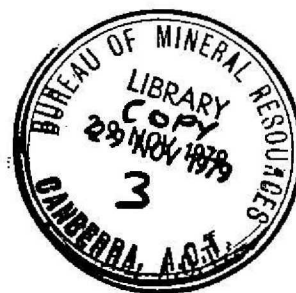


DEPARTMENT OF  
~~NATIONAL RESOURCES~~  
NATIONAL DEVELOPMENT



BUREAU OF MINERAL RESOURCES,  
GEOLOGY AND GEOPHYSICS

Record 1979/81



MINERAL RESOURCES BRANCH  
SUMMARY OF ACTIVITIES FOR 1979

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Record 1979/81

MINERAL RESOURCES BRANCH  
SUMMARY OF ACTIVITIES FOR 1979

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## INTRODUCTION

J. Ward, Head of Branch

(Assistant Director, Mineral Resources)

As in recent years, the work of the Branch in 1979 continued along two main functional lines: (1) the monitoring and analysis of the minerals industry both on a national scale and in an international context, together with dissemination of information and provision of authoritative advice resulting from this work; and (2) the assessment of our national mineral resources.

Much of the so-called routine work of the Branch has exacting deadlines, which are becoming increasingly difficult to meet because of continuing staff ceilings and the loss of key members of the staff. Nevertheless, reasonable timeliness of publications has been maintained because of the efforts of all concerned, and for this my thanks are due to the mineral commodity specialists, mining engineers, statistical officers, and editorial staff involved.

During the year, officers of the Branch continued to provide expert information and specialist advice to the Department and to other Government departments and agencies, mainly as background to policy formulation. This applied particularly to departmental briefing in connection with international mineral commodity arrangements, e.g. Lead-Zinc Study Group; the Australia/Japan Standing Joint Study Group on Raw Material Processing, involving mineral sands, lead, zinc, copper, aluminium, and gemstones; environmental impact studies, particularly in relation to uranium; the Subcommittee on Southern Africa of the Parliamentary Joint Committee on Foreign Affairs and Defence; and the Law of the Sea, particularly in regard to deep-sea mining and production of manganese nodules. Within BMR, officers of the Branch contributed to the Energy Task Groups on uranium and coal set up to advise on an enhanced energy-oriented role for BMR.

In addition to the major projects undertaken by the Branch, about 20 percent of the commodity specialists' time is taken up responding to ad-hoc requests for information which, although they can be handled individually without a great deal of time-consuming research, nevertheless together constitute a major erosion of manpower available for in-depth studies and publication of results. There is an increasing need for a small, qualified, competent group within the Branch, sheltered from these ad-hoc demands, which can devote itself full time to these longer-term major studies.

In 1979 the Branch continued to provide a lecturer for the Industrial Mobilisation Course conducted by the Department of Defence in the various capital cities, and provided a speaker for the National Resources & Trade Committee Government Members' Support Unit. Papers were also presented at the 8th BMR Symposium, the 11th General Assembly of the Tantalum Producers' International Study Centre (Perth), the Australian Mining Industry Council (AMIC) Annual Symposium (Canberra), and the Australian Institute of Mining & Metallurgy (AIMM) Symposium 'Estimation and Statement of Mineral Resources' (Sydney). Branch officers contributed papers to the AIMM



Mawby Memorial Volume, the special 'Australian' number of Resources Policy, as well as for a course booklet on 'Exploration and Mining of Mineral Sands'. The Chief Mining Engineer, in his role of Secretary to the State Chief Inspectors of Mines Conference, re-wrote amendments to the Australian Uniform Code of Mine Safety.

In the field of international aid, mining engineers of the Branch advised the Australian Development Assistance Bureau (ADAB) on technical matters concerning mining projects in Thailand and Bangladesh; the Head of the Branch (Assistant Director, Mineral Resources) and a mining engineer assisted in the organising and conducting of a Workshop on 'Evaluation, Assessment, and Classification of Mineral Resources' at Bangalore, India under the auspices of the Commonwealth Geological Liaison Office. The ADMR was involved in the 16th Session of CCOP/ESCAP Committee for Coordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas at Bandung as a special adviser, but in the event he was unable to attend the actual meeting and Dr G. Wilford of the Geological Branch took his place; the ADMR prepared briefing material for the ESCAP 6th Session of the Natural Resource Committee in Bangkok; and he assisted in the preparation of a syllabus and in the organising of a special group course on exploration for mining and mineral sands to be conducted in early 1980 for developing countries on behalf of the Department of Foreign Affairs. The Chief Mineral Economist (I. McLeod) was a member of the BMR technical exchange delegation to China in October.

Considerable progress was achieved during the year in the continuing assessment of Australia's identified mineral resources. Mineral economists of the Branch continued to collate data, and to assess identified mineral resources; national totals were brought up to date, revised, and published in Australian Mineral Industry Quarterly, 31(4). Development of the capital-cost data storage and retrieval program of the BMR cost model was continued, and the Tin Resources Assessment Project (TRAP) was well advanced. Development of a data base for mineral deposits was initiated along the lines of the US Materials Availability System (MAS), and a seminar on BMR's role in resource assessment was conducted in collaboration with Australian Mining Companies.

Staff ceilings were maintained in line with Government Policy throughout the year; the position has now become critical, particularly as staff losses have involved senior officers. Vacancies for two Mineral Economists Class 2 and a Mining Engineer Class 3 were advertised in late September. However, this will merely 'hold-the-line', as some further retirements are imminent.

## MINERAL ECONOMICS SECTION

### INTRODUCTION

The Section's two broad and interrelated continuing functions are to study the various sectors of the mineral industry (excluding petroleum and oil shale) both in the national and international spheres, and to assess Australia's mineral reserves and resources. Against this background, the Section is also able to respond to the many requests for information from Government, the industry, and the public, and to publish information regularly.

Although the Section's work concentrates on the Australian mineral industry and on Australia's mineral resources, the scope of its work is worldwide because the Australian mineral industry is largely dependent on overseas markets for its products and is an important world supplier of most major mineral commodities.

The section's mineral-industry studies follow two main lines - commodity studies and special studies.

Commodity studies are continuing reviews of all aspects of mineral commodities, from exploration to consumption, including production, processing, distribution, and marketing. These studies generate the broad information base on which the Section relies to answer the many enquiries put to it, and from which it draws the information it publishes.

Special studies focus on details of a particular facet of the industry, such as exploration, or review a commodity in greater detail, or study a particular aspect of a commodity. Special studies are (1) either programmed by the Section and carried out to fill a knowledge gap or to meet an anticipated need, or (2) the Section is directed along a particular line of study in response to specific requests for information and advice, particularly from the Department, but also from other departments such as Trade & Resources, Treasury, and Industry & Commerce, as well as from agencies such as the Industries Assistance Commission (IAC), the National Energy Advisory Committee (NEAC), National Energy Research, Development & Demonstration Council (NERDDC), and the Office of National Assessments (ONA).

Officers of the Section, with assistance from the Australian Bureau of Statistics (ABS), are jointly the authors of the Australian Mineral Industry Annual Review and the Australian Mineral Industry Quarterly; details of publications, and of papers published in the Quarterly or outside journals, as well as other releases such as Records, are listed separately. Because much of the Section's work depends on statistical data, it maintains a close working relationship with ABS, through the Statistical Officer (Mining), an ABS Officer outposted to the Section. By arrangement with ABS, the Section also carries out special statistical collections. The results of these collections are issued by BMR as bulletins and are available for mineral sands; copper, lead, and zinc; tin (quarterly); and sulphur, sulphuric acid, and superphosphate (annually). The section also prepares a series of 14 Preliminary Annual Summaries providing timely but preliminary statistics and commentary on developments concerning the more important commodities.

STAFF

Staffing at 31 October 1979 was as follows:-

Science 5 (Mineral Economist)	I. McLeod
Science 4 (Mineral Economist)	D. Perkin
Science 4 (Mineral Economist)	vacant
Science 3 (Mineral Economist)	A. Gourlay
Science 3 (Mineral Economist)	A. Driessen
Science 2 (Mineral Economist)	G. Hillier
Science 2 (Mineral Economist)	K. Patterson
Science 2 (Mineral Economist)	R. Pratt
Science 2 (Mineral Economist)	vacant
Science 1 (Geologist)	C. Mock
Clerk Class 4	J. Gilmore
Clerk Class 4	S. Westerhuis
Clerk Class 2/3	S. Styles
Clerical Assistant Grade 4	R. Weber

A. Driessen is on partial higher duties in the vacant Science 4 position; K. Patterson is acting in Science 3 Driessen's position and N. Knight in the vacant Science 2 position. L. Ranford, was promoted in November, 1978 to the Oil & Gas Division of the Department.

A Clerk Class 8 continues to be outposted to the Section from ABS, as Statistical Officer (Mining); the position was held by L. Wright throughout the year.

G. Mortimer transferred from the Section in July to a Clerk Class 4 position in the Office Services Section. He was replaced by J. Gilmore from Office Services.

J. Ramsey resigned from BMR in June and was replaced by R. Weber from Office Services.

COMMODITY STUDIES AND AD-HOC WORK

The wide coverage of commodity studies allows realistic assessments to be made of the impact of change in one sector on the other sectors of the industry (fluctuating prices, for example, can have marked effects on exploration activity and other investment activities). Although the emphasis is on monitoring Australian developments, coverage is worldwide because the

Australian industry is an integral part of the world industry and because Australia ranks so prominently among world suppliers of various important mineral commodities, particularly bauxite, coal, iron ore, lead, mineral sands, nickel, tungsten and zinc, and as a potentially large supplier of uranium oxide.

Much of the information held in the Section has come from both government and industry sources, in Australia and overseas, and by way of many trade and technical journals, newsletters, and newspapers. The Section maintains a specialised library, outposted from BMR's main library, and indexes and references its own material. Some bibliographic references, particularly those pertaining to the Australian industry, are also provided as input to the Australian Earth Sciences Information System (AESIS).

Commodity specialists also maintain close personal contact; often through field visits, with State mines departments (or equivalents) and geological surveys, other organisations, and many companies. The Section gratefully acknowledges the cooperation and goodwill given it by all of these organisations.

Information is also exchanged with visitors to the Section, of which there were about 135 in the year ended 31 October 1979.

Each year commodity specialists participate in industry symposia, conferences, and courses, not only to keep up with latest developments, but also to make available the Section's expertise via discussion or the presentation of papers - details are given in a later section. The Section also provides a speaker each year to the government-sponsored Industrial Mobilisation Course and prepares an update of the Record Mineral Resources of Australia.

Two officers also participated in the workings of various inter-departmental committees (IDC's) convened by ONA; A. Gourlay on two IDC's studying the Brazilian mineral industry and the Australian gemstone industry, and R. Pratt on an IDC studying the Australian and world iron ore and steel industries.

In December, I. McLeod addressed a group of visiting mining company executives on a familiarisation course on Government departments, and in November all commodity specialists prepared material on Australia's mineral resources and mining industry for presentation to a visiting delegation of Chinese earth scientists. In an exchange of information between the two countries, I. McLeod, as one of four BMR officers making up a party of ten Australians, visited China for five weeks from October to mid-November, 1979. In September 1979, D. Perkin was invited to appear before a Parliamentary Backbenchers' Committee to answer questions and deliver a short address on the resource potential of Australia.

During the year two specialist contributions were prepared, by invitation, for the AIMM Maurice Mawby Memorial Volume - 'Mining and Metallurgical Practices in Australia': C. Mock contributed a paper giving an outline of the Australian mineral industry, and A. Driessen a paper on the sulphur industry in Australia.

The Section's information base over the last 12 months has also satisfied many ad hoc enquiries from government, industry, and the public. Some queries are answered orally, but many require detailed written preparation. A particularly time-consuming enquiry completed by the Section in November 1978 was from the Sub-committee on Southern Africa of the Parliamentary Joint Committee on Foreign Affairs and Defence, on the mineral wealth of southern Africa (Angola, Botswana, Lesotho, Malawi, Mocambique, Namibia, Rhodesia, South Africa, Swaziland, Zaire, and Zambia). D. Perkin and A. Driessen were later called to give evidence before the Committee. The report confirmed the region's importance as a world supplier of minerals; it was concluded, on the basis of 1978 statistics, that the region supplies about 60 percent of the world's cobalt and gold, at least 41 percent of the world's industrial diamonds and 30 percent of gem diamonds, about 40 percent of the world's vanadium, 36 percent of world chromite, and between 20 and 25 percent of world manganese, copper, tantalum/columbium, uranium, and corundum. The southern African region is also the world's most important source of platinum-group metals. For some commodities in particular, the region is even more important in terms of future supply because it contains a high proportion of total world identified economic mineral resources e.g., chromite 96 percent, platinum-group metals 71 percent, tantalum/columbium 63 percent, gold 49 percent and cobalt 41 percent.

The Section also prepares papers, briefing notes, and other material required for various commissions of enquiry, Australian and international commodity groups such as the UNCTAD Export Group on copper, UNCTAD Committee on Tungsten, International Lead & Zinc Study Group, International Bauxite Association, and the International Tin Council.

The Section prepares various forecasts for other government departments, on mineral export income for the Department of Trade & Resources, and on employment prospects in the mining industry for the Department of Employment & Youth Affairs. The Foreign Investment Review Board also regularly submits material on various take-over proposals for comment by commodity specialists. In the 12 months to 31 October 1979, commodity specialists spent about 594 man days (27 percent of total man days of staffed positions, excluding leave) on responding to various requests for information from government (especially the various bodies detailed above), the industry, and the public.

#### SPECIAL STUDIES

The Section's capacity to make programmed special studies, is limited by its commitment to respond immediately to the many enquiries outlined above. In 1979, opportunities were further restricted by staff turnover, staff ceilings, and other constraints. Study of the various methodologies of resource assessment and development of methods for assessing inferred reserves was set back by the loss of a specialist geostatistician, Dr J. Cottle who resigned in May 1978. Nevertheless, a detailed tin resource assessment is presently being carried out by Mr Perkin and J. Erskine with assistance from the ADP Section. R. Pratt also has begun an assessment of Australia's chromite resources. Assessment of known mineral



resources is carried out on a continuing basis from published and unpublished data; the results are published in the fourth issue each year of the Australian Mineral Industry Quarterly.

The Section was again (in addition to its major contribution to NEAC reports in 1977 and 1978) active in energy matters, in this instance in two energy task groups - coal (K. Patterson) and uranium (D. Perkin). As a response to the Prime Minister's Statement of June 1979 that BMR's role in assessing Australia's energy resources would be enhanced, BMR set up four energy task groups (petroleum, coal, uranium, and oil shale) to review BMR's program and recommend priorities.

Another project with which the Section is presently occupied is the preparation of an invited 9000-word paper on the export sector of Australia's mineral industry. The invitation came from the UK-based journal Resources Policy for publication in mid-1980 in a special issue devoted entirely to Australia; co-ordinating editor for the project in Australia is Dr G.J.S. Govett, Professor of Geology, University of New South Wales.

#### OTHER WORK

A study was begun on developing a mineral deposit data base. The Section is also studying the feasibility of recording statistical data on production, trade, and consumption in machine-readable form for computer processing. Microfilming of the Section's holdings of company Annual Reports, begun last year, continued.

#### SYMPOSIA, CONFERENCES, LECTURES, COURSES

Attendance by Section members during the year ended 31 October 1979 are detailed below:

##### Addresses to meetings and conferences

- . Workshop on Mineral Resource Assessment, 23 March - 7 April, Bangalore, India. This workshop is conducted under the auspices of the Commonwealth Geological Liaison Office; J. Ward and J. Erskine delivered a series of lectures by invitation.
- . Bankers' Overseas Trade Course, Sydney, November 1978. I. McLeod by invitation delivered a paper on Australia's mineral industry and mineral resources.
- . AMIC Symposium, Canberra, April 1979; I. McLeod delivered a paper on geological mapping and mineral resources by invitation.
- . Eleventh General Assembly of the Tantalum Producers' International Study Center, Perth, May 1979. I. McLeod was invited to participate and to present a paper on Australian tantalum deposits.
- . BMR Symposium, Canberra, 1-2 May 1979. D. Perkin, in collaboration with J. Erskine, delivered a paper on 'Predicting the location, grade, and tonnage of Australia's future tin orebodies'.

- . The School of Applied Science, CCAE, Canberra, October 1979. D. Perkin gave a lecture on 'Evaluation of mineral deposits'.
- . Meeting of the Government Members' Committee on National Resources and Trade, Parliament House, Canberra, September 1979. D. Perkin delivered a short address on 'The resource potential of Australia; current developments in the mining sector'.
- . The Centre for Continuing Education, ANU, Canberra, July 1979. D. Perkin gave a lecture on 'Geological aspects of uranium as a source of energy'.
- . BMR Tuesday Lecture Series, December 1978. A. Driessen gave a lecture on 'Developments in the phosphatic fertiliser industry' and D. Perkin a lecture on 'Tin potential in Australia - a cornucopia'.
- . Preliminary meeting at the Western Australian Institute of Technology to discuss a course on mineral sands exploration, August 1979 (J. Ward). This is to be conducted in Western Australia in early 1980 under the auspices of ADAB.

#### Attendance at Conference

- . Symposium on coal, organised by the Department of Trade & Resources, November 1978 (K. Patterson, R. Pratt).
- . Symposium on mineralisation in northwest Tasmania, organised by the Geological Society of Australia - Tasmanian Division, November 1978 (D. Perkin).
- . Seminar on the exploration potential of New South Wales organised jointly by the Australian Mineral Foundation (AMF) and the Geological Survey of New South Wales, February 1979 (K. Patterson, A. Driessen).
- . Australian Mining Symposium and Australia's First International Mining and Exploration Exhibition, Sydney, February, 1979, sponsored by AMIC (I. McLeod).
- . The Australian Institute of Energy - First National Conference, Newcastle, February, 1979 (D. Perkin).
- . Seminar organised by CSIRO, Canberra, on US Energy Developments and Policy, May 1979 (K. Patterson).
- . Seminar on the exploration potential of Victoria organised jointly by AMF and the Geological Survey Victoria, May 1979 (I. McLeod).
- . International Uranium Symposium on the Pine Creek Geosyncline, NT, June 1979, Sydney and on location. Sponsored by BMR, and CSIRO Institute of Earth Resources, in cooperation with the International Atomic Energy Agency, Vienna (D. Perkin).
- . AIMM Annual Conference, Perth, August 1979 (I. McLeod).

Attendance at training courses

- . AMF course 'Ore Genesis in the Sedimentary Environment', Sydney, June 1979 (K. Patterson).
- . AMF course 'Mineral Economics', Adelaide, July 1979 (K. Patterson).

MINING ENGINEERING SECTION

The Mining Engineering Section is a small mining research and advisory group. The mining engineers provide information and advice to Government, e.g. on mine feasibility and profitability, methods of mining, recommendations for development programs, and requests for mining assistance. The section also provides assistance to the mineral-resource-assessment groups of BMR in their compilation of economic and subeconomic mineral resources, by calculating capital and operating costs of mining projects. In co-operation with the State Mines Departments, the Section participates in the compilation of a standard mine-operating Code of Practice. A schedule of State mining royalties and Australian Government mining tax provisions is kept up-to-date, together with State mining legislation amendments. In 1979 the Section further extended the use of computers in mine feasibility studies, and continued with the design of a computerised mining data bank.

STAFF

Occupied positions (as at 31 October 1979)

Engineer Class 5	...	E.G. Timoney
Engineer Class 3	...	J.C. Erskine

CONFERENCE OF STATE MINING ENGINEERS

The Conference was held at the Tasmanian Mines Department, Hobart, 2-4 April, 1979. Mine operation and mine safety were discussed, including recommended end-of-mine rehabilitation requirements and the control of large pillar and stope blasts. E. Timoney acted as secretary to the conference, and compiled the minutes of the meeting and distributed them to all States and to the Australian Minerals & Energy Council (AMEC).

VISITS TO MINES

In early 1979 E. Timoney visited Western Australia, and examined the underground Mount Charlotte gold mine at Kalgoorlie, and nickel mines at Kambalda. In the Hamersley Iron Province he visited the Mount Newman mine, the loading facilities of Port Hedland, the pelletising plant at Karratha, and the Mount Tom Price and Paraburdoo mines. He also visited Broken Hill, and examined the North Broken Hill and Zinc Corporation mines; this trip also included Cobar and the underground C.S.A. mine. In Tasmania visits were also made to Renison Bell, Rosebery, Cleveland, Savage River, and Mount Lyell mines.

GOOGONG DAM PROJECT

E. Timoney continued to act as mining adviser to the project executive throughout the year.



## GENERAL ASSISTANCE TO GOVERNMENT DEPARTMENTS

Comments were made on behalf of the Department of Science & the Environment on several environmental impact studies. These studies outlined the proposed mining and milling programs and the necessary data on the overburden, water and tailings disposal which must be analysed before mining can start.

Advice was given to the Department of National Development about State mining legislation.

## AUSTRALIAN DEVELOPMENT ASSISTANCE BUREAU

There was not as much input to ADAB projects as in previous years, though queries about projects previously carried out in Thailand and Bangladesh continue to be received. Some time was spent helping in the selection of a consultant for an iron ore project in Pakistan and for a Senior Inspector of Mine for Fiji.

## GEOSTATISTICS FOR ORE RESERVE CALCULATIONS

Progress was delayed during the year because of the complexity of calculations involved and the lack of sample values drawn from a real case from which a variogram could be drawn. Actual sample values have now been obtained from a mining company, and a computer program will soon be written to cover most calculations.

## MINING COST ASSESSMENT

E. Timoney designed and implemented a multi-purpose computer program to calculate and print out discounted rate of return, cash flow, taxation charges, and royalty payments from known mining projects. A second program was written to outline the items above by using figures for incremental tonnage and capital. The need for such a program became evident early in the year in an assessment of Australian phosphate deposits. He also designed and wrote up a ready reckoner for the preliminary evaluation of open-pit mines of various grades and sizes. This ready reckoner was issued as BMR Record 79/35.

## ASSESSMENT OF AUSTRALIAN TIN RESOURCES

Work continued on the collection of information about Australian tin mines and prospects, and J. Erskine and D. Perkin of the Mineral Economics Section, together with E. Smith of the ADP Section of Operations Branch, have nearly completed the first stage of the assessment of Australia's tin resources. E. Smith's assistance in writing a program for this work has been invaluable. Such a program for tin alone would be relatively simple, but the program has to be capable of being expanded to analyse mineral extraction costs with varying mining methods and to assess ore reserves at different metal prices, and also to assess resources of other major metals. To write such a program may entail considerable effort, but it is planned that the work should continue throughout the coming year. Messrs Erskine, Perkin, & Smith also collaborated in the presentation of a paper on the future tin resources of Australia, presented at

the 8th BMR Symposium. The potential for large, relatively low-grade, hard-rock tin deposits (porphyry tin) appears good, as it also does for very-large, low-grade alluvial deposits, on the eastern watershed of the North Queensland tin-bearing granites such as King's plain, on Station Creek within the granites, and in other areas well out beyond the western edge of the granites. The many existing alluvial producers continue to use outmoded techniques, and consequently only two alluvial operators seem yet to be making good profits even with today's high tin price (\$14,000/tonne).

#### OVERSEAS VISITS

J. Erskine delivered a series of lectures on mining costs and mining taxation at the Commonwealth Geological Liaison Office workshop at Bangalore, India, from March 23rd to April 7th, which he attended in company with J. Ward. While in India he visited the Kolar Goldfield, and was able to descend to 3415 m (11 200 ft), the deepest one can go into the Earth's crust anywhere in the world (though the Rand mines in South Africa are about 300 m deeper below the surface as measured from the Rand's considerably higher surface elevation). The science of rock mechanics and the technology of refrigeration of mine air were first developed and applied at Kolar. J. Erskine also visited the large new Kudre Mukh iron ore mine development which will ship its ore to Iran via a 65-km slurry pipeline to Mangalore port. The ore grade as mined at 38% Fe, is very low, but the ore is amenable to relatively easy wet magnetic beneficiation at the mine, after grinding in autogenous mills to minus-20 mesh using, as grinding media, the hard taconite-type material which underlies the softer magnetite hematite that makes up the ore reserve. A high-grade (66.5% Fe) product can be shipped at a competitive price US\$22/tonne f.o.b. in 1979 dollars) because of the cheap transport cost by slurry pipeline.

#### SYMPOSIA, CONFERENCES, COURSE, LECTURES

Early in the year E. Timoney attended a one-week course in Mining and Petroleum Law run by AMF in Adelaide. He later presented a talk of this subject at the BMR Tuesday Lecture Series. Later in the year he also presented a short lecture, 'Mining factors outside the orebody'.

J. Erskine delivered a lecture on mining costs to mining engineers and geologists from CSR Ltd; presented a paper at AIMM, Sydney Branch, on the effects of costs and prices on ore reserves; and collaborated with D. Perkin in a paper on Australia's future tin resources. He also spent considerable time speaking to visiting geologists and engineers about methods of estimating mining costs for new projects.

#### MINING STUDENTS AT UNIVERSITIES

J. Erskine was invited by the School of Mining Engineering of the University of New South Wales to be a member of a panel of industry experts to review the quality of the final year students' work and the effectiveness of the school's teaching in the subjects of ore reserve estimation, feasibility studies, and financial analysis (the other two panel members were CSR's Chief Mining Engineer and a mining consultant in private practice). Other Universities

and Colleges of Advanced Education (e.g. at Brisbane, Melbourne and Ballarat) have sent mining syllabus material to BMR during the year, for our information, and J. Erskine has spoken to geology students at the Canberra College of Advanced Education about feasibility studies. Copies of his lectures on mining costs have also been distributed to mining students at the University of Bangalore in India.

#### AUSTRALIAN ATOMIC ENERGY COMMISSION

Contact was maintained with the two mining engineers at the AAEC in Sydney, in discussions and correspondence about uranium mining costs and problems.

#### BUREAU OF INDUSTRY ECONOMICS

Technical information about iron ore and uranium mining costs and methods was given to BIE to help in a major project they have undertaken on the effects of mining investment on Australia's manufacturing industries. Similar help was given to the Industry Assistance Commission for the capital cost elements of their 'Impact' and 'Snapshot' models of the Australian economy.

#### AUSTRALIAN MINERAL INDUSTRY ANNUAL REVIEW

The Section writes the following parts of the AMI Annual Review:-

State mining royalties

Government assistance to the mining industry

Mining legislation (income tax & Federal Government levies)

Government controls

Foreign investment policy

State royalties

#### RUNDLE OIL SHALE PROJECT

The mining engineers prepared rough cost figures for oil shale mining. J. Erskine prepared a proposal for oil shale research and development.

#### ENVIRONMENTAL IMPACT STATEMENTS

J. Erskine co-authored a Professional Opinion on the Jabiluka E.I.S. in collaboration with Messrs Wilson and Haldane of Geological Branch.

### VISITORS AND ENQUIRIES

During the year the mining engineers received many visitors and handled many enquiries from mining companies, individuals, Government Departments, Universities and other agencies, on a wide variety of subjects associated with mining techniques, mineral resources, underground support, mining equipment, mining feasibility calculations, etc. For example:

- . A consulting engineer called to discuss costs of bucket-wheel excavator operations.
- . A management consultant required advice on setting up an exploration project in Thailand.
- . A management consultant required advice about how to prepare a report on the difference between lead production costs in Australian mines and US mines for a large AUS mining company.
- . The administrations manager of a large Australian manufacturing company called to enquire about the locations of new mining projects and the addresses of the operators of such projects.
- . A query about oil shale in Thailand.
- . A query about limestone deposits in New Guinea.
- . A query from an Australian manufacturer about where to find lime suitable for the new uranium projects in the Northern Territory.
- . A query from UK about costs and methods of restoring mining areas to productive farmland.
- . A senior exploration geologist from a mining company needed help with the methodology of financial analysis for new projects.
- . A senior exploration geologist called to discuss mining costs.
- . A departmental officer required help in preparing a table of costs of titanium manufacture.

Many enquiries were made by members of the public about State mining laws, and were generally referred to the relevant State Mines Departments. Enquiries were also received about metal detectors, and what suggestions we might have for the use of them. Our suggestions can only be that fossickers clear their right to prospect an area with the Mines Department, once they have chosen areas to prospect which have a history of alluvial gold production.

PUBLICATIONS ISSUED IN 1979

Australian Mineral Industry Annual Review 1977

Australian Mineral Industry Quarterly, Volume 31, Nos. 2, 3, and 4;  
Volume 32, Nos. 1 and 2.

BMR Record 1979/14, Mineral Resources of Australia, 1978, by J. Ward  
& I.R. McLeod.

BMR Record 1979/35, A ready reckoner for early evaluation of open-pit  
base and precious metal projects, by E. Timoney.

Articles published in the Australian Mineral Industry Quarterly:

- . 'The effect on ore reserves of rising costs and falling prices', by J.C. Erskine (Vol. 31, No. 2, 53-66).
- . 'The Australian tungsten mining industry', by G. Hillier  
& N.D. Knight (Vol. 31, No. 3, 106-115).
- . 'The Australian use of iron oxide minerals for purposes other  
than iron and steelmaking', by R. Pratt (Vol. 31, No. 4, 166-176).
- . 'Australian identified mineral resources, 1978'.  
Author - BMR (Vol. 31, No. 4, 177-181).
- . 'Enhanced recovery from Australian oil reservoirs', by  
B.A. McKay\* (Vol. 32, No. 1, 9-15).

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\* Petroleum Exploration Branch