

Monitor and analyse data from observation bores in the ACT region and at Jervis Bay. Monitor the water level and quality of water of Lake George.

Murray-Goulburn

Complete the groundwater survey of the area; work includes investigations to resolve saline and clay low-resistivity zones, deep seismic and resistivity sounding, and experimental shallow seismic sounding to locate thin sandy aquifers.

Rutherglen-Albury

Conduct a resistivity survey to monitor changes in groundwater flow patterns resulting from the urban development of Albury-Wodonga and development of Oaklands coalfields.

Great Artesian Basin

Prepare report on hydrogeology of the Great Artesian Basin, and on the description, operation, and hydraulic calibration of the GABHYD model.

Collaborate with the Geological Survey of South Australia on application of the GABHYD model in South Australia.

Arrange a workshop (Jul or Aug) on the GABHYD model for representatives of State Water Authorities and Geological Surveys.

Continue liaison with Australian Atomic Energy Commission on isotopic investigations of Great Artesian Basin hydrology.

Note: The Australian Water Resources Council nominated BMR as the coordinating body for the Great Artesian Basin project. Data are drawn from information held by BMR and relevant State Water Authorities and Mines Departments.

FOREIGN AID PROGRAM

Advice to committees

Advise the East Asian and South Pacific (ESCAP) Committees for Co-ordination of Joint Prospecting for Mineral Resources in Offshore Areas, CCOP(EA) and CCOP(SOPAC) respectively.

ESCAP project

Continue with the preparation of correlation diagrams and notes for the EXCAP Stratigraphic Atlas project.

Irian Jaya

Subject to finalisation of agreements, undertake systematic reconnaissance geological mapping supported by geochemical and geophysical surveys, to provide basic information on the geology and mineral resource potential.

Fiji

Provide geological supervision and assistance for the construction of a sewerage tunnel to be driven under Suva.

Sumatra and Java

Provide specialist advice in connection with water supply projects.

Thailand

Undertake a feasibility study on groundwater problems.

Papua New Guinea

Provide specialist drafting advice to the Geological Survey of PNG.

Training

Provide in-house training to students under the Colombo Plan, UNDP, and similar schemes.

INFORMATION SYSTEMS AND REFERENCE COLLECTIONS PROGRAM

Information is disseminated to the public and industry through the BMR series of publications, 'open file' system of unpublished data, reference collections, data indexes, inter-library loan service, and the production of national maps summarising existing knowledge. Petrological, mineralogical, and palaeontological reference collections are maintained for use by scientists of BMR and other organisations.

INFORMATION SERVICES

Information dissemination

Prepare and disseminate information to government, industry, the public and the news media; answer queries from government Ministers, Parliament, government departments and authorities, and the public as required.

Prepare for distribution the BMR annual report, pictorial broadsheets of BMR activities, open file circulars, and lists of maps, publications, and geoscience events (conferences etc.). Organise the BMR Annual Symposium (May).

Continue development and operation of a computer-based index to BMR publications and Records; conduct studies of other BMR information systems including storage, retrieval, and indexing methods and use of microfilm.

Maintain an overview of national and international geoscience information systems. Assist with the Australian Thesaurus of Earth Sciences and the Australian Earth Sciences Information System.

Library

Maintain and operate a comprehensive library for use by BMR personnel and visitors; participate in studies concerning BMR and national geoscience information systems.

Stratigraphic Index

Maintain the Central Register of Stratigraphic Names. Send lists of variations to State Geological Surveys and other interested organisations.

NATIONAL MAPS

Atlas of Australian Resources

Continue with compilation of various maps for this atlas. Maps include geology of Australia, tectonic elements map of Australia, surface rock map, and mineral deposits map of Australia.

BMR Earth Science Atlas

Compile mineral occurrences maps, tectonic map of Australia, and map of sedimentary basins of Australia.

International co-operative projects

Compile metallogenic map of Australia for Commission for the Geological Map of the World, and maps for the Circum-Pacific Map project.

REFERENCE COLLECTIONS

Core and Cuttings Laboratory

Receive, catalogue, and store drill core and cuttings; provide facilities for examination and testing of samples.

Museum

Maintain and operate a comprehensive museum of geological material; provide informational and educational services to the public, government, and teaching organisations. Arrange exchange or purchase of desirable specimens.

Palaeontological Collection

Collect samples for and curate BMR and ESCAP fossil collections.

TECHNICAL AND ADMINISTRATIVE SERVICES

Planning and review

Review and investigate short- and long-term program proposals in terms of priorities, manpower requirements, financial resources, cost effectiveness, and co-ordination of interrelated projects.

Review organisation of BMR to meet the needs of forward programs.

Automatic data processing

Provide ADP facilities and advice for BMR activities. Current projects include development of computer-assisted cartography, co-operation with Australian National University on age determination systems, development of system to determine mine capital cost and operating costs, development of geophysical field systems, and integration of laboratory instruments to BMR in-house data acquisition system.

Cartography

Provide drafting services for projects.

Drilling

Undertake shallow-stratigraphic, special purpose and shot-hole drilling.

Editing

Edit BMR publications and papers for scientific journals. Produce the BMR Journal of Australian Geology and Geophysics.

Laboratories

Calibrate and maintain equipment. Support projects as required.

Photogeology and remote sensing

Assist field parties with photo-interpretation. Undertake an experimental computer classification of LANDSAT imagery of Georgetown area Qld, and a lineament analysis of Pine Creek region, NT.

Provide specialist advice on geological aspects of LANDSAT.

Administrative services

Provide support for management and projects as required.

NOTE ON PUBLICATIONS IN PROGRESS

Current lists of publications in progress are included in the following Records which summarise the 1977 activities of BMR's Geological, Geophysical, Mineral Resources, Petroleum Exploration, and Operations Branches:

Record No.		1977/45
"	"	1977/46
"	"	1977/47
"	"	1977/48
"	"	1977/49

These Records are available at Open File Centres in the capital cities of all States and in Darwin, Northern Territory.

Complete lists of all publications, both available and out of print, may be obtained on request to BMR.