INDUSTRY COMMISSION

MINING AND MINERALS PROCESSING IN AUSTRALIA

VOLUME 2: COMMENTARY, STATISTICS AND ANALYSIS

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Apart from this volume (whose contents are detailed on previous pages), the Commission's report on Mining and Minerals Processing in Australia comprises an Overview and three other volumes as follows:

Volume 1 : Report (includes Overview)

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Volume 3 : Issues in detail

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The Overview which appears at the front of Volume 1 is also available as a separate document.

APPENDIX B

VIEWS OF PARTICIPANTS

B VIEWS OF PARTICIPANTS

This Appendix contains summaries of all non-confidential submissions and parts of submissions received for this Inquiry. Specific reference is made to the contents of second and subsequent submissions received where these contained additional recommendations or referred to issues not raised in initial submissions.

Aberfoyle Ltd (Sub. 227)
Cash-bidding for the allocation of exploration and mining rights as recommended in the Draft Report will not raise significant funds because the value of undiscovered resources is quite low. It may be appropriate in limited circumstances such as when identified resources are being sold. Aberfoyle feels strongly that explorers should have the right to mine. Steady funding of end-of-life environmental rehabilitation requirements during the life of a mine is favoured over guaranteed or up-front bonds.

Aboriginal and Torres Strait Islander Commission (Subs. 40, 91, 178, 244)
Presented a discussion of the *Aboriginal Land Rights (Northern Territory) Act 1976* which is administered by the Minister for Aboriginal Affairs. This Act governs the conditions relating to exploration and mining on Aboriginal land in the Northern Territory.

Aboriginal and Islander options for land claims, participation in royalty schemes, protection of significant sites and any other future options should not be pre-empted by decisions or recommendations made by the Industry Commission. Queensland Aborigines and Islanders are relatively disadvantaged compared to Aborigines in the Northern Territory under land rights legislation. Queensland Aboriginal and Islander people have been dispossessed of many of the traditional lands. They now live on Deeds of Grant in Trust land that does not reflect traditional affiliations.

The mining notice system should be made more intelligible to Aboriginal and Islander people so that they can understand the implications of notices. Efforts should be made to inform the traditional owners both on and off the Deeds of Grant in Trust and Local Government land. There should be a standard procedure for negotiations between mining companies and Aboriginal and Islander people. This should include negotiations with both traditional owners and holders of legal title. The *Mineral Resources Act* disadvantages communities on local government and Deed of Grant in Trust land.

Social impact assessment is important in determining the likely impacts of mining on Aboriginal and Islander communities. This should include the effects on traditional values and on the current social structure of local residents.

Indicated that the Draft Report contained the following deficiencies:

. It neither canvasses the issues adequately nor makes an adequate and balanced assessment of the problems;

. It does not take adequate account of the range of Government policies related to Aboriginal land and the rights established under the *Aboriginal Land Rights (NT) Act 1976;* and

. It proposes simplistic solutions which, if implemented, would put at risk many of the mechanisms and rights established under the *Aboriginal Land Rights (NT) Act 1976* in relation to Aboriginal land in general.

Aboriginal Co-ordinating Council (Subs. 36, 211)
All lands under Deed of Grant in Trust should be exempt from the Mining Act. No access to Aboriginal land should be granted except through a Community Council. Any negotiation should be through the Community Council. There should be complete protection of sacred sites and living areas. A guaranteed percentage of royalties and compensation should be paid for destruction and damage to Aboriginal land direct to community councils.

There should be extensive amendments to the *Mineral Resources Act 1989* to cater for the rights of veto and requirements to consent by Aboriginal and other landowners throughout Queensland. Land rights legislation for Aboriginal people in Queensland should provide these rights regardless of any other legislation. The effect on mining companies and the mining industry in terms of this Inquiry will mean a more committed involvement in social, cultural and environmental compensation both financially and morally. Mining companies should be required to make a more determined effort to come to suitable agreements through negotiations with Aboriginal communities and people in Queensland.

Opposed the recommendations in the Draft Report on Aboriginal land and Aboriginal issues as they derived from the position current in the NT which is different to that which applies in Queensland. The Commission should outline clearly how the mining legislation in each State applies to Aboriginal land. Disagreed with the statement in the Draft Report that too much power resides with Land Councils. Sought clarification of some matters covered by the Queensland Mineral Resources Act. Opposed the statement in the Draft Report that land of nature value should be removed from the list of items subject to possible national estate listing.

Aboriginal Legal Service of WA Inc (Sub. 187)
Expressed concern about the lack of formal mechanisms or legally binding systems in WA concerning the conduct of mining on Aboriginal land, and objections against mining tenement applications on the basis of harm to Aboriginal cultural interests. Emphasised the necessity to understand the importance of the relationship which Aboriginal people have with the land.

ACIL Australia Pty Ltd (Sub. 53)
Foreign interests proposing to acquire majority, or even total, ownership of an existing mining business normally gain approval, provided net economic benefits are demonstrated or the foreign interest is `Australian controlled'. In contrast, proposals to establish new mining businesses or develop coal and mineral resources need to conform, as a general rule, to the guide-line of 50 per cent Australian equity and at least 50 per cent Australian voting strength on the board or controlling body of the project.

Proposals for foreign investment in the oil and gas sector, or in resource processing, unlike those for coal and minerals, are normally approved without the need to demonstrate economic benefits or to provide for Australian equity participation. The distinction ignores the commonality of these industries' exploration, extraction and processing activities and implicitly accords greater national or strategic significance to Australian ownership of relatively abundant solids rather than relatively scarce gases and liquids.

A proposal for foreign investment in coal and minerals development needs to demonstrate to the Foreign Investment Review Board and the Treasurer that it is not contrary to the national interest. Proposals for foreign investment in other sectors, including oil and gas and resource processing, are approved unless judged by the Government to be contrary to the national interest.

Adelaide Brighton Cement Ltd (Sub. 63)
Made a confidential submission.

Alcoa of Australia Ltd (Subs. 16, 138)
The variability of conservation values in relation to the distribution of other resources should be taken into account in establishing the boundaries of future conservation areas. Mining proposals can have widely varying impacts depending on the scale of the operations involved and the level of rehabilitation expertise available.

The replacement of depreciated capital equipment is regarded by the Taxation Department as new capital expenditure with unfavourable depreciation treatment.

The federal government should not become involved directly or indirectly in the setting of mineral royalties, the establishment of resource rent programs, excess profits taxes or other industry specific taxes. Mineral royalties and other land-based levies are and should remain the exclusive responsibility of the States.

Specific industry infrastructure requirements should not be funded by the taxpayer. However, there are situations in which governments should contribute towards infrastructure development in certain circumstances. Transport services provided by governments should be priced at a level which attracts no more than a reasonable margin on the costs of providing the services.

Initiatives by the government to make coastal shipping more competitive are supported. Port authorities should be encouraged to minimise costs to shippers by supplying more efficient services, including the provision of tugs. The international competitiveness of the mineral processing industry should be maintained by the removal of import charges which do not protect domestic markets, allowing drawback of duty on imported oil which becomes part of an exported product, and the removal of import protection from local manufacturers.

Government policy on export controls on alumina are opposed for these reasons:

. Alcoa can be depended on to sell at the best price it can receive for its products;

. The alumina business is not characterised by buyer collusion or an imbalance of power between buyers and sellers; and

. The powers of the Commissioner of Taxation over export contracts will ensure that transactions between related companies are made at arms length.

Andrews A (Subs. 13, 107)
Supported commencement of mining at Coronation Hill and further development of the El Sharana lease. Opposed the policy of the federal government in delaying mining activity while an environmental and economic impact assessment is being carried out.

ARCO Coal Australia Inc (Sub. 64)
Coal exploration areas in Queensland are usually awarded on a semi-work program bidding basis which responds to public advertisement of the invitation to bid. This system of allocation is basically preferable to alternatives such as open claim or cash bidding systems given the situation in the coal industry where there is a protracted period between initial exploration and development and where the development costs are very substantial. The criteria on which competing offers are assessed need to include tests of the capacity of the bidder to deliver the project to ultimate development. Matters such as specific operating experience, quality of related work, and market acceptance need to be factored alongside the exploration development proposals defined in the formal bid documents.

To the extent that other agencies including governments, semi government authorities and employees in subsidised housing participate in the profit of the overall mining development, then they should share in the cost of the infrastructure.

There are persuasive arguments against the attachment of downstream processing obligations to mining lease conditions. The fair price of coal at any time and at any point can be determined reasonably objectively so that properly valued inputs to downstream processing are available within the existing market structure.

Objective criteria should be formulated to compensate prior land users for loss of utility. In some cases these criteria will establish that mining not proceed.

The potential flow-on benefits from mining to other industries needs to be assessed in resolving land use questions. There is a need to evaluate alternative use, mining and rehabilitation in total and to do so against minimum reasonable rehabilitation standards.

Rail freights are an inappropriate taxing mechanism. Post - 1978 mines have extremely high charges. The "claw-back" mechanism has serious unintended consequences.

Mines operators are having to bear most of the cost of industry volatility.

State Government control over mineral taxation, tenement allocation, and regulation of mining operations should be retained.

Association of Mining and Exploration Companies Inc (Subs. 15, 115, 198)
State and federal governments should produce policies and guidelines for mineral resource development which deal with the principles to be observed where development of any mineral resource is proposed which will apply equally across all land tenures. Development should be allowed to go forward without the political interference evident in the present decision making process.

The Association proposed a number of specific changes for the WA mining legislation.

The WA government policy on mining and exploration in national parks and nature reserves is opposed.

Mining legislation should not be based on historical concepts which are outmoded. Technological advances should be recognised. New Mining Acts are required in several States and Territories because existing legislation is out of date. Mining legislation should be framed so that unnecessary administrative burdens on the industry are eliminated.

Title to all minerals should be vested in the State. Private ownership of minerals should be abolished. The issue of compensation should be carefully considered. All land must be made available for exploration and mining. Multiple land use must be applied. There should be no blanket prohibition against exploration or mining on any land. However the consent of the occupier should be required before exploration or mining could take place in a National Park or on land within 100 metres of buildings such as houses or churches or facilities such as dams. An application for an exploration licence should not be required to be supported by a program of the exploration proposed.

Several suggestions were made regarding review of the current taxation treatment of different aspects of mining activity.

The Draft Report did not deal with the issue of whether the small number of existing private mineral rights should be resumed by the Crown.

Opposed the recommendations on the allocation of exploration and mining rights, and on the availability of land for application by a third party if agreement is not reached between Aboriginal owners and an explorer/miner. AMEC is concerned about the private landholders' veto on access by explorers and miners in a large area of WA. Opposed the separation of the right to explore from the right to mine except in relation to mining in those national parks with high conservation value.

Supported amendments to the *Australian Heritage Commission Act 1975* to remove detrimental effects on property and proprietary rights.

While opposed to the introduction of rehabilitation bonds, AMEC suggested that they should be in the form of company or bank guarantees.

AMEC made a number of recommendations concerning the taxation treatment of exploration and mining expenditure.

Austen and Butta Ltd (Subs. 98, 254)

Current Award Restructuring proposals under the Structural Efficiency Principle involving award simplification, multi-skilling skilling and broadbanding are vital, together with further local efficiency improvements. These changes must be introduced rapidly and effectively so that real benefits are obtained to more than offset the wage increases which are already part of the system. This is not yet happening satisfactorily. The process of union amalgamation must be encouraged, again with early implementation. Increased emphasis has to be placed on training to improve the skills of the workforce and management. Similarly, safety performance has to be significantly improved.

Within the transport chain, some unions are endeavouring to increase costs of operation by traditional demarcation disputes, an approach which is totally inconsistent with the general desire to see improved efficiency and competitiveness. This is being strongly resisted by the company.

The existing industrial relations structure has allowed both management and unions to shirk their real responsibility of resolving issues directly, and to pass such issues for resolution to a third party, who is generally less able to make appropriate judgements than the main participants themselves. Resulting decisions tend to be compromises which are not satisfactory to either side.

The *Coal Mines Regulation Act* which specifies the practices and standards under which the industry operates, is highly prescriptive and detailed, rather than enabling and flexible. In key areas, this has had the opposite effect to that intended. Whilst considerable improvements to safety performance have occurred in recent years, the performance level is poor relative to other industries and to the best international coal industry standards. This can encourage a mentality which perceives conformity with the Act as an acceptable objective rather than striving for international excellence. A Workers Compensation system which can encourage abuse compounds the problem.

It is recognised that the community expects environmental standards to continually improve. This could however be achieved far more effectively with a streamlining of the present system. The Department of Minerals and Energy has recognised this problem and is reviewing its procedures accordingly. However, the problem will not be solved until the overall process is reviewed, including Department of Planning requirements.

The Coal Industry Tribunal should be incorporated into the mainstream industrial relations system.

The approvals process for major mining projects should be streamlined. There should be a review of the requirements of the Department of Minerals and Energy and the Department of Planning.

There should be a fundamental review of the entire regulatory requirements for the industry in the light of modern practice, covering both Federal, State and Local Government arenas. Existing regulatory bodies should be rationalised, merged and/or privatised to meet minimum requirements as effectively as possible.

The process of efficiency improvement of port, rail and road transport systems should be continued.

Industry should be allowed to manage its own research activities free of control by the Government or the National Energy Research, Development and Demonstration Council.

The Federal Government should rescind its export control powers. Their very existence, implying a concentration on marketing rather than supply-side issues, gives the wrong message in endeavouring to optimise outcomes from the industry. There are, however, a range of market initiatives which the Government should be taking to complement and support the commercial initiatives being undertaken by the companies:

. Streamline the information flow to industry;

. Rationalise the highly fragmented government/institutional image which is presented to the international market;

. Concentrate on government-to-government market-opening initiatives;

. Eliminate subsidies for competing overseas coal producers; and

. Handle the environmental debate correctly to prevent serious adverse consequences for our coal industry.

More analysis is required on the practical implications of recommendations in the Draft Report on cash bidding for mineral rights and Resource Rent Taxes.

Australian Bureau of Agriculture and Resource Economics (Subs. 161, 163)
The submissions focussed on three of the major areas of government policy affecting the sectors: assistance, taxation and the environment.

Domestic tariff reform is likely to have major effects on the costs and activities of the sectors. The mining sector, because it is relatively lightly assisted in comparison with the manufacturing sector, is significantly penalised by tariffs on material and capital inputs. The tariff reduction program currently in progress will go some way toward reducing them further.

Taxation arrangements for the mining sector also provide scope for changes in government policy to significantly improve the efficiency of resource allocation and use. There is considerable support for a change in the methods of collecting payments in exchange for access to Australia's mineral resources. A shift away from taxation mechanisms based on output to those based on economic rent (that is, on profit) would be likely to be beneficial from an efficiency perspective. A tax system which taken into account mine revenues and current operating costs on a mine-by-mine basis would at least remove some of the inefficiencies associated with current taxation arrangements.

The extent of the gains to society, in terms of net social welfare, which may result from changes in the management of environmental resources are not so readily quantified. However, the gains from integrating the environmental and economic aspects of development proposals in the policy formulation process are likely to be substantial. Further research is required to determine these potential gains.

There is scope for government involvement in the acquisition and dissemination of information regarding the geological and environmental attributes of areas subject to competing demands. This is a necessary input to the process of project evaluation, which should take into account a wider range of social costs and benefits than is currently the case.

Australian Coal Association (Subs. 71, 117, 142, 232)
The Government's present emphasis on prohibitive and supportive measures is misplaced, although the situation has improved markedly in recent years with the relaxation of export control guidelines and a relative shift towards less intrusive trade promotion activities. It is most important that the issue be analysed solely on competitive grounds, free of the political considerations and special pleading by vested interests which have had a disproportionate influence in the past. Minimum price setting via export controls is not an appropriate way to ensure or enhance landed cost competitiveness of Australian exporters relative to other suppliers. Controls restrict the ability of our exporters to engage in price competition.

Government concerns about companies undercutting each other is misplaced. Australian exporters exhibit a high degree of solidarity in negotiating major settlements, particularly in a rising market. Concerns about companies contributing to overall price falls which are unjustified by the market are similarly misplaced. On a practical level, the existence of controls assumes that government is better able to gauge the market than are the producers which operate within it. Export controls are more likely to reduce rather than enhance the development of an efficient and profitable industry and long term job security.

The Association agrees with the Commission's 1988 conclusion that export controls are unlikely to benefit Australia because demand for our coal is insufficiently inelastic. While some of the short run factors on which this conclusion was based have changed somewhat, the Commission's analysis remains valid.

The Association provided reasons for opposing the existence of a separate Australian Coal Marketing and Technology Council and the continuation of the Joint Coal Board.

The principle of a national coal authority is opposed as it would protect the less efficient Australian mines from the full pressures of international competition and the minimisation of competition between Australian mines.

The coal industry is opposed to the Industry Commission's 1988 analysis which recommended cash bidding for exclusive mineral property rights combined with a resource rent royalty (RRR) as superior to First-Come-First-Served and work bidding systems in promoting efficient resource use. The long-run uncertainties of mining, i.e. defining the nature of the resource, predicting market trends and the actions of government, require that the in-situ resource be treated as a variable input which is paid for when it is consumed and priced to reflect its value to the owner/supplier at that time. The Industry Commission's analysis understates the magnitude of these uncertainties and the Association believes its preferred cash auction/RRR system is not an efficient mechanism for sharing risk between the company and the government.

Adequate legal and institutional safeguards exist at both State and Federal levels to satisfy community concerns about certain aspects of foreign investment which must be reflected in Government policy.

The Government's progressive liberalisation of foreign investment policy is commendable. However, this should extend to afford equal treatment to coal mining relative to other industries.

The argument that overseas investors can depress general price levels in the market may be of genuine concern if, for example, one country was both a dominant owner and customer. This is not the case in Australia nor is it likely to be the case in the foreseeable future.

Current funding arrangements for the Coal Research Trust Account and the National Energy Research, Development and Demonstration Council are no longer appropriate, due to their inability to adapt flexibly to industry change. The Association opposes the establishment of the Coal Research and Development Corporation, and believes that the industry should be left to manage its own research programmes and that continuation of a government-imposed levy for coal research is not justified.

The coal mining industry should be absorbed into the mainstream of Australia's industrial relations system under the Industrial Relations Commission.

While sectors of the economy, particularly some manufacturing industries, are heavily protected and/or receive assistance through Government programmes such as offset programmes, subsidies, etc, other sectors, particularly mining, receive little or no protection and, in fact, are disadvantaged because of the higher costs of inputs from the highly protected or assisted sectors.

In terms of equity, the coal industry suffers in a number of respects. For example, the discriminatory export duty applied to several Queensland mines, and the excessive rail freight charges in Queensland and NSW. The coal industry also suffers because of a lack of predictability and consistency. Examples include the frequent changes in recent years to the treatment of capital expenditure for taxation purposes and the ability of State Governments to change royalties at any time.

The coal industry supports:

. Continued phasing down of tariff and non-tariff assistance to local industry to zero and implementation of more effective tariff relief mechanisms as an interim measure;

. Elimination of the fringe benefits tax on remote area housing;

. Removal of the excise on fuel used in production, and equitable treatment between mining and farming with respect to diesel excise rebates; and

. Abolition of the Coal Export Duty which is a discriminatory and distortionary tax.

Strongly endorsed the conclusions in the Draft Report that the degree of regulation of coal mining is unparalleled in other Australian industries, and that the retention of inappropriate regulations is impeding the efficiency and economic performance of the industry.

The implementation of the Report's recommendations would go a long way to achieving the aim of a facilitative regulatory framework which encourages the industry to become more efficient.

Australian Collieries Staff Association (Sub. 34)
The Australian Collieries' Staff Association opposes proposals to abolish the Joint Coal Board (JCB), the Coal Industry Tribunal, local coal Authorities in NSW and the Central Reference Board in Queensland. On the contrary, the Association believes the JCB should be strengthened and reconstituted as the Australian Coal Board, with wider powers and responsibilities, particularly to advise the relevant Ministers as to the exercise of their powers in accordance with a co-ordinated program for the sustained steady development of the industry. The Queensland Coal Board could be integrated into the existing structure and the other state governments concerned drawn into consultative structures.

The Association opposes repeal of the NSW Coal Mines Regulation Act and Regulations and their suggested replacement by self regulation - a scheme not capable of ensuring safety in such a dangerous industry.

It is opposed to the attitude that the coal export industry is to be milked for all it is worth by means of royalties, freight and port charges by state governments. Lower charges should lead to higher export sales.

Australian Conservation Foundation (Subs. 68, 183, 218)
Waste released on or into public goods, without compensation to the public at the market price, is in effect an environmental subsidy to the production process that will, by definition, distort production and resource allocation decisions as well as threaten a possible loss of consumer welfare. Environmental resources are a form of `capital' owned by the public. Similarly, as individuals cannot forever live by running down their `capital' neither can we forever run-down our environmental `capital'. There should be greater acceptance of the economic legitimacy of non-mining alternative uses of conserved biological heritage such as national parks. Though difficult, some effort at quantification should be undertaken. The net economic benefits of alternative uses need to be considered within the context of ecological sustainability.

In order to encourage the development and growth of Australian industries that are efficient in their use of resources, the Commission will most likely have to address the difficult task of effectively determining marginal social costs and thus consider the construction of supply curves or close proxies. It is suggested that the Industry Commission take this opportunity to identify, in each of the industries to be examined, the environmental subsidies that are presently being paid. The pricing of public goods has always been problematic in economic theory yet to achieve an efficient allocation of resources a solution will need to be found.

The Industry Commission might like to pursue the issue of all waste producers being provided with incentives to minimize or recycle waste. In addition organizations which produce particularly

harmful wastes could be made permanently liable for such wastes so long as they exist. The net benefits of export projects will need to be contrasted against the environmental damage that is done in the process and the future economic cost of rehabilitation and clean-up.

A common argument for mining in a national park is that a dollar today is worth more than a dollar tomorrow, ie the future is heavily discounted in favour of today. The principle should be to err on the side of caution before assigning too much value to the benefits of mining. It is unacceptable that simply because economics finds it difficult to price non-market goods those goods, should then be sold in the only clearly defined market that can be located - the mining industry.

The stream of non-mineral income benefits to Australia from areas such as Uluru and the Great Barrier Reef stretch into perpetuity.

The Commission may wish to address the apparent inability of companies to patent the use of natural compounds that they have located.

It would seem that mechanisms to control mining and exploration activity, where they exist, are difficult to enforce thus leaving sensitive ecosystems open to abuse, as a relatively normal and rational procedure. As a result, bans would seem to be the only effective control. Mining damage caused to the environment in areas not yet reserved will also cause inefficient resource use if areas are not surveyed for their non-mining potential. Recreational and tourist values as well as localized generic variations, probably only barley recorded, could be lost forever along with their economic potential.

It is important that Australia should recognise that minerals extraction is fundamentally unsustainable since the resources are not renewable.

Competition between States has the potential to result in environmental subsidies (amongst others) being paid to industry.

The Industry Commission may wish to consider the return received by the proprietors of minerals (the public) which will need to be consistent with the concept of constant natural capital. It would seem that the returns in at least some cases are less than satisfactory.

The Industry Commission should gather information on the net return to the public from our mineral resources.

The Draft Report showed considerable bias towards established mining interests and the Commission had neglected its Terms of Reference in a number of matters. The Report is full of unsubstantiated statements, claims, facts and assumptions, all of which reflect an inherent bias within the Commission. The following recommendations are opposed:

. Restriction of the role of the BMR;

. Reduction in the role of Aboriginal Land Councils;

. Resolution of public land use conflicts;

. The use of market-based mechanisms as a solution to industry and land-use problems; and

. The consideration of economic values in the assessment process which takes place prior to national park declaration.

ACF disagreed with the views of the Commission on the following subjects:

. Sustainable development;

. Energy efficiency and safety issues in regard to transportation

. Greenhouse effect and the development of alternative technologies; and

. Regulation and control of uranium mining.

ACF discussed issues raised in the Draft Report in relation to:

. Principles to be applied in deciding whether to permit mining;

. Categories of land where mining should be prohibited;

. Successful rehabilitation of mined land; and

. Success of existing mechanisms in taking account of environmental concerns.

Australian Goldmining Industry Council Ltd (Sub. 85)
The Commission should examine the taxation system which is the single most important factor in restructuring the economy and encouraging industry development. The goldmining industry is a striking example of what can be achieved under an alternate, more internationally competitive taxation environment. Gold is now Australia's third most important export, and will contribute over $3 000 million in exports in 1990. The change in taxation arrangements for goldmining income which came into effect in 1991 will have a serious effect on the goldmining industry and the economy, conservatively costing over $1 200 million in exports annually by 1994/95. This economic loss is overwhelming compared with the revenue which will be raised as a consequence of the taxation changes. Far from representing some form of unfair industry assistance, the current taxation regime applying to the goldmining industry is a successful working model of an internationally competitive taxation system to encourage industry development.

There is a consistent, obvious and rational case for taxation reform, which ideally should entail the complete replacement of income taxes with a broadly-based consumption tax. In the absence of such a radical reform, corporate tax should be abolished, with taxation of income in the hands of shareholders, via income tax, capital gains tax or withholding tax (in the case of foreign shareholders). A consumption tax can be structured to meet revenue needs and to replace other indirect taxes. Pending implementation of these changes, the status quo should be maintained in relation to the taxation of goldmining. These reforms would simplify the taxation system,

improving neutrality and equity in the business sector. In particular, they would radically improve the international competitiveness of the Australian taxation environment. This would attract new investment and activity.

In relation to other issues, the Council generally supports the submission to the Commission by the Australian Mining Industry Council, and wishes to reinforce the views of the general mining industry with respect to access to land for exploration and development. Present government regulations, interventions and changing ground rules represent significant disincentives to investment and development.

As with the changes suggested for reform of the income taxation system, the Council favours a mineral taxation regime which is simple, stable and predictable for both companies and governments. Rent, cash flow taxes, or auction systems do not meet these goals and are not favoured by the Council.

Australian Heritage Commission (Subs. 24, 206, 260)
Provided information on procedures for the listing of places on the National Estate Register. Opposed the recommendation in the Draft Report on the charter of the Australian Heritage Commission and procedures.

It is unrealistic to suggest that conservation groups should bid for mineral rights in order to prevent them being exercised, given the vastly different levels of financial resources generally available to the groups and to mining companies.

The Commonwealth Government should arrange for EIS to be prepared by independent experts. Mining or recreation developments would be equally unacceptable in national parks.

Australian Mineral Foundation (Sub. 146)
The Draft Report showed considerable bias towards established mining interests. The Commission has neglected its Terms of Reference in a number of matters.

Indicated that it opposed recommendations concerning:

. Restriction of the role of the BMR;

. Reduction in the role of Aboriginal Land Councils;

. Resolution of public land use conflicts;

. The use of market-based mechanisms as a solution to industry and land-use problems; and

. The consideration of economic values in the assessment process which takes place prior to national park declaration.

Disagreed with the views of the Commission on the following subjects:

. Sustainable development;

. Energy efficiency and safety issues in regard to transportation

. Greenhouse effect and the development of alternative technologies; and

. Regulation and control of uranium mining.

Discussed issues raised in the Draft Report in relation to:

. Principles to be applied in deciding whether to permit mining;

. Categories of land where mining should be prohibited;

. Successful rehabilitation of mined land; and

. Success of existing mechanisms in taking account of environmental concerns.

The Australian Government should consider raising its share of contribution to the Australian Earth Sciences Information System to at least one half of the annual cost involved, the balance to be met from industry and State Government authorities.

Australian Mines and Metals Association (Subs. 134, 176)
Productivity improvement, including the most efficient use possible of our human, technical and economic resources, and payment systems related to both individual performance and the productivity and profitability of the enterprise, for example, must join such well established concepts as "fairness" and "equity" as dominant social and work values. The Association will seek to assist member companies in the development and implementation of employee relations practices and processes which emphasise enterprise level relationships, managerial leadership and initiative, and co-operative self-regulation on the part of employers and employees in preference to relying upon or promoting existing third party-oriented adversarial approaches.

Indicated that the Draft Report did not give due credit to the many gold mines which have recently been constructed using the most up-to-date technology, mining equipment and methods.

While large mining companies experienced high levels of man-days lost through stoppages, the majority of metalliferous mining operations are small and experience insignificant levels of strike action.

Expressed concern at method used to measure labour productivity. While awards can be varied to address some of the structural impediments within the labour market, the key to workplace reform rests with employers and employees.

Australian Mining and Petroleum Law Association Ltd (Sub. 12)
There should be a properly maintained system of registration for all exploration and mining tenements. If ministerial discretion to refuse a mining lease must be retained, the relevant legislation should prescribe the grounds upon which the Minister might refuse.

The principle of substantial compliance should be adopted in mining legislation so as to avoid delay, unnecessary expense and potential injustice to a party who had otherwise substantially complied with legislative requirements, such as marking boundary lines. There is scope for consistency between the states in mining legislation in matters such as the application for and granting of mining titles and the registration of and dealings with mining titles.

Clarification of several taxation issues relating to goldmining is required.

Australian Mining Industry Council (Subs. 29, 95, 158, 229)

Land access

The adverse impact caused by restricted access to explore major geographic sectors of land outside metropolitan/residential areas should be recognised. Access should be available for exploration and mining to all areas in Australia except a few locations outstanding for biological, visual, and amenity reasons. Access should be granted with appropriate conditions, recognising the benefits of the South Australian Regional Reserve concept, to maximise environmental and developmental management. Access should also be available for scientific research, with periodic review, for resource assessments and National Park/reserve boundaries.

The *Aboriginal Land Rights (Northern Territory) Act 1976*, inter alia, should be reviewed to remove veto powers. The private owner veto on WA agricultural land should be removed. Existing world heritage and national estate areas should be reviewed to determine mineralisation and potential impact of controlled mineral development. Future consideration of such areas should include full economic and national interest assessment prior to declaration.

Aboriginal land

Veto powers should be removed and non-discriminatory access provisions established with simpler administration. Negotiations should incorporate earlier participation by traditional owners. Aboriginal land should be available for exploration on a similar basis to other land, subject to appropriate protection of Aboriginal social, cultural and spiritual interests.

Exploration - Allocation of rights

Cash bidding for exploration areas is opposed. State/Territory rights must be recognised. The right to explore should lead to a right to mine, subject to meeting appropriate environmental requirements. Exploration rights should be freely transferable to optimise investment.

Environment

Environmental standards should be established within Australia which are appropriate to local conditions. The Office of the Supervising Scientist of the Alligator Rivers Region should be abolished and its functions allocated to the relevant NT Government Departments and other more appropriate research bodies such as CSIRO. The costs of environmental studies should be identified. Environmental expenditure adds to mineral production costs in Australia and affects competitiveness.

Resolving resource - use conflicts

All major complex and controversial land use decisions involving direct Commonwealth powers should be investigated by the Resource Assessment Commission (RAC) to achieve a more balanced approach to conservation and development. The 1989 Kakadu Conservation Zone decisions should be reversed. The RAC should investigate the whole of the original Kakadu Conservation Zone.

The nomination of areas for World or Australian Heritage listing should be subject to adequate consultation and the endorsement of relevant State and Territory Governments. Assessment procedures of the *Environment Protection Act* should not be circumvented to avoid appropriate consideration of development proposals. Compensation should be paid where approval is withheld or frustrated by government decisions after environmental criteria have been met.

Industry policy

There should be no barrier protection or industry assistance. Existing tariff assistance should be reduced to a maximum industry rate of 10 per cent by 1995 after current phasing down arrangements are concluded. All industry protection and assistance should be removed by 1998. Recognising the timing of these changes, an effective tariff relief mechanism should be maintained with the definition of Australian goods to require 50 per cent minimum local content. Tariff relief should be provided for goods used in mineral beneficiation, dressing and processing including refining and smelting.

Drawback arrangements must be reviewed periodically to ensure these are effective in providing tariff relief for re-exported components and materials/inputs imported and consumed in the process of producing exported goods.

Fuel excise rebates should be provided for fuel consumed in intermediate uses in mineral beneficiation, dressing and processing (including refining and smelting) operations. Customs legislation should allow importers to recover costs incurred by delays and legal and other costs relating to the successful challenge of decisions and actions of the Australian Customs Service. Industries should be allowed to determine the appropriate source of plant and equipment without restriction.

Shipping issues

A competitive coastal shipping market should be provided with assistance based on a margin of preference. Company/enterprise based employment should be established in the shipping industry. Crew-berth ratios should be reduced on Australian ships. "Greenfields" crewing arrangements should be established for Australian flag shipping. More cost efficient and equitable Commonwealth Navigation Aids arrangements should be established. Fuel excise should be removed from coastal shipping.

Operating and structural elements of the towage industry should be reformed. Licensing arrangements should be abolished along with returns for towage operators guaranteed by some port authorities. Public port facility management and efficiency should be improved with employment levels based on real operational requirements. An international competitive shipping environment should be maintained and expanded to encompass Trans-Tasman trade. Shipping standards covering technical, safety, pollution should be consistent with trading partners and international practice.

Rail freight rates

Rail transport freight charges should be based on cost of service and should be consistent with principles of efficiency and transparency. State railway monopolies should be removed. Commercial access should be allowed to railway infrastructure including track/permanent way. Road transport efficiency should not be restricted due to the potential impact on Government rail operations.

Energy
State electricity monopolies and other energy monopolies should be removed where they exist.

International trade
Improved international trade conditions should be supported with enhanced market access and reduced barrier protection through processes of the General Agreement on Tariffs and Trade. There should be a withdrawal of the provisions under the export trade powers which prohibit uranium exports from mines other than the three named existing operations. The uranium export levy should be abolished.

Austrade should be transferred to the Foreign Affairs and Trade portfolio. There should be an independent efficiency review of Austrade. Australia should withdraw from membership of the Common Fund.

Industrial/labour issues
The Joint Coal Board should be abolished. The responsibilities of the Coal Industry Tribunal should be transferred to the Industrial Relations Commission. Enterprise/site agreements/awards should be supported. The differing industrial arrangements that operate within the industry to the benefit of both employee and employer should be recognised, as well as the differing reward systems which are followed.

Investment
Discriminatory foreign investment conditions on mining which have caused greater dependence on loan funds should be removed.

Occupational health and safety
There should be a recognition of industry concern for greater workplace safety standards which are effective and site specific. Conflicts exist between differing legislation which may impact on occupational health and safety issues such as employment discrimination against women in lead smelting.

Research and training
Research and training programs covering individual company and industry arrangements such as the Australian Mining Industry Research Association should be recognised. Industry levy payments to the National Energy Research, Development and Demonstration Council should be abolished. Company funding/support for education and training in the industry should be identified.

Taxation
The constitutional rights of States to determine royalties should be recognised. Royalties should be designed to minimise adverse impact on Australia's international competitiveness and mining investment decisions. There is a strong case on efficiency grounds not to alter specific resource taxation arrangements for existing projects unless there is agreement by all parties. On both equity and efficiency grounds mineral resource taxation should be a state government responsibility.

Cash bidding for exploration and mining leases is, given the nature of the exploration process and the characteristics of mineral deposits, subject to significant difficulties.

Fringe benefits taxes should be removed from remote area housing and associated remote area service benefits.

The coal export levy should be abolished.

Anomalies in taxation arrangements relating to the mining industry should be resolved. Special conditions on foreign investment in mining should be removed.

Export controls place a direct compliance cost on the industry and weaken the bargaining position of Australian exporters in contract negotiations. The Commonwealth Government has not provided evidence of the benefits arising from the control of exports. Export controls should therefore be abolished.

"National interest" provisions in Aboriginal land rights legislation have proved unworkable because, sensibly, they could only be invoked once there was some knowledge of the extent of mineralisation in the area in question. If as is often the case, exploration access is denied or made too difficult, such knowledge will not be available against which to gauge the "national interest".

If the principle of Crown ownership of minerals is to be satisfactorily upheld, at least exploration access, subject to appropriate environmental and social conditions, must be reasonably unfettered on all categories of land. Conservation/national interest considerations can only be determined after the mineral endowment has been assessed.

The conclusion in the Draft Report that a departure from Crown ownership of minerals is not justified at present. The confusion and inequity arising from the transition to an alternative system may offset any theoretical gains identified by the Commission.

Separate mechanisms for the allocation of exploration and mining rights are necessary to take account of the needs and impacts of mining and exploration, provided exploration rights include the right to develop any discovery. The recommendation for the compulsory auction of the rights to mine is rejected. The application of cash bidding for exploration rights is inappropriate. The FCFS allocation arrangement must be supported by conditions which recognise the public good aspect of the information generated by exploration and prevent real-estating.

The proposal to compulsorily replace royalty arrangements with an alternative system raises major concerns on equity grounds. Changes to royalty arrangements for existing projects are opposed unless both parties to the royalty arrangement agree to the change.

The Draft Report should have focussed on the reasons for access problems in SA, not just the NT, given the large proportion of that State to which exploration access is effectively denied.

The recommendation is opposed that traditional owners should be allowed to choose another company if negotiations fail with the company which is first in time with the Exploration Licence Agreement.

Royalty payments to traditional owners should be based on compensation for access, disruption and loss of utility, as, in most cases, traditional owners do not own the mineral resources.

The Commission has failed to place the environmental impact of mining and mineral processing in the context of other impacts on the Australian environment.

The recommendation for the provision of performance guarantees for mine-site rehabilitation should be modified to take account of the need for flexibility in the implementation of this policy.

The ORANI-MINE model created for this Inquiry is a significant development; however, a number of unsatisfactory aspects still remain to be addressed.

The Commission should identify the economic dangers of implementing policies such as those proposed by the Australian Manufacturing Council Report by Pappas, Carter, Evans and Koop/Telesis. The recommendation on the abolition of export duties on coal and the uranium export levy should not be qualified by the preference for concurrent policy changes.

The Commission should identify the failure of the current coastal shipping reform process to provide effective market conditions by removing the absolute protection provided to licensed ship owners by the current arrangements under the Navigation Act. The Commission's support is sought for the progressive increase in competition on the trans-Tasman shipping industry.

The increase in the competitiveness of the Australian mining and minerals processing industries from reform of the electricity supply and rail industries is likely to be substantial.

A full rebate of fuel excise should be introduced for diesel fuel and other petroleum products consumed in the mining and minerals processing industries in off-road applications.

The Council is disappointed that the Commission did not address several factors which distort the cost of capital, such as policy-induced high interest rates and inadequate depreciation provisions.

Australian National Parks and Wildlife Service (Subs. 83, 248)

Factual information is provided on the provisions of the National Parks and Wildlife Conservation Act that are relevant to the Inquiry. A discussion of the constraints that apply to decisions on land use involving the Service demonstrates that although those decisions have social and environmental objectives, they cannot be taken arbitrarily.

Opposed the recommendation in the Draft Report concerning the assessment of the relative economic costs and benefits of environmental and mining values in National Parks. While there is a place for the Regional Reserve concept in the overall practice of land management, it cannot be a substitute for a comprehensive system of protected areas.

The Commission may wish to consider if it still sees sufficient overlap in the functions of ANPWS and OSS to let stand the recommendation to disband OSS. There can be no justification in extending charges for the protection of the Alligator Rivers Region from the effects of mining to those who are not involved in mining.

Australian Nuclear Science and Technology Organisation (Sub. 156)
Stated that industry representatives at two recent international uranium conferences identified a window of opportunity in the 1995-2000 period for new uranium enrichment ventures to capture a significant share of the world market for enrichment services. It is widely perceived that Australia is one of the most likely countries for such a venture, if it wished to be involved. The implications are that in order to take advantage of this opportunity a commercial commitment would need to be made within the next two or three years. For an Australian venture this timescale means that an overseas technology holder in centrifuge enrichment would need to be involved. It would also be necessary to maintain a laser enrichment research and development program to take account of longer term interests.

Australian Petroleum Exploration Association Ltd (Subs. 4, 94, 100, 184)
Supports multiple and sequential land use policies centred on:

. Sound environmental management policies; and

. Uniform processes for the declaration of land use conflicts, ie economic and environmental impact assessments of land use proposals by both government and industry.

These views were based on two fundamental points:

. Resource development can take place in environmentally sensitive locations without adversely affecting natural conservation values; and

. Application of adequate environmental controls under a multiple land use system is a prerequisite for sustainable development.

The Association believes that the only equitable option for the future taxation of petroleum in the areas subject to review is the traditional royalty system based on wellhead value and the taxation of remaining profits under the corporate income tax system.

Recommendations in the Draft Report on competitive cash bidding are outweighed by a number of disadvantages.

Opposed the concept of rehabilitation bonds in relation to tax deductibility of rehabilitation and plant demolition expenditure incurred after a mine has ceased operations.

Disagreed with recommendations concerning the application of CGT to farmouts, the valuation of farmouts, and the application of FBT to housing and transport supplied in remote mining regions.

Opposed the granting to Aboriginal people of rights to acquire or occupy land in excess of the rights available to other Australians.

Supported the recommendation to remove export controls and to eliminate direct government involvement in marketing minerals.

Barker A V (Sub. 106)
Submitted details of a low cost and efficient mineral and gold treatment plant which he has developed, and which has application in small and medium scale mineral deposits around Australia.

Barrack Specialty Metals Management Pty Ltd (Sub. 75)
To attract investment in further processing of minerals in Australia, the business environment must compare favourably with that in competing countries which are actively offering substantial incentive packages for export oriented industries.

Low cost energy, cheap labour, financial incentives including generous tax holidays and soft loans and other concessions have been successful in securing value added mineral processing projects for overseas countries. Some of these represent development opportunities lost to Australia.

Factors which are considered to be impediments to investment in industrial projects in Australia include the cost of capital, excessive level of direct and indirect taxes, persistent high inflation compared with competitor countries, high costs of labour relative to productivity and industrial relations problems. Power costs are an important consideration in energy intensive industries. Delays in obtaining project approval through statutory bodies especially Environmental Authorities are also of major concern to developers.

Barrack Mines Ltd's experience in the construction of the silicon smelter at Kemerton, Western Australia included several unreasonable demands by unions which increased capital costs, delayed project income and jeopardised market development. Such disruptive activities by unions deter prospective developers from operating in Australia.

The Australian Government should move quickly to develop and promote a national strategy to increase the level of processing of minerals prior to export and establish goals for development within a definite timeframe. Co-operation with State Governments will be essential for the preparation of an attractive business environment to improve competitiveness and encourage investment in further value added processing in Australia.

BHP Co Ltd (Subs. 67, 96, 113, 160, 223)
Concerns about problems associated with accessing land and environmental issues are centred on sterilization of large areas for exploration. While it is possible to explore in national parks and conservation areas in some states, for example Western Australia, inefficient and unsatisfactory administrative processes make it difficult in practice. In Victoria, in particular, government land management policies and practices make it very difficult, expensive and time consuming to access land.

The trend to increasing involvement of an ever widening range of government departments and agencies in all stages of a project can cause additional costs and delays. There is an increasing lack of certainty and confidence that the government will abide by its own established procedures for project development proposals without being unduly influenced by outside pressure groups, especially where environmental issues are concerned.

Governments at all levels should adopt and practice the principles of multiple land use, especially where it is clearly demonstrated that exploration will have negligible impact on subsequent use.

Proposed remedies to problems surrounding issues relating to Aboriginal land ownership are:

. Remove the Aboriginal veto (and also the veto that some other limited landowning groups have) to bring Aborigines into line with other classes of landowners;

. Amend legislation to prevent other issues giving rise to a veto, such as permission for access;

. Formulate clear and transparent administrative processes to access Aboriginal land with recognized right of appeal procedures that are efficient, do not occasion extensive delays and are not costly;

. Confine the requirements of any necessary agreements for exploration and mining to Aboriginal cultural heritage matters and restrict compensation to disturbance to land and land use using normally accepted commercial procedures;

. Any conditions relating to such matters as the environment and social impacts should be determined and set by the state or Territory government;

. Enable direct consultation with Aborigines, but always permitting advisers to the Aborigines to be present;

. The current system of allocation and administration of titles by the states and the Northern Territory is supported;

. Cash auctioning of exploration rights is strongly opposed on the basis that significant revenue will be diverted from actual exploration;

. A three tier title system is endorsed which consists of an exploration title, an interim or retention title and a mining title; and

. An optimum arrangement for royalty setting would be a minimum/maximum range of royalty rates from within which companies and governments could negotiate taking into account the degree of infrastructure support provided by the company and the government.

The following taxation issues are of concern:

. The uncertainty of tax deductibility for general exploration conducted prior to title acquisition should be removed;

. Capital gains tax applicable to exploration farm-out agreements should be removed;

. Overseas exploration and mine development expenditure should be an allowable tax deduction if income from overseas projects is taxable in Australia; and

. The seven year carry forward restriction for tax deductibility for the pooling of gold exploration expenditure from 1988 to 1991 should be eliminated.

Transport and infrastructure issues highlighted are:

. Coastal shipping costs are unnecessarily high due to the requirement to use relatively inefficient Australian flag vessels;

. Waterfront stevedoring practices significantly add to costs due to over manning requirements and inefficient work practices;

. Land transport issues of particular concern relate to non standard transport regulations between the states and the Northern Territory and high rail freight charges;

. Poor condition of roads is also a factor affecting the efficiency of some of the Division's operations;

. Poor government planning and lack of facilities in remote regional towns can also be an impediment to attracting and retaining suitable staff; and

. Lack of a co-ordinated accreditation system between states for certifying mining personnel causing labour shortages and restricting movement of people between states.

BHP-Utah Coal Ltd is opposed to the fringe benefit tax (FBT) in general, and specifically as it applies to remote mining locations, because it is a tax on employment and a fixed cost burden. Certain employees at all mines are able to use employer-provided buses charging subsidised fares to travel between the mine sites and mining towns. To consider this a benefit attracting fringe benefit tax is inequitable. As a further inequity, this benefit does not attract the remote area concession of fifty per cent. It is not considered equitable for an employee tax such as FBT to be levied on the employer rather than the employee. Nor is it considered equitable that the cost of this tax in the mining sector should fall heaviest on our operations in remote mining centres of Australia.

FBT should not apply to remote area infrastructure and services, including housing, transport etc., where these are necessarily provided by the employer for employees' use because of a lack of comparable facilities in the area. Benefits provided in remote areas in response to local circumstances should be eligible for the fifty per cent remote area FBT reduction which is not presently the case in relation to company bus transport services.

The Coal Export Duty is opposed as it is a tax on production as well as being retroactive.

Mining income derived off-shore by Australian companies is currently subject to Australian tax. However there is no corresponding deduction for off-shore exploration and mine development expenditures (other than plant) which give rise to such income.

Exploration farm-outs where there has been no realized cash gain should be statutorily treated as a disposal for nil consideration for capital gains tax purposes. Recent proposed amendments to capital gains tax group transfer roll-over provisions are inconsistent with an underlying Government taxation policy intention to allow group reorganisations on a tax-neutral basis.

The proposed gold taxation provisions do not adequately allow for deductibility of previous exploration which relates to gold operations whose income is assessable after 1st January 1991.

Excises on fuel consumed in the mining industry should attract similar exemptions and rebates to those applying to primary industry.

The federal sales tax contains various anomalies which are distortionary. An example of this is the different treatment of State owned and Company owned mineral transport facilities where the companies are required to pay sales tax, while sales tax is not similarly applicable to the State. The company believes that consideration should be given as to whether existing production input taxes generally should be phased out as part of a broader shift in the taxation system towards introduction of a properly constructed broad based consumption tax on final domestic consumption together with reduced reliance on the income tax base and reduced government expenditures.

Royalty payments should be based on realised outcomes. We could not consider an exploration cash bidding system to be an appropriate way for the States to obtain their rent. Mineral exploration is a highly uncertain process and the probability of success is very low. An exploration cash bidding system would in practice be likely to seriously distort efficient utilisation of exploration funds. The ad valorem royalty basis provides encouragement to efficient management of operations and is less likely to provide disguised subsidies to inefficient operations than might be the case with a profit related royalty system. Changes in mineral royalty system should generally apply only to new mine operations, as such changes could disadvantage existing mine operations.

To justify amalgamations on a craft or occupational basis there is need for clear and substantial advantages in terms of reduction of scope for jurisdictional disputes and/or rationalisation of unions-employers relations. Amalgamations of craft or occupational based unions of which the Company has had experience have not produced such advantages. One of the most effective ways in which an enterprise focus can be achieved is to have all the employees of an enterprise covered by the one award (i.e. an establishment award). The Company's experience has been that effective operation of production centres is best achieved when responsibility for industrial relations management is accepted locally. It is considered that acceptance of local responsibility is more likely to be fully and effectively achieved under State rather than Federal jurisdiction.

Consistency with local industrial relations standards at individual locations is to be preferred to consistency between different locations, where both objectives are not appropriate or achievable. In many industrial situations, it is important that disputes be dealt with quickly. State tribunals almost invariably are able to deal very quickly indeed with matters referred to them.

Opposed the concept of resource rent royalties as recommended in the Draft Report. A system of ad valorem royalties is preferred for reasons of incentive, simplicity and equity. There is no recognition in the Draft Report that the returns on relatively few exploration projects must carry the burden of the mass of unsuccessful exploration. It is highly improbable that State Governments could be induced to accept the high degree of cooperation to alter their present royalty systems. The resource rent royalty system is the least likely system of royalties to be adhered to by governments.

The concept of cash bidding for mineral rights is strongly opposed. The FCFS basis for allocating mineral rights is a transparent, unbiased and equitable process which does not favour major companies over junior companies or prospectors. BHP opposed the recommendation that the right to mine should be auctioned with most of the proceeds going to the discoverer.

Existing land-use categories and government processes are more that adequate if they can be made to work effectively, and should be streamlined rather than added to.

Veto rights for all private landowners, including Aborigines, should be abolished, or at least be exercised only under strict limitations.

The posting at the start of operations of interest-bearing bonds equal to the expected rehabilitation costs would be a major inhibition to development. A bank or insurance guarantee would be more capital efficient.

Comments were made on a number of taxation matters which were subject to the findings and recommendations of the Draft Report.

BHP Steel (Sub. 60)

Bidding for exploration permits and mining leases via work program is by far a more desirable means of allocating exploration permits to that of cash bidding.

There is a general concern with the time required to process applications for land title changes and the granting of mining leases.

The current arrangement whereby the ownership of minerals is vested in the Crown with the responsibility for management with the States is preferred.

The level of importance placed upon the need to consider land use alternatives over recent years has resulted in increased costs to the industry. An increased acceptance of the concept of multiple land use through positive legislation, rather than just an awareness of multiple land interest, has the potential to bring the land use partners to a speedier and more efficient resolution of conflict.

A specific concern is the requirement to pay Fringe Benefit Tax on, for example, housing subsidies which are paid to attract people to work in remote areas, particularly when the Company has had to establish the social infrastructure without government assistance. Mining is capital intensive and maximum depreciation allowances will obviously assist the industry greatly in reaching the level of investment return necessary to proceed with a particular project.

Investment decisions relating to improvements in mine efficiency are affected directly by the taxation treatment given to capital equipment. Amortisation of the cost of power, water and communication facilities through higher tariff where government agencies have established services must take more account of the benefits which the mine brings to the community and the government revenue generated.

Bolton Point/Marmong Point Progress Association (Sub. 47)
There should be a moratorium on longwall mining under existing residential areas and environmentally sensitive areas, such as lake foreshores and flood prone areas, until such time as studies have been conducted on other methods of mining or forms of stowage, which will allow extraction of coal resources without the detrimental effects of planned, large scale surface subsidence.

Immediate steps should be taken to amend legislation to ensure that the community, local councils, local service authorities and government departments have an input into the decision making process of mining plan approvals, in a manner similar to that which currently operates with an application for a mining lease. To comply with the user-pays principle, the people or the community should receive compensation for the personal trauma of living in a home that is to be subjected to deliberate damage and for the diminished resale value of the property.

Bureau of Mineral Resources, Geology and Geophysics (Subs. 26, 150, 168, 192)
As the principal Commonwealth geoscience agency, the Bureau should be given access to Aboriginal land, world heritage areas and national parks to undertake its scientific program. Information gathered from geoscientific investigations of the Australian continent is a key factor in the sustainable use of Australia's resources and thus to the economic well being of Australians. The collection of such information need not harm the environment.

Exploration should not be excluded from all areas within world heritage areas or national parks. Continued mineral exploration is necessary if the value of our mineral exports is to be sustained. A considerable part of Australia's mineral potential lies in world heritage areas and national parks. Exploration can be conducted in a manner sympathetic to the environment.

Provided details of difficulties faced when permission to carry out field work was withdrawn by an Aboriginal Council.

The Draft Report should be amended to indicate that the information gathered by government agencies like the BMR is produced from strategic research purposes, and not solely from exploration purposes. It is inappropriate that any restrictions which may apply to exploration should apply to strategic geoscientific research.

Byrne N and Associates Pty Ltd (Subs. 62, 204)
There is no incentive for an individual or company to carry out research and exploration to identify target areas only to have other applicants out-bid them when they applied for a title to protect their new target area, discovered because of their diligence and competence. A deposit which is found, but is uneconomic today, and so dropped, could become a mineable proposition for a later title-holder because the mineral price has improved, or because a further mineral associated with the original discovery, but not previously explored for, has been found and together with the original discovery, makes an economical deposit. Exploration is itself a very risky business, and to add further to that risk by having to bid for what was found by one's own endeavour would be a great disincentive.

If a cash bidding or work programme bidding system was introduced for the acquisition of exploration titles, it would make common sense for the unsuccessful explorers to cease exploration and follow the successful explorers around, out-bidding them whenever they find a target area. In any bidding system for title acquisition, the individual and the small company or syndicate could never compete with the larger corporations. Also, given the large amount of foreign money coming into or available to come into Australia, additional pressure could be added to the prices paid in a bidding system of any sort, thereby making it even harder for the small operator to survive. As most mines are found by small operators, a bidding system would result in less mines being found, which would be financially disadvantageous to Australia and lower, even further, our standard of living.

Opposed the recommendation in the Draft Report on the introduction of cash bidding for exploration and mining titles as it would lead to the exclusion of prospectors, syndicates and small mining companies from the mining industry. The concept of private ownership of minerals on freehold land in the NT would overcome many social and economic problems.

Cement Industry Federation Ltd (Sub. 46)
Investment allowances or accelerated depreciation allowances are an effective means of reducing the comparative capital disadvantage in the industry and are urged to assist in redressing the imbalances in international competitiveness.

Any measures taken by Government and their agencies to render the electricity supply industry more efficient and hence to reduce electricity tariffs will benefit the competitive position of the cement industry. Significant reductions in charges levied by State Governments should occur or positive incentives should be provided to enable the use of alternatives to natural gas used in the firing of cement kilns.

Coastal shipping has been the subject of a number of reviews by the Commission and the industry welcomes the measures being taken to reduce costs in this area. The Commission's findings on this subject should be implemented as quickly as possible.

Changes in work patterns are now under discussion in every Australian cement plant. However no plant is achieving a significant improvement by this means. Multiple unions, entrenched attitudes and the wider political agenda of the unions are proving too much of a handicap - another formula must be found.

Whilst one might expect that Australia would be protected from dumped imports by distance, this factor is offset by the availability of back loading for commodities shipped from Australia (coal, iron ore etc). Return freight for such vessels can be marginally costed. Attention is drawn to the cumbersome and ineffective procedures associated with anti-dumping measures in Australia which prevent effective action even where dumping has been proved and substantial injury is occurring. The Australian cement industry is now experiencing this in a self-sufficient regional market which can be seriously injured even though the effect on the larger national market may be low in percentage terms.

Central Land Council (Subs. 38, 193)
Recommendations with respect to access to Aboriginal land may directly affect the present rights of traditional Aboriginal land owners to control access to their land in the Northern Territory.

Improvements in the profitability of the existing projects on Aboriginal land, particularly those which are subject to the Northern Territory's Mineral Royalty Act, or the development of new exploration, mining and petroleum projects on Aboriginal land, should directly benefit the Land Councils and other Aboriginal organisations and communities in the Northern Territory.

Aboriginal land owners will be extremely reluctant to provide access to their land to applicants who show indifference, or even hostility, to cultural concerns, or cannot command the financial or technical resources to undertake mineral development. Where an applicant obviously has the financial and technical resources to undertake mineral development, and where there is likely to be a clear benefit to traditional Aboriginal land owners, agreements can, and indeed have, been reached quickly.

The Council has evidence to suggest that some miners have engaged in negotiations with the Land Council in such a way that will inevitably lead to a refusal to consent by traditional Aboriginal land owners. The company has then, effectively, deferred its right of access to the land for at least five years, thus preventing genuine explorers from gaining access to the land.

Control over access to land by the traditional Aboriginal land owners does not amount to an absolute right of veto.

Traditional Aboriginal land owners' control is now limited to one decision because by agreeing to an exploration proposal, they are also consenting to any future mining which is consistent with that proposal. This means that they must decide in principle whether to allow mining at a time when there is generally limited information available on the potential mining project. Arguments relating to restrictions on land access by many mining companies and industry associations are essentially motivated by a desire to reduce the costs of agreements negotiated prior to gaining access to particular areas of land.

Because of inadequacies in the NT *Aboriginal Sacred Sites Act 1989*, it is anticipated that there will be greater resort to the Commonwealth's *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* in the future. The great weakness of the NT legislation is that it empowers the Minister responsible to permit work to be undertaken which affects a sacred site, notwithstanding the objections of the custodians of that site, and contrary to the decision of the Aboriginal Areas Protection Authority.

The Northern Territory Government may not be adequately auditing uranium mining companies.

The actions of the Minister for Mines and Energy in giving approval to negotiate with the Central Land Council to companies which have not demonstrated that they have financial and technical expertise, and have by their actions shown that they are not prepared to respect Aboriginal cultural values, can only undermine the reputation of the mining industry with Aboriginal people. This will inevitably make it harder to obtain access to Aboriginal land for future applicants.

The gross irregularities in the flow of consents to exploration licences and permits granted by the Minister for Mines and Energy reflects a degree of inefficiency in the processing of applications and, in some instances, the intervention of government political and ideological considerations.

Alternatives to surrendering areas of land under the *Mining Act* should be examined. Surrender of land subject to exploration licence applications under the *Mining Act* can result in some land being reduced to quite small areas. This can create additional work for the Land Councils and cause further confusion in the minds of many Aboriginal people who will need to be consulted over these small areas of land that may have been the subject of consultations only recently with other companies.

Some of the recommendations in the Draft Report are based on erroneous information, and represent a superficial analysis of what are extremely complex issues. Expressed concern that the word "veto" is used in part of the Draft Report without the qualifications expressed in other parts of the Report. Many of the Report's recommendations significantly undermine the principle of the right of traditional Aboriginal owners to control access to their land. The right to explore should not be automatically tied to the right to mine.

Did not accept the Report's view that the existing procedures under the *Aboriginal Land Rights (NT) Act 1976* (Land Rights Act) were unworkable, and that the Act undermines the process of negotiating access to Aboriginal land. Disagreed with the argument in the Report that Aboriginal Land Councils are too powerful, and stated that the Commission's Terms of Reference did not allow it to comment on this matter. Since the Land Rights Act enables mining companies to meet directly with traditional Aboriginal land owners, the Report's recommendation on the matter is unnecessary.

The recommendation that traditional Aboriginal land owners should be free to appoint agents to act on their behalf in negotiations was based on the simplistic notion that the present situation confers monopoly powers on the Land Councils. Saw serious problems with the recommendation that the 40 per cent royalty which is paid to Land Councils to represent them should be paid to the traditional owners of the land where the development is situated. The recommendation which refers to Aboriginal land for which agreement cannot be reached on conditions for exploration should be altered to refer to the need for the NT Government to amend the *NT Mining Act.*

Supported the imposition by the NT Department of Mines and Energy of stricter conditions on exploration licence applicants to prevent warehousing of land by mining companies.

Urged the Commission to include a recommendation supporting the importance of the private ownership of land in the resolution of land use conflicts. Disagreed strongly with the view that Aboriginal people can extract potentially unlimited compensation for development. Opposed the recommendation that the remaining export controls on the marketing of minerals be abolished.

Chamber of Mines, Metals & Extractive Industries (NSW) (Subs. 37, 110, 124, 235, 236)
The State Government should urgently review existing policy and procedures with a view to encouraging more mineral exploration in New South Wales. Such exploration is essential to encourage further mining and minerals processing activities in this State. The mineral resources of an area should be assessed prior to that area being declared a National Park, Nature Reserve or Wilderness Area. Multiple and sequential land use should be permitted by means of a zoning system.

It is more difficult to establish projects in New South Wales than most other States due to the complex and lengthy process in gaining planning approval and in meeting the large number of environmental regulations. Approval times for planning instruments and development applications should be reduced by retaining the dual objectives of environmental protection and encouraging orderly development. The Council outlined detailed alternative planning procedures, with a view to return decision making on development approvals to the State Government for projects of major significance, thus reducing the burden on local government bodies in dealing with major matters. Inherent in this proposal is a requirement to amend the Environmental Planning and Assessment Act. What is proposed is not a radical departure from the existing procedures associated with the Act for development approvals, but rather a modification to procedures based on the experience of the past decade.

The Bulk Supply Tariff should be abolished and replaced by a variable pricing structure which more accurately reflects costs of power generation and distribution to various user groups. An urgent review should be undertaken as to the level of cross subsidisation between domestic, commercial and different types of industrial power users. The level of cross subsidisation should be clearly identified and progressively eliminated over a specified period of time. Large industrial users should be permitted to purchase electricity directly from Elcom without the involvement of county councils.

The Chamber challenges the broad concept of valuations based on the value of mine output which allows the rating authorities to share in the profits of the enterprise without making any substantial contribution to the factors necessary in the profitable operation of mining ventures. The method of valuation based on a percentage of average annual saleable value of mineral won is equitable and anomalous. The system of valuing a mining property on the basis of value of output should be abandoned in favour of land value. Separation plants or secondary processing factories should be regarded as individual land sites separate from the mines and rated on the same basis as any other such land site and buildings on which ordinary manufacturing processes take place.

Chamber of Mines and Energy, (WA) (Sub. 182)
The Chamber rejected the recommendation in the Draft Report to allow traditional Aboriginal owners to make exploration areas available to third parties if agreement cannot be reached over terms and conditions of an exploration licence.

The recommendations concerning mechanisms for resolving land-use conflicts and mechanisms to enforce or define property rights should be clarified.

The application of FBT to benefits provided by mining companies to employees working in remote areas is strongly opposed.

The present dual system of ad valorem and specific royalties should be maintained.

Expressed concern at the increasing trend in NSW of freezing out mineral exploration and mining activities as a result of possibly uncoordinated incremental decisions taken by various levels of government.

The Chamber pointed out that a recent Bill passed by the NSW Parliament prohibiting exploration or mining in areas including national parks is in direct conflict with one of the recommendations in the Draft Report. Similar action is proposed by the NSW Government with respect to wilderness areas.

Coal & Allied Operations Pty Ltd (Sub. 79)
The restrictions on mining of coal on alluvial lands within the Hunter Valley has resulted in substantial sterilisation of reserves and should be removed. Mining applications for extraction within alluvial lands should be assessed individually rather than by the adoption of `blanket'-type regulations. One or two carefully planned and monitored trial mines should be allowed to proceed within the alluvial lands of the Hunter River. The results from these trials following public and governmental review, should form the basis for the future mining of these lands.

Many of the constraints now imposed upon mining result from community concerns based on earlier opencut mines operating during the 1960s and 1970s, prior to legislation requiring environmental management and rehabilitation of mining sites. Legislation, based on overseas practice and reflecting these early community concerns, has not recognised the technological advances made in environmental management and site rehabilitation during the 1980s.

The coal industry is burdened by unacceptably large buffer zones, varying in some directions to 1.5 km from the mine boundary. The cost of property acquisition and the sterilization of these lands in excessively large buffer zones represents an unnecessary penalty. Restrictive development consent and pollution control conditions placed upon mining operations resulting from modelling studies undertaken at the Environmental Impact Statement stage should be replaced by conditions based upon operating experience and with an emphasis on self-regulation of the industry.

Colong Foundation for Wilderness Ltd (Sub. 175)
Disputed the view expressed in the Draft Report that costs and benefits of mineral exploration can be assessed. The only benefit of mining which can be confidently assessed is the amount and content of a deposit after it has been discovered.

The Report's conclusion that exploration, though not necessarily mining, should be allowed in national parks is illogical.

Comalco Smelting (Sub. 111, 144)
Submitted that no subsidy applied to Comalco's smelting operations in Queensland and Tasmania. In Queensland and Tasmania, it takes power under long-term agreements, and guarantees to meet the fixed costs of the dedicated capacity, whether it consumes the electricity or not. This condition is a long-term and potentially very costly obligation. It was this commitment that underpinned the financial viability of the investment of the Electricity Authorities in new capacity.

Consolidated Rutile Ltd (Sub. 6)
Major concerns were:

. The application of efficient, effective multiple land use planning, as opposed to the present trend towards mutually exclusive zoning;

. The use and control of export licences as a form of mining industry control;

. The use of external affairs powers in relation to attaining government environmental objectives;

. Security of mining tenure in the progression from exploration permits through mining titles;

. The extent to which government, social and environmental objectives act as constraints on coastal mining activities and the costs to the nation of opportunities foregone through lack of effective land-use planning; and

. Governments should provide tangible measures to encourage downstream mineral processing.

Consumers Transport Council (Subs. 44, 118, 177)
Plans of the Maritime Services Board or any NSW Port Authority to contract facilities to receive road deliveries of bulk exports should be subject to full Environmental Impact Assessment under the NSW Environment Protection and Assessment Act, 1979. In the absence of full road cost recovery from general articulated truck operations within NSW, the State Government should levy a surcharge on road delivered bulk commodities, and if the State Government fails to impose such a surcharge, then it should be imposed by the Federal Government. Local Government in New South Wales should be compensated for local road maintenance on roads used by trucks hauling bulk commodities for export.

The existing reservations of coal to rail should be retained along with transferring Burragorang Valley coal to rail, with a use of rail freight bounties for marginal coal traffic. More effort should be made to improve the efficiency of rail, including completion of the Maldon-Dombarton rail link. Off road transport of coal to the port should be a prerequisite to the approval for any new mines and major expansion to existing mines.

The NSW Government and its relevant authorities should give a positive response to the recommendation of the Inter-State Commission regarding the systematic planning of land-side access to ports and their interconnection by efficient transport services, with this planning also having regard to the impact on the community and the environment.

The Draft Report gave insufficient attention to past and potential improvements in rail transport efficiency. Inadequate attention was also paid to the adverse social and environmental impacts of the transport of coal by road in urban areas, and the need to conserve liquid fuels in bulk transport.

Coronation Hill Joint Venture (Subs. 27, 121, 157)
Governments should provide clear, stable and balanced long term policies for land use and management based on fact and not subject to short term interference for politically expedient reasons. In particular, for Kakadu National Park and the Conservation Zone, the Federal Government should reverse its recent decision and honour its prior commitments to allow controlled exploration and mining in the original 2,252 sq km Conservation Zone. Governments, if they desire to prohibit mining in a national park should at least allow exploration before making that decision so that the real cost to the community for taking this action can be known. As well, in this situation, compensation should be payable to the holders of any pre-existing mineral interests. Once established environmental procedures are agreed to they should not be changed by Government at a later date without the consent of the development proponent.

There should be a rationalization of control and reporting arrangements for the Coronation Hill Project and future exploration in the Conservation Zone. The NT Department of Mines and Energy should have a prime role because of the expertise and experience in administering the Ranger and Nabarlek mines in the region. There should be a limitation on the direct input that other government agencies have on the project operations, for example, the Office of the Supervising Scientist for the Alligator Rivers Region. Any concerns that these bodies may have should be directed through the prime regulatory authority, such as the NT Department of Mines and Energy.

The Federal Government should not pre-empt or undertake NT Government responsibilities with regard to Aboriginal sacred sites and areas of significance. It should only become involved after it can be demonstrated that either the Aboriginal Sacred Sites Protection Authority or the NT Government has failed in its legislative obligations. Processes should be developed that allow and facilitate direct communication with Aborigines directly affected by projects so that general agreements can be reached. This has partially occurred with the 1989 NT legislation for sacred sites.

In submission 157, the Joint Venture indicated that it refuted the material presented by the Northern Land Council in submission 108.

Cotton R G H (Sub. 122)
Referred to the desirability of recycling manufactured products. Stated that when cars, machinery, houses or buildings have finished their useful life, industries should be developed for the processing, sale and reuse of all their resource components.

Council of the Shire of Paroo (Sub. 243)
Expressed support for submission 228 made by The Landholders Association.

CRA Ltd (Subs. 73, 135, 166, 238)
CRA strongly disagrees with the essence of the Commission's proposals on the allocation of exploration rights as set out in the Commission's discussion paper.

Exploration
Taxes and policies should be directed to facilitating rather than inhibiting exploration. The Commission should acknowledge that the current system of allocation is better placed to facilitate exploration than are up front bid/auction systems.

Taxes and royalties
The taxation and other infrastructure contributions of the mining industry vis a vis other industries should be recognised. Profit-based should be supported rather than resource rent royalty arrangements. The Taxation Act should be changed to allow deduction of all capital expenditure. Remote area housing and transport should be exempted from the Fringe Benefits Tax.

Labour
Labour market reform, particularly award and union structures, should be accelerated, in order to facilitate the development of enterprise based employee relations arrangements and bargaining units, including changes to s118 of the Federal Industrial Relations Act. The Coal Industry Tribunal should be brought within the jurisdiction of the Industrial Relations Commission.

Rail
Rail transport freight charges should be based on the cost of service (including a return on capital) so that they are consistent with principles of efficiency and transparency. Legislated State railway monopolies should be removed and road transport competition permitted.

Ports
State governments should privatise port facilities. Company employment should be more quickly introduced onto the waterfront, particularly as it affects stevedoring. Public port facilities establish employment levels based on real operational requirements. Cross-subsidisation of port activities should be abolished and cost recovery principles should be based on user pays.

Shipping
Shipping standards covering technical, safety requirements, and pollution should be consistent with those of trading partners and international practice. A competitive coastal shipping market should be introduced over a reasonable period. Company employment should be introduced into the Australian shipping industry. Crew berth ratios on Australian ships should be reduced in line with those of our trading partners.

"Greenfields" crewing arrangements should be introduced for Australian flag shipping so that mining may reflect the work requirements of individual vessels. More cost efficient and equitable Commonwealth Navigation Aids arrangements should be established. Fuel excise should be removed from coastal shipping. An internationally competitive shipping environment should be maintained and expanded to encompass trans-Tasman trade.

Towage
Operating and structural elements of the towage and mooring industry should be reformed. Licensing arrangements with guaranteed returns for towage operators should be abolished by those port authorities where they occur.

Uranium
The uranium export levy should be abolished. Those aspects of the Nuclear Non-Proliferation Treaty which restrict the development of the industry should be reviewed. The three-mines uranium policy should be abolished along with the uranium floor price scheme.

Environment
The Commission should highlight the responsible actions of the great majority of companies in the mining industry in environmentally sensitive mining developments. The Commission should also draw attention to the adverse impact that restricted land access has on the development of the mining industry. The Resource Assessment Commission should investigate all major complex land use decisions involving direct Commonwealth powers, in order that a more scientific and objective approach may be taken to this issue.

Access to exploration and mining in National Parks should be permitted within appropriately defined environmental controls which take account of the need to absolutely protect areas of unique scientific, geological or community value. Private landowners' veto on mining on agricultural land should be removed. There should be a review of existing World Heritage and National Estate listings to determine mineralisation and the potential impact of controlled mining development, with such listings taking account of national economic benefits.

Environmental standards appropriate for local conditions should be established within Australia. Designated down-stream development sites should be identified which have prior in-principle environmental planning approvals.

Aborigines
There should be a review of the *Aboriginal Land Rights (Northern Territory) Act 1976.* The effectiveness of the system of land councils as the vehicle for advancing the welfare of Aboriginal groups and traditional landowners should also be reviewed. Negotiations with Aborigines should incorporate direct participation by traditional owners. Local and regional Aboriginal councils rather than peak land councils should be regarded as the principal authority.

Research and Development
The leading role in research, development and new technology should be taken by the private sector with governments playing a supporting role through the creation of a dynamic business climate and the encouragement of private sector research and development.

Further Processing
Major micro-economic reforms are necessary if Australia's cost competitiveness is to improve sufficiently to increase further processing of our minerals. Reforms to shipping and the waterfront should be expedited and extended. General tariff reductions should continue and tariff reductions applicable to mining equipment should be extended to processing equipment. All capital expenditure should be made tax deductible.

State and federal governments should give a higher priority to developing a clear environmental approval process involving time limits on approvals. Economic policy which supports artificially high exchange rates should be changed. Construction costs should be reduced by industry restructuring, improved work practices to enhance productivity, access to remote area projects by foreign contractors and the unification of building standards nation-wide.

Export Controls, Foreign Investment Regulations and Tariffs
Export controls should be recognised as ineffective and costly and should be removed immediately. Foreign investment policy and the Foreign Takeovers Act should treat naturalised companies in the same way as they treat Australian companies.

There should be an immediate conversion of all quantitative restrictions to tariffs and then reduction of all tariffs to less than 10 per cent over a 5 year period, with earliest reductions made in areas with the highest tariffs. Binding of reduced tariffs should be used to gain maximum advantage from these proposed reductions in the Multilateral Trade Negotiations.

Disagreed with the proposition of Aboriginal land councils, apparently supported in the Draft Report, that in the absence of de jure mineral rights, there is a need for Aboriginals to obtain de facto mineral rights.

CRA's support for Crown ownership of mineral rights is based on the difficulties which would be faced if negotiations had to be carried out with private landowners if they held the mineral rights to their land.

Contingent valuation as a means of placing a community value on areas such as national parks is seriously flawed.

Disagreed with the support in the Draft Report for increased reliance on auctions for allocating mineral rights, competitive cash bidding and the use of resource rent taxes, and recommended continuation of the FCFS mechanism. Strongly opposed the proposal that the rights to mine an orebody should be auctioned.

Practical problems associated with RRR schemes make them inappropriate for Australian mineral production. The Commission appears to misunderstand that the concession on FBT for remote areas does not simply apply to the mining industry, but to all activities in those remote areas.

CSIRO - Institute of Minerals, Energy and Construction (Sub. 61)
A downstream factor in considering competitive pressure on Australia's minerals industry is that with the maturation of traditional technologies for the manufacture of metals, it is increasingly more difficult to improve productivity.

There will be a clear incentive, with time, to transfer such industries to countries offering a labour cost advantage. Australia obviously stands to lose from this scenario.

The courses open to Australia in the face of these challenges are to:

. Find new high quality deposits that are competitive with those elsewhere;

. Develop better techniques for extraction from existing mines, lowering production costs;

. Resort to known complex deposits, (such as Macarthur River), which require technological breakthroughs to allow them to be processed into saleable commodities;

. Lower costs in the production of tradition metal and mineral products; and

. Develop new products with high value added that incorporate new and advanced materials.

All of the above options or concurrent courses require a strong commitment to research and development and new technology by the industry and the public sector. Overall Australian investment in research and development is poor relative to other comparable nations, roughly two-thirds of which is Government sourced. The mining sector performs better than most other parts of the economy in this regard, sourcing between a half and two thirds of expenditure on research and development.

Further processing opportunities are primarily investment driven, rather than primarily dependent on research and development. Companies must consider investment incentives, taxation and depreciation regimes, production input costs, and transport and port/shipping charges. As energy cost is a major determinant in siting further processing facilities, improvements in energy efficiency can potentially have high leverage in creating new enterprises. To maintain its leadership of world coal trade the sector Australian coal industry will need to focus on the mining, preparation and definition of coal product rather than on mining technologies. The coal industry supports research and development but mainly in relation to improving conventional technology. Awareness of new technology developments and their significance has generally been low, and support for medium to long term innovative research and development has also been relatively poor. CSIRO's joint venture initiatives have consequently tended to involve industrial partners outside of the mainstream coal industry.

The role of technology in limiting the impact of the Greenhouse Effect must be recognised and given due weight in decisions relating to research and development funding investment incentives, and technology purchase by Government.

Costs and benefits need to be carefully weighed in any decisions between land use options. The Division of Exploration Geoscience is involved in the development and refinement of less intrusive exploration techniques such as remote sensing. Without an indication and assessment of potential economic benefit foregone by not exploiting mineralisation in a region, rational decisions cannot be made.

Davy McKee Pacific Pty Ltd (Sub. 214)
Overseas countries are profiting more than Australia is from processing our irreplaceable mineral and other natural resources. Very few projects are being implemented to process minerals into high value products, relative to the potential and the needs of the national economy. Australia's taxation system discriminates against manufacturers generally and particularly against capital intensive processing and production of differentiated products.

Deloitte International Trade & Customs (Sub. 49)
Drawback of excise duties should be allowed on non-gaseous petroleum fuels used in processing products of the mining industry for export.

Denison Australia Pty Ltd (Subs. 22, 103, 104, 131, 220, 230, 233, 247)
Exploration is not a land use in the true sense. It is temporary and much can be accomplished without even access to the land. However, there is a critical need for access for specific tasks. It can be well demonstrated that exploration has a negligible impact. The industry now has numerous operational codes that ensure the continuation of this situation. The mining industry, along with other developers, is required by governments and the community to produce clear and competent accounting of the benefits and costs of any project. On the other hand, the closure of land to exploration is done without any accounting of geoscientific benefits and costs.

It has been claimed that a full survey of the mineral potential of Kakadu Stage 3 Conservation Zone has been made by the Bureau of Mineral Resources, Geology and Geophysics. It must be understood by governments and the public that such an assessment will not be valid in the future because of the inevitable advance of both geoscientific theory and technology. Australian policy must move to a situation where all proposals to dedicate land to single or limited uses, to the exclusion of resource assessment, have a full or `best effort' accounting of the benefits and costs.

Cash bidding for exploration land is an undesirable means of allocation.

Mineral exploration and mining are separate parts of the same process. Mining will cease to exist if exploration is denied. Mineral exploration will not proceed if the right to mine is denied. The recommendation in the Draft Report concerning cash-bidding for exploration and mining rights will achieve few of its stated aims, but will constitute a serious impediment to the continuation of effective and productive exploration.

Government agencies should continue to supply the exploration industry with information services for the country as a whole, and particularly for environmentally sensitive areas and national parks.

It is not necessarily good practice to attempt to return land to its original condition, and other options should be considered. The normal public facilities in mining communities such as police, local government, education and health should be provided by government.

Denovan P J (Sub. 125)
Expressed concern at the discomfort and loss of amenity caused by gold mining operations carried out in close proximity to residential dwellings.

Department of Environment and Planning (SA) (Sub. 2)
An area subject to mining exploration or extraction should not necessarily preclude nature conservation management. Mining activity is not considered to be a major injurious land use practice in arid areas particularly compared to the impacts of feral animals and to a lesser extent tourism. Conversely it believed that it is not in the best interest of nature conservation to sequester tracts of land with important conservation features to enable mining potential to be determined in due course.

Department of Industrial Relations (Sub. 145)

The mining industry is a poor performer in terms of occupational health and safety. It has the highest rates of deaths, injuries and workers' compensation costs of any industry in Australia. Some operational features of the mining industry contribute to this relatively poor performance eg the inherently dangerous nature of the work and the geographic isolation of many mines. However, aspects of the industry's occupational health and safety framework and practices are not conducive to upgrading the level of performance. These aspects include:

. The fragmentation of mining industry occupational health and safety regulations within and between the States/Territories;

. A reliance on the external enforcement of detailed technical regulations by mining inspectors; and

. A reluctance to adopt the workplace occupational health and safety consultative strategies applying in other industry sectors.

Occupational health and safety practice in the mining industry has been characterised by less change than in other industries. The mining sector has not fully embraced the reform, implemented in the workforce generally, that supervisors and workers should be more involved in key decisions affecting occupational health and safety in their workplaces.

It is considered that the mining industry should examine its capacity to move to greater self regulation along similar lines. In doing so the following new directions should be considered.

. Vesting responsibility (the general duty-of-care) with mine owners/employers, rather than with the mine manager;

. Moves to greater national regulatory uniformity;

. Enhancing occupational health and safety roles for workers through the establishment of workplace committees and the appointment of health and safety representatives;

. Reviewing the role of Mines Inspectors to be advisers in workplace-based occupational health and safety generally, with a broader focus than simply technical enforcement;

. An improved flow of hazard assessment/management information between employers, employees and equipment or materials suppliers;

. The training required to both appreciate and act on this information so that workers, supervisors and managers are able to meet their responsibilities for workplace health and safety in a self-regulatory environment; and

. A reappraisal of the role of mining inspectors to give greater emphasis to providing occupational health and safety advice.

Department of Mines (WA) (Sub. 203)
Disagreed with the recommendation in the Draft Report in favour of competitive cash bidding for exploration and mining rights. Aborigines should not be granted mineral rights in conjunction with land rights.

There should be clarification of the mechanism for compensating the information gathered by private exploration on public land in cases where exploration does not lead to the right to develop an identified resource.

The present FBT regime does not sufficiently address the equity and efficiency shortcomings of its impact on the mining and processing industries in remote areas.

The WA Government favours the use of ad valorem royalties given their broad acceptance by industry, ease of administration and equity characteristics.

Department of Primary Industries and Energy (Sub. 261)
Provided factual information on the sections of the Draft Report dealing with uranium and nuclear issues.

Department of Resources and Energy (Tasmania) (Sub. 242)
Private mineral ownership is the norm rather than the exception in Tasmania, and has been an impediment to development through delays in negotiation of agreements. Tasmania prefers a work-program bidding system in preference to the award of long-term tradeable exploration rights as recommended in the Draft Report. Experience has shown that many companies fail to utilise those rights unless pressure is applied through regulation.

There is insufficient sound data available on the undiscovered mineral potential of land proposed to be reserved for conservation purposes except in well-known mineral provinces.

The Commission's views were sought on market-oriented mechanisms to reduce the loss of amenity caused by exploration.

Reliance on a rent-based royalty approach as recommended in the Draft Report would result in a considerable loss of royalty revenue, compared to a profit-based scheme.

Department of Resources Development (WA) (Subs. 48, 90, 180)
The "first in time" mineral allocation system is best suited to the circumstances prevailing in this State. The system of royalties adopted in Western Australia is appropriate to the needs of the State and is widely accepted by the industry. The policy of requiring developers to share the cost of providing additional social infrastructure necessary to support a project is equitable.

Western Australia's system of *State Agreement Acts* provide the State and developers with a flexible vehicle for accommodating the individual needs of large development projects.

Western Australia has a balanced policy for protection of reserves and national parks which does not exclude the possibility of exploration and mining where such activity can be demonstrated to the satisfaction of the Parliament to have a higher value than the conservation value foregone.

The Commonwealth programme of phased reductions in tariff protection is to be commended and due consideration should be given to further reductions beyond the current programme.

The current environmental approval process used in Western Australia is thorough, incorporates public participation and provides a relatively short turn-around time. There is no conflict with Federal provisions and duplication of effort is minimal. The existing system should be retained. Environmental assessment and management is best carried out by State Agencies which have expertise in the particular needs and problems of the individual State.

The Western Australian Government asked the Industry Commission to:

. Consider what the effective rate of assistance will be on the mining industry when the current tariff reduction programme is completed;

. Examine the reasons for high labour costs in remote area operations and recommend ways in which these might be ameliorated;

. Examine how disincentives resulting from current taxation concessions to remote area operations can be ameliorated;

. Examine the relative tax position of companies operating in Australia in the mining and mineral processing sector vis a vis similar companies operating overseas;

. Recommend ways to counter incentives offered by overseas countries to attract downstream processing operations if they are found to be significant determinants of plant location;

. Consider ways in which the transport cost impediments to downstream processing can be addressed;

. Examine the impact of the Commonwealth fuel excise on mineral processing operations where rebates are currently not allowed;

. Recommend that the present system of environmental approvals being granted on the basis of individual State assessments be maintained where there is an effective co-ordination with Federal procedures and duplication of effort by developers is minimal;

. Have due regard to the impact of net value royalties such as resource rent taxes on the stability of State revenues when it is making its recommendations on royalty arrangements;

. Indicate how the short term impacts of any recommendations stemming from its inquiries are distributed between the different groups affected; and

. Recommend that Australia should not establish tariff barriers to protect emergent mineral processing industries.

It was disappointed with the recommendation in the Draft Report concerning the removal of the 50 per cent concession on FBT. Arguments posed by the Commission concerning the deductibility of non mine-site housing welfare expenditure offsetting the full impact of FBT are unconvincing.

Supported the broadening of the categories of eligible exploration expenditure under s.122J of the Income Tax Assessment Act, and the incorporation of expenditure on feasibility studies as eligible expenditure. The Commission's reluctance to recommend extending deductibility provisions to cover feasibility costs for processing operations is an important omission.

The reference in the Draft Report to the trade-off of royalties for infrastructure under the Goldsworthy/Nimingarra Agreement is factually incorrect.

The WA Government has applied the "one-stop shopping" concept of mining approvals to major projects which are subject to special legislation ratifying a "State Agreement" for designated projects.

Department of the Arts, Sport, the Environment, Tourism and Territories (Subs. 65, 263)
The adoption of the fundamental principles of ecologically sustainable development will require a need for greater recognition of the externalities associated with resource use as well as improved systems for determining resource pricing. There is a continuing need for the incorporation of all economic costs and benefits in both public and private decision-making processes. This extension to the process involves the concepts such as the polluter-pays principle and cost-internalisation of externalities. There is a critical need for increased assessment of the continued demand for mining resources following a move to an ecologically sustainable development regime. The valuation of natural resources for both natural and environmental resource accounting and natural resource valuation will become increasingly necessary.

When examining measures for altering the signals provided to the market place, the Federal system of government provides an impediment to the efficient use of natural resources. Unilateral changes to the manner in which resources are priced and accounted for in national accounting systems will set these local industries at a disadvantageous position in relation to other countries which delay their move to the principles of environmentally sustainable development. An alternative view is that Australia's long-term future could be enhanced through adopting a sustainable development approach as soon as possible. The trading of emission rights can potentially impact on emissions and economic efficiency provided they can be freely traded.

It is essential to ensure that more is done to protect biological diversity, not only within those areas designated for the purpose, eg World Heritage areas, National Parks etc, but also in those areas designated for development. The mining industry will need to ensure that mechanisms are in place to take advantage of new technologies regarding greenhouse emission. It will also need to be aware of research into recycling which ensures that we are using resources in a less wasteful way.

It is essential that before we look at how the industry will operate we develop a register of our stock of assets, and a system which will ensure proper charging for that resource. Consideration of environmental impact should be an integral part of planning for a project, considered from the earliest stage and throughout the life of the project. Not all ecosystems could possibly be rehabilitated after mining activity to the extent that all conservation values are recovered, except perhaps after a great deal of time. It should not be assumed that the mining industry has the right, either moral or legal, to explore or have access to every piece of land on the Australian continent and surrounding oceans.

Australia needs to develop policies for creating multiple land-use areas where mining interests can undertake exploration and extractive activities, where the environmental impact is minimised and rehabilitation can be successfully undertaken. There is potentially a need to move to a more adaptable regime whereby mining permits are not issued to a particular individual or company in perpetuity but rather on a lease type basis.

Recycling where appropriate is the most efficient method for postponing the extraction of further supplies of mineral resources, therefore, negating the potential for environmental degradation. There will be a significant trend away from non-renewable resources and greater emphasis on the development of renewable resources to ensure that at least a constant capital stock of natural and environmental resources is retained for future generations. The mining and minerals processing industry should be encouraged to undertake more research into alternative practices.

There is a critical need for levels of technology transfer between developed countries and lesser developed countries to be significantly increased.

A system of rehabilitation bonds would be particularly appropriate for operations which are undertaken over a period of decades to ensure that there is funding set aside `up front' when the project commences and which will be accessed for rehabilitation following close down of the operation.

DASETT referred to the conclusion in the Draft Report concerning the environmental impact analysis of proposed mining projects, and stated that market-based mechanisms would lead to much more uncertain outcomes. There is limited scope for the application of market-based measures to the improvement of the environmental performance of the mining industry. Such measures are unlikely to be sufficient for this purpose on their own. The Industry Commission could institute some useful investigations into the conversion of mining rents into new capital, provided their is a clearer understanding of the main criteria of sustainable development.

The findings of the Commission are not valid in so far as Commonwealth procedures are concerned under the *National Parks and Wildlife Conservation Act 1975.* The Draft Report fails to properly reflect the role and responsibilities of the Australian Heritage Commission in preparing the Register of the National Estate. While the Commonwealth Government has an international obligation to protect and conserve World Heritage property, there is no impediment to existing land uses which do not threaten the universal natural and cultural values of the property.

The finding that successful rehabilitation means achieving reasonable compatibility with the surrounding environment leaves too much scope for interpretation with those not responsible for long term management of the land.

DASETT disagrees with the finding that there are substantial problems in the administration of mining activity in the Alligator Rivers Region. There is no substance to the argument that parties other than the mining operators themselves should bear the costs of protecting the environment from the effects of mining in the Alligator Rivers Region.

Department of Water Resources (NSW) (Sub. 42)
Exploration activities often involve extensive areas and can lead to substantial impacts on water and related resources either directly, or indirectly through catchment effects. Hence, the Department would not like to see the current referral procedures watered down. In any transfer of mining rights, the environmental responsibilities and commitments of the previous owner should be recognised and consented to by the new owner. In addition the authorising body would need to assess the new owner's capability of meeting those responsibilities. The granting of mining rights should be contingent on the satisfactory compliance by the applicant with the conditions of any exploration licence previously granted, or any other approvals granted by governmental authorities.

The royalty system may need to be modified to include a component to cover the government costs of environment review and the community's cost of forgone benefits from other uses that were being enjoyed prior to the commencement of the activity.

An important current land use is an area's contribution to the catchment runoff in terms of water quantity and quality and its contribution to biological processes and habitats. Significant depletion of river sand and gravel resources close to centres of development is causing increasing concerns about the ability of many rivers to supply the increasing demand without severely affecting the stability of river-bed and banks. Federal and State pressure for upgrading of the Pacific Highway will increase demand to levels not able to be supplied by present riverine sources. Sand and gravel is a finite resource and alternative sources of aggregate will increasingly have to be sought.

Surface and ground-water availability may be a limiting factor in relation to water supplies for the mining industry depending upon the location, quantity and quality of the required supply.

All taxation concessions should be forfeited by mining companies if any exploration, mining or mineral processing environmental protection requirements are breached.

Dominion Mining Ltd (Sub. 9)
Objected to legislation which restricts access to land in NT, WA and Victoria which makes it difficult and expensive to carry out mining activities. Contrasted this with proposed NSW legislation which would remove the right of landowners to veto access to their land. Suggested a royalty payment system based on net profits which increases with the profitability of the operation, resulting in a decreased burden during hard times, and higher payments during periods of high commodity prices and increased profits.

Expressed concern about operating costs in remote sites and the provision and cost of services and infrastructure in such locations.

Electricity Supply Association of Australia (Subs. 72, 155)
Stated that Australian electricity prices provide a very efficient contribution to the internationally competitiveness of the Australian mining industry. This efficiency has been further enhanced by the real price reductions in electricity tariffs that have generally occurred throughout the Australian electricity supply industry.

Energy Resources of Australia Ltd (Subs. 57, 127, 139, 147, 197)
ERA strenuously objects to the imposition of the Uranium Export Levy for the following reasons:

. The levy is discriminatory, in defiance of the accepted principle of equity in taxation, as the levy is restricted to uranium exports from the Alligator Rivers Region;

. The application of levy proceeds to fund the Office of the Supervising Scientist of the Alligator Rivers Region (OSS) produces minimal contribution to environmental protection at Ranger; and

. The magnitude of the levy, currently in the region of $4 million per year, represents a significant proportion of ERA's production costs.

The OSS has contributed very little to the environmental management and regulation of the Ranger mine especially when consideration is given to the OSS expenditure of about $50 million over the period 1978 to 1989. The OSS has failed to produce any practices and procedures of value to the environmental management of the Ranger mine. Ranger has had to bear the additional cost of developing and refining those standards, practices and procedures relevant to environmental management and rehabilitation. Regulation of the uranium industry in the public interest requires the involvement of appropriately qualified public-sector authorities and agencies. These groups already exist without the assistance of the OSS.

The OSS as presently constituted appears to be unable to fulfil its statutory responsibilities. Research results able to be used by Ranger have been negligible, with few standards and no practices or procedures developed. Research appears to be misdirected and to neglect the applied component. ERA has needed to independently contract the services of the CSIRO, the Australian Nuclear Science and Technology Organisation and other expert groups to carry out essential research work. OSS has no role in the regulation of the uranium industry which in practice is carried out by the Alligator Rivers Region Research Unit of the Northern Territory Government. The Government infrastructure put in place at the commencement of uranium mining in the region is no longer relevant.

ERA made a number of recommendations for the reorganisation of OSS.

Commonwealth Environmental Requirements for the Alligator Rivers Region are applied inconsistently by OSS or are no longer relevant. ERA requested that the following matters be the subject of a review:

. Regulatory control arrangements of the Ranger Mine;

. The procedures by which the Northern Lands Council formally seeks and records the views of the traditional landowners in regard to mining issues; and

. Fringe Benefits Taxes as applied to remote area housing and travel assistance.

The recommendation in the Draft Report that mining companies should post interest-bearing bonds to cover the cost of mine rehabilitation should recognise the need for mechanisms to reduce the impact of the bonds on production costs.

The current inability to export uranium to France and Taiwan has resulted in foregone opportunities for the Australian uranium industry. ERA agrees with the finding that the uranium industry is over-regulated but noted that Australia may not benefit from premature expansion of the uranium industry.

Environment Centre of the NT Inc (Subs. 56, 126, 210)
Contrary to the mining industry's claim that exploration and the actual mining process are "temporary uses" of the land, the actual impacts and effects are felt well beyond the actual mining phase. In many instances the adverse effects may be irreversible. Referring to the claim by the Australian Mining Industry Council that 23.5 per cent of Australia's land surface and nearly 50 per cent of the NT, mostly consisting of Aboriginal land and conservation areas, were either "severely restricted or closed" to new exploration or mining activity, the Centre stated that almost two thirds of the area referred to is available for exploration and mining if certain consultation and consent requirements with Aboriginal traditional owners are complied with.

The Centre opposes the view of the mining industry to regard the environment as expendable in the achievement of a higher standard of living. It is this generation's responsibility to leave future generations an environment which is at least as healthy and diverse as the present environment even if may require some sacrifice in terms of perceived living standards.

Made the following recommendations:

. Promotion of ecologically sustainable development which involves a reduction in the use of non-renewable resources, research and development into conservation and renewable energy technology, and adoption of waste reduction and recycling programmes;

. Greater community participation in the integration of conservation and mining developments;

. No mining in national parks or nature reserves; and

. A ban on uranium mining.

The Draft Report failed to understand the fundamental principles of ecological sustainability, and misrepresented its position on mining on Aboriginal land.

Environment Protection Authority of WA (Sub. 191)
Opposed the recommendation in the Draft Report on the economic cost-benefit analysis of existing National Parks to determine if they should have been declared. Suggested that bank guarantees can offer the same protection as interest-bearing rehabilitation bonds. Opposed the concept of tradeable pollution permits on the basis that as pollution is unacceptable, attaching a commercial value to it cannot be justified. The Authority would like to know where market-based mechanisms for achieving desired environmental outcomes, as recommended in the Draft Report, had succeeded where environmental impact assessment had failed. Provided information on the environmental issues associated with Rhone-Poulenc's proposed rare earth plant.

Exxon Coal And Minerals Australia Ltd (Subs. 58, 97, 102, 257)
To significantly reduce total unit costs of export coal, it will be essential to reduce unit labour costs by both reducing costs and increasing productivity. Unnecessary costs resulting from outdated working practices, bans on use of contractors for the provision of services, industrial disputes and excessive penalty rates need to be eliminated. Labour on-costs in the areas of superannuation, long-service leave and workers compensation could be reduced without reducing any entitlements by more efficient operation of these arrangements.

The labour costs/productivity experiences of the last decade (and most recently of the `industry restructuring' changes to rosters and work practices) do not give much confidence that significant improvements in unit labour costs can be achieved under the regulatory and attitudinal environment that currently prevails. These improvements will only be achieved if there is substantial labour market deregulation in the coal industry including more enterprise-based bargaining and more flexible union attitudes to working practices and conditions and pay structures. Unless there is a rise in productivity to give a payback for increased costs, companies will be sceptical of participating in other programs such as award restructuring under the current regulatory regime.

Further Government encouragement of union amalgamation and unification into an industry based union may help solve the high level of strikes in the coal industry. Exxon would like the right to hire employees it considers suitable for its operations rather than have the relevant union supply a list from which it has to choose. Superannuation and long service schemes and workers' compensation funds could be administered more effectively.

The Coal Industry Tribunal should be wound up and industrial relations matters for the coal industry handled by the Industrial Relations Commission as for any other industry.

The key issue with regard to resource taxation for the coal industry is reducing its level in real terms over time rather than attempting major changes to its structure. The concept of resource rent taxation is irrelevant and inappropriate in the coal industry where the large majority of participants earn uniformly inadequate returns. The only changes necessary are to move both NSW and Queensland to a uniform low royalty rate per tonne of coal sold.

Rail and port charges for almost all mines and planned projects are highly excessive relative to the task involved.

Excessive capital contributions have been required by State government authorities and local government for the provision of rail, port, water, power and township infrastructure which has substantially increased the capital costs of mines and projects. There is a great disparity between royalties and other charges applied by various states between various resources and even for the same resource. Royalties which take account of profitability and/or profits are more efficient than other forms of royalty but that does not mean that they are better in practice.

Council rates should be based on land value, as for all other industries, and should not rise at a greater rate than the CPI.

The policy of requiring coal projects to demonstrate that they are in the national interest, have a minimum 50 per cent Australian equity and control or have to show an unavailability of Australian equity capital at the time of development is discriminatory, impractical and an impediment to the raising of up to $9 billion of new capital investment which will be required in the Australian coal industry over the next decade.

Since resource rent taxes can be shown to be neither weakly nor strongly neutral, this raises considerable doubts about their economic efficiency. These taxes have serious adverse effects on a company's decision process in determining whether to explore. The petroleum resource rent tax which is the only example of a resource rent tax in Australia, is seriously flawed in practice as a system of secondary taxation.

Capital gains tax should not apply to non-cash farmouts as they are undertaken to spread the risks and share the costs of exploration and not for the purpose of realising gains. A number of reasons were given to support the contention that capital gains taxes discourage exploration.

The Commission draws conclusions in its Draft Report about the relative merits of various systems for bidding for exploration and mining rights which do not seem to take account of the problems associated with cash auctions and the advantages of other means of allocation.

Fardon R and Associates (Sub. 195)
Opposed the recommendation in the Draft Report concerning cash bidding for exploration permits. There should be no change to the present system of exploration permits with their expenditure and relinquishment requirements. Mineral deposits should not be auctioned once discovered and delineated, with the proceeds going mainly to the discoverer.

Fisher W & E Pty Ltd (Sub. 207, 250)
Opposed the recommendation in the Draft Report on cash-bidding for the allocation of mineral exploration and mining rights as it would destroy the initiatives and contributions of prospectors and small-scale explorers. The introduction of work-program bidding would reduce the efficiency of the mining industry.

Fitzroy Shire Council (Sub. 253)
Supported the submission made by The Landholders Association.

Fraser Island Defenders Organisation Ltd (Sub. 1)
Expressed concern about the following matters:

. Granting of Authorities to Prospect and the lack of public involvement or participation at the stage that these authorities are being issued;

. The implications that Authorities to Prospect carry an implicit right that the discovery of any significant commercial deposits may be converted to mining leases by the holder of the Authority to Prospect;

. The inadequate conditions applied to mining leases to protect the environment and the unenforceability of such conditions;

. That conditions of leases are monitored by Mines Department officers who are not independent and impartial;

. The readiness of governments to compromise on the tenure conditions of leases without full consideration of the public interest;

. The seeming automatic renewal of mining leases which allows some mining leases to be maintained in virtual perpetuity;

. The general failure to recognise the public interest in the determination of rents and other lease fees, royalties paid for raw materials extracted, the requirement to process minerals products outside Australia, the methods of adjudicating the public interest, and the adversarial and partiality of the process of Queensland mining Wardens; and

. That Warden's recommendations have been ignored by Ministers where they were unacceptable to the mining companies.

Freehill, Hollingdale & Page (Sub. 76)
The Inquiry should recognise the nexus between environmental regulation, project commitment and the availability of finance for project development. The determination of environmental requirements such as maximum acceptable levels should take into account the likely effect of the investment climate and project economics. The regulatory framework governing project licensing and approval (and relevant technical requirements) should be clearly and objectively defined. Government agencies should take a pro-active role in defining environmental guidelines to apply to proposed projects. Environmental rules should not be changed once a project has commenced. The role of ministerial discretion in the licensing and approval process should be minimised as far as possible. Where it is appropriate that a Minister has discretion, specific guidelines setting out government policy and the relevant matters to be taken into account by the Minister should be published.

Consistency between Federal and State laws and regulations is critical, as is consistency of approach between the States. The number of different government agencies with whom investors must deal should be minimised as far as possible.

Friends of the Earth (Sydney) (Subs. 153, 167, 169)
Provided information on the world market for uranium and copies of Parliamentary discussion of this subject. In disagreeing with the view that the uranium industry is over-regulated, stated that the Draft Report failed to make realistic estimates of the market for uranium. It should have commented on ERA's position on the Three Mines Policy.

Geological Society of Australia Incorporated (Sub. 3)
Expressed concern with the increasing trend in Australia to alienate land from access for many purposes including the accumulation of scientific knowledge. Stated that knowledge of Australian geology and its potential to host minerals for the benefit of the nation can only be obtained if land is available for examination and adequate research funds are provided. Indicated that previous investigations of an area of land may have ignored its potential to host particular minerals.

German Creek Coal Pty Ltd (Sub. 130)
Refuted comments made by the Joint Coal Board about the alleged lack of awareness of the company in the Inquiry.

Greenpeace Australia Ltd (Subs. 25, 133)
Predicted that the world uranium market will be almost exactly in balance over the decade 1991-2000 as a whole. Development of even one small new uranium project in Australia (such as Koongarra or Kintyre) would mean that supply would significantly exceed demand, and as a result the possibility of even a modest recovery in prices would probably disappear. The addition of a large project such as Jabiluka would create substantial over-supply and result in a large build-up of stocks during the 1990s. This would not only threaten the economic viability of the new projects, but would also diminish returns from existing uranium mines to the national economy, to shareholders, and to Aboriginal landowners in the Northern Territory.

Grey F (Sub. 241)
The recommendation in the Draft Report on the use of net present values for the resolution of public land use conflict is theoretically elegant but will prove impractical. Mining companies should be required to provide appropriate rehabilitation to mined areas, though this appears to be unlikely to restore the original ecological values in many cases.

Hosking A J and Associates Pty Ltd (Sub. 209)
Opposed the recommendation in the Draft Report on competitive cash bidding for exploration rights because there is no overwhelming evidence that the present system is not working. The private sector should be allowed to compete with government agencies for the provision of information services in those areas in which cost recovery applies or will apply in the future. Aboriginal communities should be encouraged to take a more direct role in the negotiation processes leading to agreements to explore or mine on their lands. The expanded use of voluntary professional and other organisations should be evaluated before additional bureaucratic actions are taken by governments. Australia should establish an integrated nuclear industry embracing the entire nuclear fuel cycle except for the reprocessing of spent fuel.

Joint Coal Board (Subs. 18, 165, 170)
Stated that mining companies are frustrated with the cost and complexity of obtaining approval for the development of new projects. However if all of the proposed production comes on stream in the time frame being contemplated, the oversupply situation of 1982-87 may be repeated to the detriment of the industry.

Kembla Coal and Coke Pty Ltd (Sub. 87)
Australia is the world's largest coal exporter. Because two thirds of Australia's production is for export, the effects of market swings are felt more acutely in Australia than the USA. This requires more production flexibility than has been the norm in Australia and requires a different mind set for the industry and regulatory bodies. The existence of a separate Tribunal for coal helps reinforce the notion that the industry is in some way "special". A coal marketing authority would help perpetuate the myth that coal is somehow special but would be likely to do great damage to Australia's hard won market position as the world's leading exporter. The unacceptably high level of industrial disputation in the industry, the comparatively high level of earnings by employees, the low level of productivity and poor industry profitability points to a failure of the Coal Industry Tribunal to act in the best long term interests of the industry.

Early access to coal leases is unusual in NSW up to 10 years prior to mining. This is not only desirable for gas drainage but also necessary for extensive exploration to delineate geological faults as an aid to mine planning. Without this, efficient longwall extraction over the long term would not be possible. The period of some three to four years required to obtain development consent and a coal mining lease for a new mine in NSW is unacceptable. Mines need to be brought on stream to coincide with buoyant market conditions. Market opportunities can easily appear and disappear over a four period. The prime source of duplication, conflict and delay is that the provisions of the Environmental Planning and Assessment Act and the various mining Acts are often duplicated. Mining projects require the approval of both the Minister for Minerals and Energy and the Minister for Planning.

State Governments tend to levy excessive charges on coal which are reflected in operating costs prior to the declaration of net profits. The Federal Government has competed with the States by levying a coal export duty. It has even spread to the Local Government area where in some cases Council rates are perceived as a form of royalty and not as a fee for service.

Koongarra Traditional Owners (Sub. 237)
Strongly supported the commencement of uranium mining at Koongarra in the NT.

Kooragang Coal Loader Ltd (Sub. 202)
Expressed concern that the matter of the excessive land rental paid by KCL to the NSW Government which was referred to in submissions by the NSW Coal Association and Oakbridge Ltd was not raised in the Draft Report.

Lawrence L (Sub. 78)
Land should be made available to miners in the Pine Creek area to acquire pastoral leaseholds for a variety of land uses. Convenants should be placed on miners' leases which ensure that rehabilitation occurs. If this does not occur, the miner must relinquish any claim to convert the mining lease to an agricultural lease.

Legislative Council of Tasmania (Sub. 234)
Submitted copies of reports prepared by a Select Committee which examined issues associated with making decisions on public land-use and made final recommendations.

Leisure Coast Tourist Association Ltd (Sub. 123)
Urgent submissions should be made to the Federal Government for funding to upgrade the Illawarra Highway to National Highway standard and for construction of a section through Caloola Pass to eliminate the notorious Macquarie Pass. Suggested a number of short term measures to alleviate congestion on the Wilton and Appin Roads including the provision of more stockpiling facilities at the Port Kembla Coal Loader. In the medium term, consideration should be given to the construction of "truck only" lanes on the Wilton and Appin roads. In the longer term consideration should be given to construction of a Freeway to link the F6 and F5 Freeways from a point near the Wilton interchange to Mt Ousley.

Limestone Association of Australia Inc (Subs. 35, 109)
The Association recommended that government policies at all levels (local, regional, state and Federal) make provision for:

. Continued exploration for new limestone deposits;

. The development of new limestone mines to replace existing mines as they are depleted; and

. A supply of low cost electricity to decentralised areas.

A tax rebate scheme should be introduced to encourage and financially assist landholders in areas affected by acid soil, to recondition and neutralise the soil. Such a scheme would directly support the Government's Landcare program. The various State Governments should ensure that where a right to mine a specific limestone deposit exists (ie a mining lease has been granted), that such a right be registered on the title of the subject property and that the right to mine continue (subject to lease conditions) with any change in ownership of the land.

The present diesel fuel excise rebate should be continued to assist in keeping the price of limestone as low as possible. The current import duty (18 and 21 per cent) should be removed on equipment such as dump trucks, front end loaders, excavators, crushing and grinding equipment, in the size ranges commonly used in the industry.

Maroochy Shire Council (Sub. 253)
Supported the submission made by The Landholders Association.

MIM Holdings Ltd (Subs. 19, 149, 196)
Tariff rates of 10 and 15 per cent will continue to impose substantial costs on the mining industry because its equipment is extremely costly. A further phased reduction in tariff levels should be introduced to achieve a single rate of 10 per cent for all goods by 1995 and the removal of all assistance by 1998.

The definition of mining operations within the income tax legislation should be expanded to encompass downstream processing up to and including the refining of mined ore, and necessary support facilities. Flexible accelerated tax depreciation provisions for mining investments together

with related outlays should be allowed. Recommended that the principles inherent in the dividend imputation system be extended. The abolition of accelerated depreciation write-offs, particularly the 3-5 year write-offs for plant and equipment, will dramatically affect capital intensive projects. All production inputs should be free of taxation. The level of taxation of refined products such as diesel fuel and fuel oil has reached a critical level.

Mining companies should be allowed to nominate tax depreciation rates for their productive plant and equipment. This would relieve the difficulties faced by companies making their substantial outlays, encourage reinvestment and expansion, and make less necessary the need for foreign capital to support investments. If taxation laws were structured to provide encouragement and support for investment in the resources sector, rather than redistribution and negativity, there would be a far greater probability of equity financing rather than debt financing of resource industries. This can be done if provision existed for taxation benefits to flow back to shareholders where a company is in a loss situation. Bond rate finance should be made available for private enterprise investment in public infrastructure including housing, roads, pipelines, power stations, railway lines, ports and dams.

There should be a three year delay in the introduction of increased employee superannuation payments in order not to handicap international competitiveness in the short term. Labour cost increases that are in excess of those in competitor nations are opposed. Recent changes in the timing of taxation payments and PAYE payroll deductions have created cashflow problems as well as increased administrative costs.

There must be a firm commitment to, and progress in, structural changes in the waterfront industry and in the containment of labour costs.

Certain long term actions are vital to everyone in Australia, including those in its mining and related industries:

. Establish sound educational curriculum standards that achieve education outcomes matching those of successful countries;

. Accelerate the teaching of second languages, aiming essentially for all university entrants from 2001 onwards having matriculation level second language education;

. Alter national priorities through the recognition of the value of the contribution of industry and other real contributors to long term economic strength;

. Treat the national infrastructure as essential for continued growth, to which a portion of national saving has to be devoted. This approach must encompass the nation's basic road, rail and energy systems;

. Insist on efficiency through competition in transport, waterfront, maritime and communication sectors, and in the areas that do not have direct international competition to set the standard; and

. Provide Australians with access to their land for mineral exploration and mining, subject to restrictions determined on a sensible case by case assessment.

The recommendations in the Draft Report will only achieve a partial amelioration of the cost and government regulation burdens now imposed on the industry. The Commission has not fully accepted or appreciated the strength of the commercial realities that guide investment decisions in Australia's mining and mineral processing industries, and has allowed "perfect world" theory to overtake those realities. Rejected the Commission view that industry support for Crown ownership may reflect a belief that better deals can be struck with governments than with private landowners. Cash bidding for exploration and mining rights fails to accommodate the realities and commercial demands of the mining industry.

While the Commission has identified some of the unsatisfactory aspects of mineral taxation and royalties, the following areas of inequality remain:

. tax deductibility of plant and equipment used on the mining lease or in the subsequent transportation, treatment and downstream processing aspects of the industry;

. accelerated depreciation rates; and

. capital gains taxation on farm-outs.

The use of rent-based royalties merely places a cap on profits with no bottom on losses. There is a need for a full rebate on the excise levied on petroleum fuels. The examples set out in the Draft Report of alleged damage to the environment from exploration are unsupported by independent assessment. Up-front rehabilitation bonds would impose a severe cost penalty on new mining projects and should not be considered. The tariff reduction program should continue past 1992. MIM requested that the issue of sales tax on production inputs be addressed in the Final Report.

Nature Conservation Council of NSW (Sub. 50)
Mining, exploration and minerals processing should adopt the principle of ecological sustainability as its driving ethic. There should be no exploration, mining or minerals processing in National Parks, Nature Reserves, National Estate, Marine Reserves and similar areas. All exploration, mining and mineral processing proposals in all States and territories should be subject to a national standard Environmental Impact Assessment with the right of third party appeal through the Courts.

Environmental Impact Statements and related submissions should be evaluated by an national independent scientific body with expertise in the areas of ecology, ecosystem management, toxicology, occupational health and safety, and risk and hazards analysis. A national independent scientific body needs to develop a set of performance indicators as the basis for monitoring, evaluation and review. There should be a regular national environmental audit of all ongoing mining, exploration and minerals processing operations.

There should be greater emphasis on the recycling of metals and the commercial recovery of metals from waste effluent. There should be deposit legislation for aluminium and steel cans. Natural ecology diversity or agricultural production should not decline following mining and rehabilitation. Under no circumstances should a mining project proceed for which there is no environmentally safe way of dealing with wastes generated during the project.

The Council opposed:

. Ocean and/or river dumping of any wastes whatsoever; and

. The establishment of uranium enrichment plants in Australia.

There should be a phasing out of the uranium industry in Australia due to the decreasing world demand for uranium and the massive environmental problems associated with the industry. There should be national environmental regulation of the mining industry applicable to all states and territories that covers environmental impact assessment of all exploration, mining and minerals processing, management and preparation of the environment prior to and during operations and rehabilitation after cessation of the operation.

Nature Conservation Society of South Australia Inc (Sub. 30)
Environment protection costs are not addressed for many mining ventures in South Australia which implies that the implementation of regulations relating to the environment is not adequate. These costs could be recovered by inclusion of the expected environmental damage and associated costs of restoration in the overall plan for every mining venture. The argument that mining has to occur where minerals are found applies equally to conservation areas.

Normandy Poseidon Group (Subs. 11, 80, 141, 224)
Proposed that a major recommendation of this inquiry should be in favour of both reform of industry policy and microeconomic reform in order to reduce the cost structure in Australia. The inquiry should identify the benefits to be gained by microeconomic reform, specifically for the mining industry, but also for the whole of Australia. Maintained that only when the potential value of a mineral resource and the specific details of developing that resource are known can a rational decision be made as to whether it should be developed or not. Claimed that mineral industry exploration is research, just as much as any other industry research and development programme and should be treated accordingly for taxation purposes.

The true cost of a major discovery is not just the sum of money expended on that particular tenement. It includes all the exploration expenditure leading up to the selection of that area. Cash bidding for tenements is quite inappropriate for mineral exploration. The cash bid is supposed to represent part payment for the transfer of property rights - ownership of a mineral resource - from the community to the explorer. However, most exploration ventures are unsuccessful and the tenement will be relinquished. The cash bid would be then paid for a resource which did not exist or at least was not found on that occasion. Accordingly, if a cash bidding system is introduced, the logical bid from mineral exploration companies for most tenements will be zero.

The proposal to require cash bidding as a pre-requisite of exploration is not only inappropriate, but counter productive. It would reduce the number of small companies that can participate in exploration and thus reduce the critically important component of innovative and original thinking. The community's mineral resources are of no value to the community until they are discovered. Discovery realises the potential value of the resources. Therefore, some of the economic rent should accrue to the discoverers as well as to the owners of the resource. Provided a negotiated rate of tax takes the place of the existing royalty system, this could provide a more equitable system of recompensing the community for its ownership of mineral resources without preventing development of marginal deposits.

Successful government exploration would certainly produce competitive cash bidding for identified resources, but industry experience indicates that the government would not recover the costs of unsuccessful exploration. Voters might have the final say on any government which devoted hundreds of millions of dollars per year to the extremely risky business of mineral exploration. If it is accepted that a mineral development substitutes for some other form of economic activity, the mineral development is likely to be of more benefit to the community than any alternative activity. This is due to the negative effective rate of assistance to mining compared to large, positive effective rates of assistance to rural and manufacturing industries.

Disagreed with the recommendation in the Draft Report that exploration tenements should not be subject to any conditions relating to work which must be carried out. The opposition of the Commission to expenditure requirements and to work program bidding appears to be based on a desire not to constrain the choice of when it is efficient to explore or mine, supported by the notion of rent dissipation and excessive exploration. Cash bidding for exploration rights over areas without known deposits is completely unacceptable. Cash bidding will reduce the amount of actual exploration which can be done. The recommendation for tradeable mineral rights to be allocated by competitive cash bidding may deprive the community of the full value of its resources, as the contribution of a mining project to GDP is very much greater than its economic rent. Most mining companies would oppose any system which required them to put up a discovery for auction. The timing of a forced auction might seriously disadvantage the discoverer, particularly if it is a small company with limited resources. The problem the mining industry has with the economic inefficiency of the NT land rights legislation will not be solved by abolishing the Land Councils. Having greater access to traditional owners at the pre-decision stage would allow the company to better take on their concerns.

The finding and recommendations in the Draft Report do not address or find a solution to the cultural clash between mining and Aboriginal land interest. The recommendation to allow traditional Aboriginal owners to make exploration areas available to third parties if agreement cannot be reached over terms and conditions of an exploration licence is totally rejected. The recommendation that 70 per cent of royalties be paid to the Aboriginal people on whose land a mine is established is considered detrimental to the Aboriginal people and their unique culture.

North Broken Hill Peko Ltd (Subs. 33, 219)

The mineral industry is opposed to a system of application for a permit or lease based on the release of land by authorities who wish to conduct competitive bidding or tendering. Nor, for on-shore work in the States, is this an area where the Commonwealth ought to inquire. The industry does not want to waste time building up mineralisation models without the knowledge that there will be access to the land being studied. A switch to cash bidding would see a marked decrease in creative thinking and a decline in discovery yield. The worst example of the loss of the right to mine is the prohibition of mining operations in Kakadu and the denial of explorers' rights to compensation from that prohibition. Where such federal intervention has occurred in actual cases in the last decade or two, the reason given is almost always linked to the environment. More proper grounds for federal intervention might involve, say, the control of strategic minerals or national defence.

The inquiry ought to examine the subject of permanence or durability of property rights. There are mining leases in Australia today which are current, but upon which work is suspended or prohibited. The rights and obligations of the lease document - including the obligation to perform work - have been revoked, not by cancelling the leases, but by making orders that the leases cannot be enjoyed.

Royalties and special imposts have to be seen as illogical levies that imply a form of punishment or retaliation for the users of resources that require discovery. There are large areas of Australia which industry experts consider to be prospective, which are off-limits for fear that exploration will cause a mining land use to arise. Royalties have a disadvantage to the producer in that they can be changed, often capriciously, without proper regard to the total imposts already upon the producer. The State, charging the levy, does not always talk to the Commonwealth, who runs the income tax system.

The methodology of economic analysis of competing land uses is not highly evolved. There are two serious impediments which need consideration before the Commission embarks on this type of analysis if that is its intention:

. The economic data base is usually incomplete. In terms of mineral resources, it is common for estimates of mineral value to be made for an area of land subjected to economic assessment. The estimate is commonly made despite objections that the land has not been adequately explored; and

. The immaturity of economic methods of analysis of other land uses, such as tourism and wilderness.

The encouragement of research and development need not have a large up-front cost. The important ingredient is attitude - the attitude that investment of brain power in research and development will be rewarded with the ability to do something positive with the research and development result. Of the whole mining spectrum, the area needing most research and development is probably in secondary processing, the "value added" stages that remove some of the "quarry Australia" allegations. We could have a much more serious research and development effort in uranium enrichment, for example, but policies of the Federal Government actively discourage this.

The Draft Report did not fully address the issue of private versus Crown ownership of mineral resources, and the problems which have arisen with the right of veto held by some groups of people. Supported the FCFS method of allocation of exploration right in preference to cash bidding. Apart from a limited number of exceptions, there should be no other places where the right to mine does not follow automatically from the right to explore. The Inquiry should make an assessment of the expenditure by Federal Government Departments on publicity and educational material directed against the mining industry. The production of an EIS should be limited to those cases where the proposal has some major extraordinary features. There is insufficient evidence that the industry has behaved badly enough to warrant the posting of up-front rehabilitation bonds.

Northern Land Council (Subs. 28, 108, 148, 194)

The vesting of ownership of sub-surface minerals in the Aboriginal land owners would not only recognize the special relationship that Aboriginal people have with their land, but would also have economic benefits for the wider community. If Aboriginal people cannot obtain comparative mineral rights then they need to completely control development of their land by a strengthened ability to control access in an ordered manner. Aboriginal people should have the right to give or withhold consent to projects at the exploration stage and at the mining stage. There are two ways in which this could be overcome. One method would be to allow the right to negotiate disjunctive agreements where companies agree. The second is an exploration agreement with agreement on the fundamental environmental and financial parameters for the mining stage. It would facilitate the reaching of agreement if both parties knew from the outset what statutory royalty would be required under a production agreement, as the negotiations of contractual payments has to take into account the viability of a project and the reward expectations of both parties plus government royalties and taxes. The latter are known factors but the statutory regime, particularly in the case of uranium, it an unknown factor.

The NT Department of Mines and Energy and the Minister take an inordinately long time to give approval for companies to negotiate with the Land Councils. In addition, the Department has complete control over the number of applications that receive Ministerial consent at any one time. There should be a complete review of boundaries of Exploration Licence Applications to take into account social boundaries and minimum size requirements to allow efficient and cost-effective exploration programs for companies.

Where a clan group has withheld consent for exploration and mining, this veto should apply to all their country, not just the particular section within a given exploration licence application area. The period for relinquishment of half the exploration licence should be extended to 4 years and that there should be no statutory time limits placed on consideration of any subsequent applications.

Proponents wishing to use Aboriginal land for development purposes should be willing to pay the costs associated with negotiating an agreement as they would with other private land owners. Whilst this is not a matter which calls for any amendments to the legislation, it needs to be recognised that the policy of proponents meeting the costs where they wish to undertake commercial activities on Aboriginal land is valid and will continue. The grants of exploration licences on land under claim put the traditional Aboriginal owners at a significant disadvantage at some future time in the event that an ore body is found, since traditional Aboriginal owners will not have the ability to negotiate on fair and equitable terms and conditions as they no longer have the right of veto. Traditional owners also will receive no compensatory benefits from exploration operations already in process.

The Draft Report misinterpreted the Council's criticism of amendments to the *Aboriginal Land Rights (NT) Act 1976.* The recommendation concerning the ability of Aboriginal owners to be able to negotiate freely with mining companies and appoint any agent they wish is unnecessary. The Commission should become aware of the full implications of its proposal to make changes to the distribution of royalties. The privatisation of the ownership of minerals beneath Aboriginal land in combination with some fiscal mechanism could eliminate difficulties associated with changing the current system of Crown ownership.

Opposed the unconditional allocation of exploration and mineral rights by competitive cash bidding. Expressed concern that if controls were removed on uranium exports, auditing of production and sales would still be required. The difficulties associated with negotiating with Aboriginals concerning mining at Coronation Hill derive from the fact that the land is Land Under Claim for which the legal regime is not as clear cut as for Aboriginal land.

Norton Mining Services Pty Ltd (Sub. 179)
Referring to the Draft Report, stated that present methods of mining lease valuation are well tested and are preferable to RRT. The practicalities of deciding when the initial explorer had done enough work to take it off him and put it out to tender would involve governments in more work than is involved in the management of off-shore oil. There has been insufficient experience gained with respect to RRT to test the mechanics of reimbursement from bids. There could be a disincentive for initial explorers without a right to mine to keep exploration expenditure below what might be received from tender bids. Should any review of royalties, RRT or dividends payable to the Crown and public be undertaken, there is a good case on sustainable development grounds not to exempt deposits of sand, stone and soil.

Exports of surplus quantities of mining concentrates have kept inefficient foreign smelters and refineries operating, preventing Australian firms from participating in this business. The ISASMELT and AUSMELT developments should make it possible for more smelting to be carried out in Australia. The Inquiry should examine the opportunities for mineral developments and export opportunities which have been lost, ignored or are undeveloped. There should be some comment on the reasons why Australia imports chromite, platinum and titanium.

The submissions which referred to occupational health and safety do not represent a balanced view from within the industry. Most firms in the industry would feel that this subject is outside the terms of reference.

NSW Aboriginal Land Council (Subs. 86, 93, 114)
Where land acquired by a Land Council is encumbered by a mining, exploration, or prospecting licence at the time of acquisition, or where mining operations are for minerals excluded by the *Land Rights Act*, there are no provisions for notification and negotiation between the Land Councils and mining interests. Pre-existing licences or permits may also be renewed without allowing for negotiation with the Land Council. Statutory channels for notification and discussions should be formally established to cover those instances not presently addressed by the Act. Formal channels for the effective notification of Aboriginal communities should be immediately established, in cases where mining is proposed on land not under Land Council control, but which may be near Aboriginal Land, or lie upstream of it on water courses or in other positions potentially affecting Aboriginal Land or communities which may be potentially claimable, or may be likely to contain Aboriginal sites. Aboriginal communities are concerned that the land should be respected in any mining operation. If cultural heritage is to be respected, then prevention of damage to significant sites is critical. Proposals to relocate people of any community should be avoided wherever possible, and should always involve full and early consultation with the communities themselves.

It is possible that in times of economic difficulty, the rights of Aboriginal people in relation to mining will be eroded in the name of efficiency for the mining sector. Even should the mining sector increase its efficiency and profits without direct regulatory prescription, it is highly unlikelythat there will be any direct benefit at all for the Aboriginal population of New South Wales. We therefore suggest that a proportion of resource taxation should be allocated for Aboriginal people.

Our concern is particularly related to minerals and situations exempted under the Land Rights Act and to new Acts which do not afford us any special consideration in relation to activities which affect our quality of life. Aboriginals have general rights as dispossessed owners of the land to recompense from all users of land, and in particular from all miners, which should be exercised in the form of a levy on all extracted minerals, to be paid to the peak Aboriginal body in each State and Territory.

NSW Coal Association (Subs. 45, 140, 151, 231)
The approval procedures for major new projects in NSW tend to discourage mineral development in this State by adding to project costs and development time. Mining developments are somewhat unique in that two separate and largely independent instruments of approval are needed prior to the commencement of any new project. All other types of development only require one such instrument. A revision of legislation is sought to reduce delays and duplication which currently occur, which would increase the confidence and security of investors in major mining projects.

The term "designated development" in Schedule 2 of the NSW *Environment Protection Act* Regulations in respect of coal industry activities should be redefined to permit a decision to be taken by government on a case-by-case basis, depending upon the degree of social or environmental sensitivity presented by each mining proposal, avoiding the need to utilise the full approval procedures of Part IV of the Act. Suggestions were put forward for simplifying the current legislative and administrative requirements for Commissions of Inquiry under the NSW *Environment Protection Act* which greatly extend the time-frame and the cost of the approval procedure.

The *Environment Protection Act* should contain firm time limits for response by government authorities responding to calls by the Department of Planning for comment on environmental impact statements. A lack of response in this context should be deemed as acquiescence. The Associations put forward a number of objections to the NSW *Environment Protection Act,* and suggestions for revising the *Coal Mines Regulation Act.* The Association believes that the NSW *Occupational Health and Safety Act 1983* provides a suitable model for the coal mining industry.

The Association believes that the Joint Coal Board (JCB) should be disbanded and certain of its functions transferred to other bodies. The promotion by government of the following policies and activities could provide a better basis for land use decisions:

. The concept of multiple and sequential land uses, wherever these are appropriate;

. Review of the policies of individual government departments and authorities towards coal extraction beneath land and structures within their control;

. Restrictions applying to much of the land in national parks could be relaxed to permit underground mining, without detracting from the overall purpose or value of the parks;

. The NSW government should adopt the option of state recreation areas rather than national parks wherever possible and appropriate, and especially within established coal mining areas;

. There should be an evaluation of the mineral resources of proposed national parks, recreation or wilderness areas, and public scrutiny of the economic value of these resources. Wherever possible, provision should be made for future exploitation under appropriate controls; and

. A co-operative approach between the Association, the Mine Subsidence Board and the Department of Minerals and Energy is likely to be the most cost-effective and successful means of eliminating community concerns about mine subsidence and thereby avoiding the unnecessary sterilisation of coal.

The Association's major concerns in relation to rail are:

. The need to ensure continuing rationalisation in the SRA, with cost savings flowing on in real freight rate reductions;

. Improvement in SRA management information systems so that costs can be accurately allocated to all business segments; and

. The need for a transparent basis for the setting of freight rates.

Major concerns in relation to ports and coal loaders are:

. The operating efficiency and over-manning of the Port Kembla loader;

. The control of the Kooragang and Port Waratah coal loading heads by the MSB Port Authorities;

. The grossly excessive land rental which the Kooragang coal loader is obliged to pay to the NSW Government (the excess over a fair market rent is approximately $5 million per year); and

. the fact that $54 million of company funds has been spent on railworks and wharf facilities at the Kooragang coal loader which are now government property and earn revenue for government.

The Association is concerned with the possible introduction of a resource tax on the coal industry at some time in the future by a Commonwealth Government. The Association does not support the introduction of a Resource Rent Royalty system as proposed in the report of the joint Industry-NSW Government Working Party Review.

Cash-bidding for mineral titles as recommended in the Draft Report may have some economic logic, but a much more detailed assessment is needed for what would be a fundamental change to the way the mineral industry would operate in Australia. Among the concerns of the Association about RRR are sovereign risk, that it penalises the more profitable projects, that the coal industry as a whole could pay greater royalties in future years, and that it would also change the rules of the game. Industry would be divided into two categories, those existing mines which would remain on the flat rate royalty, and new mines which would be subject to RRR.

NSW Government (Subs. 52, 162, 217, 249)

Additional Commonwealth funding for research and development and training in specialist technologies such as metallurgy would greatly benefit the industry. A major Commonwealth boost to road funding in NSW is required. Tax deductibility of mining rehabilitation after cessation of mining needs to be clarified, and made consistent with the state government requirement for the mining industry to honour its environmental obligations. The differentiation of guidelines for foreign ownership in exploration, mining and minerals processing warrants review. There is potential for improved consultation between Commonwealth and state governments regarding Commonwealth export intervention on environmental grounds.

The Commonwealth Government needs to make efforts to reduce volatility in foreign exchange rates, as this factor inhibits planning in the mineral sector. The high interest rate policy favoured by the Commonwealth needs review in the light of its inhibiting effect on exploration and research expenditure.

Multiple land use or sequential land use concepts must be developed to ensure environmentally sound land management. If the multiple land use concept is accepted, the conflict between mining and surface development can be resolved and both uses can co-exist with some restrictions imposed on both.

Low tariff barriers for relatively unprocessed materials present opportunities to the producers (and associated service industries) of relatively unprocessed minerals. Conversely, the barriers to processed minerals reduce the opportunities for trade in this area, and may lead to Australia having to import materials that it may otherwise have been able to export. NSW has supported, and continues to support, the Commonwealth Government in its efforts to reduce barriers to trade in the international market place. In particular, the NSW Government supports the attempts of the Commonwealth Government to improve market access through negotiations under GATT. Barriers for the export of Australian processed minerals need to be identified, and where possible, strategies should be devised by state and Commonwealth Governments, as appropriate, to thwart those barriers.

Exploration, mining and minerals processing are often inextricably linked. Therefore, differentiation in foreign investment guidelines for these industries may not be appropriate. The current system of the threat, rather than actual implementation of export controls, appears satisfactory in achieving reasonable prices. However, the Commonwealth Government's export control powers may affect the development of mines producing coal for both domestic and export markets.

The impact of actions, such as the restraints imposed on miners at Fraser Island in Queensland, to protect environmentally sensitive areas can be very negative on the mining industry if it is perceived by the minerals industry that an injustice is imposed. Such actions rendered all States less likely to receive investment, whether by Australian or foreign interests, in the minerals industry.

Interest rates impact directly on exchange rates as well as on Australia's economic activity. High rates are also likely to reduce expenditure in activities producing delayed revenue, such as exploration, research, or long term market development. Both high exchange rates and interest rates render exporting more difficult. While the inflation rate may be relatively high, it would seem to be of less concern in the short term to exporters than interest rate and exchange rate instabilities.

The Commonwealth and state governments should consider enhancing their overseas trade network with a view to facilitating greater marketing of Australia's mineral products. Implementation of many of the recommendations of transport investigations could lead to a significant expansion of mineral related exports. The development of a compensation scheme, perhaps through a tax based system, could increase the willingness of companies to train, leading to eventual improvements in the productivity standard of the workforce.

Export competitiveness requires that the technology used in processing operations should be up to date. The Commonwealth Government may be able to act as an intermediary in licensing appropriate technology, improving the awareness of industry of recent technical innovations, or ensuring that political difficulties do not threaten access to technology. It is possible to speed exports, or the implementation of export oriented projects, through the implementation of aggressive administrative arrangements. This could include giving additional personnel to government departments handling such matters.

Consideration may be given to the mining and processing industry structure best adapted to export success. The present industry structure reflects the influence of such matters as taxation, interest rates, social customs, transport and communications. Newer projects may require a change in these areas to ensure that joint venture, finance or other arrangements are made which provide for the increased chance of long-term success.

Supplementary submission 162 provided additional information on current coal mining developments, an update on local government rating of mines, and comments on the NSW Government position on federal taxation, foreign ownership and export controls.

Expressed concern about the recommendation in the Draft Report for the allocation of mineral rights by cash bidding. Any mechanism which impedes the acquisition of exploration rights, or increases the investment risk, such as auctioning, will encourage mining companies to invest elsewhere. The involvement of governments in geological investigations is not only done for the direct benefit of the mining industry, but to enable land use decisions to be made.

Expenditure on exploration licences should be deductible as an exploration expense, while such expenditure on mining leases should be treated in a manner consistent with the treatment of analogous expenditure in other industries.

The recommendation that EISs should primarily be scientific reports does not provide for the consideration of economic issues. National Estate listings should not be made without consultation with relevant State governments which can provide a more comprehensive environmental assessment than is made at present.

Guidance is required on the implementation and administration of a resource rent royalty system.

These is no component of royalty in rail freight charges in NSW.

Mining injury statistics are reducing, contrary to indications by the Department of Industrial Relations that there appears to be no sign of this performance improving. There is little evidence for the claimed adverse impact on the mining and mineral processing industries resulting from the inefficiencies in the provision of electricity. Explanations were provided on a number of matters raised by witnesses at the Sydney hearings involving the NSW Government.

NT Chamber of Mines and Petroleum Inc (Sub. 205)
The Chamber totally opposed the recommendation in the Draft Report on cash-bidding for the allocation of mineral exploration and mining rights in the NT. A number of practical issues need to be addressed if the recommendations on access to Aboriginal land and the redistribution of royalty payments are implemented. Rejected the recommendation on the availability of land for application by a third party if agreement is not reached between Aboriginal owners and an explorer/miner. A statutory pre-determined mining royalty applying to Aboriginal land would expedite negotiation of exploration and mining agreements. The Commonwealth Government must recognise its responsibility for the current impasse in the negotiation of exploration and mining agreements on Aboriginal land.

NT Government (Subs. 77, 136, 226)
The government drew attention to the detriment which the *Aboriginal Land Rights (Northern Territory) Act 1976* is causing to the development of the mining industry in the NT.

The conflict between alternate forms of land use and lost economic rent due to unresolved conflicts is characterised by the Kakadu National Park and the Conservation Zone case histories. The conservation of the environment and mining are compatible forms of land use. Mining is a legitimate and sustainable form of land use. The National Conservation Strategy acknowledges the role of sustainable development in providing essential needs of individuals and the society. The application of the wilderness concept can only be a last resort if areas demonstrably cannot sustain other forms of land use.

Nominations for the registration of sites to the National Estate and World Heritage must be subject to a thorough and impartial assessment process. The final decision about the nomination of sites must rest with governments with which the subject land is vested. Rational and objective resource assessment is indispensable for land use decisions. The cost benefit analysis as the central piece of resource assessment must be enhanced through the precise and comparable definition of the values of non-market goods. The jurisdictional consequences of findings of the Resource Assessment Commission have to be clarified.

Multiple land use must be the principle of responsible policies. A balance between conservation and development must be struck for the economic welfare of Australia. Objective findings, and not political opportunity, have to govern the decisions being made.

The implementation and operation of a fiscal system which encourages the investment of risk capital in mining is crucial for the development of mineral resources. The principle of an equitable and simple taxation system requires that taxation of the mining industry is analysed in context of the general, national taxation policy.

Government floor prices are serious obstacles to the development of the uranium mining and nuclear fuel industry in the NT. The prohibition of additional uranium exports has a tremendous negative impact on the Australian and NT economies. Substantial export income and tax/royalty revenue are forgone and thousands of potential jobs lost. The Commonwealth's position favours mining investment in other countries, especially Canada. The inconsistency in Commonwealth policies and procedures undermine the security of mining and minerals processing investment in Australia. Unclear positions and the contradiction between policies and actions jeopardizes State/Territory efforts to attract investment and facilitate development.

Interference in State/Territory matters by virtue of external powers makes long-term land use planning and commitment of investment funds to mining and minerals processing projects difficult. High interest rates associated with a tight monetary policy reduce the international competitiveness of Australia as a location for investment in mining and minerals processing ventures. Uncompetitive construction and operating costs in some sectors of the minerals processing industry prevent the expansion of value added industries. Inefficient labour market structures, protection of outdated work practices in transport industries and higher costs of transport fuels hamper faster development.

The Government totally opposed the recommendation in the Draft Report for the allocation of exploration and mining rights by cash bidding. The Government also opposed the recommendation to allow traditional Aboriginal owners to make exploration areas available to third parties if agreement cannot be reached over terms and conditions of an exploration licence. There was an inconsistency in the Draft Report between findings and recommendations relating to conflicts over public land use.

Additional recommendations were made concerning National Estate and World Heritage listings of places.

Caution should be exercised in making commitments to market-oriented mechanisms for enforcing or defining property rights.

The Government considered that CSIRO's stature as a detached professional body has been destroyed by their biased and unprofessional handling of environmental investigations at Coronation Hill.

A blanket rejection of all forms of Government involvement in the marketing of minerals was not supported.

Geographic disadvantages rather than inefficiencies in the provision of electricity adversely impact on the viability of mining and mineral processing projects.

The Commonwealth Government should grant to the NT Government the right to raise royalties from the mining, milling and sale of uranium and uranium products. The direction of research in the Alligator Rivers Region should be determined by organisations with a direct interest and influence on operations and environmental performance.

Oakbridge Ltd (Subs. 32, 143, 190)
The Commonwealth Government should endeavour to persuade Queensland and New South Wales to forego the excess portion of rail freights in exchange for grants funded through increased company taxes. At Newcastle there is concern that the coal industry bears an inordinately large share of port costs. Electricity is a significant component of underground coal mining costs and the coal industry appears to be cross-subsidising other electricity consumers. Oakbridge urges the Industry Commission, in its inquiry in relation to energy generation and distribution, to make a special point of investigating this issue. It is highly desirable for the forms of the various taxes imposed on the industry to be redesigned so as to be more sensitive to prevailing economic conditions, to the amount of rent currently available and, generally, to be more neutral in their impact on investment and operational decisions.

Oakbridge would like to see the development of a royalty system based upon real resource value, similar in concept to Resource Rent Tax, but with a threshold that reflected the coal industry's discount rate (or required return on capital) and a royalty rate that reflected the risks borne by the developer. One of the major concerns of the industry is the different treatment of new mines which would operate under such a system and existing mines which may not.

Payroll taxes bear heavily on labour intensive industries and technologies including underground mining. It is reasonable for local government to seek additional revenue through increased mine rate payments, but applying a de facto royalty on output results in an inefficient outcome. The coal industry acknowledges that substantial mine developments can strain local council finances; however clearer guide-lines are needed from government particularly with respect to per capita grants, and more accountability in local councils for the expenditure of these funds.

While the overall effect of Commonwealth taxation measures is small, they do contribute to inappropriate factor pricing in the same direction as some of the larger imposts and thus compound other inefficiencies. The failure of the previous NSW Government to compensate promptly and commensurately for private coal rights expropriated gave substance to perceptions of heightened sovereign risk in NSW and will be a continuing penalty on the cost of financing coal mining ventures.

Coal companies are prepared to incur the capital cost of major infrastructure provided they have ownership or management control of the assets. The coal industry believes the wholly government owned and operated ship loader at Port Kembla should be privatised, enabling its performance to be brought up to acceptable standards. Further opportunities for privatisation exist in the rail sector. Rail haulage costs for coal in NSW are much higher than for comparable systems overseas.

Policies adopted in releasing areas for coal mining in NSW and the procedures associated with allocating and approving mining leases need to be reformed in the interests of economic efficiency. The size of blocks made available for modifications and extensions to existing mines are unnecessarily cumbersome. To the maximum extent practicable the approval process for new coal mining developments should be encompassed within the development consent procedures and associated environmental impact assessments. There is a very important need for clear environmental guidelines published on an industry-wide basis where that is appropriate and for additional, location-specific guidelines to be attached to mining leases at the time they are issued.

Governments departments should have an obligation to assess with developers the economic impacts of the conditions they impose and the delays they cause. The long period involved in gaining development approvals and the absence of any indication of progress or of the probable outcome in the meantime makes efficient mine planning difficult and, at times, impossible. While substantial regulation of coal mines is appropriate, the Coal Mines Regulation Act is unnecessarily prescriptive in specifying the technical operation of coal mines and imposing a particular management structure. Longwall block approvals are matters that should be determined at the time mining leases are initially issued. The regulatory process is also acting to restrain the introduction of new technology into NSW coal mines. NSW governmental relationships are in urgent need of reform. Mine planning and financing would be assisted if the Commonwealth environment protection legislation were to specifically identify those circumstances in which State procedures or requirements could be regarded as inadequate.

The regulatory role of the Joint Coal Board (JCB) is inappropriate today and its continuing existence is no longer justified. A number of JCB activities currently conducted in accordance with or under the authority of the Coal Industry Act should be the responsibility of the Department of Mines and Energy. A number of JCB services would be more transparently valued and more closely tailored to industry needs if provided instead by the private sector. Other JCB activities should be dropped, or would be more appropriately undertaken by other bodies.

It is important that the economic implications of proposals to extend areas from which mining activities are excluded, or in which they are restricted, are properly assessed and taken into account before such proposals are agreed to. There needs to be an improved system for resolving land use conflicts in NSW.

Oakbridge is concerned about the very high labour costs in the coal industry, and about the progressive and significant increases in earnings which have occurred without commensurate reductions in unit costs through productivity. The coal industry is concerned that the statutory superannuation fund has no vesting and that the legal responsibility for, or ownership of, the scheme's unfunded liability remains undefined. As in other industries, the payment of workers' compensation premiums represents a substantial cost. However, for coal mining, a number of special provisions apply and increase the cost. Substantial progress has been made in reducing accidents and occupational diseases in the coal industry but this has not been reflected in the cost of claims for workers' compensation.

Oakbridge recognises the vital importance of training in the development of an efficient workforce. A 2 per cent general training levy proposed by the Federal Government could hinder, rather than enhance, coalmining training and is seen as a costly and inefficient method of developing skills in our workforce. The NSW coal industry is the object of more special treatment at the hands of government in respect of long service leave. Many inappropriate working restrictions still remain in the NSW coal industry, preventing the achievement of efficient and flexible mining operations. A most regrettable failure in negotiations between industry and the mining unions to date is that full advantage of the restructuring award has not been taken in respect of type of rosters and shift length.

Addressed some implementation difficulties in relation to recommendations made in the Draft Report.

Sought a separation between tradeable mineral rights and cash bidding for titles to mineral leases. Cash bidding is only appropriate where there is competition for mining rights. If there is no competition for rights in a particular area the FCFS approach should continue to be used. Supported the use of cash bidding to allocate leases in areas where coal reserves are reasonably well defined in preference to the use of Ministerial discretion. Disagreed with the proposal to retrospectively apply a rent based royalty regime to existing projects. Cash payments regimes should be designed so that the project owner and the Crown are indifferent about continuing with the existing regime or switching to the new one.

Was concerned that the NSW Parliament is considering a Bill which contradicts the recommendations to apply economic considerations in the assessment of National Parks.

Office of the Supervising Scientist for the Alligator Rivers Region (Subs. 59, 128, 200)
The Office of the Supervising Scientist for the Alligator Rivers Region (OSS) provided factual information on its role and functions, and discussed the institutional arrangements and legislative background relating to the environmental control of uranium mining in the Alligator Rivers Region. OSS stated that Energy Resources of Australia Ltd (ERA) had a poor understanding of the role and functions of OSS. Assessment of the potential environmental impact of mining-related activity is carried out by the 6 staff of the Supervisory and Assessment Branch of OSS. Most of OSS resources are devoted to the research activities carried out by the Alligator Rivers Region Research Institute. Care has been taken to ensure that the research carried out by OSS does not duplicate the work of other organisations. ERA accepted the broad thrust of OSS research until 3 years ago when the uranium levy was significantly increased by the Commonwealth Government. Contrary to ERA's views, OSS has developed a large number of standards, practices and procedures, some of which are now incorporated in NT legislation.

While OSS does not have any regulatory or enforcement powers, it has always been heavily involved in regulatory issues. This role follows from the requirement to advise the Commonwealth Minister on the adequacy of the NT regulatory regime for environmental protection, and the extent to which implementation of the Commonwealth's own environmental requirements is being enforced by the NT administration. The high standards of environmental protection being demanded for mining operations within the Alligator Rivers Region would not be maintained in the absence of OSS.

Referring to a claim by the Coronation Hill Joint Venture (CHJV) at a public hearing that OSS had requested CHJV to construct a very expensive retaining wall to prevent soil erosion, OSS stated that this was not true. OSS disagreed with the view expressed by CHJV in evidence that OSS refused to acknowledge the validity of its leases.

In submission 128, OSS strongly rebutted criticisms of its role and activities made in submissions 27 (Coronation Hill Joint Venture), 29 (Australian Mining Industry Council), and 57 (Energy Resources of Australia Ltd). Provided a number of corrections on matters discussed in the Draft Report.

Ok Tedi Mining Ltd (Sub. 99)
Submitted a correction to comments made during evidence given by CHJV (Sub. 27) about a tailings dam at the Ok Tedi minesite in Papua New Guinea.

Pancontinental Mining Ltd (Subs. 152, 181, 264)
There is growing world wide acceptance of nuclear energy as environmentalists prefer nuclear reactors to additional atmospheric pollution. There will be a major increase in demand for uranium over the next 10 years. Uranium inventories will reach acceptable levels by the mid 1990s with the result that prices will continue to rise. Canada and other countries are spending millions of dollars in anticipation of improved market conditions. Major market opportunities exist for Australia and Jabiluka provided that supply is competitive and political support assured. It is necessary to commence marketing now in order to secure long term contracts with deliveries starting in the mid 1990s.

The present Australian Government uranium policy is both contradictory and inconsistent; the three-mine policy has resulted in Australia losing economic and employment benefits and has also caused international criticism and puzzlement. It should be abandoned forthwith. As a direct result of this absurdity, export sales revenue has been lost to Australia; Canada, with a third of Australia's uranium reserves, has produced three times Australia's export revenue from this vital commodity. The policy has been totally ineffective and detrimental to Australia's short and long term interests.

Expansion of existing mines does little to improve the socio-economic life of the NT or to improving employment. The benefits to the Territory and Australia which would result from opening up Jabiluka would be immense. Furthermore, there is the issue of benefits in cash and employment opportunities denied to the Aboriginal people by the present restrictive and inconsistent policy. It is nonsense to restrict the development of Australia's uranium industry. The potential uranium mining industry demands the right to play its logical role on the world scene and to assist in the economic recovery of Australia.

Because uranium orebodies at Ranger and Jabiluka have been discharging radio-activity for millions of years, mining under strict controls may well reduce the environmental impact of this natural effect.

Supported recommendations concerning agreements between traditional Aboriginal owners and mining companies, royalties payable thereon, and the resolution of land use conflicts. Questioned the belief that national parks have been endowed with special conservation values. Supported the abolition of the uranium export levy and uranium export controls, other than safeguards, and the retention of the OSS.

Pasminco Limited (Subs. 89, 112, 225, 259)
Recommended the adoption of a consumption tax with a corresponding reduction in existing expenditure and income taxes which will encourage savings and reduce dependence on borrowing from foreign countries. Accelerated taxation depreciation is required to enable re-investment in modern technology, eg, write offs in line with technical obsolescence rather than the current definition of the economic life of the asset. Costs incurred for feasibility and environmental studies should be wholly claimable in the year of expenditure without restriction as to the outcome of the study. Costs for environmental and mine rehabilitation should be wholly claimable in the year of expenditure. Demolition costs incurred as part of a capital expenditure project should be wholly deductible in the year of expenditure.

Capital Gains Tax legislation should be reviewed and changed to recognise the (presumably) unintended impost on the transfer of exploration and mining leases. The Fringe Benefits Tax on the provision of housing and transport at remote mining sites acts as an impediment to being internationally competitive. Remote area personal taxation allowances need to be re-assessed in order to encourage labour mobility to isolated areas.

Pasminco is not averse to the principle of state royalties, although Broken Hill has one of the most onerous profit based royalty systems in Australia. If governments are prepared to participate in mining activities by providing some essential infra-structure and thereby share in the risks of such activities, then royalties or resources rents should reflect such a shared risk.

State Mining Authorities should be responsible for the administration for all matters other than federal taxation. This would reduce the inefficiencies of bureaucratic councils and agencies. The respective State Departments of Mines should be identified and promoted as being the agency through which all approvals, obligations etc. should be co-ordinated. The Resources Assessment Commission should be encouraged to become pro-active in the interests of identifying a reasoned and balanced methodology with regard to the exploration of Australia's resources.

The pace of microeconomic reform of the Australian waterfront is progressing too slowly. It is essential also that microeconomic reform occur in other areas such as the railways and energy generation and distribution.

There should be rapid development of a new focus for the training of Australian fields of engineering and applied science. Facilities at universities and the CSIRO should be maintained and improved.

Pasminco cannot accept the Commission's view expressed in the Draft Report on the inter-relationship between exploration, mining and the transfer of mineral rights. In practical terms, the preferred position is one where the right to explore confers the right to mine on the party who conducted the exploration and no-one else. In the context of further processing, cost

competitiveness would be boosted by both accelerated depreciation measures and action to reduce the impact of the extra freight cost for the shipping of zinc metal. Pasminco opposed any system which would deny the right to mine in the hands of the explorer who makes a discovery, recognising always that the particular discovery is permitted to be developed in the first place.

In contrast to the finding in the Draft Report that miners earn more than other Australian workers in part because of the hazardous nature of their work, it was asserted that this was due to simple supply and demand factors and the remote location of most operations. There is insufficient information on how the Commission's recommended royalty regime would be implemented to enable predictions to be made about the likely impact on the company's long term operations. The Commission does not appreciate the dampening effects that such royalty provisions would have on the mining sector.

Pidgeon R T (Associate Professor) (Sub. 54)
High level training of technologists and research at the universities go hand in hand. Universities should be targeted by the Commission for special support for maximising the integration of mining and minerals research and high level training of technologists. Analysis of the present research base of the industry suggests that, despite recent initiatives, financial support by the Government for overall research, and by industry for strategic research, is low with respect to the future high technology needs of the industry. Research into mineral and mining-related problems is a small part of the funding provided by the Australian Research Council. A Cooperative Research Centre in mineral exploration technology should be established in Western Australia, based on available technologies at the Curtin University of Technology, the University of Western Australia and CSIRO.

Placer Pacific Ltd (Subs. 88, 216)
The requirement for Australian equity in mining developments, if strictly adhered to, could restrict development of projects due to insufficient Australian risk capital. The "National Interest" test would be more beneficial to all parties if it had a positive, rather than a negative emphasis. The interaction between the taxation of foreign source income and the dividend imputation system means that franked dividends cannot be paid out of foreign source income. As an incentive for Australian companies to invest overseas, the tax law should be amended to allow foreign tax paid as a franking credit. The Government can contribute to investor confidence by having policies which are stable over the long term.

The transitional system for the taxation of gold mining income disadvantages gold mining companies as opposed to general mining companies. The costs of mine rehabilitation occur at the end of the mine life where companies have trouble utilising the tax deductions. To encourage voluntary rehabilitation of mine sites by mining companies, the taxation law should be amended to allow deductions for such costs in earlier years of the mine life.

Strongly disagreed with the recommendation in the Draft Report that cash-bidding be introduced for the right to mine identified resources. Governments should be responsible for the funding of exploration work in areas where opposition to mining activity may prevent the exploitation of resources. The discoverers of a mineral resource should have the right to mine the resource. Legislation regarding compensation and access arrangements is necessary to safeguard the rights of landholders. There should be no distinction between Aboriginal and other landholders.

The recommendation relating to FBT is based on the erroneous assumption that there are concessions in the FBT legislation for mining companies. This recommendation should be withdrawn. Since the group commenced paying income tax in 1991, it is reluctant to consider the introduction of a new mineral royalty system.

Prospectors and Miners Association of Victoria Inc, Gipps Branch (Subs. 172, 173, 208)
The Association supported the use of suction dredges to extract gold and gems from streams and rivers. Aborigines should have the same rights as other Australians with respect to titles to minerals and access to land. Exploration leases should be subject to covenants which require a reasonable amount of work to be done on them each year. Land users should have an input into decisions on the closure of Crown Lands.

Queensland Alumina Ltd (Sub. 31)
Recommended adoption of policies which would:

. Provide a competitive coastal shipping market with assistance based on a margin of preference;

. Establish company/enterprise based employment in the shipping industry;

. Establish "greenfields" crewing arrangements for Australian flag shipping;

. Improve ship management;

. Establish more cost efficient and equitable Commonwealth Navigation Aids arrangements;

. Remove fuel excise from coastal shipping;

. Reform operating and structural elements of the towage industry;

. Maintain an international competitive shipping environment and expand to encompass Trans-Tasman trade;

. Ensure shipping standards covering technical, safety, pollution are consistent with trading partners and international practice;

. Refund import duty with respect to that proportion of inputs to production which is directly or indirectly exported; and

. Supply rail services at cost of providing the service.

Queensland Chamber of Mines Ltd (Subs. 74, 101)
To prohibit or restrict unduly all exploration and mining in environmental parks and national parks would for practical purposes result in locking up any potential mineral resources. This would totally ignore the opportunity for multiple land use and deny benefits to the entire community of Queensland which not only "owns" parks and reserves but also the minerals which may be contained within them. Parks and reserves have not always been fully evaluated prior to

proclamation in relation to their total environment. In particular, their geological potential has rarely been assessed to the extent that the decision to create the park or reserve could be said to have been an informed one. The final decision on the most appropriate land use at any given time properly rests with Government as a whole and should not rest with the party owning or controlling the surface of the land in question. The industry seeks a policy on parks and reserves which endorses multiple land use opportunities while providing for rational economic development which is consistent with the public interest.

In view of changing economic and technological circumstances it is not possible at any given time to measure definitively the minimal resource inventory in a specific area, let alone in an entire State. Today's sub-economic resources are frequently tomorrow's mining reserves and today's waste is sometimes tomorrow's high technology material. Access to all mineral resources wherever they occur should be available to ensure assessment of potential, albeit with due observation of conditions relating to other uses of the land in question. If mineral exploration successfully delineates a resource in a park or reserve which is or is likely to become economic in the near future then the Government should determine the policy on land use.

Government, at the mining stage, should take into account in an informed way a wide range of economic, social, environmental opportunities, costs and benefits and other policy considerations in determining how to proceed. Grant of an exploration title upon specified conditions subsequently made unworkable due to change in the rules would require the Government to examine the question of compensation. Government needs to reassess specific land use decisions at regular intervals to relate them to changes which may have occurred to community values since the decision was taken.

Any discretion available to a Minister for Mines to impose conditions on the grant of mining leases should be supported by the development and application of standard conditions which should provide general objectives to be met by mining operations in all parks and reserves. The proponent should be afforded the opportunity to review and negotiate the conditions before they are imposed. Alternatively provision could be made for appeal against inappropriate conditions. The Department of Mines as the relevant lead agency should establish with other responsible Government department and agencies, in consultation with industry organisations, acceptable procedures for setting and reviewing conditions attaching to exploration and mining proposals in parks and reserves. There is a wide range of non-intrusive, environmentally benign activities which can be safely undertaken by explorers within parks and reserves. These activities should be subject only to the management regulations pertaining to the particular park or reserve.

Since the ownership of minerals in Australia resides with State and Territory governments (with off-shore minerals belonging to the Commonwealth) it is essential to recognise the constitutional rights of States to determine royalties. Proposals for a Commonwealth Resource Rent Tax would inevitably lead to a dual system of royalties in Australia. The Chamber strongly opposes any such move. It is apparent that the States would resist any move to take from them their capacity to impose royalties, given their ownership of the minerals.

It is essential that some policy framework be in place whereby Cabinet can consider the interests of both conservation and development. The setting up of separate, self-contained Departments of the environment serves only to exacerbate the problem.

A major threat for the future is the creation of National Parks specifically to stop other activities, rather than for their own intrinsic merit. We reject as lacking in logic the claim that States should have an arbitrary percentage of their total area classified as National Park. There should be an immediate review of *the Australian Heritage Commission Act* to limit the types of properties and areas that can be placed on the Heritage Register, particularly Section 30 of the Act which allows Federal Governments to impact on export approval by the use of this Act. No area within Australia should be considered for World Heritage status unless and until:

. The area has been listed on the National Estate, or is a designated National Park;

. The nomination is supported by the appropriate State Government or Territory; and

. Existing businesses and industries caught within that area have an agreed compensation package in writing with the Commonwealth or State Government.

It is often not understood that in addition to paying the taxes, mining companies have paid for the full cost of the construction of the railway services and additional provisions, as well as paying a normal rail freight charge, before the rail freight tax is added as a third tier. No other country in the world taxes its coal producers this way. Attention is drawn to the extraordinarily harsh effects of the Fringe Benefits Tax (FBT) on resource companies who have built mining towns and provide housing infrastructure at the request of trades unions and governments. The effect of FBT is virtually to ensure that never again will a mining town be built in Queensland. Capital Gains Tax acts directly against the whole concept of farm-ins and farm-outs where the intention is to share the risk and encourage additional capital, to continue the investigations in the search for minerals. The Chamber calls for the immediate removal of this levy which is probably the only example in the world of a single company tax on an export commodity.

Queensland Coal Association Ltd (Subs. 70, 246)
Supported the submission of the Australian Coal Association.

The Association believes the Queensland Coal Board (QCB) should be disbanded and its Act repealed. However, this should not happen while the Joint Coal Board (JCB) remains in existence. The Association would be reluctant to contribute to a situation where the position vacated by the Queensland Board was to any degree filled by the JCB. Opposed the intention of the Queensland Government to expand the Queensland Coal Board.

There are a number of broad principles which the Association believes a mineral royalty system should satisfy, if not completely, then in a way which minimises the practical trade-offs between them. Royalties should be a fully transparent, on-budget item of Government revenue subject to the restraint provided by public accountability. There should be only one royalty mechanism, the application of which should be explicit and uniform over time. Any mining company should be

able to calculate in advance its royalty liability under all possible future conditions. The method by which royalties are assessed should allow the amount to vary in accordance with changes in market and mine conditions. Stability of Government revenue is not an appropriate royalty criterion. Royalties constitute payment for the input of raw materials to the production of a saleable product:

. They should be assessed when the mineral is consumed and its value realised;

. They should not directly or indirectly tax the returns on other factors of production such as labour, capital, exploration or research and development; and

. As far as practicable, a royalty system should be simple and inexpensive for the Government to administer and companies to comply with.

Coal exported from Queensland is subject to two main types of royalty - explicit ad valorem royalties and excess rail charges. This two-tiered system does not satisfy the royalty criteria described above, with major distortions resulting from the use of rail charges as the principal taxing mechanism.

In setting rail charges for particular mines or classes of mines, concepts of equity and efficiency in resource use have taken a back seat to the objective of maximising Government revenue. The current rail charge applying to a post-1978 mine is the sum of a `base' freight rate and a `clawback' component. For existing mines already subject to the system, it implies premature decline in production levels and hence premature closure.

For those prospective developers of new projects, the system effectively shortens the period of mine life available for investors to recoup the initial capital outlay and earn a sufficient return on funds. First, ownership of project-related infrastructure should reside with whomever pays for their construction and maintenance. If the Government, by necessity or choice, is the funding body, it is appropriate that the charges for use of facilities include recovery of an adequate return on capital expenditure in addition to recoupment of operating costs. If infrastructure is company funded but Government owned, the developer's contribution should be offset in future royalty payments. Durable infrastructure, like railway track and port facilities, typically confer benefits on the general community long after cessation of the project to which it was originally related. The Association believes that royalties should be divorced from rail charges and the latter priced to recoup marginal railway costs including a reasonable return on Government funded capital.

Queensland Government (Subs. 55, 154, 164, 255)
There should be consideration of the significance of domestic interest rate structures and of the cost of obtaining hedging and risk management cover for mining enterprises.

The following taxation matters should be examined:

. The availability overseas of special incentives which give encouragement to mining and mineral processing;

. The need for adequate tax deductibility provisions for rehabilitation and decommissioning costs of mining operations;

. The effect of fringe benefit taxation provisions on the development of mining and mining-related industries in remote areas; and

. The impact of fuel excise and certain sales tax provisions (eg. on road transport and business equipment) on the input costs of mining and minerals processing industries.

The consequences of Commonwealth Government policies and procedures in environmental management and land use should be assessed. A further item warranting attention is the potential impact from current and prospective obligations under international treaties. The Inquiry should assess the appropriate role for the Commonwealth Government to fill in organising and supporting research and development into technological needs.

The coal export duty discriminates against exports and is inconsistent with the Commonwealth Government's policy of encouraging internationally competitive, export-oriented industries. It is also inconsistent with a general principle strongly supported by this State Government that State royalties rather than Commonwealth imposts is the appropriate mechanism for extracting a return to the community from exploitation of onshore mineral and energy resources. Moreover, it is the prerogative of the State Government to determine the appropriate level of community return.

While there have been recent significant improvements in tariff and import arrangements directly affecting mining and minerals processing, the Queensland Government believes there is a need to accelerate the process of phasing out tariff and import protection assistance. The Government supports and is prepared to actively co-operate with the Commonwealth Government to improve the efficiency of the waterfront and coastal shipping as an important element of the Australia-wide process of micro-economic reform. The Government supports the liberalisation of world trade and the removal of subsidies offered by overseas Governments. The difficult world trading environment for coal is of particular concern. The State Government therefore supports the Commonwealth Government in continuing to take strong action over Australia's concerns through bilateral representations and international forums such as the GATT.

A particular aspect of foreign investment policy suggested for evaluation is the potential benefit from a re-orientation of the Australian Trade Commission's activities to provide a greater focus on investment promotion.

The Inquiry is encouraged to address the macro-economic and infrastructure cost ramifications arising from Loan Council restrictions on borrowing limits.

Although quarantine restrictions applying to soil can impact on the importation of ore for minerals processing it is important that these quarantine precautions are maintained to protect primary industries from accidental introduction of damaging exotic pests and diseases.

Queensland Mines Limited (Nabarlek) (Sub. 41)
A rational methodology needs to be developed to properly assess the environmental/economic trade-offs that impact intending and existing resource developments in Australia. The present situation whereby environmental decisions are being taken on the run by regulatory authorities in response to emotional political pressures with little or no technical substantiation is unsustainable. The Industry Commission must initiate the development of a coherent and broadly supported environmental/economic impact assessment methodology which will enable protagonists on either side of the development fence to argue their respective positions using a common yardstick.

Robe River Iron Associates (Sub. 245)
Requested that the Commission consider the following areas of concern relating to FBT on the Robe River mining project:

. The impact of Labour Industrial Agreements which lock companies into providing so called fringe benefits which cannot be changed through higher compensatory wages;

. Inequitable FBT levied on the Robe River Project;

. FBT exemptions applicable to employers in industries other than mining which discriminate against the mining industry; and

. FBT on remote area benefits comprise 91 per cent of all fringe benefits provided or paid by Robe.

R Z Mines (Newcastle) Pty Ltd (Sub. 120)
Provided information on the environmental rehabilitation of its sand mining leases.

Searle L (Sub. 213)
Recommended against changes to the mining and processing industries that will ease the way for a mindless expansion of mineral extraction. International bodies should be set up to bring about a more rational pricing structure through education.

SA Chamber of Mines and Energy Inc (Subs. 132, 252)
All privately owned minerals should be resumed to the Crown. The Private Mine mechanism in the *SA Mining Act* provides a model. Powers for the allocation of rights and the management of exploration and mining should remain with the States and Territories. Governments of the States and Territories should adopt a one application - one approval system for exploration and mining. The SA procedures provide a model of a basic mechanism. Programme bidding for the allocation of rights should be retained. Special indenture agreements provide a basis for feasibility studies of major projects.

Royalties should remain a matter for the States to determine. The mining industry should be taxed by the Commonwealth Government under the same principles applying to other industries.

The SA model of Regional Reserves should be adopted by the States and Territories as a means of sharing natural resources.

Government and industry should share the responsibility for the assessment of proposals and monitoring of operations.

Government funded agencies must continue to provide basic geoscience data to generate exploration activity.

Disagreed with the recommendations in the Draft Report concerning access to land and the concept of competitive cash bidding for the allocation of mining and exploration rights. Rejected the recommendation that if agreement cannot be reached between the applicant and the traditional owners, then the land is immediately available for another application. Cash deposits are only one of several mechanisms which are available to ensure compliance with obligations to rehabilitate mined areas.

The recommendation to apply FBT to eligible benefits provided by mining companies was strongly opposed.

SA Government (Subs. 171, 265)

Discussed issues relating to the granting of mining leases. Current exclusions of land from the operation of the SA Mining Act are under continual review so that mineral exploration and development are not unduly impeded. The development of the mining and minerals processing industries is not considered to be severely hampered by insufficient levels of research, nor through a lack of access to the latest technology. Regional Reserves have been introduced for the purpose of conserving any wildlife or the natural or historic features of Crown land while at the same time permitting the utilisation of the natural resources of the land.

The Government would resist any change to arrangements for the receipt of mining royalties and lease rentals. The State's ability to finance mining infrastructure would be seriously affected without this source of income. Mining royalties are generally set at 2.5 per cent of total mineral sales revenue. A modified royalty system incorporating a profit related component was developed for the Roxby Downs project.

The Government strongly believes that the issue of a change from State ownership to national ownership, as raised in the Draft Report, would not be in the best interests of the mining industry or the wider community.

The auctioning of mining tenement rights is appropriate for highly prospective petroleum areas, but is inappropriate for most mineral areas with well developed land uses , and where geological knowledge is insufficient to command a premium over the normal application fee. South Australia does not support the first come first served system of allocating exploration and mining rights. The existing system of approved work programs combined with work commitments or relinquishments has worked well and the State would not recommend radical changes. The compulsory change-over to a single system of rent-based royalties within three years of "grace" is not recommended. The State's interests have not been well served by the awarding of long tenure, virtually unconditional and tradeable mineral rights as recommended by the Commission in the Draft Report.

The three-mine uranium policy is supported, along with the abolition of the floor price for uranium.

The harnessing of market forces is unlikely to adequately protect the environment. While making proposed national parks subject to a cost-benefit analysis is supported, the extension of this concept to existing parks is opposed. Market-oriented mechanisms based on property rights only work while the property rights are held. If the cost of repairing the environmental damage is greater than the cost of the property rights, and the title holder is declared bankrupt, the property rights and hence the environmental costs would revert to the Crown.

Shell Company of Australia Ltd (Subs. 66, 251)
The adverse effects of restrictions on foreign investment in mining include:

. An over reliance on debt at the expense of equity for individual projects, resulting in projects which are less resilient in the face of down turns in commodity prices;

. An impeding of economic development leading to the postponement of investment projects or even jeopardising their viability if suitable Australian equity partners cannot be found; and

. Inconsistency with government policy to promote an international/export outlook for industry.

Australia's market power as a producer of coal is limited. Government intervention is not an effective mechanism for preventing the exploitation of market power by groups of purchasers. Markets for both coal and alumina are transparent to participants in those markets - in particular, Australian exporters do not suffer due to any lack of information on the behaviour of these markets. Australia's interests do not suffer due to any lack of transparency in the markets for Australian export coals. The appropriate mechanism for preventing transfer pricing is taxation, and in any case the transfer pricing issue is an argument only for compulsory reporting of export prices.

There is little scope for benefits for Australia to result from collaborative action by Australian coal exporters. There is no scope for government action to improve the price formation process in relation to Australian export coals.

The dominance of long term contracts as the primary form of sales agreement for alumina is a function of the nature of the industry, and does not detract from the transparency of the market to participants. These features of the industry are also the major barriers to entry, rather than the lack of market transparency perceived by the Department of Primary Industries and Energy. The transfer pricing issue does not constitute an argument for the involvement of the Department of Primary Industries and Energy, nor should it require the delays and confusion caused by current export controls on alumina. The alumina export control system has resulted in delays, added costs, uncertainties and the continuing possibility of missed opportunities. If the Government is to have a role in the exporting of Australian minerals and metals, it should be in the areas of:

. Removal of international barriers to Australian exports;

. Representation and negotiation on a government-to-government basis where this is required;

. Export promotion; and

. Provision of market intelligence.

Shell Australia is concerned that land use policies place too little weight on the cost to the community of locking up the mineral resources contained within this land. The mining industry supports the approach as proposed in Queensland and NSW to remove the power of veto from the land holder but to allow compensation to be determined by an independent arbitrator. Mining itself, including the bulk minerals such as coal, iron ore and bauxite, occupies only a small fraction of the land surface of Australia and modern environmental practices enable disturbed areas to be restored progressively to an acceptable condition. The standards for land development and restoration imposed and the method of their imposition may result in unnecessary impediments to the operation of the industry, without furthering the community's objectives. A further concern is that areas declared to be of environmental sensitivity may be totally excluded from any commercial activity - irrespective of the potential costs to the community.

The tax deductibility of site rehabilitation costs is strongly supported. Taxation legislation should be amended to ensure that all forms of environmental research are covered by the 150 per cent tax deduction. The 150 per cent tax deduction for research and development should apply to research supported by Australian operations and used to the benefit of the Australian industry but which is conducted overseas.

Delays in obtaining government approval for mineral rights can seriously affect the economics of the development proposal. Current royalty arrangements should not be replaced with resource rent taxes/royalties. Taxes on mining operations should not be hidden as government charges. Services currently provided by Government should be subject to market forces and charges for Government services should not involve any elements of cross-subsidisation.

The Coal Industry Tribunal and the Joint Coal Board should be abolished, and industrial relations in the industry brought within the mainstream of Federal and State Industrial authorities.

The notion of "pre-mature exploration" is a major plank in the Commission's recommendation in the Draft Report for the support of cash bidding for mining and exploration licences. It is a theoretical concept which is not borne out in real life.

The Commission has overstated the problems associated with the current royalty systems, and placed insufficient weight on practical difficulties associated with a resource rental approach. The changing of the rules for determining royalties for existing mines, as proposed by the Commission in its Draft Report, is a blatant illustration of sovereign risk.

Standards set for minesite rehabilitation must be clear, must be set objectively and must reflect the nature of the site and its possible future use.

Shell Australia is concerned that the Commission has paid too little attention in its Draft Report to industry policy at a time of intense debate on the issue. Shell would support a recommendation that the mining and mineral processing industries are still seriously impeded by tariffs which should be reduced to zero as soon as possible.

The Commission has been too hasty in rejecting Shell's request that the 150 per cent taxation deduction should be allowed for R&D undertaken overseas but funded from Australia with benefits flowing to Australia. Shell also expressed concern about comments made in the Draft Report on rail transport and environmental impact assessment.

Shire of Carpentaria (Sub. 253)
Supported the submission made by The Landholders Association.

Social Impact Unit (Sub. 20)
Companies need to look at not only maximising profits but maintaining a good reputation in the community. In doing this they must ensure that their activities are planned and remain environmentally, socially and ethically sound. In recognising that, because of a project, things do "change", developers must initiate mechanisms by which they are, and are seen to be, cognisant of the needs of the community. At the present time many "good neighbour" policies are solely dependent on financial compensation. This type of arrangement is often under strong company control, with the company having final say over the ways in which monies are spent. This type of agreement has been strongly criticised and described as paternalistic and contrary to the development of community autonomy. This is particularly so in the case of agreements with Aboriginal communities.

State Energy Commission of WA (Sub. 262)
Stated that some of the conclusions of the Draft Report reflected poorly on SECWA and should be modified or clarified. Energy prices are higher in WA than in other States due to more expensive input fuels, lack of economies of scale due to the smaller, more dispersed population, and the high costs of investment capital. While the supply of natural gas is deregulated in WA, SECWA believes that the relatively thin market for electricity would not support more than one supplier. SECWA has made substantial gains in productivity, which shows that efficiency improvements and Government ownership are not mutually exclusive.

Stockdale Prospecting Ltd (Subs. 43, 119, 199, 240)
Access to land should be enhanced by strengthening the principle of Government ownership of minerals. Exploration should be permitted in parks and reserves, subject to appropriate environmental guidelines which could be more stringent than those applied to recreational park users. The de facto aboriginal right of veto should be removed. Decisions on mining should continue to be the responsibility of State governments, which just act in the over-all public interest. Royalties should reflect the reality of the international market for mineral commodities. Governments should stay out of the commercial decision making area.

The tax structure should be amended to encourage exploration and mining and take account of modern exploration techniques. The bias of fringe benefits taxes against work in remote locations should be removed.

Foreign investment in mining activities should be consistent with the rules applicable to industrial investment. Supports encouragement of direct relationships between traditional owners and explorers. Seeks either the abolition of the Northern Territory veto by Aborigines on mining and exploration or alternatively, the right of access for exploration but with a limited right of veto over mining.

Requested that comments made in the Draft Report on an extract from an earlier submission concerning payment for access to land be amended to reflect the intended meaning. The one-off sale of mineral rights as recommended in the Draft Report will fail to realise the maximum return to the State Government as the owner of the minerals. The current tenement arrangements generally work effectively and transparently. There is little enthusiasm for what may appear to be more economically efficient proposals.

The recommendation that the rights to mine ore bodies should be auctioned is not only inconsistent with Australian commercial practice but also out of touch with the realities of mine development. The recommendation that if agreement cannot be reached between Aboriginal traditional owners and explorer/miners, the licence application should be cancelled and made available to others is considered inappropriate. It is difficult to grasp the rejection of the contention that it is better to spend money in the ground rather than dissipating limited funds in payments to gain rights to explore or mine.

Swan Portland Cement Ltd (Sub. 7)
Continued access to mining leases has been threatened by actions of state government authorities proposing to rezone land as a national park and as a reservoir site. Referred to unfair competition from cheaper road transport used by a competitor when the company has been required to use rail services. Objected to a requirement to make payments towards rates on freehold land and for mining leases, for rent on mining leases and royalties on limestone removed due to the lack of services provided by the local authority. Objected to the requirement by a local authority to conform with the conditions of an Extractive Industry Licence.

SX Holdings Ltd (Sub. 5)
Environmentally acceptable solutions in the mining and minerals processing industries have not been defined in terms which are simple enough for the both environmentalists and mining companies to grasp. The uncertainty in estimating the time for receiving environmental approval for mining projects appears to seriously disadvantage the medium size Australian company and to favour larger overseas based companies, especially those with a reasonable share of world markets. The environmental approval process forces disclosure of plans to competitors which can seriously disadvantage local companies.

Sydney Rainforest Action Group (Sub. 51)
An independent public review board with resources to investigate the operation of Australian mining companies overseas should be established to facilitate increased scrutiny public scrutiny of these companies. A moratorium should be placed on further off-shore expansion of the Australian mining industry especially into areas where indigenous peoples do not have land tenure, until it can be proven that these activities will be remain ecologically sustainable and are done in full consultation with all traditional land owners affected.

A mining industry strategy should be developed to clean up existing mining operations, close down unnecessary new projects, reduce global raw mineral consumption and development of ecologically sustainable industries, before any further expansion is embarked upon. Regulations with extra-territorial application should be developed by Government to ensure Australian mining companies operating overseas conform to a strict code of environmental and social ethics.

Taroom Shire Council (Sub. 253)
Supported the submission made by The Landholders Association.

Tasmanian Chamber of Mines Ltd (Subs. 81, 221)
Multiple use of land should be a principal objective and no land use decision should automatically exclude any other land use. Rational land use planning requires the thorough study of land use potential before recommendations on usage are made. As mineral exploration data available at the time a land use decision is made will inevitably be incomplete, continued opportunity for exploration and re-assessment of land use decisions should be provided. Proposals for significant changes in land use should be subject to environmental assessment. Any regulatory intervention regarding new or changed uses of land should consider both economic and conservation factors. No public land should be exempt from this principle. The impact of the recent Government decision to create new World Heritage areas and National Parks has had a negative impact on exploration investor confidence. Almost 21 per cent of Tasmania is now closed to exploration and mining, and the agenda of the conservation movement and the independent Members of Parliament to close further areas is leading to understandable investor nervousness.

The Industry Commission Inquiry should recognise the deficiencies and shortcomings which currently exist in the present *Australian Heritage Commission Act 1975.*

Research by the Centre for Regional Economic Analysis has concluded that an across the board reduction in import tariffs of 20 per cent would increase Tasmanian employment by 1 per cent, more than double the increase of 0.4 per cent which would occur in Australia-wide employment. All industry protection and assistance should be progressively removed by 1998. Tariff assistance should be reduced to a maximum industry rate of 10 per cent by 1995 after current phasing down arrangements are concluded. Pending achievement of the above, an effective tariff relief mechanism should be maintained. Tariff relief should be provided for goods intended for intermediate use in mineral beneficiation, dressing and processing. All existing export controls should be abolished.

The Chamber of Mines also recognises that the mining and mineral processing industry requires a dependable and economically priced source of energy over the next decade and beyond.

The principle of confidentiality of bulk power contracts should be maintained. Reviews of energy pricing policies should include consideration of international tariff structures, the competitive position of Australian industrial consumers, and the full costs of supply to all consumers. Assistance should be provided to relevant State authorities to assist in long-term planning for future energy needs.

The Chamber supports the principles of waterfront and coastal shipping reform as outlined by the Australian Mining Industry Council in Submission 29. All rail transport freight charges should be based on the costs of services, and should be consistent with principles of efficiency. All impediments to road transport efficiency should be removed. There is a direct link between coastal shipping costs and costs imposed by existing waterfront practices and Australia's international competitiveness in a number of mineral product markets. Increased levels of mineral processing in Australia will only occur through increased efficiency and reduced costs in the shipping and waterfront sector.

All mining and mineral processing developments are highly sensitive and susceptible to the form and incidence of State taxes, charges and royalties. Such imposts will directly affect the projected cash flow of any proposed development. Taxation incentives should be introduced to ensure that the mining industry is able to make the most adequate site restoration and pollution abatement procedures. Pay-roll tax should be restructured or removed to assist in employment generation. Excise on fuel used in production processes should be removed.

The State has the constitutional right to determine the method of royalty payments.

Addressed three areas of concern which were dealt with in the Draft Report. Assured land access to prospective regions of Tasmania is a serious issue for the local mining industry. The Chamber opposed the cash bidding systems for exploration and mining rights as proposed in the Draft Report, and generally prefers the FCFS system. Development approval processes in Tasmania are slow, uncertain, inefficient and expensive. There is an urgent need for predictable and disciplined development approval procedures to be introduced.

Tasman Institute (Sub. 215)
Took issue with the finding in the Draft Report in favour of permanent vesting of mineral rights prior to the discovery of anything of value. Crown ownership of mineral rights is custodial pending their assignment to those who can demonstrate value in them. There is little justification in the levying of royalty payments, at least at levels which more than compensate for the costs incurred by governments in policing mineral rights. Taxation of mineral production above the level generally prevailing in the economy is discriminatory, unless rival firms are vying for the right to mine in an area.

The recommendation that discoverers be obliged to auction land that they have successfully explored is opposed. Recommendations for additional scrutiny of exploration and mining proposals could introduce more uncertainty and slow down the process of wealth generation. Decisions on rehabilitation might best be left to prior agreement between the miner and landowner (who may be the Government) with a court establishing the measures to be taken, or compensation to be paid, in the event of disagreement.

Tiaro Shire Council (Sub. 258)
Supported the submission made by The Landholders Association.

Tharpuntoo Legal Service Aboriginal Corporation (Sub. 188)
Recent conflicts between Aboriginal communities and mining companies in Cape York Peninsula may be attributed to the absence of any structured framework for negotiation and the structural disadvantage of Aboriginal people in their negotiations with miners, rather than opposition to mining per se. Representation of Aboriginal groups by Land Councils will go a long way to overcome these problems.

The Landholders Association (Subs. 8, 137, 186, 228)
In urban and rural residential areas, no mining associated activities should be allowed within 1 km of any land on which is situated a dwelling or building without the consent of the occupiers. To minimise the impact on farming, mining associated activities should not be allowed within 1 km of stock handling facilities, watering points, soil conservation or development works or airstrips, or within 100 metres of any other improvement or development, such as cultivation, orchards, and fences.

Mining interests should be required by States' mining legislation to arrange conditions of access with the farmer or landholder concerned before those mining interests are allowed to enter any land. Submitted that legislation should provide that exploration or mining development should not commence on certain areas of land until agreement is reached with individual landholders. Described certain categories of land for which access for mining operations should be prohibited unless prior agreement had been reached with relevant landowners. Disagreed with the conclusion in the Draft Report that a general departure from Crown ownership of minerals is not justified at present. Stated that private ownership of minerals would substantially eliminate conflict between miners and landholders.

Total Environment Centre Inc (Subs. 10, 82, 105)
All national parks, nature reserves and marine parks should be legislatively free from mining. Mining and exploration proposals should be subject to a standard environmental impact assessment process. All landowners should be given the right of veto over mineral development proposals. Further emphasis should be placed on the recycling of metals. Governments should encourage efficient use of mineral and energy resources.

Environmental protection should ensure that the mining industry does not degrade other natural resources. Methods of mine waste management should be prohibited which risk damaging the environment, eg, ocean and river dumping. Exploration should not lock up or degrade for lengthy periods land with significant natural resources.

Toxic Chemicals Committee (Sub. 92)
The Committee is opposed to any consideration of exploration and mining in National Parks. It may be possible, with proper planning, design and care to operate mining enterprises with due concern for the environment, but past experience does not give immediate confidence. In every case, industry has to demonstrate convincingly that the proposed processes can be used and operated in the required environmentally friendly manner. The government should develop policies and guidelines for protection of the environment in relation to mining and processing of minerals. In preparing the policy and guidelines they should consult with environmental groups and further, they should seek to have the agreed document adopted by the States. All mining operations including exploration and all mineral processing operations should be "designated developments" and subject to an Environmental Impact Statement (EIS) with provision for public inquiries when there is public opposition.

Mining plants should be designed so that all releases to the environment, whether into the air, water or land, are minimised by the best available technology. This could mean that some effluents would have to be contained within the site. Governments need to have a type of environmental protection agency independent of political pressure which is staffed by competent people who can not only carry out a proper analysis of an EIS, but license and monitor operations, and ensure that the operator works within the licence. Government authorities should establish limits for the release of toxic substances to the atmosphere, waterways and soil which should not be exceeded.

Trades and Labour Council of WA (Subs. 39, 189)

The most efficient of the unconditional methods of allocating mining rights is the use of sealed bid auctions, to allocate property rights and appropriate a return for the exploitation of resources. The State does not have access to sufficient information to set the price of permits. Severance taxes can be considered an extremely blunt instrument, distorting allocative decisions in an extreme way relative to more efficient methods to be reviewed. However, other instruments, such as Resource Rent Taxes are considerably more efficient. The Resource Rent Tax in conjunction with up-front cash payments, is the most popular formulation of a combined instrument. The Council supports legislation which will soon be passed which formalises the conditions applicable to various mining operations in national parks and A class reserves. The new arrangements are considered an effective compromise between `no access' and `easy access'. The Council supports the development of environmental planning processes which are identical in each State.

Two special dangers are posed by mining on or near Aboriginal land. The first relates to the aborigine's special relationship with the land which can be shattered by mining disruptions. The second issue pertains more to the social disruptions caused by growth of large mining communities in remote areas. These social costs need to be internalised when making decisions which may have impact on Aboriginal communities.

Policies aimed at improved research and development in industries servicing our dominant industries are best because they utilise what natural advantage we do possess. Hence, the processing of mineral ores and the provision of mining and processing equipment are strategically significant industries. The future of Australian manufacturing lies in raw materials based development, through down-stream processing and value-added. There is much scope for improvement. Australian reliance on commodity exports is the worst of all OECD countries and the returns from further processing are usually significant.

In terms of risk allocation and social returns it is difficult to understand why social infrastructure is deductible over a longer period than industrial infrastructure. The concession for items providing more direct social benefit should receive priority. The unions are totally opposed to the generation of power in Australia by privately operated power stations, except where the electricity is to be predominantly for the use of the firm generating the power.

It is counter to the interests of workers and the community to limit the Commission's inquiry to labour market factors and their impact on operating costs. Labour interests clearly extend beyond the simple use of workers as an input into the production process. Analysing the role of labour in a narrow `market' sense ignores social growth and personal fulfilment for all Australians which must be a goal of the development of Australian industry. The Council desires to see the competitiveness of coastal shipping improved supports reform of the waterfront industry.

The broad policy initiatives based on the level playing field concept are doomed to fail. Integration of the Australian economy into the global economy will be extremely difficult without positive assistance measures. Training in R&D should be given high priority in any examination of downstream processing opportunities in Australia. Opposed the removal of land of "nature value" from the list of items subject to possible heritage listing. Some form of cash bidding is the most effective method for allocating and charging for mineral rights.

The Government should refrain from intervening in mineral markets, except where there would be a benefit to the nation. Industrial safety and health legislation which applies to industry in general should also apply to the coal industry. Opposed the expansion of uranium mining and processing in Australia. While supporting the concept of rent-based royalties, expressed concern that such a move would have some effect on State revenues particularly as commodity prices fall.

Adequate cost-sharing arrangements must be adopted between Government and industry where industrial infrastructure is to be shared between companies and the community as a whole. The cost of subsidising cheap electricity for mineral processing will become prohibitive as the extent of the subsidy continues. A publicly owned power station will deliver electricity at a cheaper price than one which is privately owned.

Expressed concern that the Commission appeared to be suggesting that management should take a tough and uncompromising stand in pressing for change at the enterprise level. Considered that the comments by Blandy and Brummitt on a workplace-focussed union structure were simplistic in the extreme.

United Mineworkers Federation of Australia (Subs. 23, 129)

The private sector mining industry has an obvious history of inability to adequately serve either the needs of the communities directly involved or the interests of the wider public. In the coal mining industry the raison d'etre of the union has been to prevent arbitrary cuts in wages and employment levels caused by wild fluctuations in the market due in large measure to the inability of mine owners to look after their own collective interests via capacity planning let alone the public interest. There is therefore a need for federal and state governments to ensure that the public interest is served through efficient overseeing of the development of the industry.

Mining activity should be carried out with the minimum possible disturbance to the surrounding environment and without imposing long term burdens on the ecosystem. The use of land rights legislation to enable compensation to be paid to the original owners of the land, the aborigines, is to be commended. There is no particular reason why "foreign" capital should be subject to more scrutiny or restriction than "domestic" capital. All proposals for mining development should be evaluated on their merits, and especially in terms of their net benefit to the Australian community.

Royalties are not taxes; they are a cost of production. As a consequence criteria used for assessing taxes should not be applied to royalties. Nor should royalties be lowered simply to subsidise coal companies. Royalties should be maintained as a charge per tonne. It is clear that there is already a high degree of flexibility and profit sensitivity in royalties (both over time and between mines) which do not apply to other costs of production. The mechanism by which royalties respond to variations in industry fortunes should be maintained as currently applies in NSW. Taxes and

royalties in Australian coal mining are not high by international standards. Nor are royalties high in the coal industry in comparison with other Australian mining. There is no detrimental effect on either international competitiveness or the allocation of capital within Australian mining. The Coal Export Duty could be reviewed but without any presumption that it should be abolished.

Costs of mine health and safety and environmental regulations are low in Australia compared to one of our major competitors in coal trade, the United States. The history of coal export negotiations demonstrates that there will always be one company with an interest in expanding tonnage or securing other contract conditions in return for price concessions. Unfortunately the low price applies to all exporters while the benefits of such settlements are restricted to only a few exporters. Such deals bolster company profitability without improving industry stability or viability. The coal mining unions advocate the introduction of a statutory body not to regulate the industry from above or to act as a marketing body, but to participate actively on a day to day and informed basis and to play the role of an aid, a consultant and an agent of industry co-operation and planned development. This has been referred to as a National Coal Authority.

Suggestions that the functions performed by the Joint Coal Board should be hived off amongst various State and Federal Government departments should be rejected. Indeed, the extension of its powers to other States would provide an ideal vehicle for industry planning. The union favours retention of the existing coal industry arbitration system.

Uranium Information Centre Ltd (Subs. 17, 116, 185)
Observed that Australia with about 30 per cent of world uranium reserves has about 10 per cent of the world market, while Canada which has about 10 per cent of world reserves has about 30 per cent of the world market.

Victorian Chamber of Mines Inc (Subs. 21, 212)
Unless governments stop the exclusion of mineral exploration and possible mining development from rapidly increasing areas of Australian land, the rate of real investment in these activities will deteriorate through both loss of opportunity and loss of confidence in the credibility of public policy. Exclusions areas are rarely based on sound analysis of environmental economic and social costs and benefits but are usually based upon politically driven perceptions which are not subject to objective scrutiny. Federal and State governments should adopt policies requiring equally stringent criteria and open enquiry to be applied to continuation of existing or approval of new exclusion areas, as is required for natural resource development interests. In Victoria the expansion of public land areas from which exploration is excluded includes much geologically prospective country including former gold workings.

Of equal importance in Victoria as an impediment to exploration and mining is the lack of an effective mechanism to co-ordinate mining, planning, conservation, water resource, environmental control, local municipal and other authorities in the approval and conditioning of mineral related activity. Public Land management policies should provide for multiple use for natural resource industries and water supply and recreation as well as conservation and protection of living, social and cultural resources. Proponents of development are frequently unable to ascertain from authorities exactly what processes will be required in order to gain approval, how long it will take or what factors may cause progress to be obstructed or delayed at any time during an expensive development sequence.

Was concerned that the Draft Report gave much attention to the ownership of minerals without drawing a firm conclusion. Opposed the recommendation in favour of cash bidding for allocating mining and exploration access. The Chamber does not accept that the NSW arrangements concerning the relationship between landholders and mineral interests is a useful model. The Commission should emphasise the need for more efficient processes of environmental assessment. Disagreed with the introduction of profit-based royalties in general, and royalties and taxation on gold.

Victorian Farmers Federation (Subs. 84, 256)
Landowners own the mineral rights within their land as defined by their title. Except with the consent in writing of the owner and or the occupier of private land, a mining tenement should not be granted by the responsible Minister under the Victorian Mines Act in respect of private land or within 200 metres of private land, which is in bona fide use as a stockyard, garden orchard, vineyard, plant nursery, plantation, under cultivation or on which has undergone substantial improvement. All proposals to win minerals should be subject to an independent impact statement which should include a benefit cost analysis, including the economic, social and environmental impact of the proposal. Objections should be evaluated and recommendations made by an impartial body capable of rationally evaluating competing land use claims on social, economic and environmental grounds. Exploration and mining should occur subject to local government planning provisions. The landowner and explorer/miner should enter into agreement with regards to compensation for the conduct of mining activities. The approach to the rehabilitation of the land must be agreed to before exploration/mining commences.

An impartial body should be established which is capable of evaluating rationally competing land use issues, to make recommendations to the Minister on applications to which landowners have objected. The following areas must be protected from exploration and mining:

. Areas of special historical and/or environmental significance;

. Residential areas and substantial capital improvements on and to land; and

. Water courses and catchment areas.

Victorian Government (Sub. 222)
The Government reaffirmed its commitment to the Crown ownership of minerals. The introduction of cash-bidding for exploration and mining rights as proposed in the Draft Report would be a disincentive to exploration in Victoria. Procedures have been developed for obtaining access to land where permission is not granted by landowners, and for determining the circumstances where compensation may be payable. Government policy is that there shall be no exploration or mining in national parks, which contrasts with the recommendation in the Draft Report that economic values should be taken into account along with environmental values.

Improved mechanisms for the resolution of land use conflicts are supported. The Environment Effects Statement process is generally engaged only for major projects where significant environmental issues have been raised. New legislation is proposed which will streamline approval processes for mining titles and coordinate planning and environmental approvals. A profit-based royalty system does not necessarily provide a minimum payment in return for the right to develop mineral resources. The competitiveness of electricity prices on international markets is influenced by Australia's exchange rate and the volume and consistency of actual power usage.

WA Aboriginal Affairs Planning Authority (Sub. 201)
Submitted information on the functions and responsibilities of the Authority. Provided clarification of the following matters relating to WA as discussed in the Draft Report:

. Aboriginal property rights and control over access for exploration and mining;

. Negotiation between Aboriginal communities and mining companies; and

. Compensation and royalties.

WA Iron Ore Consultative Council (Sub. 14)
The provision of the fringe benefits system of remuneration in the remote area mining industry is a response to the incentives inherent in the present taxation system and the real problems of providing infrastructure in areas where it did not exist or was clearly inadequate. Fringe Benefit Tax (FBT) has had a dramatic and anomalous effect on the mining industry with respect to the provision of subsidised employee benefits such as housing and accommodation, home ownership finance, power costs, travel and meals.

Barriers to further processing of iron ore in WA include:

. Higher energy costs compared with some overseas locations;

. Higher capital costs for a Pilbara based plant compared with some other locations

. High coastal shipping costs if iron ore is to be brought to the south of the State for processing or if coking coal is required;

. Low domestic steel requirements resulting in the need to export a high percentage of processed product;

. The need to selectively mine and beneficiate local ores for the Direct Reduction process as well as the consequential effects of the selective mining process; and

. The lack of suitable coking coal for the conventional blast furnace process.

Western Mining Corporation (Subs. 69, 159, 239)
Governments are responsible for land-use policy, yet decisions on this matter are being made without adequate information on potential mineral resources in the subject area. Proposals to overcome this lack of information through government exploration programmes are not supported by the company. Successful exploration requires dedication of funds over a long period and the

setting of programs and budgets of sufficient size to attain a reasonable confidence level of an economic discovery. Actions which divert resources away from on-the-ground exploration in fact increase the discovery risk. Studies of the overall exploration performance of the mining industry indicate that returns from exploration in Australia have been marginal. Existing disincentives to investment in exploration should therefore be removed.

Retention of the present registration-by-priority system for exploration leases is supported. Proposals such as cash bidding for exploration land are not supported. The company is especially concerned about `sovereign risk' associated with cash bidding systems - the likelihood that future governments will seek revenue in addition to the auction price.

The concepts of rent taxation put forward from time to time are impractical. Much of the so-called rent arises not from scarcity, but rather from the application of knowledge and expertise in the exploration phase together with entrepreneurship and risk-taking. These are not restricted to the mining industry; no other industries in Australia are subject to special taxation on the basis of these returns, nor is there any proposal to levy such a tax. An ad valorem royalty mechanism continues to be the most appropriate means for the States to recoup a return on their assets. The overall Australian taxation structure is in urgent need of further, radical reform. The taxation system is hideously complex, non-neutral as between different types of business, favours debt financing over equity and, overall, discourages saving.

Much of the tax burden should be transferred from income to consumption. Company tax and imputation should be replaced by a single stage, lower rate income tax. The present taxation of income from goldmining, where profits are taxed in the hands of shareholders, is the basis of a practical, very successful model for all companies. Withholding taxes should be used to tax income remitted overseas. In the absence of further taxation reform, changes need to be made to the taxation provisions of the Income Tax Assessment Act in relation to eligible exploration expenditure and to transitional provisions extending income taxation to goldmining operations. These changes are sought to recognise new forms of exploration and to ensure that gold is treated consistently with other minerals. Government intervention in the development of mining and mineral processing projects is adding considerably to the time required to bring these facilities into production. At the same time, increasing demands are being placed on the mining industry to provide infrastructure with little effort in some cases by governments to contribute to, or coordinate various agencies within their jurisdiction.

Transport heavily penalises the competitiveness of mining and mineral processing operations. Likewise, the statutory monopoly provision of energy supply coupled with coastal shipping cost penalties and federal excise on fuels means energy costs are substantially above those of competitors. In view of the need to increase exports and reduce debt, current export controls on uranium mining should be relaxed. Foreign investment regulation applying to the mining industry should be removed to encourage a greater level of equity investment.

In submission 159, the company responded to the comments made about the activities of an unnamed mining organisation in submission 8.

Opposed the recommendation in the Draft Report that up-front bonds should be lodged at the commencement of operations to cover rehabilitation costs when the mine is closed. The arguments presented by the Commission to overcome the problems associated with cash bidding are not persuasive. The practical outcome will be a cutback in exploration activity by mining companies in Australia.

The analysis and recommendations in the Draft Report concerning mineral taxation do not give adequate emphasis to the incentive structures which drive successful mining companies. Their fundamental flaw is that they only emphasise the maximisation of Crown revenues. The Draft Report's conclusions regarding mineral taxation are highly theoretical in terms of the effects of their application and, perhaps more seriously, are extremely susceptible in terms of their actual implementation by the variety of governments in Australia. The Commission has failed to address the issue of whether there is a need for any transitional taxation arrangements for the mining of gold. There is a consistent correlation between the taxation arrangements applying to goldmining and the growth of the industry.

Wilson N H (Sub. 174)
Presented information relating to the development of a deposit of cobalt combined with uranium located at Carcoar, NSW.

APPENDIX C

ECONOMIC IMPORTANCE OF RESOURCE-BASED INDUSTRIES

C ECONOMIC IMPORTANCE OF RESOURCE-BASED INDUSTRIES

Australia is well endowed with mineral resources and, as a technically advanced nation, we have developed world-class mining and (to a lesser extent) minerals processing industries. As a country, we are amongst the world's leading miners of coal, bauxite, diamonds, gold, iron ore, silver/lead/zinc ores, and mineral sands (including rutile and ilmenite). In terms of processed minerals, Australia is a leading producer of alumina and aluminium. Mining and early-stage mineral processing activities more than satisfy the nation's basic industrial requirements in terms of construction materials, fuels and industrial raw materials, so that we can also cater for overseas demands for many minerals. In fact, the sector accounts for about a half of Australian merchandise exports. These activities have also been largely responsible for what little decentralisation of population and industry as has occurred in this country - as towns, railways and ports were built to service mines and processing facilities. The fact that mining and early-stage minerals processing accounts for almost a tenth of Australia's gross domestic product underscores the economic importance of the activities under reference in this inquiry. Indeed, such activities account for an even higher proportion of economic activity in some Australian States and Territories (eg Western Australia, Queensland, and the Northern Territory).

Australia's natural resource endowment has not only meant that we are self-sufficient in most minerals but we have also become a leading exporter of many (eg coal, gold, alumina, iron ore and aluminium are each likely to earn at least $2 billion in export income in 1990-91).

Resource-based industries produce over 60 different commodities, with the annual value of production ranging up to in excess of $5 billion in the case of coal. Australia mines (or has unworked deposits of) most economically important minerals - with sulphur being the only major exception. Significant minerals with demonstrated large reserves include bauxite, black coal, clays, copper, diamonds, gold, iron ore, lead, manganese, natural gas, nickel, salt, silver, uranium, and zinc.

Mining and early-stage mineral processing activities are important contributors to overall economic activity. Australia's gross domestic product (GDP) in 1988-89 was valued at almost $336 billion, of which nearly $25 billion (or 7.4 per cent) was generated by the mining industry (which excludes much minerals processing activity). The addition of metal smelting and refining adds almost $6 billion to the `resource sector' and, at $31 billion (or 9.1 per cent), means that mining and early-stage minerals processing industries (including energy) comprise a significant part of the Australian

economy.[1] In its review of recent (1988-89) developments in the Australian mineral industry, the Australian Bureau of Agricultural and Resource Economics (ABARE 1990) summarised industry trends as follows:

> This broadly defined sector experienced strong growth in 1988-89, as strong world demand for, and lagging supply of, metals fed through to higher prices. The ex-mine value of mine production in Australia in 1988-89 was approximately $16.5 billion. This was around $1.3 billion, or 9 per cent more that the 1987-88 value, and equal to the record level attained in 1985-86, in current dollars. While sector performance was mainly attributable to upward movements in metal prices, it also featured some notable improvements in production volumes. These offset generally declining energy prices and (excluding black coal), declining energy production volumes.
>
> Major minerals to realise improved ex-mine production values were copper, diamonds, mineral sands (ilmenite and zircon), nickel and zinc, while the substantial increase in gold production was offset generally be an easing in the gold price. Major minerals to record significant declines in ex-mine values were crude oil and LPG (declining price and production levels) and lead (price decline).

Because of the capital intensity of the sector, its share of investment spending is usually much higher than its share of GDP. Generally, between a fifth and a third of total private new capital expenditure is directed to increasing the productivity of mining and minerals processing activities. The capital-intensive nature of these activities also results in its share of aggregate employment being considerably less than its contribution to GDP. In 1988-89, only 2.4 per cent of the workforce was engaged in mining and basic metal production.

Australian mineral export prospects depend on international trade opportunities and trends in the demand for minerals around the world, particularly in Asia. These demand trends are linked generally to rates of economic growth, and more specifically to rates if industrial production and capital investment. As ABARE noted in its submission (sub. 161, p.11), the ability of Australian producers to take advantage of these opportunities depends on the behaviour of market competitors, costs of production in Australia relative to competing producers overseas (as mediated by relevant rates of exchange), trends in freight costs and other supply factors.

In this appendix, the mining and minerals processing (or resource) sector is defined for statistical purposes as comprising the ABS-defined mining and basic metal products industries (based on the Australian Standard Industrial Classification - ASIC).

Mining as defined in Division B of ASIC broadly covers the extraction of minerals occurring naturally as solids (such as coal and ores), liquids (such as crude oil), or gases (such as natural gas), by such processes as underground mining, open cut extraction methods, quarrying, operation of

[1] As noted by ABARE (sub. 161, p.7), the contribution of the mineral resource sector to the Australian economy has changed over time. Although discrete eras, such as that following discoveries of gold in the 1850s, boosted the sector's economic important from time to time, it is only since the 1960s that it has consistently made a major contribution to the economy. *The sector'' share of GDP grew rapidly in the 1960s before stabilising at around 6 per cent in the 1970s. In the 1980s, the sector's share rose again to around 8 per cent, following significant growth over the 'boom' years from 1978 to 1980.)

wells or evaporation pans, dredging or recovering from ore dumps or tailings. Activities such as dressing or beneficiating ores or other minerals by crushing, milling, screening, washing, flotation, or other processes (including chemical beneficiation) or briquetting, are included because they are generally carried out at or near minesites as an integral part of mining operations. Natural gas absorption and purifying plants are also included. Excluded are establishments mainly engaged in refining or smelting of minerals or ores (other than preliminary smelting of gold), or in the manufacture of such products of mineral origin as coke, cement and fertilisers. (Oil and gas activities are not under reference in this inquiry.)

The basic metal products industry, as defined by Subdivision 29 of ASIC, includes the manufacture, casting and forging of iron and steel, the refining and/or smelting of copper, lead, silver, alumina, aluminium, and nickel, the rolling, drawing and extruding of aluminium and other metals, and the separation and further processing of mineral sands which include zircon, rutile, ilmenite and monazite. The basic metal products industry is closely integrated with the mining industry.

C1 Mineral production

Tables C1 and C2 show quantities produced of selected minerals and the contents of metallic minerals produced for 1987-88 and 1988-89, while Table C3 reports the value of principal minerals produced for the same time periods.

Table C4 highlights the dominant role played by Australia in world mineral production. For example, Australia is the leading producer of bauxite, diamonds, lead and mineral sands.

The State dimension

Table C5 sets out the ex-mine value of minerals, coal and construction materials produced, by States and Territories for 1987-88, with the information contained in the table being illustrated in graphical form in Figure C1.

C2 Mineral processing and treatment

The extraction of minerals from ore deposits, as in mining and quarrying, is only the initial stage of a sequence of value-adding activities which transforms ore into useful resource-based products. Thus, few minerals can be used in the form in which they are mined. In most cases, minerals must undergo considerable processing and treatment before utilisation.

Table C6 shows particulars of the production of certain manufactured products of mineral origin in 1987-88 and 1988-89.

Table C7 reports estimates of the extent of processing of resource-based exports over the period 1973-74 to 1986-87 based on date compiled by the Office of the Economic Planning and Advisory Council (EPAC). Trends in processing based on this data are shown in Figure C2.

Table C1: **Quantity of selected minerals produced, 1987-88 and 1988-89**
(Tonnes, kilograms)

Mineral	*Units*	*1987-88*	*1988-89*
Metallic minerals			
Bauxite	'000 tonnes	35 142	37 355
Copper concentrate	"	np	907 [b]
Copper ore	tonnes	23 748	77 556
Gold bullion [a]	kg	167 486	216 872
Iron ore	'000 tonnes	102 202	97 618
Lead concentrate	"	np	np
Lead-copper concentrate	tonnes	32 763	30 998
Lead-zinc concentrate	"	69 904	90 103
Manganese ore	'000 tonnes	1 950	1 907
Mineral sands			
Ilmenite concentrate [c]	"	1 569	1 751
Rutile concentrate	"	236	269
Zircon concentrate	"	469	486
Nickel concentrate	"	389	354
Silver concentrate	tonnes	4 780	5 117
Tantalite-columbite concentrate	"	np	np
Tin concentrate	"	13 667	np
Tungsten concentrates (Scheelite)	"	2 001	2 378
Uranium concentrate (U_3O_8)	"	4 193	na
Zinc concentrate	'000 tonnes	np	np
Coal			
Coal (other than lignite)			
Saleable coal [d]			
Semi-anthracite	'000 tonnes	284 122	
Bituminous	"	122 490	135 008
Sub-bituminous	"	13 654	13 996
Washery rejects [d]	"	31 333 [b]	34 735 [b]
Lignite			
For briquettes	"	1 956	1 844
Other	"	41 525	46 109
Briquettes	"	807 711	
Construction materials			
Sand	'000 tonnes	29 465	na
Gravel	"	14 895	na
Crushed and broken stone	"	65 944	na
Other (decomposed rock, dimension stone, etc)	"	29 382	na
Other non-metallic minerals			
Clays	'000 tonnes	np	na
Limestone (including shell and coral)	"	np	na
Salt	"	np	na
Silica	"	2 596	na

na Not available
np Not available for separate publication.
a Includes alluvial gold.
b Excludes South Australia.
c Includes ilmenite from which titanium dioxide is not commercially extractable and beneficiated ilmenite.
d Raw coal is saleable coal plus washery rejects.
Source: ABS 1989b.

Table C2: Contents of selected metallic minerals produced, 1987-88 and 1988-89
(Tonnes, kilograms)

Metallic mineral	*Units*	*1987-88*	*1988-89*
Antimony	tonnes	1 159	1 625
Cadmium	"	np	np
Cobalt	"	2 504	2 268
Copper	"	np	np
Gold	kg	np	np
Iron [a]	'000 tonnes	65 080	62 142
Lead	tonnes	np	np
Manganese	"	np	np
Molybdenum	kg	11 029	6 774
Monazite	tonnes	10 393	10 389
Nickel	"	72 231	63 100
Palladium	kg	454	280
Platinum	"	82	70
Silver	"	1 135 073	np
Sulphur	tonnes	531 965	559 190
Tantalite-columbite (Ta_2O_5 + Nb_2O_5)		np	np
Tin	tonnes	np	np
Titanium dioxide (TiO_2)	"	1 457 723	np
Tungstic oxide (WO_3)	mtu [b]	149 172	175 800
Uranium (U_3O_8)	tonnes	3 556	4 216
Yttrium oxide (Y_2O_3)	kg	np	np
Zinc	tonnes	np	np
Zirconium dioxide (ZrO_2)	"	327 511	347 120

np Not available for separate publication.
a Includes content of iron ore for SA and content of pellets for Tasmania.
b Metric ton unit (mtu) equals 10 kilograms.
Source: ABS 1989b.

Table C3: Value of selected minerals produced, 1987-88 and 1988-89
($'000)

Mineral	*1987-88*	*1988-89*
Metallic minerals		
Bauxite	np	np
Copper concentrate	np	np
Copper ore	np	np
Gold bullion [a]	2 585 011 [b]	2 748 338 [b]
Iron ore	1 687 541 [b]	1 500 383
Lead concentrate	np	np
Lead-copper concentrate	np	np
Lead-zinc concentrate	np	np
Manganese ore		
Metallurgical grade	np	np
Mineral sands		
Ilmenite concentrate [c]	152 246	190 362
Rutile concentrate	133 011	163 455
Zircon concentrate	np	252 775
Nickel concentrate	np	np
Tantalite-columbite concentrate	np	np
Tin concentrate	np	np
Tungsten concentrates		
Scheelite concentrate	np	np
Wolfram concentrate	4	..
Uranium concentrate (U_3O_8)	np	282 510 [d]
Zinc concentrate	np	np
Coal		
Coal (other than lignite)		
Saleable coal [e]		
Semi-anthracite	8 187	4 203
Bituminous	4 118 386	4 604 711 [b]
Sub-bituminous	395 156	408 436
Lignite		
For briquettes	..	11 731
Other	301 527	342 333
Briquettes	18 717	17 762
Construction materials		
Sand	np	na
Gravel	np	na
Crushed and broken stone	np	na
Other (decomposed rock, dimension stone, etc)	np	na

Table C3 (cont): **Value of selected minerals produced, 1987-88 and 1988-89**
($'000)

Mineral	*1987-88*	*1988-89*
Other non-metallic minerals		
Clays	56 451[e]	na
Gems		
Diamonds	248 203	na
Opal	106 077	na
Sapphire	2 841	na
Limestone (including shell and coral)	np	na
Salt	np	na
Silica	np	na

.. Negligible
na Not available
np Not available for separate publication.
a Includes alluvial gold.
b Excludes Tasmanian production.
c Includes ilmenite from which titanium dioxide is not commercially extractable and beneficiated ilmenite.
d Excludes South Australia
e Excludes Northern Territory.
Source: ABS 1989b.

Table C4: Word production, Australia's share of world production and world's leading producer of selected minerals, 1988
(Tonnes, carats and per cent)

Mineral		*Estimated world production*	*Australian production as a percentage of estimated world production*	*World's leading producers*
			(per cent)	
Bauxite	million tonnes	87.5	41.1	Australia
Black coal-saleable	million tonnes	3 323	4.3	China
Copper in ores and concentrates [a]	' 000 tonnes	6 727	3.5	Chile
Diamonds	million carats	86	40.7	Australia
Gold in ores and concentrates [a]	tonnes	1 543	10.2	South Africa
Iron ore	Million tonnes	967	9.9	USSR
Lead in ores and concentrate [a]	' 000 tonnes	2 334	20	Australia
Manganese ore	' 000 tonnes	25 600	7.8	USSR
Mineral sands:				
Ilmenite concentrate	' 000 tonnes	3 540 [b]	45.8	Australia
Rutile concentrate	' 000 tonnes	468	49.4	Australia
Zircon concentrate	' 000 tonnes	850	56.4	Australia
Nickel in ores and concentrates [a]	' 000 tonnes	560	11.1	Canada
Salt	' 000 tonnes	197	3.6	USA
Silver in ores and concentrates	tonnes	13 765	8.1	Mexico
Tim in ores and concentrates [a]	' 000 tonnes	152	4.6	Brazil
Tungsten in concentrate	' 000 tonnes	41	2.4	China
Uranium in concentrates [a]	tonnes	36 073	9.8	Canada
Zinc in ores and concentrates [a]	' 000 tonnes	5 071	14.8	Canada

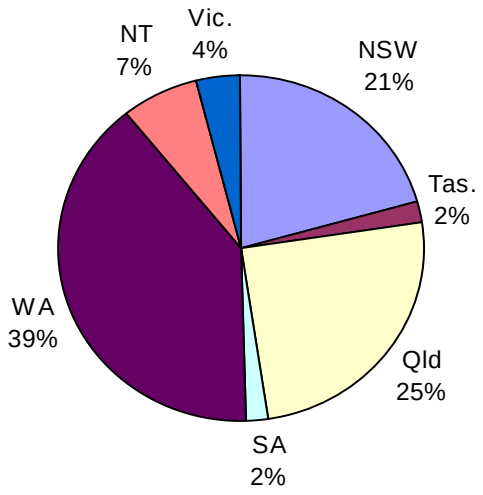
a Excludes centrally planned economies
b Excludes large tonnages from ilmentite-magnetite ore in USSR.
Source: ABS 1989b

Table C5: Value of minerals, coal and construction materials produced, by State/Territory, 1987-88

State/Territory	*($ million)*
New South Wales	3 217.5
Victoria	631.4
Queensland	3 836.6
South Australia	264.0
Western Australia	5 935.6 [a]
Tasmania	382.6
Northern Territory	1 086.0 [b]

a Excludes construction materials
b Excludes non-metallic minerals
Source: ABS 1988a.

Figure C1: Value of minerals, coal and construction materials produced, by State/Territory, 1987-88



Source: Table C5

Table C6: Production of principal manufactured products of mineral origin, 1988-89 and 1989-90

(Tonnes, kilograms, number)

Commodity	*Units*	*1988-89*	*1989-90* [a]
Metals			
Non-ferrous			
Alumina	'000 tonnes	10 602	11 041
Aluminium (ingot metal)	"	1 226	1 235
Blister copper [b]	"	191	201
Refined copper	"	211	245
Lead bullion [b]	"	181	198
Refined lead	"	184	97
Refined zinc	"	303	295
Refined tin	tonnes	377	381
Ferrous			
Pig iron	'000 tonnes	5 873	6 187
Raw steel	"	6 651	6 680
Precious			
Refined gold	kg	188 229	234 230
Refined silver	tonnes	374	404
Fuels			
Coal products			
Metallurgical coke	'000 tonnes	3 889	na
Brown coal briquettes	"	751	na
Building materials			
Clay bricks	millions	2 142	2 062
Portland cement	'000 tonnes	6 901	7 075
Chemicals			
Sulphuric acid	'000 tonnes	1 904	1 464
Superphosphate	"	na	2 653

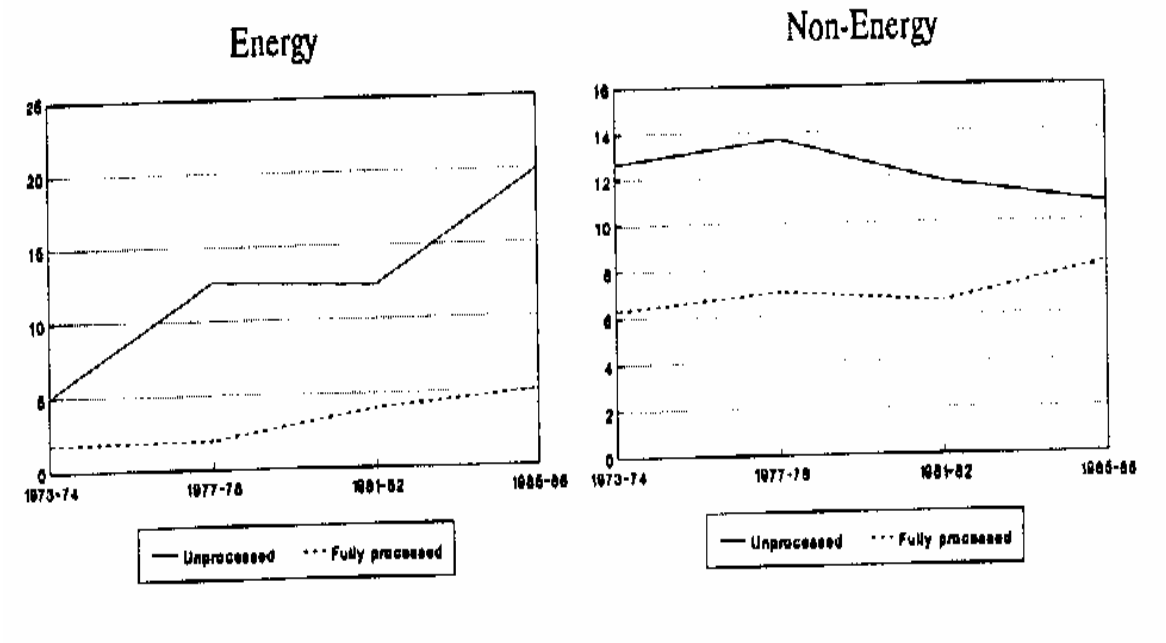
a Preliminary data.
b Metallic content.
na Not available
Sources: ABARE 1990, ABS 1990d and ABS 1990e.

Table C7: Extent of processing of resourced-based exports, 1973-74 to 1986-87
(Percentage of merchandise exports)

	1973-74	*1977-78*	*1981-82*	*1985-86*	*1986-87*
Mineral-based products					
Energy:					
Unprocessed [a]	5.0	12.6	12.3	19.9	18.5
Semi-processed [b]	..	..	..	0.1	..
Fully processed [c]	1.8	2.0	4.0	5.1	3.3
Total	6.9	14.6	16.3	25.2	21.8
Non-Energy					
Unprocessed [a]	12.7	13.7	11.8	10.8	13.1
Semi-processed [b]	5.2	7.6	7.4	5.5	5.3
Fully processed [c]	6.3	7.0	6.6	8.2	7.7
Total	24.1	28.3	25.8	24.5	25.0

.. Negligible
a Unprocessed includes some beneficiation done as a matter of course at the extraction site, as with iron ores.
b Semi-processed covers items such as alumina which involve significant further processing but which falls short of final product.
c Fully processed covers items such as primary aluminium which represents the final product of the extraction - processed sequence.
Source: EPAC 1988

Figure C2: Trends in the extent of processing of resource-based exports



Source: Table C7

Table C8 reports estimates of gross value added by further processing of selected raw materials. Gross value added is defined as the total addition to the value of the raw material through processing to the stage indicated (eg from bauxite to alumina, or from bauxite through the alumina stage to aluminium metal). The gross value-added coefficient is then calculated as the sale price of output divided by the outlay on raw materials used in the production of that output.

As pointed out by EPAC, the coefficient includes both direct value added by the processing industry itself and indirect value added which accrues to industries providing other inputs used in making and supplying processed outputs to final users (eg energy, transport, other manufactured inputs and financial services).

Of course, by the time all components of value added are accumulated to form the final selling price, many processed products - if manufactured in Australia - could well have become too expensive to attract buyers. In other words, it will only be profitable to add further value to our minerals if at the end of the day the final product is still price competitive. The fact this is often not the case explains why - while we are generally able to sell unprocessed or semi-processed products profitably - we are nevertheless often unable to sell fully processed (let alone elaborately transformed) ones, even though they are based on the very same minerals.

Thus, because gross domestic product (equal to national income) is merely the sum of value added in each Australian industry, calls to add further value to our mineral resources represent no more than an unfulfilled desire to be richer that we are, unless we are prepared to ensure that, in the process of adding value to our natural resources, we do not price the resulting products out of the market.

C3 Overseas trade

Australia's mining and minerals processing industries are highly export oriented. The share of exports accounted for by the sector has expanded rapidly from around 30 per cent of total merchandise exports in the late 1960s to 48 per cent in 1988-89. The share of total export earnings accounted for by the sector has increased from 27 per cent to 38 per cent over the same period. The value of exports by the mineral resource sector is well above the value of manufacturing sector exports (although strictly speaking many resource-based exports are classified as manufactures), and has exceeded rural sector exports since 1981-82.

Four commodities currently dominate exports of resource-based products, namely, black coal, alumina/aluminium, gold and iron ore (which together accounted for over 65 per cent of such exports in 1988-89). This has not always been the case, since the relative importance of particular mineral exports has changed substantially over time. For example, base metals and iron ore, which were the major export commodities in the early 1970s, have declined in relative importance as aluminium and gold exports have risen to prominence.

Variations in the level of overall economic activity (world growth) and its regional distribution have important implications for the pattern of minerals trade. Metals consumption tends to be concentrated in capital goods producing industries, notably construction and machinery and equipment suppliers.

While significant further processing of minerals occurs in Australia, considerable quantities of metallic ores, concentrates, slags and residues are still exported (to be further processed overseas).

Exports and imports

According to information published by ABARE, the value of mineral exports rose by 16 per cent to a new record of $23.9 billion in 1989-90. Major minerals to show gains on their 1988-89 levels included coking and steaming coal, alumina, gold, crude oil, iron ore and zinc. Both sSubstantial decreases came only from only two commodities, aluminium metal and uranium. Volume and price increases accounted for the growth in value of mineral resources exports in 1989-90. Volume increases were recorded for about two-thirds of the exports surveyed and the price index of mineral resources exports rose by 10 per cent.

Increased export value of iron, ingot steel and ferro-alloys in 1989-90 over the previous year reflected a continuing trend toward increased value added to resource exports by downstream processing of Australia's raw materials. The value of diamond exports rose significantly (14 per cent) despite a decrease in the quantity exported, and the Commission sees few obstacles to adding more value domestically in this area in the future. Zinc and manganese improved appreciably as well (by 40 and 76 per cent respectively). Despite a 31 per cent increase in the quantity of gold exported, the value of gold exports rose by only 17 per cent as a consequence of declining world gold prices - a trend that may well be reversed given our continuing success in producing and marketing gold coins and continued uncertainties in the Middle East. The value of uranium exports fell by 32 per cent, following a decline of 26 per cent in export volumes, due to falling demand.

Coal export revenues increased in 1989-90 by 26 per cent to $5.8 billion, despite a marginal decrease in overall export volumes, reflecting higher prices received for Australia's largest mineral export. Other exports which return revenues of over $2 billion are gold, alumina, iron ore and aluminium.

Crude oil and refined petroleum products continues to dominate the value of mineral imports, although their contribution is not as dominant as it used to be. In 1989-90, the value of crude oil imports rose by 19 per cent to $1607 million - despite an decrease of 4 per cent in the quantity imported - reflecting a general strengthening of world energy prices. The value of refined petroleum products increased by 38 per cent over the previous year to $1031 million, with quantities rising by 21 per cent. Crude oil and refined petroleum product imports accounted for 71 per cent of the total mineral import bill.

Table C9 reports ABS data on exports and imports of minerals by industry of origin for the period 1987-88 to 1989-90 (with the information represented graphically in Figure C3). Trends in these data confirm the resource sector as the dominant contributor to export earnings (and becoming more so over time).

Table C10 sets out exports of major resource-based commodities for 1989-90, while Table C11 details principal metallic contents of selected ores and concentrate etc exported from Australia for the same period.

Table C8: Estimated potential of gross value added by further processing [a]
(Number)

Raw material - processed material	*Gross-value-added coefficient*
Bauxite – alumina	3.8
Bauxite - aluminium	14.6
Iron ore - pig iron	3.8
Iron ore - steel	5.3
Manganese ore - ferromanganese	4.8
Tin concentrates - tin metal	1.1
Zinc concentrates - refined zinc	2.1
Rough opal - cut and polished opal	2.0-5.0
Ilmenite - synthetic rutile	5
Ilmenite - pigment	20
Zircon - zirconia	20
Zircon - zirconium metal	400
Monazite - heavy rare earth oxides	10
Monazite - heavy rare earth metals	150

a Gross value added is the total addition to the value of the raw material through processing to the stage indicated. The gross value-added coefficient is calculated as the sale price of output divided by the outlay on raw materials used in the production of that output. The coefficient therefore includes both direct value added by the processing industry itself and indirect value added which accrues to industries providing, for example, energy, transport, other manufacturers and financial services to the processing industries.

Source: EPAC 1988

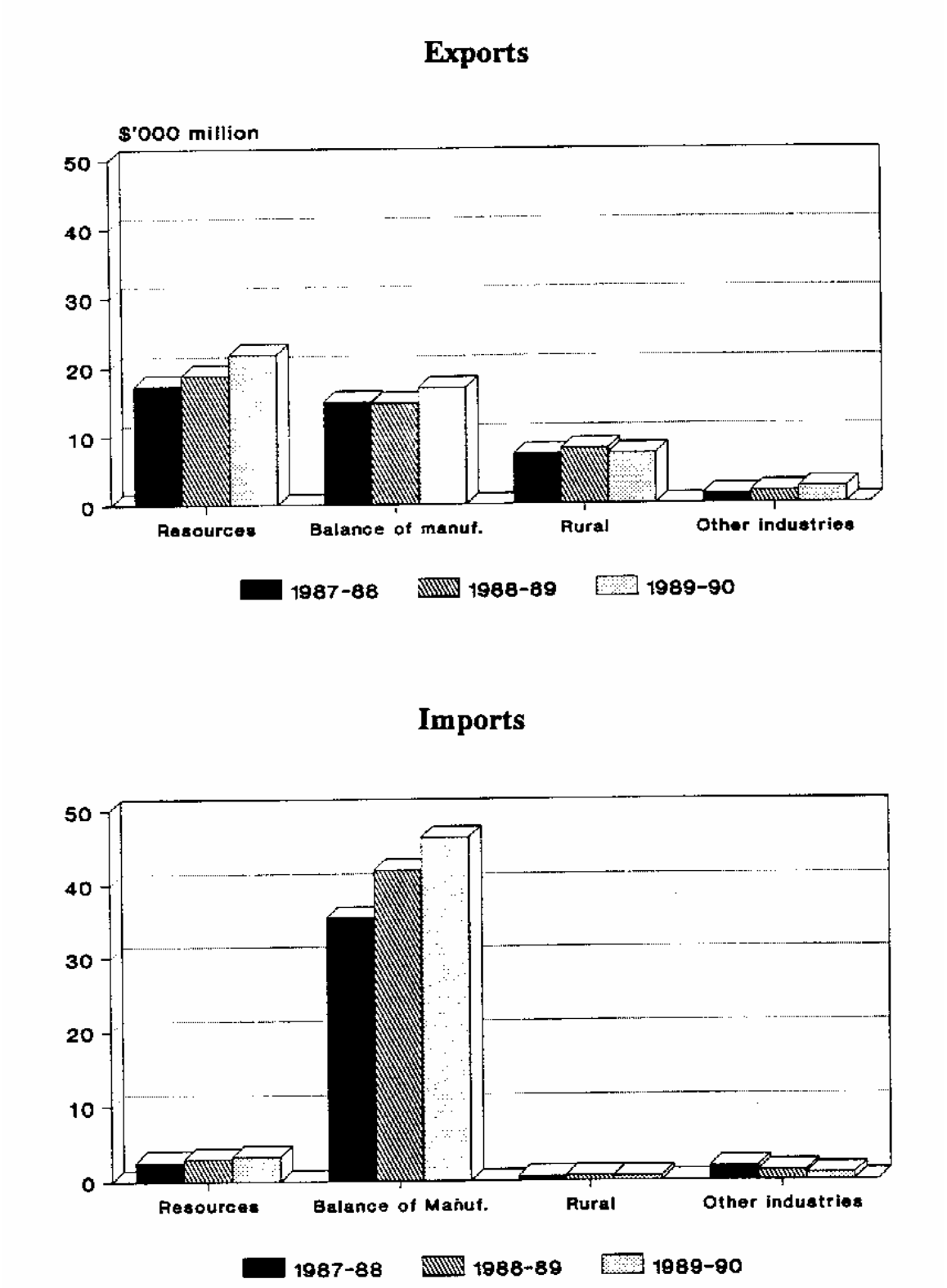
Table C9: Exports and imports by industry of origin, 1987-88 to 1989-90
($ million and per cent)

Sector	*1987-88* $m	%	*1988-89* $m	%	*1989-90* $m	%
Exports						
Rural[a]	7 266.9	(17.7)	8 072.6	(18.5)	7 412.2	(15.2)
Resources sector[b]: of which	17 423.8	(42.4)	18 882.2	(43.4)	21 937.2	(45.0)
Mining: of which	9 581.4	(23.3)	9 745.7	(22.4)	11 755.7	(24.1)
Metallic minerals	3 468.3	(8.4)	4 243.4	(9.8)	4 315.6	(8.9)
Coal	4 774.4	(11.6)	4 641.0	(10.7)	5 860.2	(12.0)
Oil and gas	1 195.3	(2.9)	727.3	(1.7)	1 428.6	(2.9)
Construction materials	2.0	(0.0)	4.3	(0.0)	3.9	(0.0)
Other non-metallic minerals	141.4	(0.3)	129.7	(0.3)	1 47.3	(0.3)
Basic metal products	7 842.4	(19.1)	9 136.5	(21.0)	10 181.5	(20.9)
Balance of manufacturing[c]	14 987.4	(36.5)	14 778.6	(34.0)	17 016.2	(34.9)
Other industries	1 399.7	(3.4)	1 788.4	(4.1)	2 380.4	(4.9)
Total	41 077.8	(100.0)	43 521.8	(100.0)	48 746.0	(100.0)

Sector	*1987-88* $m	%	*1988-89* $m	%	*1989-90* $m	%
Imports						
Rural[a]	6 24.7	(1.5)	668.2	(1.4)	5 97.9	(1.2)
Resources sector[b]: of which	2 567.1	(6.3)	3 017.6	(6.4)	3 269.6	(6.4)
Mining	1 329.1	(3.3)	1 334.8	(2.8)	1 436.4	(2.8)
Basic metal products	1 238.0	(3.0)	1 682.8	(3.6)	1 833.2	(3.6)
Balance of manufacturing[c]	35 465.1	(87.4)	42 021.4	(89.3)	46 482.7	(90.6)
Other industries	1 939.6	(4.8)	1 332.0	(2.8)	972.9	(1.9)
Total	40 596.5	(100.0)	47 039.2	(100.0)	51 323.1	(100.0)

a Agriculture, forestry, fishing and hunting.
b Mining and basic metal products.
c Manufacturing (excluding basic metal products)
Sources: ABS 1989a, ABS 1990b, ABS 1990c and ABS 1990f.

Figure C3: Exports and imports by industry of origin



Source: Table C9

Table C10: Exports of major resource-based commodities, 1989-90
($ million and per cent)

Commodity	*Value* *$m*	*Share of total exports* *%*
Alumina	2 649.7	5.4
Aluminium	2 279.6	4.7
Coal	5 858.2	12.0
Copper ores and concentrates	187.3	0.4
Copper and copper alloys	501.1	1.0
Gold	2 901.3	6.0
Iron and steel	710.6	1.5
Iron ore	2 150.3	4.4
Lead and lead alloys	298.4	0.6
Nickel and nickel alloys	280.2	0.6
Nickel ores	229.1	0.5
Ores and concentrates of molybdenum, niobium, titanium, etc	518.8	1.1
Oil, crude	955.9	2.0
Petroleum products	1 026.4	2.1
Uranium and thorium ores	288.0	0.6
Zinc and zinc alloys	376.6	0.8
Zinc ores	666.8	1.4

Source: ABS 1990f.

Table C11: Principal metallic contents of selected ores and concentrates etc exported from Australia, 1989-90
(Tonnes, kilograms)

Ores and concentrates etc	*Metallic contents - estimated from assay*						
	Copper	*Lead*	*Zinc*	*Tin*	*Tungstic oxides*	*Gold*	*Silver*
	tonnes	tonnes	tonnes	tonnes	tonnes	kg	kg
Copper concentrate	35 351	-	-	-	-	2 269	66 236
Unrefined copper	36	-	-	-	-	73	504
Copper [a]	4 437 459	849 841	-	-	-	142 544	20 498
Gold concentrate	-	-	-	-	-	70	302
Lead concentrate	4 754	-	-	-	-	1 027	60 697
Lead bullion	48	155 060	260	-	-	69	379 872
Lead ash and residues	2 291	183 448	-	1 085	-	17	516
Zinc concentrate	407	23 278	540 219	-	-	227	98 975
Zinc spelter	-	-	290	17	-	-	-
Tin concentrate	-	-	-	591	7 648	-	-
Other ash and residues	-	1 936	-	-	-	-	-
Scheelite concentrate	-	-	-	-	1 327	-	-
Wolfram concentrate	-	-	-	-	2	-	-
Total metallic content	4 480 346	1 212 903	541 360	8 750	1 329	146 296	627 600

a Includes copper matte, copper slags and residues and copper-lead dross and speiss.
Source: Unpublished ABS information

Pattern of mineral trade

During 1988, Australia exported minerals to more than 100 countries. Japan accounted for 39 per cent, up from 37 per cent in 1987, which had been the lowest share since 1965. Principal mineral products exported to Japan included alumina, aluminium, black coal, copper, crude oil, gold, iron ore, lead, mineral sands, nickel and zinc. The share of minerals going to Asian countries other than Japan has increased in recent years, and in 1988 accounted for 28 per cent of the total (24 per cent in 1987). The main country destinations and commodities exported were: Korea (aluminium, black coal and iron ore); Hong Kong (black coal and gold); and Taiwan (aluminium, black coal and iron ore).

The figures continue to reflect the trend of increasing Australian trade with Asian countries other than Japan, while the importance of traditional European markets continues to diminish.

The Middle East supplied 30 per cent of Australia's mineral imports by value in 1988 (38 per cent in 1987), while Indonesia provided a further 13 per cent (20 per cent in 1987). Other major suppliers in 1988 were Malaysia (10 per cent), Canada (6 per cent) and the United States of America (5 per cent). Middle East, Indonesian and Malaysian mineral imports were predominantly crude oil, while Canada and the USA were major suppliers of sulphur and fertilisers, with Canada also providing nickel and the USA supplying clays and diamonds.

C4 Employment

Table C12 reports the results of an August 1989 survey of persons employed and average hours worked, by industry.

Table C13 reports average weekly earnings, average weekly hours paid for and average hourly earnings by industry in respect of full-time non-managerial employees (split into adult and junior categories) from a survey conducted in November 1988. Data presented in the table and displayed graphically in Figure C4 confirm miners as workers being paid the highest hourly wage rates of any group in the economy.

Table C14 (and Figure C5) set out estimated total labour costs by industry (broken down into earnings and various categories of `on-costs' - such as superannuation and workers compensation payments) for 1987-88.

Industrial disputes

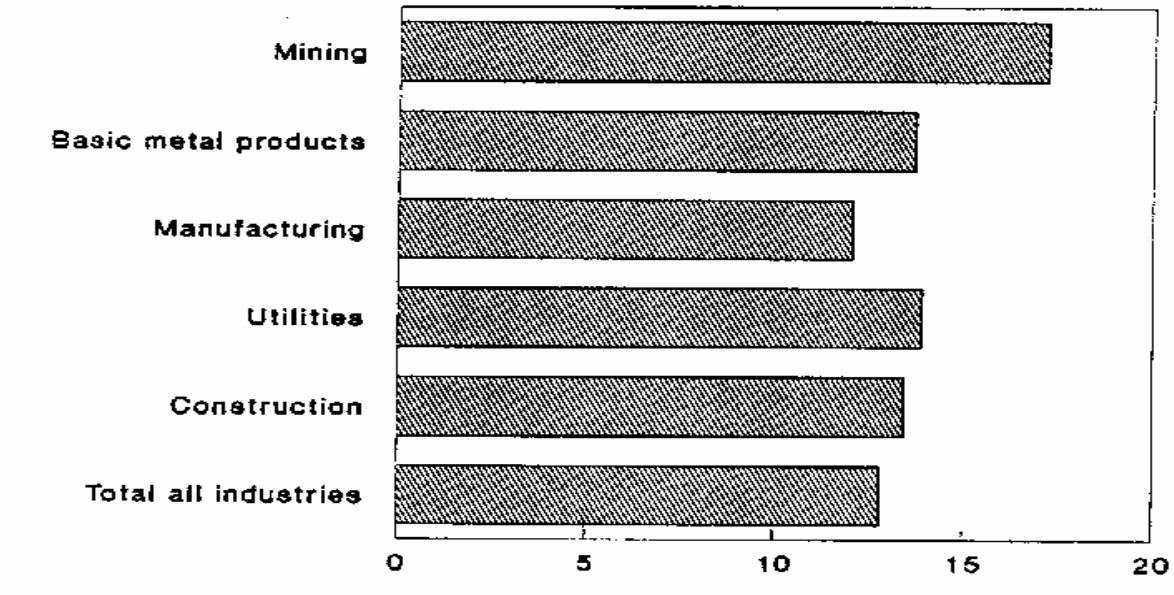
Table C15 tabulates industrial disputes by industry in the form of working days lost per thousand employees over the period 1984 to 1988, with a comparison of the 1987 and 1988 figures being presented in Figure C6. While the mining sector as a whole compares unfavourably with other sectors of the economy in term of industrial disputation, the coal industry stands out as having by far the worst record of any Australian industry in terms of working days lost through industrial disputes.

Table C12: Employed persons by industry and average weekly hours worked, August 1989
('000 and number)

	Number ('000)			*Average weekly hours worked*		
Industry	*Males*	*Females*	*Persons*	*Males*	*Females*	*Persons*
Agriculture, forestry, fishing and hunting	291.3	115.0	406.2	46.0	26.8	40.5
Mining	94.1	11.3	105.4	42.2	35.1	41.5
Manufacturing	895.3	340.7	1 236.0	40.9	33.4	38.8
Food, beverages and tobacco	133.3	59.4	192.6	40.8	31.1	37.8
Metal products	170.2	33.6	203.7	41.5	32.4	40.0
Other manufacturing	591.9	247.8	839.7	40.7	34.0	38.8
Electricity, gas and water	103.0	10.4	113.4	36.4	31.6	36.0
Construction	526.0	75.4	601.4	40.9	20.6	38.3
Wholesale and retail trade	871.5	735.4	1 606.9	41.0	27.7	34.9
Transport and storage	325.1	82.4	407.5	40.9	31.9	39.1
Communication	101.5	38.3	139.8	36.5	31.6	35.2
Finance, property and business services	51.2	424.0	875.2	42.0	31.8	37.1
Public administration and defence	197.3	126.7	324.0	36.2	30.7	34.0
Community services	476.5	880.4	1 356.9	39.4	29.2	32.8
Recreation, personal and other Services	239.0	315.7	554.7	39.0	28.3	32.9
Total	4 571.9	3 155.7	7 727.6	40.7	29.5	36.1

Source: ABS 1990a.

Figure C4: Average hourly earnings by full-time non-managerial employees, by industry, November 1988
($)



Source: Table C13

Table C13: (cont): **Full time non-managerial employees: average earnings and hours paid for, by industry, November 1988**
($ and number)

	Males			*Females*			*Persons*		
Industry	*Average weekly earnings ($)*	*Average weekly hours paid for*	*Average weekly hours ($)*	*Average weekly hours ($)*	*Average weekly hours paid for*	*Average weekly hours ($)*	*Average weekly hours ($)*	*Average weekly hours paid for*	*Average weekly hours ($)*
Junior employees									
Resource sector: of which									
Mining	430.0	40.1	10.71	299.9	38.1	7.88	400.4	39.7	10.09
Basic metal products	292.0	39.5	7.38	270.7	38.1	7.10	290.2	39.7	7.36
Manufacturing	249.1	10.3	6.18	240.0	38.8	6.18	246.9	40.0	6.18
Electricity, gal and water	308.0	37.7	8.16	288.1	37.0	7.78	303.3	37.6	8.07
Construction	286.4	40.1	7.14	225.1	37.9	5.94	281.1	39.9	7.04
Wholesale and retail trade	223.7	39.9	5.61	222.4	38.8	5.74	223.2	39.4	5.66
Transport and storage	265.5	39.0	6.80	248.1	38.3	6.48	259.1	38.7	6.69
Communication	273.1	38.1	7.17	259.3	37.7	6.88	268.6	37.9	7.08
Finance, property and business services	260.9	38.9	6.70	249.9	38.3	6.53	253.2	38.5	6.58
Public administration and defence	276.5	37.5	7.37	275.0	37.0	7.43	275.6	37.2	7.41
Community services	268.4	39.0	6.88	259.4	37.8	6.86	261.1	38.0	6.87
Recreation, personal and other services	230.3	40.7	5.65	180.8	39.7	4.56	191.4	39.9	4.80
Total all industries	251.4	39.8	6.65	236.4	38.5	6.14	244.5	39.2	6.24

Source: ABS 1990a

Table C14: Total labour costs and major components, by industry, 1987-88
($ and per cent)

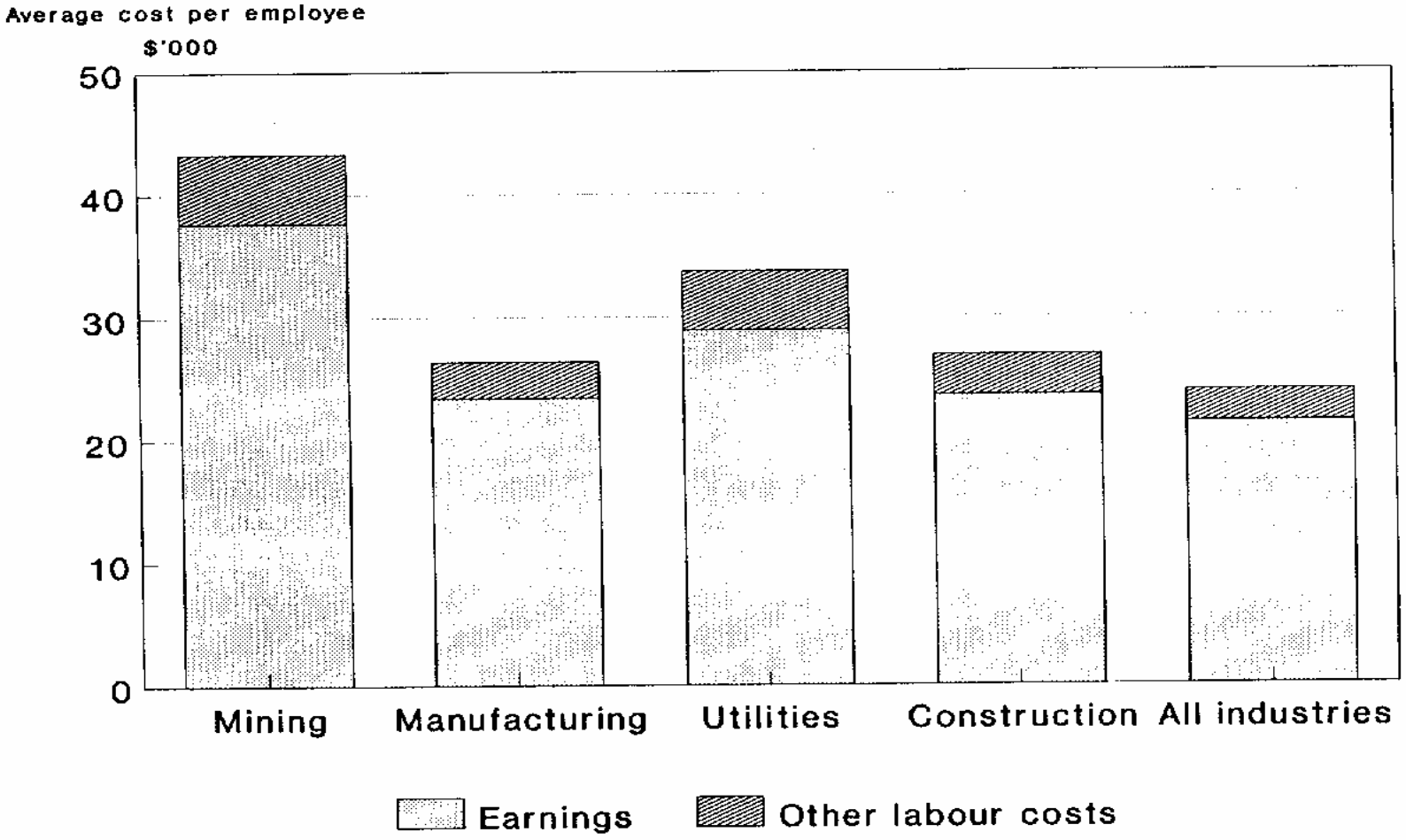
Type of cost	*Mining*	*Manufac-uring*	*Electricity, gas and water*	*Construc-tion*	*Wholesale and retail trade*	*Transport, storage and commun-ication*	*Finance property and business services*	*Public administra-tion and defence*	*Community services*	*Recreation, persona and other services*
Average cost per employee ($)										
Earnings: of which	37 768	23 406	28 936	23 618	16 779	25 578	24 581	23 393	22 059	12 032
Gross wages and salaries	35 124	22 752	27 573	23152	16 452	24 829	23 935	22 819	21 701	11 853
Severance, termination and redundancy payments	2 644	654	1 364	466	324	749	646	574	358	179
Other labour costs: of which	5 633	2 984	4 804	3 291	1 601	3 871	3 289	3 067	2 233	950
Payroll tax	1 899	1 112	1 599	739	572	805	1 133	306	454	383
Superannuation	1 671	861	2 272	1 269	500	2 210	1 478	2 043	1 339	253
Workers' compensation	1 468	887	846	1 129	376	766	243	644	407	268
Fringe benefits tax	595	124	87	154	152	90	436	74	32	47
Total labour costs	43 401	26 389	33 741	26 909	18 376	29 449	27 871	26 460	24 292	12 983
Superannuation:										
Cost per employee covered	2 165	1 559	2 665	2 573	2 144	3 310	3 190	2 659	3 164	1 916
Employees covered (%)	77.2	55.3	85.2	49.3	23.2	66.8	46.3	76.8	42.3	13.2

Table C14: Total labour costs and major components, by industry, 1987-88
($ and per cent)

Type of cost	*Mining*	*Manufac-uring*	*Electricity, gas and water*	*Construc-tion*	*Wholesale and retail trade*	*Transport, storage and commun-ication*	*Finance property and business services*	*Public administra-tion and defence*	*Community services*	*Recreation, persona and other services*
Costs as a percentage of total labour costs										
Earnings:	87	88.7	85.8	87.8	91.3	86.9	88.2	88.4	90.8	92.7
Gross wages and salaries	80.9	8.62	81.7	86	89.5	84.3	85.9	86.2	89.3	91.3
Severance, termination and redundancy payments	6.1	2.5	4	4	1.8	2.5	2.3	2.2	1.5	1.4
Other labour costs:	13	11.3	14.2	12.2	8.7	13.1	11.8	11.6	9.2	7.3
Payroll tax	4.4	4.2	4.7	2.7	3.1	2.7	4.1	1.2	1.9	3
Superannuation	3.9	3.3	6.7	4.7	2.7	7.5	5.3	7.7	5.5	2
Workers' compensation	3.4	3.4	2.5	4.2	2.7	2.6	0.9	2.4	1.7	2.1
Fringe benefits tax	1.4	0.5	0.3	0.6	0.8	0.3	1.3	0.3	0.1	0.4
Total labour costs	100	100	100	100	100	100	100	100	100	100

Source: *ABS 1990a.*

Figure C5: Total labour costs (including on costs), by industry, 1987-88



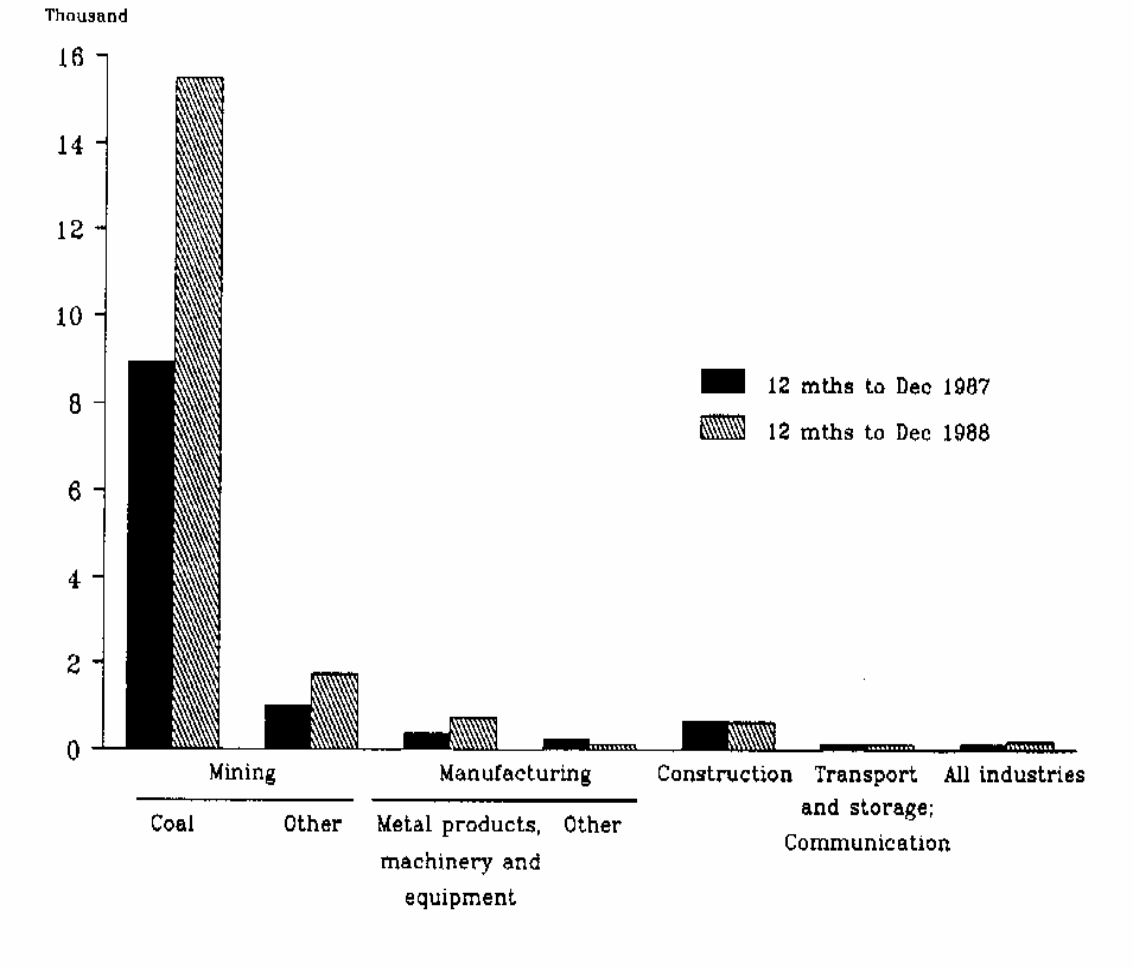
Source: Table C14

Table C15: Industrial disputes: working days lost, by industry, 1984-88
(Days/thousand employees)

Year	All	Mining		Manufacturing			Construction	Transport and storage; Communication	Other industries
		Coal	Other	Metal products, machinery and equipment	Other				
1984	3 913	3 745	343	416	503	372	91	248	
1985	6 892	1 928	256	312	666	430	71	228	
1986	10 741	3 328	445	328	458	135	72	242	
1987	8 920	1 072	479	305	743	217	70	223	
1988	15 548	1 777	750	183	725	177	85	269	

Source: ABS 1990a.

Figure C6: Industrial disputes: working days lost per thousand employees, by industry



Source: Table C15

C5 Investment

Table C16 reports private new capital expenditure by industry and type of asset (buildings and structures versus equipment, plant and machinery) for 1986-87 and 1987-88. The aggregate data are presently in graphical form in Figure C7.

C6 Prices

The late 1970s and early 1980s was a period of depressed demand in the markets for most metals. Prices were low by historical standards resulting in substantial rationalisation of supply capacity world wide in many industries. Stronger world economic growth in the second half of the 1980s led to a resurgence in the demand for metals. Capacity utilisation rates for mine and processing facilities increased and stocks declined as growth in demand outpaced growth in production. Delays in commissioning new or recommissioning idle capacity, and short term supply disruptions, exacerbated supply problems. With demand growing ahead of supply, metal prices increased sharply and, despite significant easing in prices throughout 1989-90, have remained high by historical standards, (see Figure C8). Strong demand has also resulted in substantial price increases for iron ore and coal in recent years, though in the latter case this followed a prolonged period of surplus production capacity and low prices. The uranium market has remained depressed, partly as a result of large inventory holdings.

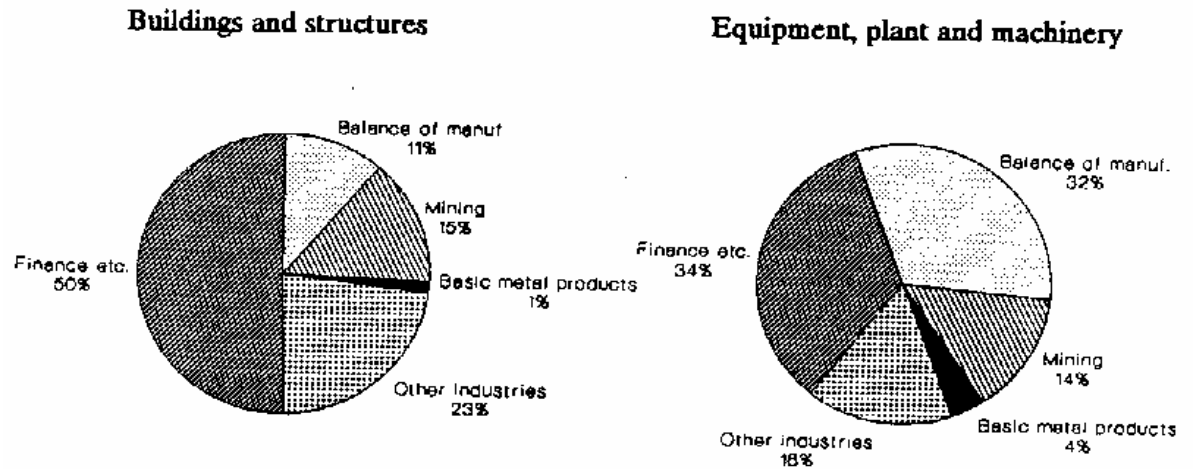
Figure C9 illustrates the course of prices (expressed in index form with 1984-85 equal to 100) for selected minerals for the period June 1985 through June 1990. Included are iron ore, coal (coking and steaming), copper, zinc, aluminium, lead, nickel and tin (based on $A per tonne data) as well as gold (based on $A per troy ounce data). Also included in the series of graphs are Australian Mining Industry Council (AMIC) composite mineral price indexes expressed in nominal US and nominal and real Australian dollars, along with the $US/$A exchange rate.

Table C16: Private new capital expenditure by selected industries [a] and type of asset, 1987-88 and 1988-89
($ million and per cent)

Industry	*1987-88*	*Share*	*1988-89*	*Share*
	($m)	(%)	($m)	(%)
Buildings and structures				
Resource sector[b]: of which	1 752	(21)	1 624	(16)
Mining	1 619	(19)	1 479	(15)
Basic metal products[c]	133	(2)	145	(1)
Balance of manufacturing[d]	803	(9)	1 114	(11)
Finance, property and business services	3 911	(46)	5 123	(50)
Other selected industries	2 066	(24)	2 296	(23)
Total	8 532	(100)	10 157	(100)
Equipment, plant and machinery				
Resource sector[b]: of which	3 078	(20)	3 137	(18)
Mining	2 205	(14)	2 407	(14)
Basic metal products[c]	873	(6)	730	(4)
Balance of manufacturing[d]	5 262	(34)	5 605	(32)
Finance, property and business services	2 452	(16)	5 819	(34)
Other selected industries	4 797	(31)	2 742	(16)
Total	15 588	(100)	17 303	(100)
Total new capital expenditure	24 120			

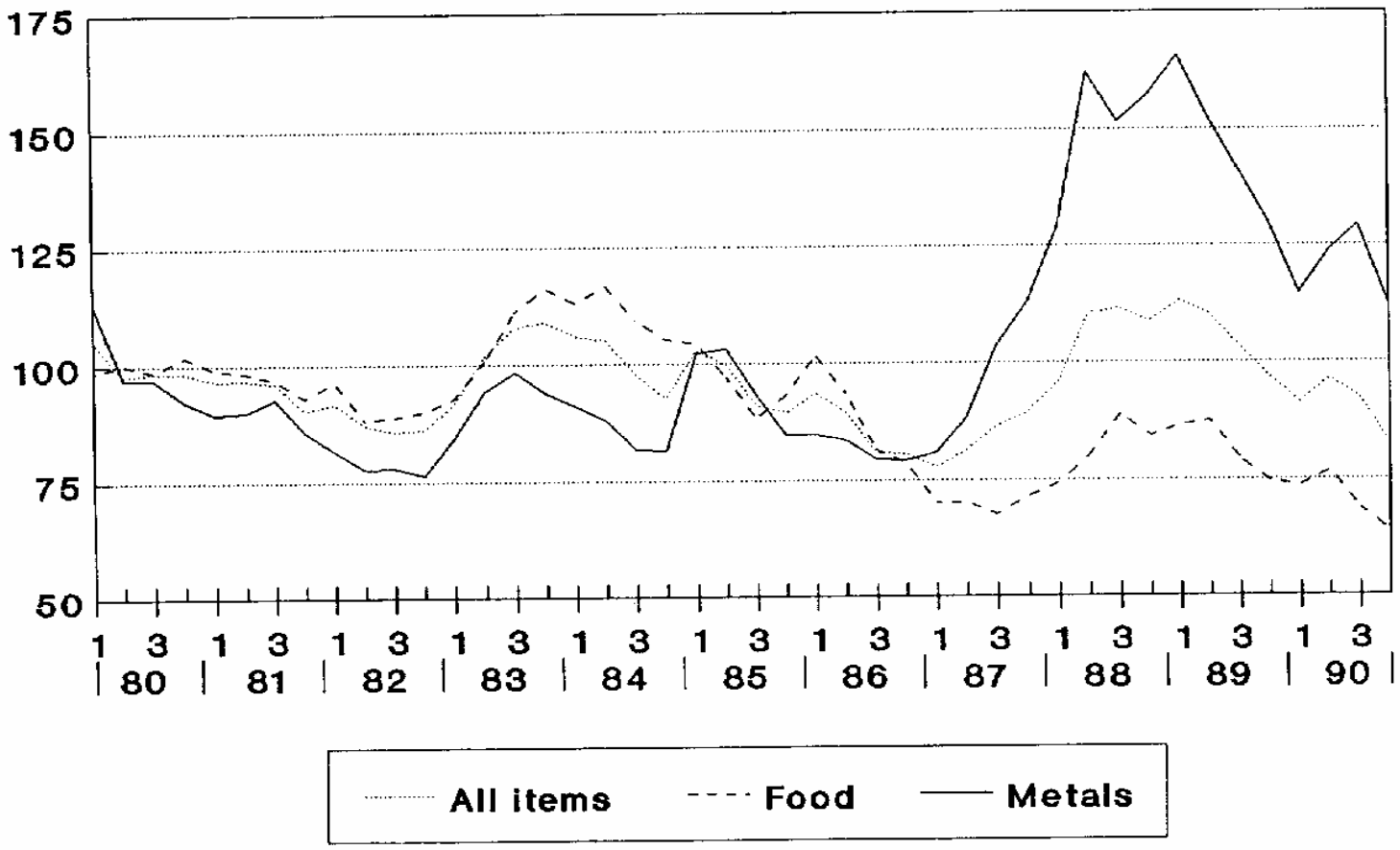
Note: Components may not add to totals due to rounding errors.
a Excludes public sector and all industries classified to agriculture, forestry, fishing, hunting, community services and construction.
b Defined as comprising mining and basic metal products industries.
c Estimated by proportioning total new capital expenditure by the basic metal products industry between the buildings and structures and equipment, plant and machinery categories based on relative spending by the manufacturing sector as between these two categories.
d Manufacturing, excluding basic metal products.
Source: ABS 1988b and ABS 1989c.

Figure C7: Private new capital expenditure by industry, 1988-89



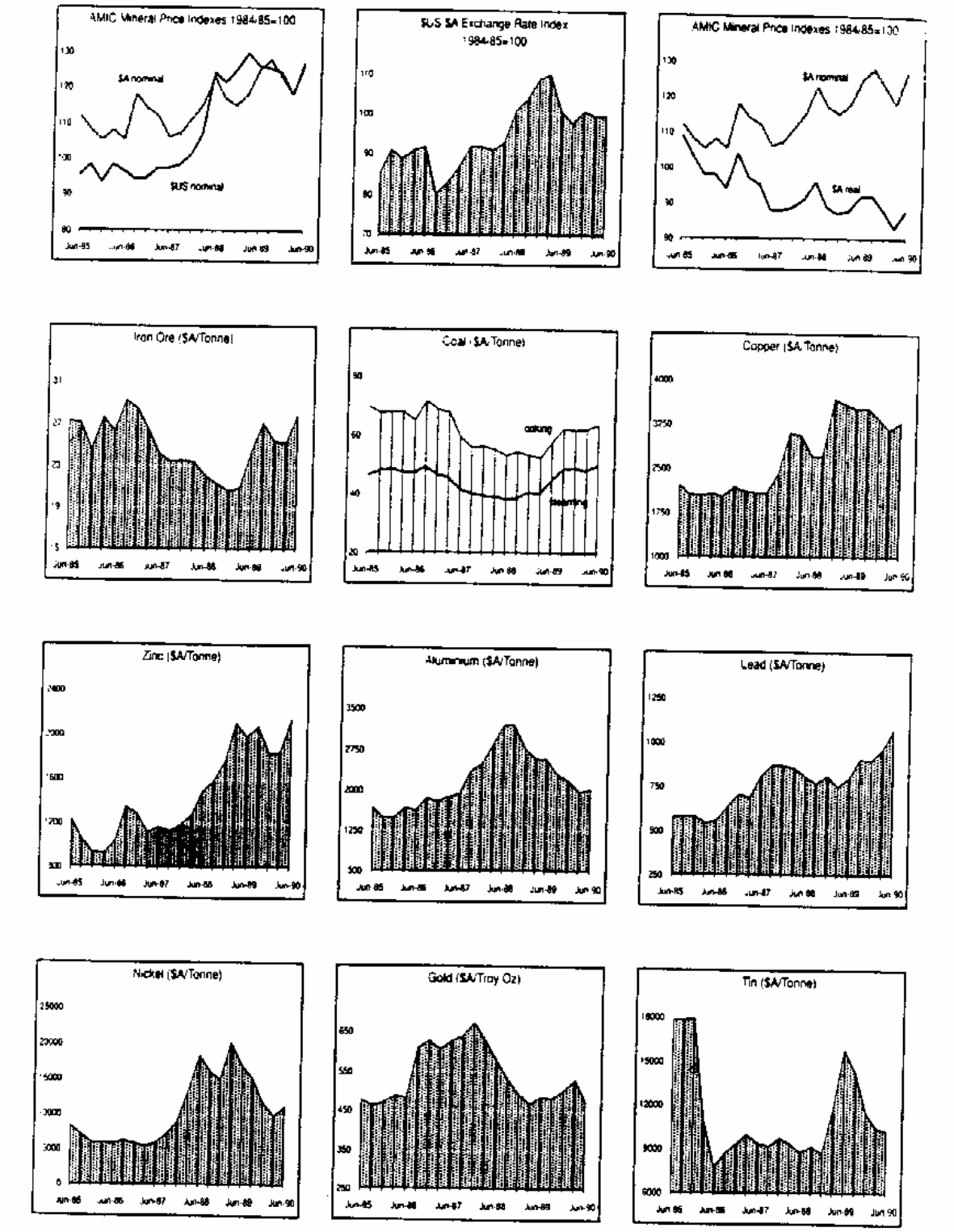
Source: Table C16

Figure C8: Indexes of commodity prices - metals versus food and all commodities, 1980-1990 (1980=100)



Source: Commodity statistics compiled by *The Economist*

Figure C9: Mineral prices, June 1985-June 1990



Source: AMIC 1990

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APPENDIX D

MINERAL EXPLORATION

D MINERAL EXPLORATION

Exploration is fundamentally important to the mining industry, because without an adequate flow of new mineral discoveries the industry will eventually ceases to exist. Expenditures on exploration in Australia are amongst the highest in the world, with most exploration in Australia being conducted by international companies attracted to local conditions (although this may be changing). Geological conditions are not favourable to exploration in Australia, because intense weathering has destroyed most surface clues which might indicate the presence of sub-surface mineralisation. Partly because of this, exploration in Australia tends to be a time-consuming and expensive activity, with low rates of success. Nevertheless, levels of exploration have remained relatively high because such expenditures are as much determined by market and other factors as geological conditions.

D1 What is exploration?

Western Mining Corporation (WMC) describe (sub. 69, pp.11-12) the process of exploring for minerals as follows (more details on which can be found in Attachment D1 to this appendix):

The *mineral exploration phase* is a sequential information gathering process commencing with a *conceptual stage* - before exploration begins on the ground - where geoscientists formulate exploration concepts as the basis for selecting the particular ground perceived by the explorer as possibly being favourable for a target or range of target minerals. ... The choice of target minerals may be dictated by markets conditions, but in many cases this will not override the process at this stage. Following the development of these concepts, *primary exploration* is undertaken. This involves subjecting land identified in conceptual studies as `favourable' to a series of tests ranging from non-destructive, remote techniques such as studying Landsat images, geomagnetic and geochemical surveys, progressing to more detailed `on-the-ground' sampling, seismic surveying and eventually to drilling. This is the first stage at which physical access to the land becomes important. Mineral deposits are generally located by drilling, although in the past surface deposits or deposits with a surface expression were often located by sampling. At this stage a deposit has been discovered, but its ultimate size or value remains unknown. This is the object of the *delineation stage* which involves systematic sampling of the deposit by drilling or trenching to identify its physical size (boundaries), the grade of the deposit and the distribution of grade over the deposit as well as other physical characteristics. Decision points exist at, and within, each stage of the exploration phase. These involve the commitment of financial and physical resources which entail opportunity costs where choices must be made in favour of one area as opposed to another, or to step up one type of exploration activity as against another.

Thus, successful mineral exploration requires knowledge of how orebodies are formed in order to select promising areas which appear to display favourable combinations of geological, mineralogical, and geochemical factors involved in ore genesis. "Ore deposits are not merely exotic features that develop randomly - they are intrinsic parts of their geological setting" (CSIRO 1986, p.12).

Clearly, mineral deposits are not easy to find - with deposits having obvious surface expressions representing extremely rare exceptions. Mineral deposits of economic significance are infrequent, highly anomalous occurrences typically hidden in a complex geological and geomorphological setting. Thus these types of resources are not readily identified and assessed, as is the case with other natural resources such as forests and land suitable for agriculture. Mineral deposits must first be discovered, and then delineated and their grade assessed. Even the largest ore bodies are small in size relative to areas which are considered to be prospective.

For the purpose of collecting statistics on exploration expenditures, the Australian Bureau of Statistics (ABS) adopts the following definition of exploration (ABS 1990, p.484):

> Exploration consists of the search for new ore occurrences or undiscovered oil or gas and/or appraisal intended to delineate or greatly extend the limits of known deposits of minerals or oil or gas reservoirs by geological, geophysical, geochemical, drilling and other methods.

D2 Changing nature and importance of exploration

To retain and foster competitive mining and mineral processing industries in Australia, an adequate flow of new mineral discoveries needs to be maintained. This is the function of exploration and its importance as the "lifeblood of the mining industry" (Normandy Poseidon Group, sub. 11, p.1) was emphasised by many inquiry participants (eg the Australian Mining Industry Council (AMIC), CRA, and WMC).

Despite the endearing and hopefully enduring qualities of the A. V. Barkers of this world, we can no longer rely on lucky prospectors to maintain this flow. Most explorers now seem to agree that the nature of exploration for minerals in this country is changing. As pointed out by the Commonwealth Scientific and Industrial Research Organisation (CSIRO):

> Most existing mines in Australia work orebodies which were exposed at the time of their discovery, or were easily located by distinctive surface expressions. Over the last two decades, increasingly complex techniques for locating such `outcropping orebodies' have had many notable successes, for instance the Kambalda nickel and Telfer gold deposits in Western Australia. While miners may continue to find exposed orebodies of unrecognised types, most explorers think that the emphasis must shift to locating concealed orebodies. (CSIRO 1986, p.8)

In a similar vein, the Normandy Poseidon Group (sub. 80, pp.1-2) described mineral exploration and its evolving nature in Australia as follows:

Mineral exploration involves as diverse an array of exploration methodologies as there are classes of exploration targets. Energy minerals, such as oil, gas and coal occur in unmetamorphised and little deformed sedimentary basins. Knowledge of a relatively limited part of such basins can indicate the probability of economic deposits being present, even though a great deal of exploration effort may be necessary to locate and define such deposits. This does not apply to metallic deposits which usually occur in deformed and intruded metamorphic rocks and intrusive complexes. If exposed at the surface, many have distinctive expressions in the weathered zone which help in their discovery. However, most exposed deposits have been mined out or are being mined now. It is most likely that all the large deposits exposed at the surface have been discovered. Therefore, the bulk of exploration for metallic mineral deposits is aimed at locating buried ore deposits. This is because only large deposits are capable of returning the full costs of exploration and development. An example of the buried deposits being sought is the Roxby Downs deposit, a very large copper-gold-uranium deposit which is buried beneath 300 metres of younger, unmineralised rocks.

D3 Who undertakes exploration in Australia?

Mineral exploration is primarily a private enterprise activity in Australia. However, governments play a supportive role by conducting research and providing the maps and other basic information which exploration companies need to define prospective regions.

A number of participants pointed out that exploration is increasingly becoming an international activity dominated by multinational companies, with explorers (including Australian-based ones) directing their efforts in whatever country appears to offer the best prospects at the time. Table D1, which reports exploration expenditures for selected countries over recent years, shows that Australia has been something of a preferred target for exploration in this regard.

Table D1: Minerals exploration expenditure by country, 1982-87
($US million)

Country	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*
Australia	473	339	326	281	273	363
Canada	381	353	368	359	540	641
USA	367	332	309	189	180	226
South Africa	105	114	108	78	101	162

Source: CRA (sub. 73)

A recent minerals policy survey conducted by the East-West Centre (a Hawaii-based non-profit educational institution) ranked Australia as the most favoured place to explore for minerals - based on the combination of a country's geological potential, its political stability and government mineral policies (see report in the Australian Financial Review of 13 March 1990, reproduced in Volume 4). "Gaining the right to mine was considered the most important political factor, followed by the right to repatriate profits, the ability to gain or retain management or equity control, and to establish fixed tax terms and fixed rules for the life of a mine."

A number of participants commented on this rather rosy picture. For example, in CRA's view (sub. 73, p.23):

> Australia is in danger of losing some of this advantage. Obtaining access to land is becoming more difficult (and more expensive if up-front bidding becomes common), whereas access to land overseas is generally getting easier. This is causing exploration companies, including CRA Exploration, to review their priorities and increase the proportion of their budgets spent outside Australia.

Most of the money spent on exploration (other than for petroleum) in Australia in 198485 (52.3 per cent) was accounted for by other than Australian-controlled companies (ie foreign controlled (35.8 per cent), with joint foreign and Australian controlled and naturalised and naturalising enterprises accounting for the other 16.7 per cent)(ABS 1986). This was down on the figure for 1975-76 (the last time such statistics were collected) when the corresponding figure was 63 per cent.

In terms of domestic exploration expenditures, some of the funding comes from producing mines where a proportion of profits is set aside for exploration, but most of it comes from public companies, floated specifically to undertake exploration. Cook (1990) states that many smaller exploration companies have, however, found it difficult to raise funds in the post-1987 financial environment.

Actual exploration is carried out by prospectors, junior explorers/miners and large corporations. Prospectors in the popular sense of individuals searching the land surface for mineralisation clues seem to be becoming a dying breed. Large companies monitor the efforts of smaller groups, who may discover a resource whose exploitation is beyond their ability to finance.

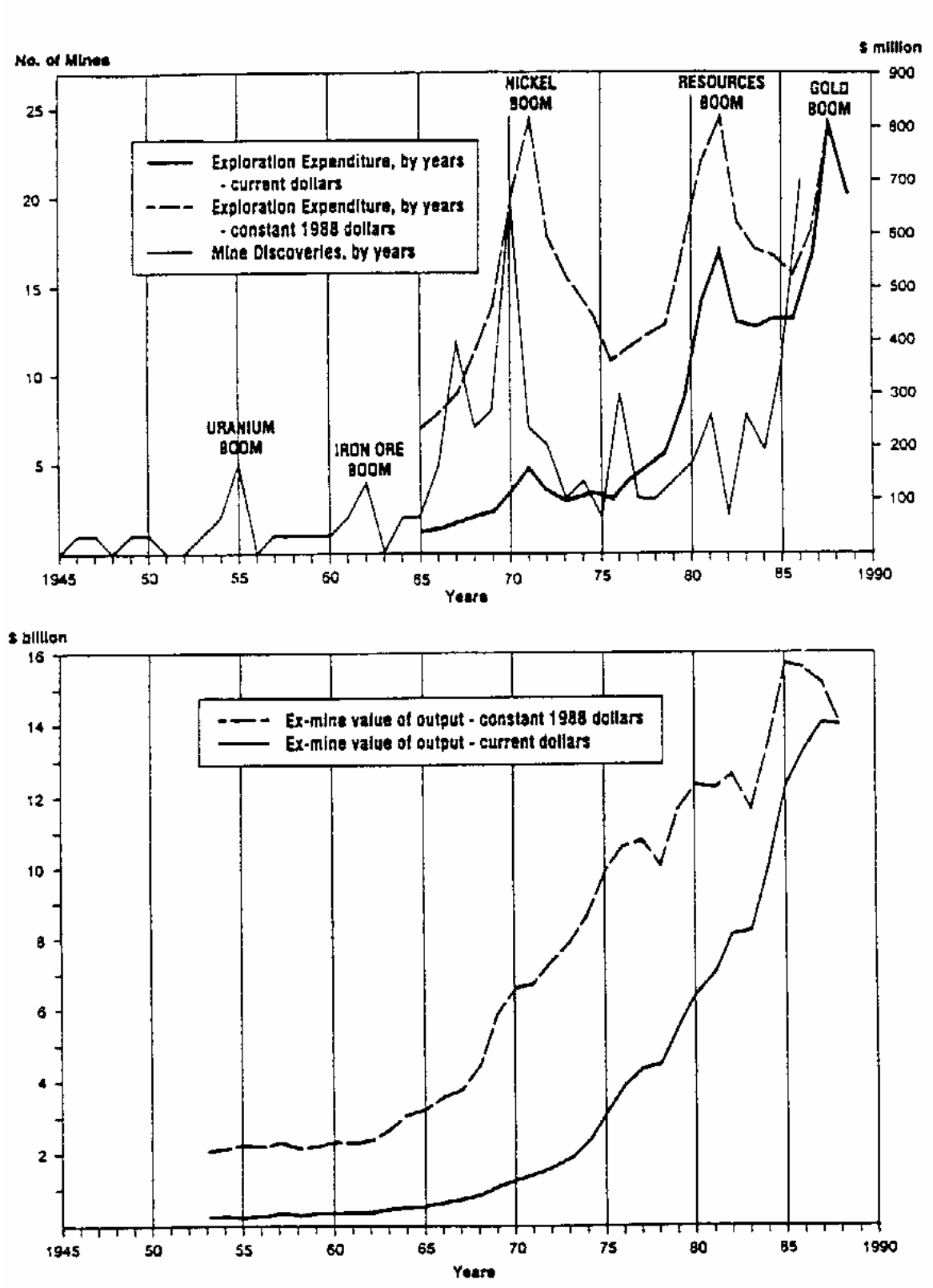
D4 Current trends in exploration in Australia

CRA (sub. 73, p.27) reported that, to date, explorers have discovered approximately 500 mineable mineral deposits of note in Australia - compared with about 400 in the USA and around 300 in Canada.

There have not, however, been many recent finds of significance in Australia. Commenting on this unfavourable trend, Lambert (1990) remarked that "The past decade, in which there were no major discoveries, was not a good period for base metals exploration", while Skye (1990) pointed out that only three discoveries have become producers in the last fifteen years.

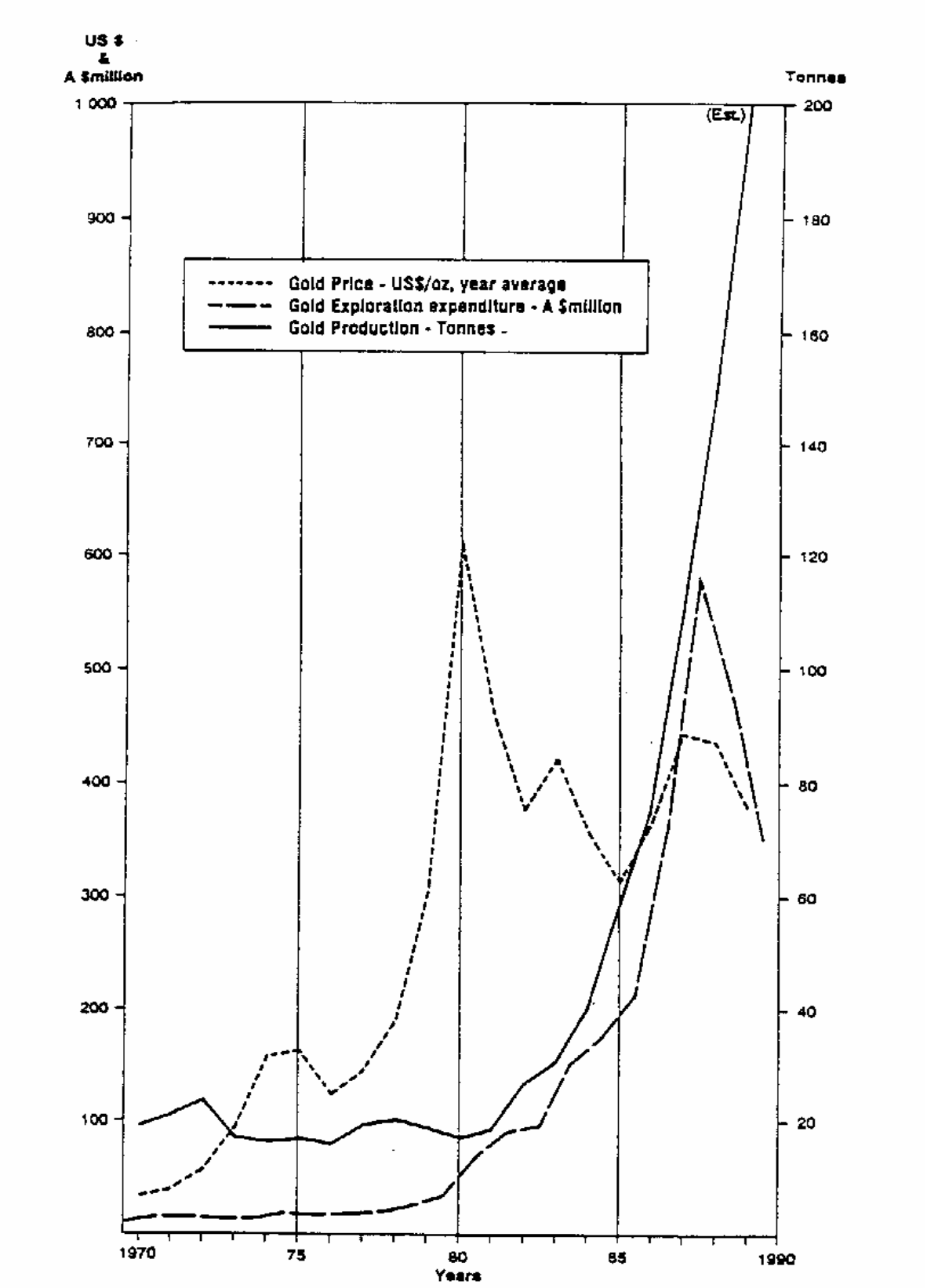
In its submission, the Normandy Poseidon Group included graphs (reproduced here as Figure D1 and D2) showing exploration expenditures in current and constant (1988) dollar terms, mine discoveries and the ex-mine value of output in current and constant dollar terms for the period since the Second World War. In the twenty five years to 1980, over $1ÿ600 million was spent on exploration. In the 1970s exploration

Figure D1: Exploration expenditure, number of mines and ex-mine value of output, 1945-89



Source: Normandy Poseidon Group (sub. 11)

Figure D2: Gold price, gold exploration and gold production, 1970-89



Source: Normandy Poseidon Group (sub. 11)

expenditures were equivalent to about 10 per cent of the value of mine production. During the 1980s, this has declined to about 5 per cent of the mining industry's turnover. This progressive decline may be attributable in part to the success of the earlier programs in discovering ample reserve deposits of many minerals, and in part to the fact that significant deposits are becoming increasingly difficult to discover.

Table D2 shows that over the five year period to 1988-89, private mineral exploration in Australia has increased by about 60 per cent, peaking at $800 million in 1987-88.

The States with the largest expenditure, Western Australia (60 per cent of all exploration in Australia), Queensland (20 per cent), and the Northern Territory (10 per cent), also have had the highest exploration growth rates over the period (110 per cent, 70 per cent, and 170 per cent respectively). The biggest loser is South Australia, where exploration has plummeted from 13 per cent of national exploration to 2 per cent over the period. The table shows the volatile nature of exploration, with exploration within a State increasing two-fold (Victoria) or decreasing four-fold (South Australia) in a single year.

Table D2: Private mineral exploration (other than for petroleum): expenditure by State/Territory, 1984-89
($ million)

State/Territory	*1983-84*	*1984-85*	*1985-86*	*1986-87*	*1987-88*	*1988-89*
New South Wales	55.6	49.5	51.8	47.6	61.5	51.1
Victoria	11.1	15.2	12.3	15.5	33.9	21.4
Queensland	80.7	9.5	88.6	120.6	159.3	133.4
South Australia	54.4	57.6	48.9	11.0	18.9	16.5
Western Australia	184.7	189.8	205.2	323.3	466.3	392.0
Tasmania	18.0	17.8	10.6	10.9	10.4	15.1
Northern Territory	24.2	28.0	24.6	27.9	48.9	66.9
Australia	428.7	437.3	422.0	556.8	799.2	696.5

Source: ABS 1990

Table D3 shows gold to be the most sought after mineral, accounting for three quarters of all exploration expenditure in 1988. Expenditure on gold exploration has risen more than six-fold over the period, from under $100 million in 1982-83 to almost $600 million in 1987-88.

There are a number of reasons for this. Lambert (1990) says that gold has `traditionally' accounted for around 40 to 50 per cent of exploration expenditure. Gold is both easier to find and to mine than most other minerals, so supply is more responsive to favourable market conditions. To some extent, exploration companies search for either gold, or other minerals, so any increase in gold exploration means a decrease in other exploration.

The next most sought after minerals were the copper group (copper, lead, zinc, silver, nickel, cobalt), which, at 11 per cent of total expenditure, are well down from their `traditional' 30 per cent. Uranium, coal, diamonds and `other non-metallic' all had about $20 million devoted to exploration.

The table shows that mineral exploration is a very volatile activity, with expenditure devoted to the search for some minerals (eg uranium) increasing four-fold, with others (eg construction materials) decreasing by the same amount within a single year.

Apart from gold, the other areas of rapid exploration growth were mineral sands (over 500 per cent growth), and `other gems' (300 per cent) Tin is the biggest loser, with exploration falling by 90 per cent, going from the third most sought after mineral after gold and copper in 1982Ä83, to the least sought after mineral in 1986-87.

Table D3: Private mineral exploration (other than for petroleum): expenditure by type of mineral, 1983-88
($ million)

Mineral	*1983*	*1984*	*1985*	*1986*	*1987*	*1988*[a]
Copper, etc[b]	130	138	135	79	77	84
Gold	96	152	177	215	357	581
Iron ore	10	9	16	12	12	12
Mineral sands	2	2	2	6	7	13
Tin, etc[c]	32	22	14	8	3	3
Uranium	37	20	13	50	22	23
Other metallic	11	6	8	7	10	13
Coal	61	44	35	32	37	25
Construction materials	2	1	1	2	3	1
Diamonds	51	27	29	23	17	24
Other non-metallic	5	7	8	9	11	21

a ABS final issue.
b copper, lead, zinc, silver, nickel, cobalt.
c tin, tungsten, scheelite, wolfram.
Source: ABS 1989

D5 Factors influencing exploration

Physical considerations

A harsh climate and large distances in Australia combine to make for expensive exploration. As Green (1990) points out, such physical factors conspire to make exploration in Australia "a difficult, uncertain and expensive activity".

As well, geological factors do not favour Australia compared to many other countries. Australia's ancient land surface has been widely subjected to intense weathering, such that an oxidised mantle, 100 metres deep in places, suppresses or interferes with many of the physical and chemical clues that overseas exploration techniques are designed to detect (CSIRO 1986, p.9).

Also, several countries have richer ore grades than Australia (eg according to Crowson (1983) Zaire's copper deposits are twice as rich as Australia's). Deposits in most countries are also generally less expensive to find. Green (1990) reports that it costs four times as much to find a base metal deposit in Australia than it does in Canada, our main competitor. Mackenzie and Woodall (1983) also claimed that it takes four times as long.

Social factors

There are also a host of social factors which influence exploration. Despite its `unfriendly' geology, Australia is popular with exploration companies because of its political stability and government mining policies which have been generally considered to be favourable. In particular, mining companies have supported government policies on release of information - which ensures that exploration results are eventually made available to all. They also generally feel that, at least up until the late 1970s, Australian governments were helping their efforts by providing useful basic geoscientific information (eg geological maps) which were sufficiently up-to-date to be of considerable value.

On the other hand, explorers complain that, compared to some of its competitors, Australia has more `red tape' to negotiate. Also, because mining costs are relatively high here, Australian discoveries need to be of higher quality than they do elsewhere, which lowers the reward-to-effort ratio for Australian exploration.

Similarly, the increasingly vexed issue of competition for the use of land (see discussion in Volume 3) adversely affects exploration. For example, Dominion Mining Ltd (sub. 9, p. 1) reported that, in the Northern Territory (where Aboriginals own approximately half the land), there have been only 24 exploration licences granted since 1976 on Aboriginal land, compared to 755 since 1982 in the other half of the Territory. This appears to be mainly due to mining companies judging that high negotiation costs in respect of Aboriginal land is likely to render exploration uneconomic.

Mackenzie and Bilodeau (1984) found that exploration is only marginally economic on average in Australia anyway. They estimated the expected cost to find and delineate an economic deposit at around $38 million (spread over a number of years). Discounted back to the beginning of the exploration phase (using a discount rate of 10 per cent), this figure became $19 million. The average return at that time was estimated at $23 million, yielding an average profit of $4 million. This represented an 11 per cent rate of return, only marginally above the calculated 10 per cent cost of capital.

Regarding the (then) current tax regime, on the one hand they found that it benefited exploration because of the tax deductibility of such expenditures, thereby reducing exploration costs from $19 million to $11 million. On the other hand, the taxation regime reduced the value of mine income from an average $23 million to $9 million, giving an overall expected return to exploration of (minus) $2 million.

Market factors

It seems that market conditions, more than geological or other unfavourable factors, determine when, where and how much exploration is carried out in Australia. Sources and levels of demand, price fluctuations and exchange rate variations are all important. As the Normandy Poseidon Group (sub. 11, p.4) put it:

> Exploration and development are parts of a complex process and are affected by many factors ... but market forces are by far the most important.

The prime factor affecting exploration is external demand, either actual or anticipated. Historically, the level of exploration expenditure has fluctuated in sympathy with peaks of mineral prices and demand. The lag between market movements and changes in the levels of exploration, at least for base metals appears to be in the order of one to three years.

Levels of exploration in Australia tend to be characterised by boom and bust cycles. For example, there have been periods of depressed exploration activity in the middle of each of the last three decades. Lambert (1990) reports that there is an expectation of a general downturn over the next five years, but not as severe as the preceding episodes (as anticipated falls in interest rates, the dollar and inflation are all favourable signs).

The long-term trend in prices for most minerals has been down, not up, which adds an incentive to find and mine minerals now rather than later (see Volume 3, Attachment 8A for evidence on this). On this aspect, CRA (sub. 73, p.29) claimed that "the economic rent due to time may be negative and is highly uncertain".

D1 NATURE OF EXPLORATION

Time, money and risk

Exploration is a process that consumes large amounts of time and money, and involves only a small probability of significant return.

Mackenzie and Bilodeau found that companies spend from 5 to 40 per cent of their after-tax cash flow on exploration investment. The Normandy Poseidon Group (sub. 80, p.2) said that:

> [We think] in terms of a 25 year commitment to exploration at a substantial expenditure level, currently $15 million per year, to have a reasonable expectation of making a major discovery.

MacKenzie and Bilodeau also estimated that for an exploration to be 90 per cent confident of making at least one discovery, an expenditure of about $86 million is required. The Normandy Poseidon Group (sub. 80, p.2) reported that "The chance of success in the first target area may be 1 in 10 000 or worse. Many companies are unable to maintain the commitment and expenditure for long enough and fail to make a significant discovery".

Skye (1990, p 2) reports that:

> Aberfoyle spends about 7.8 per cent (about $10 million) of its annual revenue on exploration. It equates to the research expenditure of manufacturing industries. It is a very large percentage by any industry standard, but it is deemed essential for survival.

Usually, particular mineralised belts are chosen and explored for several years at a rate requiring $0.5 million a year or more, and it can take up to ten years from initial exploration before production commences - if indeed an economic mineral deposit is found at all.

Green (1990) states that when a mineable deposit is found, exploration typically comprises 30 per cent of all expenditure involved in its development and production life.

The exploration process

Green (1990) describes exploration thus:

> The exploration process is a deceptively simple sequence of area selection followed by information acquisition, interpretation and, finally a decision. The decision to either stop exploring, start digging, or get more information is usually based on economic arguments.

Each succeeding stage of exploration is likely to be more costly than the preceding one. It is important that each stage narrows the area of search until final subsurface investigations can be focused on a precise target.

Concepts phase

> This first phase begins with a literature search, and selection of theoretically favourable areas. Eligible areas involve millions of square kilometres, and this phase may take a couple of years. On average, the expense entailed in this phase is reportedly about $250 000.[1]

CRA (sub. 73, p 25) stated that:

> First generation discoveries were made through empirical observations by prospectors, second generation discoveries where made through technical surveys ... we are now starting the third generation of discoveries that are essentially conceptual, based on scientific identification of areas where ore is predicted to occur. This latter approach particularly requires intensive desk and laboratory work to select favourable areas, followed by field work over extensive areas of land.

Many small companies contribute significantly in this early phase of exploration, which is characterised by intense use of specialised labour.

AMIC (1990) still considers that the essential ingredients for successful exploration are the human ones of "very keen powers of observation coupled with tenacity, patience and a little luck". But the increasing application of new techniques has meant that, nowadays, to a large extent these qualities are utilised off tenement and largely based on information gathered by earlier explorers. Ninety per cent of exploration projects - often having had over a million dollars spent on them - never actually reach the stage of surface exploration (AMIC 1990).

N. Byrne and Associates (sub. 62, p.2) stated:

> Most mineral deposits discovered in recent years have been found on previously explored ground, utilising the accumulation of geological, geophysical and geochemical knowledge left by previous explorers who may not be looking for the same target mineral.

Because of advances in theory and technology, WMC (sub. 69, p.18) considered that:

> It is of critical significance to understand that ground can never be `fully explored'. New ideas can result in the reassessment of areas previously explored without success or considered `worked out'. The discovery of nickel deposits in the Kalgoorlie are is one such example.

Explorers must now apply advanced procedures and instruments to detect potential deposits. Conceptual and comparative studies determine the `geological model' appropriate for the target mineral. Regions where the major land forms and rock types are such that a particular geological model is likely to explain are then identified from information already to hand.

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[1] Figures for time, cost and areas involved in each exploration phase are principally sourced from WMC (sub.69, pp.12ff)

Reconnaissance phase

This phase focusses on geophysical surveys of land identified as favourable by conceptual studies. The areas typically searched still involve hundreds of thousands of square kilometres, the time it takes is measured in years, and the expense entailed often exceeds a million dollars.

Most of the exploration in this phase is done by what is known as `remote sensing' - a term which applies to a variety of techniques including satellite imagery, conventional and infrared aerial photography, airborne geophysical surveys to detect magnetic and gravitational anomalies, helicopter-borne radiometric surveys (measuring radioactivity), and side-looking radar.

Typical mineralisation clues provided by remote sensing include such things as the alignment and intensity of faults and fractures in the earth's crust, the presence of domed or dish-shaped rock structures and rocks that have been formed or altered by volcanic activity. Other detectable features may also be of significance (eg the distribution of vegetation types can provide clues to subsurface conditions). Significant skill can be required to interpret the data resulting from such surveys.

Surface exploration phase

When remote sensing has suggested a promising area, surface examinations commence. This is often the first time that geologists actually set foot on the ground, and heavy vehicles are not usually used at this stage. The area involved can still cover tens of thousands of square kilometres. Again, the time involved to complete this stage may take one to two years. This is one of the more costly phases, with expenditures commonly ranging up to $5 million.

Because modern exploration is based on theories which identify large areas as potentially favourable, access to larger tracts of land is increasingly required. AMIC (1990) estimates that while only 0.02 per cent of Australia's land surface is under mining or mining purposes title at any time, 12 per cent of the land mass is actively being explored.

More detailed exploration maps (than standard government-supplied ones) are usually prepared during this stage. Because certain types of minerals are known to be only associated with certain types of rocks, it is important to identify as early as possible the rock types in the exploration area. Sampling and testing of rock outcrops, together with field observations of structural features, all assist in interpretation of the geological processes that were involved in the formation of the land under examination.

Geochemical surveys measure the chemical properties of rocks, soil, stream sediments, roots, leaves and other material in the environment to detect abnormal chemical patterns that may be suggest mineral concentration.

When orebodies form, metals or other elements in the surrounding rock usually exceed background concentrations. The affected area is called the `halo'. As weathering occurs, material from the halo and the orebody may be eroded and spread throughout the surrounding environment. This distribution or dispersion of ore minerals or indicator elements is called `secondary dispersion'.

But, as noted before, Australian surface geology seldom yields many clues about subsurface mineralisation. Subsurface work carried out at this stage usually is aimed at measuring magnetism, radioactivity, density, and electrical resistance. Because of the expense involved in drilling, actual subsurface samples are not usually taken during this phase.

Subsurface exploration

By this stage the target area has usually been reduced considerably, to less than a thousand square kilometres, and the time factor is down to about a year. The expensive involved has not lessened, though, and is still up to $5 million. Only about one in a hundred exploration projects ever reach this stage.

It is not usually until an `anomaly' (that is a local feature or rock type distinguishable from its surroundings by its geophysical or geochemical properties) has been identified - and surface testing has revealed it to be a possible orebody - that any attempt is normally made to obtain a subsurface sample.

AMIC (1990) report that "the cost of drilling is high and each drill hole is carefully located on a specific target which has been identified as the result of a step by step process".

Deposit delineation and evaluation phase

This phase, if it occurs, is limited in area to the deposit size - which is usually minute compared to the initial area. For example, AMIC (1990) reports that the Argyle pipe diamond deposit, "although major by world standards represents only 0.0047 per cent of the 9ÿ500 square kilometres that were surveyed by aeromagnetics and an even lesser percentage of the region first identified as the basis for a diamond exploration program." Again, the time taken can be up to a year, and the expense still several million dollars.

If a deposit is found, it is still unlikely that it will be economic. Evaluating the size and quality of a discovery is an essential part of the exploration process. The delineation stage involves systematic sampling of the deposit by drilling or trenching to identify its physical extent, the grade of the deposit (and grade distribution), as well as other physical characteristics. This delineation often proceeds in parallel with mining operations.

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APPENDIX E

THE ECONOMICS OF INDIVIDUAL MINING OPERATIONS

E THE ECONOMICS OF INDIVIDUAL MINING OPERATIONS

This appendix reports results from a simulation model of a hypothetical mining and minerals processing project involving a remotely located metalliferous mine (and associated onsite treatment facilities) producing ore which can be exported as a saleable product in its ex-mine form. Alternatively, ore can be despatched to a domestic smelter/refinery for further processing in Australia with the resulting product either being exported or sold on the domestic market.

The model concentrates on the underlying economics of the project, that is on anticipated costs and benefits as a guide to decision-making - such as how much ore to export and how much to further process in Australia. It has been specially constructed to illustrate many of the issues discussed in this report, including demonstrating the sensitivity or viability of mining/minerals processing projects to:

. changes in the exchange rate, interest rates and perceptions of sovereign risk;

. royalty arrangements imposed by governments (including comparing ad valorem, specific and pure-rent royalties);

. charges for transport and handling services;

. variations in labour costs and productivity (and to more flexible labour arrangements); and

. delays.

Activities represented in the model include: having to devote human and financial resources to exploration; provision of mine-related infrastructure; establishment and maintenance of the mine and associated onsite treatment facilities; the necessity to undertake minesite rehabilitation work once mining ceases; smelting/refining of ore; and necessary transport and handling services.

Based on maximising net benefits (ie anticipated revenues less costs) on a period-by-period basis, decisions are made about what proportion of ore to export and, in the case of mine outputs which it is profitable to subject to further domestic processing, what proportion of smelter/refinery product to sell on world markets (as opposed to selling on the domestic market). More specifically, assuming specific settings for `givens' such as:

. an appropriate (real) discount rate;

. the size of any `risk premium' demanded by lenders of those wishing to invest in mining and minerals processing ventures in Australia;

. the exchange rate;

. prevailing world prices for ore and smelter/refinery product exports; and

. royalty arrangements imposed by governments -

and (project-specific) costs such as those involved in:

. undertaking exploration;

. providing necessary infrastructure;

. mine establishment and provision of on-site processing facilities;

. mine operation;

. transport and bulk handling of ore to port and, in the case of ore which is to be further processed domestically, further transport/handling of ore; and

. smelter/refinery operation -

the object of the simulation model is to determine, in respect of each period in which the project remains a viable proposition, that combination of:

. mine outputs;

. ore exports;

. smelter/refinery exports (and domestic sales); and

. labour and capital needed to operate the mine, associated onsite treatment facilities and the smelter/refinery -

such that the net present value of any surpluses associated with the project are maximised. (Optimal activity levels will include smelting/refining operations only if further domestic processing of ore is a cost/effective activity to undertake, compared with the alternative of exporting ore).

A complete description of the model, including its expression in mathematical form, can be found in Attachment E1, while Attachment E2 reports detailed results from the `base simulation' which is intended to serve as a basis of comparison for the other simulations - in which, typically, the setting for a key variable is changed (eg interest rates are increased, a devaluation of the Australian dollar occurs, or increased productivity flows through to reduce mining and/or refining costs).

Dollar-denominated results from the model, such as revenues and costs, are all reported in constant value terms (ie they are already adjusted for the effects of inflation). Cost and revenue streams are also discounted back to the base period to facilitate comparisons between simulations.

Possible sources of project revenue are:

. from ore or smelter/refinery product exports; and

. from selling smelter/refinery product on the domestic market - while

major costs recognised in the model are:

. non-mining costs (exploration expenditures, the cost of providing necessary infrastructure to support the mine, mine establishment costs together with associated onsite treatment facilities, and rehabilitation expenses);

. mining costs (mine operation and transport charges to get ore to port, and bulk-handling charges to get ore onto ships for export);

. smelting/refining costs (transport/handling charges to ship ore for further domestic processing, smelter/refinery operation, and transport handling charges to get any product destined for export to port and loaded on ships).

E1 Setting up a basis for comparison

By making a series of assumptions about the expected values of a host of variables - such as world prices for ore and refined product, the $A exchange rate and the determinants of the various components of the cost of the project (see Attachment E2 for details) - and given the structural relationships underlying the model (see Attachment E1), a standard or `base' simulation was run, the results of which are reported in column 1 of Table E.1 (and replicated in column 1 of each of Tables E.2 through E.5).

The base simulation sets out the underlying economics of the hypothetical mining/mineral processing project, with the mine situated 100 kilometres by rail from the nearest port - from which ore can be shipped in bulk either direct to foreigners (ore exports) or around the coast to an associated smelter/refinery for further domestic processing. If it is cost-effective to further process ore from the mine in Australia (rather than export it at the earliest possible stage in the value-adding process, ie in the form of ore), there is then the question of whether to sell smelter/refinery product to foreigners (product exports) or on the domestic market (where it is assumed that local competition forces sales to be made at prices which reflect domestic production costs, including a normal return on capital employed).

In the `base case' simulation reported here (and detailed in Attachment E2) it is profitable to operate the mine for 8 years (starting in year 7 and ending in year 14), in the process incurring non-mining costs with a present value of some $57 267 227, as a result of having:

. undertaken exploration (at the rate of $1 000 000 annually) for the first 6 years (and continuing efforts at delineating the orebody in year 7, involving expenditure of a further $1 000 000), with the present value of this expenditure stream amounting to $5 786 373;

. provided necessary infrastructure to service the minesite (and any associated town) amounting to $7 000 000 spread over years 4 through 7 - see Attachment E2 for details - (with a present value equal to $5 339 082);

Table E1: Simulation results – sensitivity of project viability to changes in the exchange rate, interest rates and perceptions of sovereign risk
(Constant price dollar values and years of mine operation)

	Base case	*Devaluation*	*Increased cost of capital*	*Increased sovereign risk*
Present value of:				
Revenues: of which	1 862 029 965	2 429 739 277	1 830 596 977	1 154 773 783
Ore exports	575 828 857	0	775 490 947	376 091 234
Smelter/refinery exports	0	2 429 739 277	0	0
Domestic product sales	1 589 201 108	0	1 055 106 029	778 682 549
Costs: of which	1 393 866 311	1 758 954 087	1 387 787 432	859 458 842
Non-mining costs: of which	57 267 227	57 267 227	57 367 227	43 590 591
Exploration	5 786 373	5 786 373	5 786 373	4 868 419
Infrastructure	5 993 082	5 339 082	5 339 082	4 131 436
Minesite establishment	44 859 986	44 859 986	44 859 986	34 017 298
Restoration/rehabilitation	1 281 785	1 281 785	1 281 785	573 438
Mining/refining costs: of which	1 336 599 084	1 701 686 860	1 330 520 204	815 868 250
Mine operation	989 640 948	1 269 116 596	1 014 281 389	610 920 424
Transport/handling costs to get ore to port (including ore exports)	39 153 699	2 881 039	106 853 751	52 154 416
Transport/handling costs to ship ore for further domestic processing	222 286 620	308 942 175	147 640 908	108 933 418
Smelter/refinery operation	85 517 816	115 839 698	61 764 157	43 860 170
Transport/ handing costs to export final product	0	4 907 352	0	0
Rents from mine operation (revenues less mining costs)	525 430 881	728 052 417	500 076 772	338 905 533
Rents for overall project (revenues less costs)	468 163 654	670 785 190	442 809 545	295 314 942
Royalties	0	0	0	0
Period mine operational (years)	8	10	8	8

Source: Purpose-built simulation model of a mine and associated smelters/ refinery

. incurred mine and associated treatment facility establishment costs totalling $60 000 000 spread over 5 years, starting in year 4 - see Attachment E2 - (present value $44 859 986); and

. having to spend $500 000 annually during years 15 through 20 to restore/rehabilitate the minesite, after the cessation of mining (present value $1 281 785) -

and incurring other costs whose total present value comes to $1 336 599 084, the major components of which are:

. mine operation (present value $989 640 948);

. transport/handling charges to get ore to port, including ore exports (present value $39 153 699);

. transport/handling charges to ship ore for further domestic processing (present value $222 286 620); and

. smelter/refinery operation (present value $85 517 816).

More than offsetting all these costs (amounting to a total present value of $1 393 866 311) are revenue streams whose total present value is $1 862 029 965, generating an overall surplus (or rent) for the project whose present value is $468 163 654, comprising:

. ore exports (present value $272 828 857); and

. domestic product sales (present value $1 589 201 108) -

and a rent/surplus from the mining and smelting/refining operation by themselves of $525 430 881.

In the absence of some royalty arrangement to appropriate any of these rents/surpluses on behalf of the community as a whole (as `owner' of the mineral deposit), these monies would accrue to the mining company holding the relevant mineral rights.

Of course, some miners argue that none of these `rents' should be appropriated by government and point to the sunk costs associated with unsuccessful exploration, which need to be covered by surpluses earned from the occasional economic deposit which is discovered. In the case of the base simulation, the surplus generated by this project could finance approximately 81 unsuccessful exploration attempts of similar scale as that assumed to have led to the discovery of a viable deposit in this case. This emphasises the importance of the issue of what should be allowed as an eligible deduction for exploration when calculating the basis on which to levy any pure-rent royalty.

E2 Sensitivity of project viability to changes in the exchange rate, interest rates and perceptions of sovereign risk

Effects of a devaluation

Many participants in this inquiry stressed rates of exchange of the Australian dollar against foreign currencies (particularly the $US), as key determinants of the viability of mining and minerals processing projects. The importance of this key economic variable is illustrated in Table E.1 where the results reported in column 2 (headed Devaluation) show the effect of a 10 per cent devaluation of the $A against the $US. (In every other respect the assumptions/data/parameter settings underlying this simulation are identical to those underlying the base case simulation.)

Note that revenues increase by approximately 30 per cent (with ore exports and domestic sales ceasing in favour of exports of more `value added' smelter/refinery product), overall costs by 26 per cent (with mine life being extended by 2 years), with the result that project rents increase by 43 per cent to (a present value figure of) $670 785 190. However, these results overstate the benefits likely to be associated with a weakening Australian dollar since imported equipment (and other costs denominated in foreign currency) would increase in price - and these secondary effects have not been taken into account in the simulation. Nevertheless, aggregate movements of this magnitude certainly support the key role played by exchange rates in the underlying economics of mineral production.

Effects of an increase in the cost of capital

By contrast, interest rate increases (proxied in this model by an increase in the `risk premium' from 1 to 15 per cent above the real discount rate - equivalent to a rather hefty increase from 6 to 20 per cent in nominal interest rates) lead to much less spectacular effects compared with exchange rate effects. In this case, revenues contract by approximately 2 per cent compared with the base case (with more emphasis placed on exporting ore to avoid the more capital-intensive smelter/refinery phase), overall costs actually contract marginally by 0.4 per cent (but mine operating costs increase by 2.5 per cent), with the result that project rents contract by 5.4 per cent to (a present value figure of) $442 809 545. This result is somewhat surprising and may be partly a refection of the fact that the project represented in the `base case' simulation is not as capital intensive as most actual projects.

Effects of a perception of increased sovereign risk

An important and recurring theme of this inquiry was widespread perceptions of `sovereign risk' on the part of miners/mineral processors. Governments in Australia seem to have such a proven track record of changing the rules half way through the game that many participants were extremely reluctant even to contemplate the possibility of fundamental reforms in the area of royalties (particularly if cash bids were to play any role in the allocation of mining rights). The widespread belief was that, should such a system be implemented, those seeking to acquire mining rights would severely discount their bids - in anticipation that governments could not resist having a second bite of the cherry in the event of `bonanzas' emerging down the track. In terms of the

simulation model, perceptions of sovereign risk were captured by increasing the real discount rate (from 5 to 10 per cent). This had the effect, for example, of shaving (the present value of) project rents from an expected $468 163 654 in the base case to $295 314 942 in the column headed `Increased sovereign risk' in Table E.1 (representing a decrease of 37 per cent in the maximum bid that could be expected to secure the project in the hypothetical situation of perfect foresight of what all project costs and revenues would prove to be). Thus increased perceptions of sovereign risk run the risk of turning what should otherwise be attractive investment opportunities into marginal ones from the point of view of the prospective explorer/miner (and already marginal ones into even more marginal propositions). The likely outcome is a mining and mineral processing sector which is much smaller than could otherwise be the case.

E3 Sensitivity of project viability to changes in royalty arrangements

Securing an appropriate return for the community as `owners' of Australia's mineral wealth has always been something of a contentious issue. On the one hand, mineral deposits are clearly a key input to creation of many natural resource-based products, and as owners of something of value the community naturally expects to be compensated when others seek to benefit from exploiting minerals. On the other hand, until discovered and proved to be economically viable, mineral deposits have only a prospective rather than a demonstrable value, so that attributable discovery and mining costs have to be deducted from mineral revenues in order to arrive at the contribution to wealth creation made by a deposit. There is also the problem that if the community takes too much, or levies royalties in a way which detracts from the viability of a particular project, miners will be encouraged to make inefficient decisions. Induced inefficiencies can mean that ore which would otherwise be economic to mine will be left in the ground, with both miners and the community as a whole losers as a result.

A series of three simulations reported in Table E.2, headed *Ad valorem* royalty, Specific royalty and Pure-rent royalty (along with a repetition of the Base case simulation), illustrate these points.

Effects of imposing an *ad valorem* royalty

A much-used method of securing a return for the community when minerals are exploited is to levy an *ad valorem* royalty (ie a charge in proportion to the value of ore being shipped from the minesite).

In the simulation reported in column 2 of Table E.2, an *ad valorem* royalty equal to 10 per cent of the fob value of ore exports is levied as compared with the base case experiment in which the project is not subject to any royalties.

This generates an income stream to the government whose present value amounts to $159 675 441 (representing some 34 per cent of total rents generated by the project). Thus a surplus income stream whose present value is $298 378 934 continues to accrue to the owners of the project, but note that total project rents are 2.2 per cent down on rents accruing in the base case. The reason for this contraction in the overall worth of the project is that the economic life of the mine has been shortened by one year (down from 8 to 7) because *ad valorem* royalties are an inefficient way of collecting a return for the community (because they distort the underlying economics of the project - in this case causing the mine to shut down a year earlier than otherwise, so that 5 000 000 tonnes of material that would otherwise be mined in year 15 (see Attachment E2) is left unmined when the *ad valorem* royalty applies).

Table E2: Simulation results – sensitivity of project viability to changes in royalty arrangements
(Constant price dollar values and years of mine operation)

	Base case	*Devaluation*	*Increased cost of capital*	*Increased sovereign risk*
Present value of:				
Revenues: of which	1 862 029 956	2 679 183 050	1 676 183 050	1 862 029 965
Ore exports	272 828 857	272 828 857	272 828 857	272 828 857
Smelter/refinery exports	0	0	0	0
Domestic product sales	1 589 201 108	1 406 354 193	1 406 354 193	1 589 201 108
Costs: of which	1 393 866 311	1 380 804 115	1 380 811 393	1 862 029 965
Non-mining costs: of which	57 267 227	57 267 227	57 267 227	57 267 227
Exploration	5 786 373	5 786 373	5 786 373	5 786 373
Infrastructure	5 339 082	5 339 082	5 339 082	5 339 082
Minesite establishment	44 859 986	44 859 986	44 859 986	44 859 986
Restoration/rehabilitation	1 281 785	1 281 785	1 281 785	1 281 785
Mining/refining costs: of which	1 336 599 084	1 323 536 888	1 323 544 166	1 804 762 738
Mine operation	989 640 948	852 213 469	852 213 469	989 640 949
Transport/handling costs to get ore to port (including ore exports)	39 153 699	38 901 165	38 901 165	39 153 699
Transport/handling costs to ship ore for further domestic processing	222 286 620	196 679 675	196 679 675	222 286 621
Smelter/refinery operation	85 517 816	76 067 139	76 067 139	85 517 816
Transport/ handing costs to export final product	0	0	0	0
Rents from mine operation (revenues less mining costs)	525 430 881	355 646 162	355 638 884	0
Rents for overall project (revenues less costs)	468 163 654	298 378 934	298 371 658	0
Royalties	0	159 675 441	159 682 718	468 163 654
Period mine operational (years)	8	7	7	8

Source: Purpose-built simulation model of a mine and associated smelter/ refinery

Effects of imposing a specific royalty

Levying a specific royalty of $12 per tonne of ore despatched from the minesite collects approximately the same revenue as the 10 per cent royalty (in present value terms), but also has the undesirable effect of reducing the economic life of the project by one year (see results in column 3 of Table E.2).

Thus both *ad valorem* and specific royalties applied to the project prove to be blunt (ie inefficient) instruments if their object is to appropriate a good proportion of available project rents, without at the same time killing the goose that is laying golden eggs. This is essentially because neither is at all sensitive to the changing fortunes of the project over time - in any year they either take too much or too little of available mineral rents, and so fundamentally alter the cash flow position of the project in ways which result in what would otherwise be economically recoverable ore being sterilised (ie left in the ground, perhaps never to be mined).

In fact, the (undiscounted) annual surpluses generated in the base case simulation over the 8 years of mine operation are as follows (see Attachment E2 - Rents from mining):

Year	Surplus
7	$168 251 238
8	$169 495 550
9	$144 936 218
10	$118 909 545
11	$ 92 083 131
12	$ 67 551 997
13	$ 43 644 152
14	$ 20 015 680

Both the *ad valorem* and specific royalties above seek to appropriate more surplus than is generated in Year 14, thus leading to cessation of mining after 7 rather than 8 years. Of course, government could prevent this happening by waiving the full amounts owing as available surpluses dry up - and there was evidence presented to this inquiry that this was what indeed tended to happen. But it remains the case that unless they are made totally negotiable (in the sense of having to be varied on an annual basis - in which case they could hardly retain their name and would generate much uncertainty), both *ad valorem* and specific royalties not only will generally prove incapable of appropriating available surpluses, but will lead to inefficient behaviour on the part of project managers (for example, closing mines prematurely).

Effects of imposing a pure rent royalty

Pure-rent royalties, on the other hand, are not only capable (at least in theory) of collecting up to 100 per cent of available surpluses but the viability of the project will remain unaffected by their imposition. In other words, they represent an efficient instruments for collecting royalties.

This is illustrated in the final column of Table E.2 where all available rents/surpluses associated with the project have been appropriated, yet the underlying economics of the mining and mineral processing operation remain unaffected (with exactly the same decisions being made about such

things as how much ore to export versus how much to further process domestically, including how long it is economic to continue mining). Thus the results for the pure-rent royalty case mirror those for the base case in every respect apart from the costs and `rents' section.

Although in this case a lot of rents end up being collected by government under a pure-rent royalty, it should be pointed out that under such a royalty regime the government would actually have to recompense explorers/miners during periods of negative cash flow (in this case the first 6 years of operation during which no revenues are being received but outlays are being incurred on activities such as exploration, the provision of necessary infrastructure and mine establishment). In fact, outlays with a present value of $51 755 196 (see Attachment E2) would be owed to the project if the government was to assume all of the risks, in return for appropriating all of the rents the project eventually generates (in this case an income stream with a present value of $468 163 654). (Of course, a risk-averse government may well choose not to assume all risks, and therefore decide to collect only a proportion of any rents eventually generated, in combination with an up-front cash bid component -see Chapter 6.)

E4 Sensitivity of project viability to changes in transport and handling charges

A prominent complaint by mining companies during this inquiry has been that charges for transport and bulk handling services provided by government business enterprises are too high (and thus constitute a *de facto* royalty). Excessive rail freights have been pointed to in particular, although port-related costs (eg for use of government-provided bulk-handling facilities) also came in for their fair share of criticism.

The implications of lower transport and handling charges for the viability of the model mining/mineral processing project are examined in Table E.3 where the effects of posited reductions in rail freights (column 2), reduced coastal shipping costs - an industry whose operations are regulated by government - (column 3) and reduced bulk-handling charges (column 4) are simulated and compared with the base case (column 1).

Effects of reduced rail freights

In this simulation, the cost per tonne-kilometre for hauling ore to port was reduced from 15 to 10 cents. This one-third reduction adds a year to the life of the project, with overall rents increasing by 17 per cent, that is, by $78 787 094 in present value terms. This latter figure can be compared with the reduction in rail freight revenues which have a discounted present value of some $11 130 393). Clearly, such an outcome must call into question the wisdom of governments using excess freight charges as disguised royalties.

Effects of reduced coastal shipping costs

Excessively high coastal shipping costs were also cited as an impediment to the mining and minerals processing industries, particularly the `value-adding' smelter/refinery end of the ore-to-final-product sequence. That excessive charges in this link in the total value-added chain may indeed militate against further domestic processing of ores is illustrated in column 3 of Table E.3 where the cost per thousand tonnes of ore shipped around the coast to the smelter/refinery was assumed to drop from $500 to $250 (ie

Table E3: Simulation results – sensitivity of project viability to changes in transport and handling charges
(Constant price dollar values and years of mine operation)

	Base case	*Devaluation*	*Increased cost of capital*	*Increased sovereign risk*
Present value of:				
Revenues: of which	1 862 029 965	2 032 491 624	1 879 090 866	1 879 090 866
Ore exports	272 828 857	272 828 857	0	0
Smelter/refinery exports	0	0	0	0
Domestic product sales	1 589 201 108	1 759 662 767	1 879 090 866	1 879 090 866
Costs: of which	1 393 866 311	1 485 540 876	1 407 349 638	1 394 846 789
Non-mining costs: of which	57 267 227	57 267 227	57 267 227	57 267 227
Exploration	5 786 373	5 786 373	5 786 373	5 786 373
Infrastructure	5 339 082	5 339 082	5 339 082	5 339 082
Minesite establishment	44 859 986	44 859 986	44 859 986	44 859 986
Restoration/rehabilitation	1 281 785	1 281 785	1 281 785	1 281 785
Mining/refining costs: of which	1 336 599 084	1 428 273 649	1 350 082 411	1 337 579 562
Mine operation	989 640 948	1 128 810 326	989 640 949	989 640 949
Transport/handling costs to get ore to port (including ore exports)	39 153 699	28 023 306	2 411 474	1 929 180
Transport/handling costs to ship ore for further domestic processing	222 286 620	177 147 452	259 110 135	547 089 581
Smelter/refinery operation	85 517 816	94 292 564	98 919 853	98 919 853
Transport/ handing costs to export final product	0	0	0	0
Rents from mine operation (revenues less mining costs)	525 430 881	604 217 975	529 008 454	541 511 304
Rents for overall project (revenues less costs)	468 163 654	546 950 748	471 741 227	484 244 077
Royalties	0	0	0	0
Period mine operational (years)	8	9	8	8

Source: Purpose-built simulation model of a mine and associated smelter/ refinery

coastal shipping costs were halved). As a result, all ore is now subject to further domestic processing compared with the base case where some ore was exported. Also, the present value of overall rents increase by a relatively modest 0.8 per cent (or by $3 577 573 in present value terms). However, because of the considerable increase in tonnages shipped, coastal shipping costs increase by 16.6 per cent. The simulation graphically illustrates how unnecessarily high transport costs can undermine the competitiveness of more elaborately transformed manufacturers of mineral origin, so reducing the potential for more `value adding' processes to be undertaken in Australia.

Effects of reduced bulk handling costs

To round off the set of simulations dealing with transport/handling issues, the final simulation reported in Table E.3 sets out results assuming a 20 per cent reduction in the fixed costs involved in:

. loading ore onto railway rolling stock;

. loading ore onto ships for export;

. loading ore onto ships for further domestic processing;

. unloading ore from coastal shipping for further domestic processing;

. loading smelter/refinery product onto ships for export -

as well as a 50 per cent reduction in the variable costs associated with the above operations (where relevant).

As was the case with the coastal shipping simulation, all ore is now subject to further domestic processing compared with the base case where some ore was exported, with the present value of overall rents increasing by 3.4 per cent (or by $16 080 423 in present value terms). Again, this simulation highlights the potential for excessive transport and handling costs to price mineral-based products which incorporate more value-adding steps out of the competitive race to capture sales on both world and domestic markets.

E5 Sensitivity of project viability to changes in labour costs and productivity

Labour costs and practices loom large in the viability of any economic activity, as do increases in productivity (whether attributable to labour or capital) - particularly if, in the case of labour, they are uncompensated (eg management buys a labour-saving new piece of equipment, but does not have to pay any extra to the people who operate it). Mining and mineral processing activities are no exception; rather this observation applies *a fortiori* in this case because of the capital intensity of many mining and processing operations. Thus mine managers complain that if only they could use the expensive capital equipment they have invested in 24 hours a day, 52 weeks a year - mine outputs would be much more competitive on world markets. To which workers respond, observing what seem to be handsome profits already being earned by virtue of their sweat, that perhaps they should share more fully in this largesse, before being called upon to redouble their efforts in the interests of the company/country. Table E.4 sets out a series of results of simulations on the labour

Table E4: Simulation results – sensitivity of project viability to changes in labour costs and productivity
(Constant price dollar values and years of mine operation)

	Base case	*Devaluation*	*Increased cost of capital*	*Increased sovereign risk*
Present value of:				
Revenues: of which	1 862 029 965	1 596 416 590	2 208 393 826	1 862 029 965
Ore exports	272 828 857	1 596 416 590	0	272 828 857
Smelter/refinery exports	0	0	2 208 393 826	0
Domestic product sales	1 589 201 108	0	1 635 535 458	1 589 201 108
Costs: of which	1 393 866 311	1 276 091 680	57 267 227	1 391 018 424
Non-mining costs: of which	57 267 227	57 267 227	5 786 373	57 267 227
Exploration	5 786 373	5 786 373	5 786 373	5 786 373
Infrastructure	5 339 082	5 339 082	5 339 082	5 339 082
Minesite establishment	44 859 986	44 859 986	44 859 986	44 859 986
Restoration/rehabilitation	1 281 785	1 281 785	1 281 785	1 281 785
Mining/refining costs: of which	1 336 599 084	1 218 824 453	1 579 086 231	1 333 751 197
Mine operation	989 640 948	988 642 639	1 159 466 377	986 793 061
Transport/handling costs to get ore to port (including ore exports)	39 153 699	217 953 643	2 881 039	39 153 699
Transport/handling costs to ship ore for further domestic processing	222 286 620	0	308 942 175	222 286 621
Smelter/refinery operation	85 517 816	12 953 643	106 796 640	85 517 816
Transport/ handing costs to export final product	0	0	0	0
Rents from mine operation (revenues less mining costs)	525 430 881	377 592 137	630 307 594	528 278 768
Rents for overall project (revenues less costs)	468 163 654	320 324 910	573 040 368	471 011 541
Royalties	0	0	0	0
Period mine operational (years)	8	7	10	8

Source: Purpose-built simulation model of a mine and associated smelter/ refinery

theme. Column 2 reports on the effects of higher wage costs, column 3 addresses the effects of (uncompensated) productivity increases, while column 4 looks at the effects of more flexible labour arrangements which permit greater utilisation of capital.

Effects of higher wage costs

The higher wage cost simulation canvasses the effects on the viability of the project in circumstances where workers manage to secure increases in their hourly remuneration rates. Specifically, miners go from a base case hourly wage rate of $25 to $30, while onsite treatment workers and smelter/refinery workers are assumed to go from $20 to $25.

The effects are (not unexpectedly) rather dramatic, with smelter/refinery labour being dispensed with as all ore is exported - rather than subject to further domestic processing, the economic life of the project is curtailed by one year, while overall rents generated by the project contract by 32 per cent to a surplus stream with a discounted present value of $320 324 910.

Effects of increased productivity

Uncompensated productivity increases have the opposite effect to wage increases (column 3 of Table E.4). Underlying the base case simulation was an assumed annual increase in labour productivity of 1 per cent. If this annual increase is assumed to rise to 2 per cent annually (as is the case in the increased productivity simulation), and workers remain uncompensated, all ore is now processed domestically, the economic life of the mine is extended by two years, and overall project rents increase by 22 per cent to equal a present value of $573 040 368.

Effects of more flexible labour arrangements

Underlying the base case simulation was an assumption that project workers work 1920 standard hours (eg 40 hour weeks for 48 weeks of the year) and up to 400 overtime hours annually (with overtime earnings at time and a half hourly rates). The results in the final column of Table E.4 show the results presuming that an agreement is struck between management and those working on the project to increase standard hours to 2080 hours annually (eg 40 hour weeks for 52 weeks of the year), thus enabling available capital to be used year round.

As a result, although this is not enough to extend the economic life of the mine, final-year-of-mine-operation annual remuneration for workers of various types are as shown below,

	Base case	More flexible labour arrangements
	$ per annum	$ per annum
Miners	76 973	82 109
On-site treatment workers	48 000	52 000
Smelter/refinery workers	44 160	47 840

and rents from the project increase by 0.6 per cent to a present value of $471 011 541.

E6 Sensitivity of project viability to delays

Finally, another recurring theme of this inquiry was the cost of delays (eg mine approval delays and even delays once the project became operational). Delays can be costly, as illustrated by the simulation reported in Table E.5 where, compared with the base case, a single year's delay was assumed to occur in Year 4 (after 3 years of exploration activity) and in Year 8 (after the mine is established, but before it is permitted to operate). Many cases involving much greater delays to projects were drawn to the attention of the Commission during the course of the inquiry.

Even though the project, once mining commences, remains viable for 9 compared with 8 years in the base case (in this case essentially because of the cost-reducing effects of assumed productivity growth), overall rents nevertheless contract (by 6.4 per cent to a present value of $438 071 036). Of all the ways potential rents/surpluses from mining projects can be dissipated, unnecessarily delaying a project once outlays on it have commenced is arguably the most futile since no one benefits as a result - not the community via royalties, not the owners of the project, not even the workers.

Table E.5: Simulation results - sensitivity of project viability to delays
(Constant price dollar values and years of mine operation)

	Base case	*Project delayed*
Present value of:		
Revenues: of which	1 862 029 965	1 859 004 557
Ore exports	272 828 857	0
Smelter/refinery exports	0	0
Domestic product sales	1 589 201 108	1 859 004 557
Costs: of which	1 393 866 311	1 420 933 522
Non-mining costs: of which	57 267 227	54 539 084
Exploration	5 786 373	5 608 280
Infrastructure	5 339 082	5 052 610
Minesite establishment	44 859 986	42 596 410
Restoration/rehabilitation	1 281 785	1 281 785
Mining/refining costs: of which	1 336 599 084	1 366 394 438
Mine operation	989 640 948	1 007 769 524
Transport/handling costs to get ore to port (including ore exports)	39 153 699	2 405 427
Transport/handling costs to ship ore for further domestic processing	222 286 620	260 025 356
Smelter/refinery operation	85 517 816	96 194 131
Transport/handling costs to export final product	0	0
Rents from mine operation (revenues less mining costs)	525 430 881	492 610 120
Rents for overall project (revenues less costs)	468 163 654	438 071 036
Royalties	0	0
Period mine operational (years)	8	9

Source: Purpose-built simulation model of a mine and associated smelter/refinery

E7 Conclusions

By constructing a simulation model of a combined mining and mineral processing project (specifically a remotely located metalliferous mine whose ore may either be exported or further processed domestically), this appendix illuminates and in some cases quantifies in an illustrative way many of the points made elsewhere in this report.

Specifically, results of simulations with the model:

. demonstrate how sensitive the viability of mining projects are to movements in the exchange rate and, to a lesser extent, interest rates (and the cost of capital generally)(see section E.2). These macroeconomic influences were emphasised by many participants to this inquiry (see discussion in Section 19 - Macroeconomic factors - in Volume 3);

. underscore the importance of mining industry perceptions of sovereign risk (see section E.2). This important issue is also discussed at length elsewhere in the report (eg see the Overview and Volume 1);

. demonstrates that *ad valorem* and specific royalties are inefficient instruments for appropriating a share of project rents/surpluses on behalf of the community, while pure-rent royalties do not affect the underlying economics of a project - and are therefore efficient (see section E.3 and discussion in Section 14 - Royalties - in Volume 3);

. draws attention to the critical influence of transport and handling costs to the overall viability of mining projects, particularly the extent to which value-adding activities such as smelting/refining take place in this country (see section E.4 and discussion in Section 16 - Transport of minerals - in Volume 3);

. emphasises the role played by labour costs, conditions and industrial relations and labour and capital productivity in determining project viability (see section E.5 and discussion in Section 17 - Labour - in Volume 3); and, finally,

. illustrates that of all the ways potential rents/surpluses from mining projects can be dissipated, unnecessarily delaying a project once outlays on it have commenced is arguably the most futile since no one benefits as a result.

E1 Model specification

Nomenclature (helps in reading what variables stand for and the equations)

p	(domestic) price/processed
wp	world price
q	quantity
m	mined/mine-related
t	(onsite) treatment-related
st	subject to onsite treatment
ms	minesite
o	ore
sr	smelter/refinery
e	exported
dom	sold domestically
d	despatched
h	hourly
w	wage rate
oc	`on-cost' (labour)
b	bonus
rr	road/rail (transport)/recovery rate (ore)
lc	loading cost
uc	unloading cost
fp	subject to further domestic processing
f	fixed component of cost
v	variable component of cost
l	labour-related
k	capital-related
PV	present value
r	discount/interest rate
ER	exchange rate
E	exploration expenditure
I	infrastructure cost
MT	mine and onsite treatment construction/extension cost
R	minesite rehabilitation cost
CS	coastal shipping cost

Variables

Revenues section of model

pmse(i)	(constant value) $A fob price obtainable for ore exported in period i;
ml	last period of mine operation;
qdmse(i)	quantity of ore exported in period i;
psre(i)	(constant value) $A fob price obtainable for smelter/refinery products exported in period i;
qdsre(i)	quantity of smelter/refinery products exported in period i;

psrdom(i) (constant value) $A price obtainable for smelter/refinery products sold domesticly in period i;
qdsrdom(i) quantity of smelter/refinery products sold domestically in period i;

Costs section of model (excluding variables already identified)

fm(i) (constant value) fixed cost incurred in operating the mine in period i;
qm(i) quantity mined in period i;
qlm(i) quantity of labour used to operate the mine in period i;
ehwm(i) number of extra hours worked by miners in period i;
plm(i) cost of mine labour in period i;
vlm(i) (constant value) variable labour cost to operate the mine in period i;
pkm(i) cost of (variable) capital used to operate the mine in period i;
qkm(i) quantity of (variable) capital used to operate the mine in period i;
vkm(m) (constant value) variable cost of capital used to operate the mine in period i;
vm(i) (constant value) variable cost incurred in operating the mine in period i
ft(i) (constant value) fixed cost incurred in operating the mine in period i;
qmst(i) quantity of mine output subject to onsite treatment in period i;
qlt(i) quantity of labour used to operate onsite treatment facilities in period i;
ehwt(i) number of extra hours worked by treatment workers in period i;
plt(i) cost of labour used to operate onsite treatment facilities in period i;
vlt(i) (constant value) variable labour cost to operate minesite treatment facilities in period i;
pkt(i) cost of (variable) capital used to operate minesite treatment facilities in period i;
qkt(i) quantity of (variable) capital used to operate minesite treatment facilitiesthe mine in period i;
vkt(m) (constant value) variable cost of capital used to operate minesite treatment facilities in period i;
vt(i) (constant value) variable cost incurred in operating minesite treatment facilities in period i
fp(i) (constant value) fixed cost incurred in smelting/refining ore subject to further domestic processing in period i;
qdmsfp(i) quantity of ore subject to further domestic processing in period i;
qlp(i) quantity of labour used in smelting/refining ore subject to further domestic processing in period i;
ehwp(i) number of extra hours worked by smelter/refinery workers in period i;
plp(i) cost of smelting/refining labour used in period i;
vlp(i) (constant value) variable labour cost of smelting/refining ore subject to further domestic processing in period i;
pkp(i) price of (variable) capital used in smelting/refining ore subject to further domestic processing in period i;
qkp(i) quantity of (variable) capital used in smelting/refining ore subject to further domestic processing in period i;

vkp(m) (constant value) variable cost of capital used in smelting/refining ore subject to further domestic processing in period i;
vp(i) (constant value) variable cost of smelting/refining ore subject to further domestic processing in period i;

Quantity relationships section of model (excluding variables already identified)

qdms(i) quantity of ore dispatched from the minesite in period i;
qdsr(i) quantity of smelter/refinery products produced in period i;
qmst(i) quantity of mine output which is subject to onsite treatment in period i;
qdms(i) quantity of ore dispatched from the minesite in period i;
qdsrdom(i) quantity of smelter/refinery products sold domestically in period i;
qkm(i) (variable) quantity of capital used to operate the mine in period i;
qkt(i) (variable) quantity of capital used to operate onsite treatment facilities in period i;
qkp(i) (variable) quantity of capital used to operate the smelter/refinery in period i;

Revenues section of model (equations)

PV of revenues

= PV of proceeds from ore exports
+ PV of proceeds from smelter/refinery exports
+ PV of proceeds from domestic sales of smelter/refinery products

- - -(1)

= $pmse(1)qdmse(1)/(1+r) + pmse(2)qdmse(2)/(1+r)^2 + ...$
$+ pmse(ml)qdmse(ml)/(1+r)ml$
+ $psre(1)qdsre(1)/(1+r) + psre(2)qdsre(2)/(1+r)^2 + ...$
$+ psre(ml)qdsre(ml)/(1+r)^{ml}$
+ $psrdom(1)qdsrdom(1)/(1+r) +$
$psrdom(2)qdsrdom(2)/(1+r)^2$
$+ ...+ psrdom(ml)qdsrdom(ml)/(1+r)^2$ - - - (2)

where

pmse(i) is the (constant value) $A fob price obtainable for ore exported in period i (i = 1,2, ..., ml) where ml is the last period of mine operation

= ER(i)wpoe(i)

(where ER(i) is the (real) exchange rate expressed as the number of (constant value) Australian dollars one $US will buy in period i and wpoe(i) is the $US fob price obtainable in period i for ore exports);

qdmse(i) is the quantity of ore exported in period i;

r is the (real) discount rate;

psre(i) is the (constant value) $A fob price obtainable for smelter/refinery products exported in period i

= ER(i)wpsre(i)

(where wpsre(i) is the $US fob price obtainable in period i for smelter/refinery exports);

qdsre(i) is the quantity of smelter/refinery outputs exported in period i;

psrdom(i) is the (constant value) $A price obtainable for smelter/refinery products sold domestically in period i; and

qdsrdom(i) is the quantity of smelter/refinery products sold domestically in period i.

Costs section of model (equations)

PV of costs= PV of exploration expenditures

+ PV of mine development costs

+ PV of mine operating costs (including on-site treatment)

+ PV of transport/handling costs involved in exporting ore

+ PV of minesite rehabilitation/restoration costs

+ PV of transport/handling costs involved in despatching ore for further domestic processing

+ PV of costs to further process ore domestically

+ PV of transport/handling costs involved in exporting smelter/refinery products

- - - (3)

where PV of exploration expenditures

$$= E(1)/(1+r) + E(2)/(1+r)^2 + ... + E(e)/(1+r)e \quad \text{- - - (4)}$$

where

E(i) = is the (constant value) cost of attributable exploration expenditures incurred in period i (i = 1, 2, ..., e) where e is the last period during which such expenditures are incurred; and

where PV of mine development costs

= PV of infrastructure costs
+ PV of establishing the mine and associated onsite treatment facilities

where PV of infrastructure costs

$$= I(1)/(1+r) + I(2)/(1+r)^{2} + ... + I(inf)/(1+r)^{inf} \quad \text{- - - (5)}$$

where

I(i) = is the (constant value) cost of mine-related expenditures on infrastructure incurred in period i (i = 1, 2 ..., inf) where inf is the last period during which such expenditures are incurred; and

where PV of establishing the mine and associated onsite treatment facilities

$$= MT(1)/(1+r) + MT(2)/(1+r)^{2} + ... + MT(mt)/(1+r)^{mt} \quad \text{- - - (6)}$$

where

MT(i) = is the (constant value) cost of (capital) expenditures necessary to establish (or extend) the mine and associated onsite treatment facilities in period i (i = 1, 2, ..., mt) where mt is the last period during which mine establishment/extension expenditures are incurred; and

where PV of mine operating costs (including on-site treatment)

$$= [fm(1) + vm(1)]/(1+r) + [fm(2) + vm(2)]/(1+r)^{2} + ... + [fm(ml) + vm(ml)]/(1+r)^{ml} + [ft(1) + vt(1)]/(1+r) + [ft(2) + vt(2)]/(1+r)2 + ... + [ft(ml) + vt(ml)]/(1+r)^{ml} \quad \text{- - - (7)}$$

where

fm(i) is the (constant value) fixed cost incurred in operating the mine in period i (i = 1, 2, ..., ml) where ml is the last period of mine operation

= flm(i) + fkm(i)

(where flm(i) and fkm(i) are labour- and capital-related components of this fixed cost respectively);

vm(i) is the (constant value) variable cost incurred in operating the mine in period I

= vlm(i) + vkm(i)

(where vlm(i) and vkm(i) are labour- and capital-related components of this variable cost respectively, with

vlm(i) = plm(i)qlm(i)

where plm(i) and qlm(i) represent the cost and quantity of labour used to operate the mine in period i, and where

plm(i) = hwm(i)(shm(i) + (1+otm(i))ehwm(i)) + ocm(i)
+bm(i)qm(i)/qlm(i)

where hwm(i), shm(i), otm(i), ocm(i) (=frm(i)hwm(i)shm(i)) and bm(i) are the hourly wage rate, the 'standard' number of hours worked, the premium rate paid for extra hours worked (ehwm(i)), the labour 'on-costs' incurred for each mine worker and the bonus per unit of mine output paid in period i respectively, and where

vkm(i) = pkm(i)qkm(i)

where pkm(i) and qkm(i) represent the price and (variable) quantity of capital used to operate the mine in period i, and where

pkm(i)= r + rp(i)

where r is the (real) interest rate obtainable in period i for a 'risk-free' investment and rp(i) is a `risk premium' attaching to borrowings used to create capital in the mining/early-stage mineral processing industries in period i, and where

qkm(i) = km(i)(cumulative sum of quantity mined (qm(i));

qm(i) is the quantity mined in period i;

ft(i) is the (constant value) fixed cost incurred in operating onsite treatment facilities in period i (i = 1, 2, ..., ml)

= flt(i) + fkt(i)

(where flt(i) and fkt(i) are labour- and capital-related components of this fixed cost respectively);

vt(i) is the (constant value) variable cost incurred in operating onsite treatment facilities in period i

= vlt(i) + vkt(i)

(where vlt(i) and vkt(i) are labour- and capital-related components of this variable cost respectively, with

vlt(i) = plt(i)qlt(i)

where plt(i) and qlt(i) represent the price and quantity of labour used to operate onsite treatment facilites in period i, and where

plt(i) = hwt(i)(sht(i) + (1+ott(i))ehwt(i)) + oct(i)
+bt(i)qmst(i)/qlt(i)

where hwt(i), sht(i), ott(i), oct(i) (=frt(i)hwt(i)sht(i)) and bt(i) are the hourly wage rate, the 'standard' number of hours worked, the premium rate paid for extra hours worked (ehwt(i)), the labour 'on-costs' incurred for each onsite treatment worker and the bonus

per unit of mine output treated onsite paid in period i respectively, and where

vkt(i) = pkt(i)qkt(i)

where pkt(i) and qkt(i) represent the price and (variable) quantity of capital used to operate the mine in period i, and where

pkt(i) = ir(i) + rp(i)

where r is the (real) interest rate obtainable in period i for a 'risk-free' investment and rp(i) is a 'risk premium' attaching to borrowings used to create capital in the mining/early-stage mineral processing industries in period i, and where

qkt(i) = kt(i)qmst(i));

qmst(i) is the quantity of mine output subject to onsite treatment in period i; and

where PV of transport/handling costs involved in exporting ore

= PV of road/rail costs + PV of port/ship-loading costs

= [frre(1) + cptkm(1)qdmse(1)nkm(1)]/(1+r) +
[frre(2) + cptkm(2)qdmse(2)nkm(2)]/(1+r)2 +
[frre(ml) + cptkm(ml)qdmse(ml)nkm(ml)]/(1+r)ml
+ [flce(1) + vlce(1)qdmse(1)]/(1+r) +
[flce(2) + vlce(2)qdmse(2)]/(1+r)2 +
[flce(ml) + vlce(ml)qdmse(ml)]/(1+r)ml - - - (8)

where

frre(i) is the (constant value) fixed cost incurred in transporting ore to port for export in period i (i = 1, 2, ..., ml) where ml is the last period of mine operation;

cptkm(i) is the (constant value) cost per tonne-kilometre incurred in transporting ore to port for export/further domestic processing in period i;

qdmse(i) is the quantity of ore exported in period i (ore exports);

nkm(i) is the number of kilometres ore has to be transported to port for subsequent export/further domestic processing in period i;

flce(i) is the (constant value) fixed cost incurred in port/loading operations for ore exported in period i;

vlce(i) is the (constant value) variable cost incurred in loading ore onto ships for export in period i; and

where PV of minesite rehabilitation/restoration costs

= R(1)/(1+r) + R(2)/(1+r)2 + ... + R(h)/(1+r)h - - -(9)

where

R(i) is the (constant value) cost of rehabilitation/restoration expenditures incurred in period i (i = 1, 2, ..., h) where h is the last period during which mine-related rehabilitation/restoration expenditures are incurred; and

where PV of transport/handling costs incurred in despatching ore for further domestic processing

= PV of road/rail costs + PV of port/ship-loading costs + PV of coastal shipping costs + PV of unloading/transfer to smelter (or refinery) costs

= [frrfp(1) + cptkm(1)qdmsfp(1)nkm(1)]/(1+r) +
[frrfp(2) + cptkm(2)qdmsfp(2)nkm(2)]/(1+r)2 +
[frrfp(ml) + cptkm(ml)qdmsfp(ml)nkm(ml)]/(1+r)ml
+ [flcfp(1) + vlcfp(1)qdmsfp(1)]/(1+r) +
[flcfp(2) + vlcfp(2)qdmsfp(2)]/(1+r)2 +
[flcfp(ml) + vlcfp(ml)qdmsfp(ml)]/(1+r)ml -
+ CS(1)/(1+r) + CS(2)/(1+r)2 + ...+ CS(ml)/(1+r)ml +
+ [fuc(1) + vuc(1)qdmsfp(1)]/(1+r) +
[fuc(2) + vuc(2)qdmsfp(2)]/(1+r)2 +
[fuc(ml) + vuc(ml)qdmsfp(ml)]/(1+r)ml - - - (10)

where

frrfp(i) is the (constant value) fixed cost incurred in transporting ore to port for further domestic processing in period i (i = 1, 2, ..., ml) where ml is the last period of mine operation;

cptkm(i) is the(constant value) cost per tonne-kilometre incurred in transporting ore to port for export/further domestic processing in period i;

qdmsfp(i) is the quantity of ore subject to further domestic processing in period i;

nkm(i) is the number of kilometres ore has to be transported to port for subsequent export/further domestic processing in period i;

flcfp(i) is the (constant value) fixed cost incurred in port/loading operations for ore destined for further domestic processing in period i;

vlcfp(i) is the (constant value) variable cost incurred in loading ore onto coastal shipping for further domestic processing in period i;

CS(i) is the (constant value) cost incurred in using coastal shipping to transport ore from the port of despatch to the port of receival for transfer to a smelter/refinery for further domestic processing in period i;

fuc(i) is the (constant value) fixed cost incurred in port/unloading operations in period i;

vuc(i) is the (constant value) variable cost incurred in unloading ore for further domestic processing in period i; and

where PV of costs to further process ore domestically

$$= [fp(1) + vp(1)]/(1+r) + [fp(2) + vp(2)]/(1+r)2 + \ldots + [fp(ml) + vp(ml)]/(1+r)ml \quad \text{- - - (11)}$$

where

fp(i) is the (constant value) fixed cost incurred in smelting/refining ore despatched from the minesite for further domestic processing in period i (i = 1, 2, ..., ml) where ml is the last period of mine operation

$$= flp(i) + fkp(i)$$

(where flp(i) and fkp(i) are labour- and capital-related components of this fixed cost respectively);

vp(i) is the (constant value) variable cost incurred in smelting\refining ore despatched from the minesity for further domestic processing in period i

$$= vlp(i) + vkp(i)$$

(where vlp(i) and vkp(i) are labour- and capital-related components of this variable cost respectively, with

$$vlp(i) = plp(i)qlp(i)$$

where plp(i) and qlp(i) represent the price and quantity of labour used to operate the refinery/smelter in period i, and where

$$plp(i) = hwp(i)(shp(i) + (1+otp(i))ehwp(i)) + ocp(i) + bp(i)bp(i)qdmsfp(i)/qlp(i)$$

where hwp(i), shp(i), otp(i), ocp(i) (=frp(i)hwp(i)shp(i))and bp(i) are the hourly wage rate, the 'standard' number of hours worked, the premium rate paid for extra hours worked (ehwp(i)), the labour 'on-costs' incurred for each smelter/refinery worker and the bonus per unit of ore processed paid in period i respectively, and where

$$vkp(i) = pkp(i)qkp(i)$$

where pkp(i) and qkp(i) represent the price and (variable) quantity of capital used to operate the smelter/refinery in period i, and where

$$pkp(i) = r + rp(i)$$

where r is the (real) interest rate obtainable in period i for a 'risk-free' investment and rp(i) is a 'risk premium' attaching to borrowings used to create capital in the mining/early-stage mineral processing industries in period i, and where

$$qkp(i) = kp(i)qdmsfp(i));$$

qdmsfp(i) is the quantity of ore subject to further domestic processing in period i; and

where PV of transport/handling costs involved in exporting smelter/refinery products

$$= [flcsre(1) + vlcsre(1)qdsre(1)]/(1+r) + [flcsre(2) + vlcsre(2)qdsre(2)]/(1+r)^2 + [flcsre(ml) + vlcsre(ml)qdsre(ml)]/(1+r)^{ml} \quad \text{- - - (12)}$$

where

flcsre(i) is the (constant value) fixed cost incurred in port/loading operations for smelter/refinery products exported in period i (i = 1, 2, ..., ml) where ml is the last period of mine operation;

vlcsre(i) is the (constant value) variable cost incurred in loading smelter/refinery products onto ships for export in period i; and

qdsre(i) is the quantity of smelter/refinery products exported in period i.

Quantity relationships and constraints

Definitional and equivalence relationships

qdms(i) = qdmse(i) + qdmsfp(i) (i = 1, 2, ..., ml) where ml is the last period of mine operation, and where

qdms(i) is the quantity of treated mine output (ore) dispatched from the minesite in period i;

qdmse(i) is the quantity of ore exported in period i (ore exports); and

qdmsfp(i) is the quantity of ore subject to further domestic processing in period i;

qdsr(i) = qdsre(i) + qdsrdom(i) (i = 1, 2, ..., ml) where ml is the last period of mine operation, and where

qdsr(i) is the quantity of smelter/refinery products produced in period i;

qdsre(i) is the quantity of smelter/refinery products exported in period i (smelter/refinery exports); and

qdsrdom(i) is the quantity of smelter/refinery products sold domestically in period i.

Structural relationships

qmst(i) = gm1qm(i) - gm2(cumulative sum of quantity mined) (i = 1, 2, ..., ml) where ml is the last period of mine operation, and where

qmst(i) is the quantity of mine output which is subject to onsite treatment in period i;

qm(i) is the quantity mined in period i (mine output); and

gm1, gm2 are parameters mediating the relationship between the quantity mined and the quantity subject to onsite treatment in period i;

qdms(i) = gd1(i)qmst(i) - gd2(cumulative sum of quantity mined) (i = 1, 2, ..., ml) where ml is the last period of mine operation, and where

qdms(i) is the quantity of ore dispatched from the minesite in period i;

qmst(i) is the quantity of mine output subject to onsite treatment in period i;

gd1, gd2 are parameters mediating the relationship between the quantity of ore despatched from the minesite and the quantity of mine output subject to onsite treatment in period i;

qdsr(i) = rr(i)qdmsfp(i) (i = 1, 2, ..., ml) where ml is the last period of mine operation, and where

qdsr(i) is the quantity of smelter/refinery products produced in period i;

rr(i) is the 'recovery rate' describing the (physical) relationship between a tonne of ore despatched for further processing and the subsequent smelter/refinery product; and

qdmsfp(i) is the quantity of ore subject to further domestic processing in period i;

qdsrdom(i) = p0(i) - dp(i)psrdom(i) (i = 1, 2, ..., ml) where ml is the last period of mine operation, and where

qdsrdom(i) is the quantity of smelter/refinery products sold domestically in period i;

psrdom(i) is the price obtainable for domestic sales of smelter/refinery products in period i; and

p0(i), dp(i) are parameters describing the relationship between the quantity of smelter/refinery product which can be sold on the domestic market and the price obtainable in period i for such sales;

qkm(i) = lm(i)qlm(i)(shm(i) + ehwm(i)) (i = 1, 2, ..., ml) where ml is the last period of mine operation, and where

qkm(i) is the (variable) quantity of capital used to operate the mine in period i;

qlm(i) is the quantity of labour used to operate the mine in period i;

shm(i) is the 'standard' number of hours worked by miners in period i;

ehwm(i) is the number of extra hours worked by miners in period i; and

lm(i) is a parameter describing the relationship between the quantity of capital used in mining and the number of man-hours necessary (or prescribed under the relevant award) to utilise the capacity of that capital in period i;

qkt(i) = lt(i)qlt(i)(sht(i) + ehwt(i)) (i = 1, 2, ..., ml) where ml is the last period of mine operation, and where

qkt(i) is the (variable) quantity of capital used to operate onsite treatment facilities in period i;

qlt(i) is the quantity of labour used to operate onsite treatment facilities in period i;

sht(i) is the 'standard' number of hours worked by minesite treatment workers in period i;

ehwt(I) is the number of extra hours worked by minesite treatment workers in period i; and

lt(i) is a parameter describing the relationship between the quantity of capital used in onsite treatment facilities and the number of man-hours necessary (or prescribed under the relevant award) to utilise the capacity of that capital in period i;

qkp(i) = lp(i)qlp(i)(shp(i) + ehwp(i)) (i = 1, 2, ..., ml) where ml is the last period of mine operation, and where

qkp(i) is the (variable) quantity of capital used to operate the smelter/refinery in period i;

qlp(i) is the quantity of labour used to operate the smelter/refinery in period i;

shp(i) is the 'standard' number of hours worked by smelter/refinery workers in period i;

ehwp(i) is the number of extra hours worked by smelter/refinery workers in period i; and

lp(i) is a parameter describing the relationship between the quantity of capital used in smelting/refining and the number of man-hours necessary (or prescribed under the relevant award) to utilise the capacity of that capital in period i;

Constraints

For the purposes of this model, it has been assumed that investors are unprepared to put at risk more capital than is necessary to maintain mine production at an annual rate of 5 000 000 per annum, nor are they prepared to put in more social infrastructure than is necessary to support up to 2 000 miners living onsite.

Data/constants/parameters

Revenues section of model

R	(real) discount rate;
ER(i)	number of (constant value) Australian dollars one US dollar will buy in period i;
wpoe(i)	$US fob price obtainable in period i for ore exports;
wpsre(i)	$US fob price obtainable for smelter/refinery exports in period i

Costs section of model

E(i)	(constant value) cost of attributable exploration expenditures incurred in period i;
e	last period during which attributable exploration expenditures are incurred;
I(i)	(constant value) cost of mine-related expenditures on infrastructure incurred in period i;
inf	last period during which mine-related expenditures on infrastructure are incurred;
MT(i)	(constant value) cost of (capital) expenditures necessary to establish (or extend) the mine and associated onsite treatment facilities in period i;
mt	last period during which mine establishment/extension expenditures are incurred;
flm(i)	(constant value) fixed labour cost incurred in operating the mine in period i;
fkm(i)	(constant value) fixed capital cost incurred in operating the mine in period i;
flt(i)	(constant value) fixed labour cost incurred in operating onsite treatment facilities in period i;
fkt(i)	(constant value) fixed capital cost incurred in operating onsite treatment facilities in period i;
flp(i)	(constant value) fixed labour cost incurred in operating the smelter/refinery in period i;
fkp(i)	(constant value) fixed capital cost incurred in operating the smelter/refinery in period i;
hwm(i)	hourly wage rate paid to miners in period i;
hwt(i)	hourly wage rate paid to minesite treatment workers in period i;
hwp(i)	hourly wage rate paid to smelter/refinery workers in period i;
shm(i)	'standard' number of hours worked by miners in period i;
sht(i)	'standard' number of hours worked by minesite treatment workers in period i;
shp(i)	'standard' number of hours worked by smelter/refinery workers in period i;
otm(i)	premium rate paid to miners for extra hours worked in period i;
ott(i)	premium rate paid to minesite treatment workers for extra hours worked in period i;
otp(i)	premium rate paid to smelter/refinery workers for extra hours worked in period i;

bm(i)	bonus per unit of mine output paid to miners in period i;
bt(i)	bonus per unit of mine output which is subject to onsite treatment paid to treatment workers in period i;
bp(i)	bonus per unit of ore treated paid to smelter/refinery workers in period i;
rp(i)	risk premium attaching to borrowings used to create capital in the mining/early-stage mineral processing industries in period i
km(i)	parameter describing the relationship between the (variable) quantity of capital used to operate the mine in period i and the (cumulative) quantity mined;
kt(i)	parameter describing the relationship between the (variable) quantity of capital used to operate minessite treatment facilities in period i and the quantity of mine output subject to onsite treatment in period i;
kp(i)	parameter describing the relationship between the (variable) quantity of capital used to operate the smelter/refinery in period i and the quantity of ore subject to further domestic processing in period i;
frre(i)	(constant value) fixed cost incurred in transporting ore to port for export in period i;
cptkm(i)	(constant value) cost per tonne-kilometre incurred in transporting ore to port for export/further processing in period i;
nkm(i)	number of kilometres ore has to be transported to port for subsequent export/further processing in period i;
flce(i)	(constant value) fixed cost incurred in port/loading operations for ore exported in period i;
vlce(i)	(constant value) variable cost incurred in loading ore onto ships for export in period i;
R(i)	(constant value) cost off rehabilitation/restoration expenditures incurred in period i;
H	is the last period during which mine-related rehabilitation/restoration expenditures are incurred;
frrfp(i)	(constant value) fixed cost incurred in transporting ore to port for further domestic processing in period i;
flcfp(i)	(constant value) fixed cost incurred in port/loading operations for ore destined for further domestic processing in period i;
vlcfp(i)	(constant value) variable cost incured in loading ore onto coastal shipping for further domestic processing in period i;
CS(i)	(constant value) cost incurred in using coastal shipping to transport ore from the • port of despatch to the port of receival for transfer to a smelter/refinery for further domestic processing in period i;
fuc(i)	(constant value) fixed cost incurred in port/unloading operations in period i;
vuc(i)	(constant value) variable cost incurred in unloading ore for further domestic processing in period i;
flcsre(i)	(constant value) fixed cost incurred in port/loading operations for smelter/refinery products exported in period i;
vlcsre(i)	(constant value) variable cost incured in loading smelter/reffinery products onto ships for export in period i;

Quantity relationships section of model

gm1, gm2	are parameters describing the relationship between the quantity mined and the quantity subject to onsite treatment in period i;
gd1	parameter describing the relationship between the 'grade' of mine outputs subject to onsite treatment in period i and the (attenuated) cumulative sum of mine output;
rr(i)	is the 'recovery rate' describing the (physical) relationship between a tonne of ore despatched for further processing and the subsequent smelter/refinery product;
p0(i), dp(i)	are parameters describing the relationship between the quantity of smelter/refinery product which can be sold on the domestic market and the price obtainable in period i for such sales;
lm(i)	is a parameter describing the relationship between the quantity of capital used in mining and the number of man-hours necessary (or prescribed under the relevant award) to utilise the capacity of that capital in period i;
lt(i)	is a parameter describing the relationship between the quantity of capital used in onsite treatment facilities and the number of man-hours necessary (or prescribed under the relevant award) to utilise the capacity of that capital in period i;
lp(i)	is a parameter describing the relationship between the quantity of capital used in smelting/refining and the number of man-hours necessary (or prescribed under the relevant award) to utilise the capacity of that capital in period i;

E2 RESULTS AND ASSUMPTIONS/DATA AND PARAMETER SETTINGS FOR 'BASE CASE' SIMULATION

(A) RESULTS

OBS	PERIOD	Mine operational	Mine closed	PV rents from mining (opt)	PV pure rents (opt)	PV royalties (opt)	PV revenues (opt)
1	1	0	1	.	-952380.95	0	0.00
2	2	0	1	.	-1859410.43	0	0.00
3	3	0	1	.	-2723248.03	0	0.00
4	4	0	1	.	-5191355.45	0	0.00
5	5	0	1	.	-11459564.79	0	0.00
6	6	0	1	.	-51755196.20	0	0.00
7	7	1	1	119573013.31	64264410.45	0	272828857.00
8	8	1	1	234294273.14	178308830.93	0	548914340.13
9	9	1	1	327721451.73	271736009.51	0	806923936.12
10	10	1	1	400721597.61	344736155.40	0	1047953072.41
11	11	1	1	454560696.91	398575254.70	0	1273033840.40
12	12	1	1	492176176.63	436190734.41	0	1483138543.40
13	13	1	1	515321602.35	459336160.13	0	1679183050.27
14	14	1	1	525430880.83	469445438.62	0	1862029965.34
15	15	1	0	.	469204930.07	0	1862029965.34
16	16	1	0	.	468975874.31	0	1862029965.34
17	17	1	0	.	468757725.96	0	1862029965.34
18	18	1	0	.	468549965.63	0	1862029965.34
19	19	1	0	.	468352098.66	0	1862029965.34
20	20	1	0	.	468163653.91	0	1862029965.34

OBS	PV costs (opt)	PV non-mining costs	PV mining costs (opt)	PV ore exports (opt)	PV product exports (opt)	PV product d sales (opt)	PV exploration costs
1	952380.95	952380.95	0.00	0	0	0.00	952380.95
2	1859410.43	1859410.43	0.00	0	0	0.00	1859410.43
3	2723248.03	2723248.03	0.00	0	0	0.00	2723248.03
4	5191355.45	5191355.45	0.00	0	0	0.00	3545950.50
5	11459564.79	11459564.79	0.00	0	0	0.00	4329476.67
6	51755196.20	51755196.20	0.00	0	0	0.00	5075692.07
7	208564446.55	55308602.85	153255843.69	272828857	0	0.00	5786373.40
8	370605509.21	55985442.22	314620066.99	272828857	0	276085483.13	5786373.40
9	535187926.61	55985442.22	479202484.39	272828857	0	534095079.12	5786373.40
10	703216917.01	55985442.22	647231474.80	272828857	0	775124215.41	5786373.40
11	874458585.70	55985442.22	818473143.49	272828857	0	1000204983.40	5786373.40
12	1046947808.99	55985442.22	990962366.77	272828857	0	1210309686.39	5786373.40
13	1219846890.14	55985442.22	1163861447.92	272828857	0	1406354193.27	5786373.40
14	1392584526.72	55985442.22	1336599084.51	272828857	0	1589201108.34	5786373.40
15	1392825035.27	56225950.77	1336599084.51	272828857	0	1589201108.34	5786373.40
16	1393054091.03	56455006.53	1336599084.51	272828857	0	1589201108.34	5786373.40
17	1393272239.38	56673154.87	1336599084.51	272828857	0	1589201108.34	5786373.40
18	1393479999.70	56880915.20	1336599084.51	272828857	0	1589201108.34	5786373.40
19	1393677866.68	57078782.18	1336599084.51	272828857	0	1589201108.34	5786373.40
20	1393866311.42	57267226.92	1336599084.51	272828857	0	1589201108.34	5786373.40

OBS	PV infrastructure costs	PV establishment costs	PV rehabilitation costs	PV mine operating costs (opt)	PV TH ore incl exports (opt)	PV TH f processing (opt)
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00
4	822702.47	822702.47	0.00	0.00	0.00	0.00
5	2389754.81	4740333.31	0.00	0.00	0.00	0.00
6	4628401.00	42051103.14	0.00	0.00	0.00	0.00
7	5339082.33	44183147.13	0.00	114026234.27	37097565.43	0.00
8	5339082.33	44859986.49	0.00	221792840.37	37435985.11	38579843.64
9	5339082.33	44859986.49	0.00	336339034.15	37758289.57	74645712.50
10	5339082.33	44859986.49	0.00	457670693.30	38065246.20	108349550.12
11	5339082.33	44859986.49	0.00	585344831.96	38357585.84	139834529.83
12	5339082.33	44859986.49	0.00	717199854.86	38636004.55	169235545.51
13	5339082.33	44859986.49	0.00	852213468.75	38901165.23	196679675.41
14	5339082.33	44859986.49	0.00	989640948.50	39153699.20	222286620.63
15	5339082.33	44859986.49	240508.55	989640948.50	39153699.20	222286620.63
16	5339082.33	44859986.49	469564.31	989640948.50	39153699.20	222286620.63
17	5339082.33	44859986.49	687712.65	989640948.50	39153699.20	222286620.63
18	5339082.33	44859986.49	895472.98	989640948.50	39153699.20	222286620.63
19	5339082.33	44859986.49	1093339.96	989640948.50	39153699.20	222286620.63
20	5339082.33	44859986.49	1281784.70	989640948.50	39153699.20	222286620.63

OBS	PV SR costs (opt)	PV TH prod exports (opt)	Rents from mining (opt)	Pure rents (opt)	PV royalties (opt)	Revenues (opt)	Costs (opt)
1	0.00	0	.	.	0	.	.
2	0.00	0	.	.	0	.	.
3	0.00	0	.	.	0	.	.
4	0.00	0	.	.	0	.	.
5	0.00	0	.	.	0	.	.
6	0.00	0	.	.	0	.	.
7	2132043.99	0	168251237.56	163251237.56	0	383897600.00	220646362.44
8	16811397.87	0	169495549.86	168495549.86	0	407904000.00	239408450.14
9	30459448.17	0	144936218.28	144936218.28	0	400257566.25	255321347.97
10	43145985.18	0	118909545.38	118909545.38	0	392611065.00	273701519.62
11	54936195.85	0	92083130.54	92083130.54	0	384964496.25	292881365.71
12	65890961.85	0	67551997.20	67551997.20	0	377317860.00	309765862.80
13	76067138.53	0	43644152.17	43644152.17	0	369671156.25	326027004.08
14	85517816.17	0	20015679.91	20015679.91	0	362024385.00	342008705.09
15	85517816.17	0	.	.	0	.	.
16	85517816.17	0	.	.	0	.	.
17	85517816.17	0	.	.	0	.	.
18	85517816.17	0	.	.	0	.	.
19	85517816.17	0	.	.	0	.	.
20	85517816.17	0	.	.	0	.	.

OBS	Non-mining costs	Mining costs (opt)	Ore exports (opt)	Product exports (opt)	Poduct d sales (opt)	Exploration	Infrastructure
1	1000000	.	.	.	.	1000000	0
2	1000000	.	.	.	.	1000000	0
3	1000000	.	.	.	.	1000000	0
4	3000000	.	.	.	.	1000000	1000000
5	8000000	.	.	.	.	1000000	2000000
6	54000000	.	.	.	.	1000000	3000000
7	5000000	215646362.44	383897600	0	0.00	1000000	1000000
8	1000000	238408450.14	0	0	407904000.00	0	0
9	0	255321347.97	0	0	400257566.25	0	0
10	0	273701519.62	0	0	392611065.00	0	0
11	0	292881365.71	0	0	384964496.25	0	0
12	0	309765862.80	0	0	377317860.00	0	0
13	0	326027004.08	0	0	369671156.25	0	0
14	0	342008705.09	0	0	362024385.00	0	0
15	500000	.	.	.	.	0	0
16	500000	.	.	.	.	0	0
17	500000	.	.	.	.	0	0
18	500000	.	.	.	.	0	0
19	500000	.	.	.	.	0	0
20	500000	.	.	.	.	0	0

OBS	Mine establishment	Rehabilitation	Ad valorem royalty	Specific royalty	Pure rent royalty	Mine operating costs (opt)	TH ore exports (opt)	TH f processing (opt)
1	0	0	0	0	0	.	.	.
2	0	0	0	0	0	.	.	.
3	0	0	0	0	0	.	.	.
4	1000000	0	0	0	0	.	.	.
5	5000000	0	0	0	0	.	.	.
6	50000000	0	0	0	0	.	.	.
7	3000000	0	0	0	0	160446362.44	52200000	0
8	1000000	0	0	0	0	159220358.85	500000	57000000
9	0	0	0	0	0	177698742.44	500000	55950000
10	0	0	0	0	0	197636487.65	500000	54900000
11	0	0	0	0	0	218366104.36	500000	53850000
12	0	0	0	0	0	236792676.99	500000	52800000
13	0	0	0	0	0	254588305.24	500000	51750000
14	0	0	0	0	0	272097009.79	500000	50700000
15	0	500000	0	0	0	.	.	.
16	0	500000	0	0	0	.	.	.
17	0	500000	0	0	0	.	.	.
18	0	500000	0	0	0	.	.	.
19	0	500000	0	0	0	.	.	.
20	0	500000	0	0	0	.	.	.

OBS	SR costs (opt)	TH prod exports (opt)	Qty mined (opt)	Cumulative qty mined (opt)	Lagged cum qty mined (opt)	Qty treated onsite (opt)	Qty ore despatched (opt)	Price ore exports (opt)	Qty ore exports (opt)
1	.	.	0	0	0	.	.	.	.
2	.	.	0	0	0	.	.	.	.
3	.	.	0	0	0	.	.	.	.
4	.	.	0	0	0	.	.	.	.
5	.	.	0	0	0	.	.	.	.
6	.	.	0	0	0	.	.	.	.
7	3000000.00	0	5000000	5000000	0	4000000	3200000	119.968	3200000
8	21688091.29	0	5000000	10000000	5000000	4000000	3200000	120.000	0
9	21172605.53	0	5000000	15000000	10000000	3950000	3140000	120.000	0
10	20665031.97	0	5000000	20000000	15000000	3900000	3080000	120.000	0
11	20165261.35	0	5000000	25000000	20000000	3850000	3020000	120.000	0
12	19673185.81	0	5000000	30000000	25000000	3800000	2960000	120.000	0
13	19188698.84	0	5000000	35000000	30000000	3750000	2900000	120.000	0
14	18711695.29	0	5000000	40000000	35000000	3700000	2840000	120.000	0
15	.	.	0	40000000	35000000	.	.	.	.
16	.	.	0	40000000	35000000	.	.	.	.
17	.	.	0	40000000	35000000	.	.	.	.
18	.	.	0	40000000	35000000	.	.	.	.
19	.	.	0	40000000	35000000	.	.	.	.
20	.	.	0	40000000	35000000	.	.	.	.

OBS	Qty f processed (opt)	Qty prod despatched (opt)	Price prod exports (opt)	Qty prod exported (opt)	Price prod d sales (opt)	Qty prod d sales (opt)	P cap (mine) (opt)	Q cap (mine) (opt)	V cap (mine) (opt)
1	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.
6	.	.	.	.	.	.	.	.	.
7	0	0	510	0	510.000	0	1.06	25000000	26500000
8	3200000	800000	510	0	509.880	800000	1.06	25000000	26500000
9	3140000	785000	510	0	509.882	785000	1.06	29000000	30740000
10	3080000	770000	510	0	509.885	770000	1.06	33000000	34980000
11	3020000	755000	510	0	509.887	755000	1.06	37000000	39220000
12	2960000	740000	510	0	509.889	740000	1.06	41000000	43460000
13	2900000	725000	510	0	509.891	725000	1.06	45000000	47700000
14	2840000	710000	510	0	509.894	710000	1.06	49000000	51940000
15	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.
19	.	.	.	.	.	.	.	.	.
20	.	.	.	.	.	.	.	.	.

OBS	P lab (mine) (opt)	Q lab (mine) (opt)	E hrs (mine) (opt)	V lab (mine) (opt)	V cost (mine)	V cost (opt)	F cost (mine) (opt)	P cap (tmt) (opt)	Q cap (tmt) (opt)	V cap (tmt) (opt)
1	.	.	.	.	.		.	.	.	.
2	.	.	.	.	.		.	.	.	.
3	.	.	.	.	.		.	.	.	.
4	.	.	.	.	.		.	.	.	.
5	.	.	.	.	.		.	.	.	.
6	.	.	.	.	.		.	.	.	.
7	62984.82	1675.14	0.000	105508411.07	132008411.07		1500000	1.06	2000000	2120000
8	63014.67	1658.55	0.000	104513278.28	131013278.28		1500000	1.06	2000000	2120000
9	62624.84	1904.87	0.000	119292478.03	150032478.03		1500000	1.06	1975000	2093500
10	67761.56	2000.00	140.308	135523118.13	170503118.13		1500000	1.06	1950000	2067000
11	76268.91	2000.00	367.171	152537814.90	191757814.90		1500000	1.06	1925000	2040500
12	77311.37	2163.22	400.000	167241757.89	210701757.89		1500000	1.06	1900000	2014000
13	77126.97	2350.76	400.000	181307150.57	229007150.57		1500000	1.06	1875000	1987500
14	76972.87	2534.37	400.000	195078116.12	247018116.12		1500000	1.06	1850000	1961000
15	.	.	.	.	.		.	.	.	.
16	.	.	.	.	.		.	.	.	.
17	.	.	.	.	.		.	.	.	.
18	.	.	.	.	.		.	.	.	.
19	.	.	.	.	.		.	.	.	.
20	.	.	.	.	.		.	.	.	.

OBS	P lab (tmt) (opt)	Q lab (tmt) (opt)	E hrs (tmt) (opt)	V lab (tmt) (opt)	V cost (tmt)	V cost (opt)	F cost (tmt) (opt)	P cap (proc) (opt)	Q cap (proc) (opt)	V cap (proc) (opt)	P lab (proc) (opt)
1	.	.	.	.	.		.	.	.	.	.
2	.	.	.	.	.		.	.	.	.	.
3	.	.	.	.	.		.	.	.	.	.
4	.	.	.	.	.		.	.	.	.	.
5	.	.	.	.	.		.	.	.	.	.
6	.	.	.	.	.		.	.	.	.	.
7	48000	485.791	0	23317951.37	25437951.37		1500000	1.06	0	0	44160
8	48000	480.981	0	23087080.56	25207080.56		1500000	1.06	1600000	1696000	44160
9	48000	470.266	0	22572764.41	24666264.41		1500000	1.06	1570000	1664200	44160
10	48000	459.716	0	22066369.52	24133369.52		1500000	1.06	1540000	1632400	44160
11	48000	449.329	0	21567789.45	23608289.45		1500000	1.06	1510000	1600600	44160
12	48000	439.102	0	21076919.10	23090919.10		1500000	1.06	1480000	1568800	44160
13	48000	429.034	0	20593654.67	22581154.67		1500000	1.06	1450000	1537000	44160
14	48000	419.123	0	20117893.67	22078893.67		1500000	1.06	1420000	1505200	44160
15	.	.	.	.	.		.	.	.	.	.
16	.	.	.	.	.		.	.	.	.	.
17	.	.	.	.	.		.	.	.	.	.
18	.	.	.	.	.		.	.	.	.	.
19	.	.	.	.	.		.	.	.	.	.
20	.	.	.	.	.		.	.	.	.	.

OBS	Q lab (proc) (opt)	E hrs (proc) (opt)	V lab (proc) (opt)	V cost (proc) (opt)	F cost (proc) (opt)	PERIOD
1	.	.	.	.	.	1
2	.	.	.	.	.	2
3	.	.	.	.	.	3
4	.	.	.	.	.	4
5	.	.	.	.	.	5
6	.	.	.	.	.	6
7	0.000	0	0.00	0.00	3000000	7
8	384.785	0	16992091.29	18688091.29	3000000	8
9	373.832	0	16508405.53	18172605.53	3000000	9
10	363.058	0	16032631.97	17665031.97	3000000	10
11	352.461	0	15564661.35	17165261.35	3000000	11
12	342.038	0	15104385.81	16673185.81	3000000	12
13	331.787	0	14651698.84	16188698.84	3000000	13
14	321.705	0	14206495.29	15711695.29	3000000	14
15	.	.	.	.	.	15
16	.	.	.	.	.	16
17	.	.	.	.	.	17
18	.	.	.	.	.	18
19	.	.	.	.	.	19
20	.	.	.	.	.	20

(B) DATA AND PARAMETER SETTINGS

OBS	PERIOD	Real discount rate	Risk premium	Exchange rate	World price (ore)	Delta price (ore)	World price (product)	Delta price (product)	Delta price (domestic)
1	1	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
2	2	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
3	3	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
4	4	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
5	5	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
6	6	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
7	7	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
8	8	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
9	9	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
10	10	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
11	11	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
12	12	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
13	13	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
14	14	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
15	15	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
16	16	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
17	17	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
18	18	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
19	19	0.05	0.01	1	120	.0000000	510	.0000000	.00000015
20	20	0.05	0.01	1	120	.0000000	510	.0000000	.00000015

OBS	Ad valorem royalty	Specific royalty	Pure rent royalty	FC ore to port	Cost per tonne-km	No of kilometres	FC to load export ore	VC to load export ore	FC to load ore for fp
1	0	0	0	500000	0.15	100	500000	1	500000
2	0	0	0	500000	0.15	100	500000	1	500000
3	0	0	0	500000	0.15	100	500000	1	500000
4	0	0	0	500000	0.15	100	500000	1	500000
5	0	0	0	500000	0.15	100	500000	1	500000
6	0	0	0	500000	0.15	100	500000	1	500000
7	0	0	0	500000	0.15	100	500000	1	500000
8	0	0	0	500000	0.15	100	500000	1	500000
9	0	0	0	500000	0.15	100	500000	1	500000
10	0	0	0	500000	0.15	100	500000	1	500000
11	0	0	0	500000	0.15	100	500000	1	500000
12	0	0	0	500000	0.15	100	500000	1	500000
13	0	0	0	500000	0.15	100	500000	1	500000
14	0	0	0	500000	0.15	100	500000	1	500000
15	0	0	0	500000	0.15	100	500000	1	500000
16	0	0	0	500000	0.15	100	500000	1	500000
17	0	0	0	500000	0.15	100	500000	1	500000
18	0	0	0	500000	0.15	100	500000	1	500000
19	0	0	0	500000	0.15	100	500000	1	500000
20	0	0	0	500000	0.15	100	500000	1	500000

OBS	VC to load ore for fp	Coastal shipping	FC to unload ore for fp	VC to unload ore for fp	FC to load export product	VC to load export product	Exploration
1	1	500	500000	1	100000	1	1000000
2	1	500	500000	1	100000	1	1000000
3	1	500	500000	1	100000	1	1000000
4	1	500	500000	1	100000	1	1000000
5	1	500	500000	1	100000	1	1000000
6	1	500	500000	1	100000	1	1000000
7	1	500	500000	1	100000	1	1000000
8	1	500	500000	1	100000	1	0
9	1	500	500000	1	100000	1	0
10	1	500	500000	1	100000	1	0
11	1	500	500000	1	100000	1	0
12	1	500	500000	1	100000	1	0
13	1	500	500000	1	100000	1	0
14	1	500	500000	1	100000	1	0
15	1	500	500000	1	100000	1	0
16	1	500	500000	1	100000	1	0
17	1	500	500000	1	100000	1	0
18	1	500	500000	1	100000	1	0
19	1	500	500000	1	100000	1	0
20	1	500	500000	1	100000	1	0

OBS	Infrastructure	Mine establishment	Rehabilitation	Mine operational	Mined-treated 1	Mined-treated 2
1	0	0	0	0	0.8	0.01
2	0	0	0	0	0.8	0.01
3	0	0	0	0	0.8	0.01
4	1000000	1000000	0	0	0.8	0.01
5	2000000	5000000	0	0	0.8	0.01
6	3000000	50000000	0	0	0.8	0.01
7	1000000	3000000	0	1	0.8	0.01
8	0	1000000	0	1	0.8	0.01
9	0	0	0	1	0.8	0.01
10	0	0	0	1	0.8	0.01
11	0	0	0	1	0.8	0.01
12	0	0	0	1	0.8	0.01
13	0	0	0	1	0.8	0.01
14	0	0	0	1	0.8	0.01
15	0	0	500000	1	0.8	0.01
16	0	0	500000	1	0.8	0.01
17	0	0	500000	1	0.8	0.01
18	0	0	500000	1	0.8	0.01
19	0	0	500000	1	0.8	0.01
20	0	0	500000	1	0.8	0.01

OBS	Treated-ore 1	Treated-ore 2	Ore-product	FC labour (mine)	FC capital (mine)	Hourly wage (mine)	Std hours (mine)	Max extra hours (mine)	Overtime (mine)
1	0.8	.004	0.25	0	0	25	1920	400	0.5
2	0.8	.004	0.25	0	0	25	1920	400	0.5
3	0.8	.004	0.25	0	0	25	1920	400	0.5
4	0.8	.004	0.25	0	0	25	1920	400	0.5
5	0.8	.004	0.25	0	0	25	1920	400	0.5
6	0.8	.004	0.25	0	0	25	1920	400	0.5
7	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
8	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
9	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
10	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
11	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
12	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
13	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
14	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
15	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
16	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
17	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
18	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
19	0.8	.004	0.25	500000	1000000	25	1920	400	0.5
20	0.8	.004	0.25	500000	1000000	25	1920	400	0.5

OBS	On-costs (mine)	Bonus (mine)	Productivity (mine)	Capital-man hours (mine)	Capital-quantity mined 1	Capital-quantity mined 2	FC labour (treatment)
1	0.25	1	0.01	7.25	5	0.8	0
2	0.25	1	0.01	7.25	5	0.8	0
3	0.25	1	0.01	7.25	5	0.8	0
4	0.25	1	0.01	7.25	5	0.8	0
5	0.25	1	0.01	7.25	5	0.8	0
6	0.25	1	0.01	7.25	5	0.8	0
7	0.25	1	0.01	7.25	5	0.8	500000
8	0.25	1	0.01	7.25	5	0.8	500000
9	0.25	1	0.01	7.25	5	0.8	500000
10	0.25	1	0.01	7.25	5	0.8	500000
11	0.25	1	0.01	7.25	5	0.8	500000
12	0.25	1	0.01	7.25	5	0.8	500000
13	0.25	1	0.01	7.25	5	0.8	500000
14	0.25	1	0.01	7.25	5	0.8	500000
15	0.25	1	0.01	7.25	5	0.8	500000
16	0.25	1	0.01	7.25	5	0.8	500000
17	0.25	1	0.01	7.25	5	0.8	500000
18	0.25	1	0.01	7.25	5	0.8	500000
19	0.25	1	0.01	7.25	5	0.8	500000
20	0.25	1	0.01	7.25	5	0.8	500000

OBS	FC capital (treatment)	Hourly wage (treatment)	Std hours (treatment)	Max extra hours (treatment)	Overtime (treatment)	On-costs (treatment)	Bonus (treatment)
1	0	20	1920	400	0.5	0.25	0
2	0	20	1920	400	0.5	0.25	0
3	0	20	1920	400	0.5	0.25	0
4	0	20	1920	400	0.5	0.25	0
5	0	20	1920	400	0.5	0.25	0
6	0	20	1920	400	0.5	0.25	0
7	1000000	20	1920	400	0.5	0.25	0
8	1000000	20	1920	400	0.5	0.25	0
9	1000000	20	1920	400	0.5	0.25	0
10	1000000	20	1920	400	0.5	0.25	0
11	1000000	20	1920	400	0.5	0.25	0
12	1000000	20	1920	400	0.5	0.25	0
13	1000000	20	1920	400	0.5	0.25	0
14	1000000	20	1920	400	0.5	0.25	0
15	1000000	20	1920	400	0.5	0.25	0
16	1000000	20	1920	400	0.5	0.25	0
17	1000000	20	1920	400	0.5	0.25	0
18	1000000	20	1920	400	0.5	0.25	0
19	1000000	20	1920	400	0.5	0.25	0
20	1000000	20	1920	400	0.5	0.25	0

OBS	Productivity (treatment)	Capital-man hours (treatment)	Capital-quantity treated	FC labour (processed)	FC capital (processed)	Hourly wage (processed)
1	0.01	2	0.5	0	0	20
2	0.01	2	0.5	0	0	20
3	0.01	2	0.5	0	0	20
4	0.01	2	0.5	0	0	20
5	0.01	2	0.5	0	0	20
6	0.01	2	0.5	0	0	20
7	0.01	2	0.5	1000000	2000000	20
8	0.01	2	0.5	1000000	2000000	20
9	0.01	2	0.5	1000000	2000000	20
10	0.01	2	0.5	1000000	2000000	20
11	0.01	2	0.5	1000000	2000000	20
12	0.01	2	0.5	1000000	2000000	20
13	0.01	2	0.5	1000000	2000000	20
14	0.01	2	0.5	1000000	2000000	20
15	0.01	2	0.5	1000000	2000000	20
16	0.01	2	0.5	1000000	2000000	20
17	0.01	2	0.5	1000000	2000000	20
18	0.01	2	0.5	1000000	2000000	20
19	0.01	2	0.5	1000000	2000000	20
20	0.01	2	0.5	1000000	2000000	20

OBS	Std hours (processed)	Max extra hours (processed)	Overtime (processed)	On-costs (processed)	Bonus (processed)	Productivity (processed)	Capital-man hours (processed)
1	1920	400	0.5	0.15	0	0.01	2
2	1920	400	0.5	0.15	0	0.01	2
3	1920	400	0.5	0.15	0	0.01	2
4	1920	400	0.5	0.15	0	0.01	2
5	1920	400	0.5	0.15	0	0.01	2
6	1920	400	0.5	0.15	0	0.01	2
7	1920	400	0.5	0.15	0	0.01	2
8	1920	400	0.5	0.15	0	0.01	2
9	1920	400	0.5	0.15	0	0.01	2
10	1920	400	0.5	0.15	0	0.01	2
11	1920	400	0.5	0.15	0	0.01	2
12	1920	400	0.5	0.15	0	0.01	2
13	1920	400	0.5	0.15	0	0.01	2
14	1920	400	0.5	0.15	0	0.01	2
15	1920	400	0.5	0.15	0	0.01	2
16	1920	400	0.5	0.15	0	0.01	2
17	1920	400	0.5	0.15	0	0.01	2
18	1920	400	0.5	0.15	0	0.01	2
19	1920	400	0.5	0.15	0	0.01	2
20	1920	400	0.5	0.15	0	0.01	2

OBS	Capital-quantity processed	PERIOD
1	0.5	1
2	0.5	2
3	0.5	3
4	0.5	4
5	0.5	5
6	0.5	6
7	0.5	7
8	0.5	8
9	0.5	9
10	0.5	10
11	0.5	11
12	0.5	12
13	0.5	13
14	0.5	14
15	0.5	15
16	0.5	16
17	0.5	17
18	0.5	18
19	0.5	19
20	0.5	20

APPENDIX F

THE COSTS OF IMPEDIMENTS TO MINING AND MINERALS PROCESSING

F THE COST OF IMPEDIMENTS TO MINING AND MINERALS PROCESSING

Of the many recommendations made in this report, only some have been able to be addressed in terms of attempting to quantify the likely effects of adopting them. This should not be interpreted as implying that those which have not been addressed because of modelling limitations are less important, nor even that those that are addressed in this appendix are likely to lead to the greatest gains.

Mining is found to be the major beneficiary of removal of distortions elsewhere in the economy. If infrastructure and assistance reforms were implemented, mining output would likely increase by almost $5 billion in 1989-90 prices, with gross domestic product projected to increase by over $11 billion. Over one third of this expansion in mining activity would result from various transport reforms, just under one third from from the removal of manufacturing assistance and over one quarter from various electricity industry reforms.

In this appendix the costs of various impediments to mining in Australia are assessed within an economy-wide context. A special version of the ORANI model of the economy, known as ORANI-MINE, has been developed to enable a more detailed examination to be made of issues affecting the mining and minerals processing industries. Specifically, the impact of various infrastructure inefficiencies on mining and the effects of assistance provided to manufacturing and agriculture are examined.

F1 The ORANI-MINE model

ORANI is a multisectoral model embodying both direct relationships between industries and final users of goods and services, and economy-wide constraints on the availability of resources and on spending and saving by Australian households and governments. In the simulations reported in this appendix, the fiscal version of the model was used which includes a full accounting of government revenue and expenditure, and a stylised accounting of foreign ownership of Australian assets and income payments by Australians to foreigners.

In all cases the model was run in a long-run mode - an economic environment designed to represent the responses of the economy over a period of the order of ten years. The principal features of that environment are as follows:

. sufficient time is assumed to have elapsed for capital stocks to be fully adjusted, so as to maintain a fixed rate of return in each industry;

Table F1: Concordance between ORANI-MINE's mining and mineral processing industries and ASIC classes

ORANI-MINE industries	*ASIC classes*	
Ferrous metal ores	1111	Iron ores
	1112	Iron ore pelletising
Bauxite	1121	Bauxite
Copper ores	1122	Copper ores
Gold ores	1123	Gold ores
Mineral sands	1124	Mineral sands
Nickel ores	1125	Nickel ores
Silver-lead-zinc ores	1126	Silver-lead-zinc ores
Tin ores	1127	Tin ores
Uranium ores	1128	Uranium ores
Non-ferrous metal ores nec	1129	Non-ferrous metal ores nec
Black coal	1201	Black coal
Brown coal	1202	Brown coal
Oil and gas	1300	Oil and gas
Minerals nec	1501	Limestone
	1502	Clays
	1504	Salt
	1505	Non-metallic minerals nec
Petroleum and coal products	2770	Petroleum and coal products
Basic iron and steel	2941	Iron and steel basic products
	2942	Iron casting
	2943	Steel casting
	2944	Iron and steel forging
	2945	Steel pipes and tubes
Copper smelting, refining	2951	Copper smelting, refining
Silver, lead, zinc smelting, refining	2952	Silver, lead, zinc smelting, refining
Alumina	2953	Alumina
Aluminium smelting	2954	Aluminium smelting
Nickel smelting, refining	2955	Nickel smelting, refining
Gold refining	2956	Non-ferrous metals nec smelting, refining (part)
	2957	Secondary recovery and alloying of non-ferrous metals nec (part)
Non-ferrous metals nec smelting, refining	2956	Non-ferrous metals nec smelting, refining (part)
Secondary recovery and alloying of non-ferrous metals nec	2957	Secondary recovery and alloying of non-ferrous metals nec (part)
Aluminium rolling, drawing, extruding	2961	Aluminium rolling, drawing, extruding
Non-ferrous metals basic products nec	2962	Non-ferrous metals basic products nec
	2963	Non-ferrous metal casting

. wage rates adjust so as to maintain a fixed rate of employment in each occupation;

. income tax rates adjust to maintain a fixed real government sector borrowing requirement; and

. fixed ratios are maintained between private consumption spending and national saving, and between real aggregate investment and the aggregate capital stock. The relation between investment and saving determines the balance on current account which, together with net income payments to foreigners, determines the balance of trade.

To gain more detail on the impact of various scenarios on the mining and minerals processing industries, the standard ORANI model has been modified in a number of ways to form ORANI-MINE. First, the mining and processing industries have been disaggregated to a finer level, while other parts of the standard industry structure of less relevance have been aggregated. There are a total of 75 industries and 77 commodities in ORANI-MINE. The model contains 14 mining and 12 minerals processing industries. The concordance between these industries and the corresponding ASIC classes is set out in Table F1.

A second major innovation built into ORANI-MINE relates to the treatment of mining supply responses. A recent study of transport reform reported in IAC (1989) gave mining industries a fixed factor as a means of introducing a finite supply elasticity for the mining sector. In ORANI-MINE a more systematic approach is adopted whereby an adjustment costs mechanism has been introduced for all industries. While the adjustment costs mechanism will be subject to on-going refinement, it represents an important step in introducing a consistent treatment for all industries in preference to the *ad hoc* and somewhat arbitrary treatments of long-run supply response adopted in the study referred to above.

The final major modification is the updating of the database. The database for ORANI-MINE was originally derived from the standard ORANI database for 1980-81. Since that year, the structure of Australia's external trade has changed considerably, with mineral and metal commodities being among those most affected. Accordingly, the database has been updated to reflect the structure of trade in 1986-87. The Australian Mining Industry Council expressed concern (sub. 229, p.32) that other aspects of the database such as the production technology have not also been updated and that black coal mining was not further disaggregated into open-cut and underground components. The Commission is of the view, however, that changes in the external trade structure will have by far the most important influence on the outcome of the simulations considered. The Commission considers that updating other aspects of the database and undertaking further disaggregation would not alter the broad conclusions drawn from the analysis. Accordingly, the Commission could not justify the added expense involved.

F2 Infrastructure inefficiencies

In this section the effects of inefficiencies in the provision of transport and electricity infrastructure are examined.

Transport reform

Various studies have identified major inefficiencies in Australia's transport networks - both domestic and overseas. Simulations of the removal of these inefficiencies have been summarised in IAC (1989). In that study, it was reported that:

. excess rail freights make up 50 per cent of total rail freight costs for black coal;[1]

. current tasks undertaken by railways could be achieved with 50 per cent less labour;

. inefficiencies in domestic water transport make possible 35 per cent savings on waterfront costs, 20 per cent savings in port costs and 25 per cent savings in the coastal fleet;

. international shipping freight rates faced by Australian industry could be reduced by 50 per cent for bulk trans-Tasman trade, by 20 per cent for non-bulk trans-Tasman trade, and by 15 per cent on international lines.

Simulations of the effects of removing these impediments are summarised in Table F2. More detailed output results for mining and minerals processing industries under reference are presented in Table F3. In total, the improvements are simulated to expand output of the economy (real GDP) by 1.6 per cent (or $5.2 billion in 1989-90 prices). They would be of particular importance to the mining sector, with mining output projected to expand by about 5 per cent.

In the simulation of the removal of excess coal rail freights, the mining sector as a whole expands by almost 4 per cent. Service industries expand, while both agriculture and manufacturing decline in this scenario. Removal of excess coal rail freights, however, provides a much more mixed picture for mining and minerals processing. Coal output expands by a massive 23 per cent, as exports suddenly gain a large cost advantage against overseas competitors. This increase in activity has negative indirect effects on other mining exporters, however - with ferrous metal ores, nickel ores and smelting, silver-lead-zinc ores and smelting, bauxite, and alumina smelting and refining all suffering reductions in output of over 5 per cent - as labour and materials costs are driven up by economy-wide demand pressures.

It should be noted, however, that excess rail freights were originally imposed on coal miners as *de facto* royalties, that is, as part of the price charged by governments for access to the community's coal deposits. In these simulations, the government revenue lost through removal of excess rail freights is accordingly recovered by a nondistortionary tax, which may be interpreted as a resource rent tax on coal mining. Since no resource rent tax could in reality be perfectly nondistortionary, and since the existing excess rail freights may already incorporate some variation between mines, designed to moderate their distortionary effects, the results presented in this simulation should be interpreted as strictly upper bound estimates within the context of the model. If, as may well be the case, replacement of excess rail freights by a feasible resource rent tax would have little impact on the profitability of marginal mining activities, it would merely lead to accounting changes in transactions between private coal mining enterprises and public authorities.

[1] The calculations for rail freights were based on data for 1984-85. It is noted that coal rail freights have changed to varying degrees over the last few years. However, evidence on the extent of the excess component is not conclusive with many studies claiming it is well above 50 per cent. Consequently, the figure of 50 per cent excess component has been retained for these simulations.

Table F2: Estimated long-run effects of removal of transport impediments
(Percentage changes)

Variable	*Removal of excess rail freights*	*Improved operation of railways*	*Improved water transport*	*Cheaper international shipping*	*Total*
Macroeconomic aggregates					
Real GDP	0.6	0.8	0.2	0.0	1.6
Real consumption	0.6	0.6	0.1	0.2	1.4
Real investment	1.8	2.8	0.3	0.5	5.4
Export volume	0.0	0.4	0.4	-0.5	0.3
Import volume	2.1	1.8	0.4	1.1	5.4
Balance of trade[a]	-0.3	-0.3	0.0	-0.1	-0.8
CPI	1.8	0.4	0.5	0.5	3.2
Real pre-tax wage rate	0.7	0.7	0.5	0.4	2.3
Aggregate employment (persons)	0.0	0.0	0.1	0.0	0.1
Aggregate capital stock	0.6	1.0	0.1	0.2	1.9
Shift in direct tax rates	0.0	-0.8	-0.4	0.1	-1.1
Sectoral outputs					
Agriculture	-1.0	0.2	0.1	0.0	-0.8
Mining	3.6	1.9	0.3	-0.9	4.9
Basic metals	-2.1	1.2	1.4	0.3	0.9
Other manufacturing	-0.5	0.7	0.1	-0.2	0.1
Services	0.7	1.0	0.2	0.2	2.1

a Change in the balance of trade as a percentage of base-case GDP

All sectors of the economy are forecast to benefit from improved labour productivity in railways, although mining would again be the major beneficiary, with a projected output expansion of 1.9 per cent. In this case, the major mining industry beneficiaries would be non-ferrous metal ores (such as nickel, silver-lead-zinc, and non-ferrous metal ores nec), and associated processing activities, most of which record output expansions of over 4 per cent. Rail services for iron ore mining and for black coal in Queensland were assumed to be already technically efficient, and were therefore excluded from this scenario. Output of ferrous metal ores and black coal still increase, however, by 0.3 and 0.8 per cent respectively, through gains from the general fall in domestic materials input prices. It should be noted that the treatment of improved railways labour productivity in this scenario differs from that reported in IAC (1989).

Table F3: **Estimated long-run output effects of removal of transport impediments on mining and mineral processing industries under reference**
(Percentage changes)

Industry	*Removal of excess rail freights*	*Improved operation of railways*	*Improved water transport*	*Cheaper International shipping*	*Total*
Mining Industries					
Ferrous metal ores	-9.6	0.3	0.9	-1.2	-9.6
Bauxite	-7.4	2.7	1.9	0.3	-2.5
Copper ores	-3.7	2.6	2.0	0.3	1.2
Nickel ores	-9.0	4.1	4.8	1.0	0.9
Silver-lead-zinc ores	-8.4	4.9	2.2	-0.1	-1.4
Non-ferrous metal ores nec	-3.9	5.6	-0.2	-1.1	0.5
Black coal	23.4	0.8	-0.3	-2.2	21.8
Other mining	-5.3	2.7	-0.6	-0.6	-3.9
Minerals Processing Industries					
Basic iron and steel	0.6	0.4	0.4	0.0	1.4
Silver, lead, zinc smelting, refining	-7.5	4.0	4.1	0.8	1.5
Alumina smelting, refining	-7.6	1.3	3.2	1.2	-1.8
Aluminium smelting	-6.3	0.7	2.8	0.8	-2.1
Nickel smelting, refining	-9.1	4.1	4.9	1.0	0.9
Non-ferrous metals processing	-3.4	2.4	1.5	0.4	0.9

Again all sectors of the economy are projected to benefit from improved domestic water transport, with minerals processing of basic metals being the major beneficiary, recording an output expansion of 1.4 per cent. Nickel ores and smelting and silver-lead-zinc smelting all expand by more than 4 per cent. It should be noted, however, that these benefits to mining are all indirect, since shore-based shipping costs for mining are assumed to already be at efficient levels (and hence do not change). Miners benefit mainly from access to capital and materials inputs at cheaper prices, as import prices fall due to cheaper transport costs.

Mining sector output as a whole declines by 0.9 per cent in the cheaper international liner scenario. Output of the other main exporting sector, agriculture, remains unchanged in the long-run. Both mining and agriculture benefit directly, but these gains are offset by negative indirect effects. Greater spending power of the Australian community manifests itself partly in a reallocation of resources from export-oriented to domestically-oriented industries. The higher prices that result from this reallocation raise production costs in mining. Of the individual mining industries, alumina smelting and refining and nickel ores and smelting are the main beneficiaries, while black coal and ferrous metal ores are the main losers from cheaper international shipping.

Mining industries exhibit the largest increase in output following removal of transport impediments, principally because transport costs are a relatively large proportion of their costs to produce and supply. They also face relatively favourable export market conditions and are assumed to be able to expand output without a large increase in per unit costs of production. Transport costs are also an important component of farm costs. However, farmers are less able to respond to a drop in transport costs because their exports are assumed to be less price responsive than are many mineral exports. Increased rural exports force down world prices for Australia's

agricultural output, which makes it harder for farmers to compete domestically for available resources, particularly labour. Farmers' per unit costs of production also rise faster than do miners' costs as output expands. As a result, miners stand to gain more from increased competitiveness such as lower transport costs than do other sectors of the economy.

Improved efficiency in electricity supply

In the Commission's recent Draft Report on Energy Generation and Distribution, it was demonstrated that improving the efficiency of the electricity supply industry would have important implications for the mining and minerals processing sector. The major scenarios modelled were;

. achieving international best practice, consisting of:

  - a reduction in reserve plant margins of 20 per cent, simulated as a 16 per cent reduction in per unit capital requirements; and,

  - an increase in net labour productivity equivalent to a 25 per cent decrease in per unit labour requirements;

. eliminating cross-subsidies in electricity pricing.

These simulations differ from those reported in the Mining and Minerals Processing Draft Report which were in turn based on those reported in the IAC's inquiry into Government (Non-tax) Charges (IAC 1989). The major difference is that the scenario of full cost recovery pricing is no longer included. In the previous simulations electricity prices were increased to ensure a commercial rate of return on the full value of past investments in current prices, including a return on assets which may have been mothballed or decommissioned prior to the end of their expected economic life. However, the approach adopted by the Commission in its Energy Draft Report was to recommend that surplus assets be sold off. Under this approach the cost of earlier unwise investment decisions would be reflected in a low price for surplus assets and subsequent large capital losses. This would reflect the fact that private buyers would only be prepared to pay a price which allowed a commercial rate of return.

The effects of implementing the improvements in electricity pricing and efficiency are presented in Tables F4 and F5.[2] Again, mining is projected to be the major beneficiary of these changes, with a sectoral output expansion of 3.8 per cent.

The effect of achieving international best practice in electricity production is a 16 per cent drop in electricity prices and a 4 per cent increase in electricity sales. As a result there is a 0.5 per cent increase in real GDP ($1.8 billion). Mining output expands by 1.8 per cent with ferrous metal ores and bauxite being the main gainers. Most minerals processing industries also expand with the major gainer being aluminium smelting, the most intensive user of electricity.

[2] It should be noted that although the ORANI-MINE level of aggregation was used for he electricity simulations, the database used was that for 1980-81 and the adjustment costs mechanism was not imposed.

Table F4: **Estimated long-run effects of improved efficiency in electricity supply**
(Percentage changes)

	International Best practice	*Removal of cross-subsidies*	*Total*
Macroeconomic aggregates			
Real GDP	0.5	0.2	0.7
Real consumption	0.5	-0.1	0.4
Real investment	0.2	0.0	0.2
Export volume	0.8	1.0	1.8
Import volume	0.3	0.1	0.4
Balance of trade[a]	0.1	0.1	0.2
CPI	-0.2	0.0	-0.2
Real pre-tax wage rate	0.8	0.0	0.8
Aggregate employment (persons)	0.1	0.0	0.1
Aggregate capital stock	0.2	0.0	0.2
Shift in direct tax rates	-0.6	0.0	-0.6
Sectoral outputs			
Agriculture	0.1	-0.3	-0.3
Mining	1.8	2.1	3.8
Manufacturing	0.4	0.3	0.7
Services	0.6	-0.1	0.4

a Change in the balance of trade as a percentage of base-case GDP

In the elimination of cross-subsidies scenario, all mining and most processing industries benefit significantly from cheaper electricity prices except aluminium smelting. (Real GDP increases by 0.2 per cent or about $0.7 billion.) Although electricity prices remain the same on average, the price to business users (including mining and processing with the exception of aluminium smelting) is lowered while the price to households and agriculture is increased to eliminate the claimed cross-subsidies. The electricity price faced by the energy intensive aluminium smelting industry remains unchanged as revenues received from this industry are claimed to just cover the costs of supplying electricity to it. As a result aluminium smelting becomes less competitive because other processing and manufacturing industries which compete with it for resources enjoy reductions in electricity prices and are better able to compete for those resources.

Table F5: **Estimated long-run output effects of improved efficiency in electricity supply on mining and minerals processing industries under reference**
(Percentage changes)

Industry	*International Best practice*	*Removal of cross-subsidies*	*Total*
Mining industries			
Ferrous metal ores	3.2	4.1	7.3
Bauxite	3.2	4.2	7.4
Copper ores	2.0	2.7	4.8
Nickel ores	1.6	2.6	4.2
Silver-lead-zinc ores	1.9	2.8	4.7
Non-ferrous metal ores nec.	2.2	3.1	5.3
Black coal	1.8	2.6	4.4
Minerals processing industries			
Basic iron and steel	0.2	0.3	0.5
Silver, lead, zinc smelting, refining	1.7	2.7	4.4
Alumina smelting, refining	4.2	5.4	9.6
Aluminium smelting	3.1	-1.1	1.9
Nickel smelting, refining	1.6	2.6	4.2
Non-ferrous metals processing nec.	2.8	0.4	4.7

F3 Removal of assistance

In this section the effects of removing assistance to the manufacturing and agricultural sectors are examined.

In its Draft Report the Commission also modelled the effects of removing a number of minor items classified as direct assistance to mining (such as the operations of the Joint Coal Board and the Office of the Supervising Scientist). Submissions made in response to the Draft Report have indicated that a number of these minor items are in fact predominantly funded by levies on mining industries and should not be viewed as assistance to mining. The Commission agrees with these views. In the Draft Report the impact of removing what was initially classified as direct assistance to mining was negligible on both the economy and mining and processing industries.

Removal of manufacturing industry assistance

Tariffs and bounty payments are the major forms of assistance afforded manufacturing industries. Phased reductions in the level of manufacturing assistance have been announced for the mid-1990s. The effects of these phased reductions, and of the complete removal of assistance remaining after the phasing arrangements, have been simulated. The results are presented in Tables F6 and F7.

Removing assistance to the manufacturing sector stimulates the economy, raising real GDP by a projected 0.8 per cent (almost $3 billion). This is brought about partly by a more efficient use of resources, as these are reallocated away from highly assisted towards economically more efficient activities, and partly by induced growth in labour and capital usage.

Removing tariffs benefits export-oriented industries both directly, by eliminating a tax on their materials and capital inputs, and indirectly, by inducing a real depreciation of the exchange rate. The real depreciation is required to counteract a large first-round increase in the trade deficit, as imports of previously dutiable commodities increase. It may be brought about either by a fall in the domestic price level (as in these simulations), or by a depreciation of the nominal exchange rate. In either case, it favours export-oriented activities.

Table F6: **Estimated long-run effects of removal of manufacturing assistance**
(Percentage changes)

	Assistance reductions announced for the mid-1990s	*Elimination of assistance remaining in the mid-1990s*	*Total removal of manufacturing assistance*
Macroeconomic aggregates			
Real GDP	0.2	0.6	0.8
Real consumption	0.1	0.4	0.5
Real investment	0.4	1.9	2.2
Export volume	1.8	5.2	6.9
Import volume	2.0	6.0	8.0
Balance of tradea	-0.1	-0.4	-0.4
CPI	-0.6	-2.5	-3.1
Real pre-tax wage rate	0.7	1.9	2.7
Aggregate employment (persons)	0.1	0.3	0.4
Aggregate capital stock	0.1	0.7	0.8
Shift in direct tax rates	2.9	7.9	10.7
Sectoral outputs			
Agriculture	0.1	1.0	1.1
Mining	0.4	4.1	4.5
Basic metals	0.3	1.2	1.5
Other manufacturing	-0.2	-1.9	-2.1
Services	0.1	0.6	0.7

a Change in the balance of trade as a percentage of base-case GDP

Mining industries would in reality derive relatively little direct benefit from the tariff removal, since much of their imports of materials and capital goods currently enter duty-free under Commercial Tariff Concession Orders (CTCOs). The simulation results presented here do not take account of CTCOs, and therefore tend to overstate the direct effects of tariff reform on mining sector activity. But analysis of the results shows that most of the simulated increases in mining activity levels arise through indirect effects. Mining industries benefit from tariff reform, not so much because tariffs on their own imported inputs fall, as because the previously assisted industries contract, leading to weaker demand and lower prices for domestic inputs.

It should also be noted that the removal of manufacturing assistance simulations reported here will show smaller increases in mining output than results previously derived by the Commission when using the 1980-81 database. This does not mean that the expansion in the value of mining output is lower. Rather, the mining sector is larger in the updated database and therefore, a smaller percentage increase in sectoral output is predicted as necessary to cover the increase in the value of imports following tariff reductions.

The mining activities which benefit most from the tariff reductions are the most highly export-oriented, including ferrous metal ores and black coal mining and aluminium smelting and refining. The only activity under reference to suffer is basic iron and steel making, which contracts because of a weakening in demand by previously assisted iron- and steel-using industries. Since the database does not take full account of recent and projected enhancements in the export orientation of the iron and steel industry, the effects on it of tariff reform might be more favourable than these simulation results indicate.

Table F7: Estimated long-run effects of removing manufacturing assistance on mining and minerals processing industries under reference
(Percentage changes)

	Assistance reductions announced for the mid-1990s	*Elimination of assistance remaining in the mid-1990s*	*Total removal of manufacturing assistance*
Mining industries			
Ferrous metal ores	1.4	7.4	8.8
Bauxite	0.6	5.0	5.6
Copper ores	0.3	2.2	2.5
Nickel ores	0.6	5.7	6.3
Silver-lead-zinc ores	0.5	5.0	5.5
Non-ferrous metal ores nec.	0.5	5.1	5.6
Black coal	0.6	7.1	7.6
Other mining	0.7	4.4	5.1
Minerals processing industries			
Basic iron and steel	0.2	-0.8	-0.7
Silver, lead, zinc smelting, refining	0.4	4.3	4.7
Alumina smelting, refining	1.1	6.4	7.5
Aluminium smelting	0.7	4.6	5.3
Nickel smelting, refining	0.6	5.7	6.3
Non-ferrous metals processing nec.	0.1	0.4	0.5

The May 1988 tariff cuts, when completed, will remove only a fraction of the total cost to the mining sector of manufacturing industry assistance. Mining output is simulated to rise by 0.4 per cent as a result of the announced tariff cuts, but would rise by a further 4.1 per cent if the process of tariff reform was to continue until all tariffs were removed.

Overall, the mining sector would expand by 4.5 per cent, indicating that the present structure of manufacturing industry assistance detracts significantly from the competitiveness of Australia's mining industries.

Reduced rural assistance

In examining the impact of agricultural assistance arrangements on miners and minerals processors and the economy as a whole, the ORANI-MINE model was not used. The version of ORANI used in IAC (1990) contains specialised improvements to the treatment of agricultural and food processing industries which provide a superior representation of the effects of reducing rural assistance. Assistance provided to agriculture was grouped into:

. direct assistance to farm value adding factors and other inputs;

. indirect output assistance, ie assistance provided primarily to food processors and assumed to be passed back to farmers; and

. direct output assistance provided to farmers.

Preliminary analysis of the results from full removal of rural assistance revealed some linearisation errors in the model. To avoid these problems it was decided instead to simulate a 25 per cent reduction in rural assistance.

Assistance to value adding factors and other inputs is provided mainly in the form of tax concessions and subsidies to research, disease control, wool promotion and subsidised adjustment costs. This assistance amounted to $471 million in 1987-88 or about 41 per cent of all assistance estimated to have been provided to farmers.

Indirect output assistance is provided mainly in the form of home consumption price arrangements operating at the processing level and under-recovery of costs incurred in inspection of products destined for export markets. Tariffs on processed agricultural products also provide a small amount of assistance to the rural sector. Together this assistance was estimated at $625 million or about 55 per cent of measured agricultural assistance in 1987-88.

In contrast, output assistance provided directly to farmers comprises only 4 per cent of measured agricultural assistance. This assistance mainly involved home consumption price arrangements operating at the farm level and tariff assistance on certain vegetables.

Results from the 25 per cent cut in rural assistance are given in Table F8. A 25 per cent reduction in tax concessions and other input-based assistance was simulated to contract the agricultural sector by about 0.2 per cent. The main beneficiary of this decline in agriculture is the other major exporter, the mining sector, whose output increases by 0.3 per cent. In particular, the black coal industry expands as a result of the loss of competitiveness of agriculture. As an exporter assumed to face favourable demand conditions, it can take advantage of its increased competitiveness resulting from less competition for inputs.

Table F8: Estimated long-run effects of a 25 per cent reduction in 1987 levels of agricultural assistance
(Percentage changes)

	Assistance to value adding factors and other inputs	*Indirect Output Assistance*	*Total (including direct output assistance)*
Macroeconomic variable			
Real GDP	0.0	0.0	0.0
Sectoral outputs			
Agriculture	-0.2	-0.2	-0.4
Mining	0.3	0.7	1.0
Manufactures	0.0	-0.2	-0.1
Services	0.0	0.0	0.0
Mining and Minerals Processing Output			
Ferrous metal ores	0.3	0.9	1.3
Non-ferrous metal ores	0.3	0.9	1.2
Black coal	0.4	1.2	1.6
Minerals nec	0.1	0.0	0.1
Basic iron and steel	0.1	0.1	0.1
Other basic metals	0.3	0.9	1.2

By reducing indirect output assistance, aggregate agricultural production was estimated to decline by 0.2 per cent as a large drop in output of milk products fed through to the rural sector. The decline in farm level milk production was sufficiently large in the simulation to offset expansions in other agricultural commodities, particularly grains and wool.

In total, a 25 per cent reduction in rural assistance was simulated to expand real gross domestic product by 0.04 per cent (about $150 million). The major sector to benefit would be mining, with an estimated output expansion of about 1.0 per cent in total. Black coal is the major mining industry to gain, with an output expansion of 1.6 per cent. Ferrous metal ores also expand by roughly 1.3 per cent. The smelting of aluminium, copper, silver, lead and zinc, etc also expand by close to 1.2 per cent. Only minerals and processing activities which are not primarily export-oriented gain little from the removal of agricultural assistance.

F4 Conclusions

The economic impediments examined in this appendix have been found to have a major impact on the Australian economy as a whole and the mining sector in particular. Mining is found to be the major beneficiary from the removal of distortions elsewhere in the economy. If the reforms addressed in this appendix were implemented, mining output would likely increase by almost $5 billion in 1989-90 prices. GDP is projected to increase by over $11 billion.

Over one third of the expansion in mining activity would come from various transport reforms. These would significantly reduce costs of minerals and metals at ports of discharge, and the

resulting increase in competitiveness would expand mining output by almost 5 per cent. The other major impacts on mining activity come from removing assistance to manufacturing and various electricity industry reforms, which would contribute about one third and one quarter, respectively, of mining's projected expansion. The reduction of rural assistance contributes less than 10 per cent to the total mining expansion.

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APPENDIX G

BRIEF HISTORY OF GOVERNMENT INVOLVEMENT IN MINING

G BRIEF HISTORY OF GOVERNMENT INVOLVEMENT IN MINING

The involvement of Australian governments in largely determining the terms and conditions under which mining and mineral processing activities operate today continues what has been, historically, a long-established pattern. This appendix briefly surveys that long tradition of involvement. Whether such detailed interventions by all levels of government are justified and continue to be in the best interests of the Australian community is a question which needs to be posed regularly.

To gain a better appreciation of current government interventions affecting (and largely shaping) the mining and mineral processing sector, it is instructive to look at the role governments have played historically, and how those roles have changed over time. One reason why state and federal governments have always been closely involved in mining in particular has been that, from the early years of white settlement, the Crown claimed ownership of all minerals. Thus governments had complete say in how, when, and under what conditions mineral deposits could be exploited (and by whom). Another reason for government interest and involvement was that mining was a key determinant of overall economic activity in the early days of the colonies.

For most of the last 200 years, Australian governments have sought to encourage and promote mining (and more recently mineral processing) in a bid to develop the Australian economy (as well as to develop non-urban areas of the continent). Governments have provided preferential access to land, subsidies, tax concessions/exemptions and other incentives to achieve these ends. At other times, such as during the two World Wars, governments have discouraged certain mining activity. In the latter half of this century, governments have tended to reassess the privileged position mining has traditionally enjoyed. Increasingly, environmental considerations and other claims over land (such as land rights for Aboriginals) are claiming the attentions of governments, with the result that in some cases mining projects have not been allowed to proceed.

Early developments - coal

Coal was first found by runaway convicts at Newcastle in 1791, and became the first mineral to be mined in Australia. After Governor King declared all coal and timber to be Crown property, mining began at Newcastle using convict labour in 1799. The first shipment was exported a year later. However, after only two years of operations, mining ceased because of poor returns from sales to India and the Cape of Good Hope. When the Colonial Secretary, Lord Hobart, heard that King had closed down the only venture in the colony with the potential to make a profit, he ordered the workings reopened. After a report by Commissioner Bigge in 1821 suggesting that private companies run the Newcastle mines instead of the government, convicts were supplied to private ventures. This, along with a 2 000 acre land grant, enabled the Australian Agricultural Company to gain a monopoly on coal mining in Australia (Carroll 1977).

The colonies gain control over minerals

From first settlement until the mid-nineteenth century, control over natural resources in Australia had remained with the British Government. However, it was not long before the colonies demanded control over the `waste lands of the Crown', realising they represented a major potential source of revenue. In responding to these demands, Britain decided to grant responsible government, and control over Crown lands, to eastern Australia in the mid-1850s. This enabled the colonial Parliaments to adopt a policy toward the ownership of minerals whereby the Crown retained ownership in all subsequent grants of freehold title. This was in contrast to the first years of settlement where land grants meant that title (including ownership of any associated minerals) generally passed to the grantee. The important exception was the right to `Royal Mines' (the precious metals of gold and silver) which remained vested in the Crown by virtue of the Royal prerogative.

Gold fever transforms society and the economy

Because gold and silver remained the property of the Crown, prospecting and mining for gold was slow to start despite constant rumours and small finds. However, when `gold fever' struck in the 1850s, it had the biggest impact on the Australian economy of any of the early mineral finds. Immigration for the years 1852 to 1856 averaged 45 000 compared with 10 000 in the years preceding the finds. The boom also attracted foreign capital and technological know-how. From 1851 to 1865, New South Wales and Victoria experienced annual capital inflows of around £2 000 000 - a marked increase on the £340 000 experienced between 1827 and 1850.

Although the `gold boom' had a significant effect on the long-term development of the Australian economy, in the short term it presented some problems. Existing industries were deprived of workers (thus fuelling wage inflation), while strong demand for goods and services added to inflationary pressures. Governments strained to administer and maintain order over the swelling number of miners. To deter the Chinese, in the hope of controlling racial violence, the Victorian Government imposed a disembarkation tax in 1855. A resident tax of £1 a month followed two years later. Other states soon followed Victoria's lead, and imposed taxes on the Chinese. Other colonies soon adopted NSW's approach to gold-field administration - which encompassed a miner's licence fee, customs duties, taxes on mining machinery, gold escort fees and export fees.

A miner's right to enter Crown land and stake his claim is established

In response to dissatisfaction with the miners licence (which led to the Eureka stockade uprising in 1854), Victoria passed the *Gold Fields Act in 1855.* A miner's right replaced the miner's licence. This Act was a turning point in mining legislation in Australia in that it enunciated the principle of free entry onto Crown land for mining purposes, and gave the first entrant priority in establishing a claim to any gold found.

The *Mining Statute 1865* passed in Victoria confirmed the right of a holder of a miner's right to enter and take possession of unoccupied Crown land for gold mining purposes. The statute also set out the powers of the Governor to grant leases to mine gold and other minerals, as well as a system of licences to explore for other minerals on Crown lands. This statute provided a model for the mining laws of the other Australian colonies. Similar legislation was adopted by NSW (1866 and 1874), Queensland (1874), SA (1870), Tasmania (1880), WA (1886), ACT (1930) and NT (1939) (Lang and Crommelin 1979).

Miner's rights extended to private land

The Mining Statute 1865 did not, however, cover mining on private land. This was covered under the *Victorian Mines Act 1897* which stated that a miner could obtain a prospecting licence for private land without the landowner's consent, provided the landowner was paid some form of compensation, if necessary. The holder of a miner's right could also obtain authority to enter private land to take up a claim. This legislation also served as a model for laws adopted by NSW (1894), SA (1888 and 1895), WA (1898), Queensland (1909), Tasmania (1929) and the Northern Territory (1939) (Lang and Crommelin 1979). The *Mines Act 1897* gave miners (and later mining companies) greater security of tenure and hence greater confidence in their capital outlays to undertake mining.

Coal increases in importance

Meanwhile, by 1881 the NSW coal fields were producing about two million tons of black coal annually. Subsequently, there was an even more rapid expansion of coal production because of growing demand from the railways and development of base industries which required coking coal for smelting. However, the depression of the 1890s reduced the demand for black coal so sharply that operations were severely curtailed.

Metalliferous mining becomes established

With government support, the metalliferous mining industry was well established by the early 1900s with gold, lead and silver predominating. In 1896, the Western Australian Parliament allocated £2 500 000 to build a 300 mile pipeline, eight pumping stations, and a dam at Mandaring in the Darling Ranges near Perth, to service mining operations at Kalgoorlie and Coolgardie. Royalties were first included in Western Australian legislation in the *Mining Act 1904*. The initial royalty scheme did not cover all minerals (others were later included in 1958).

World War I takes its toll

The First World War had a drastic impact on the Australian mining industry. Restrictions placed on international shipping reduced supplies of imported raw materials and machinery. The diversion of labour and materials to the armed forces and munitions industries compounded the resulting shortages. Mines were either closed or forced to cut production drastically. An export embargo was placed on sales of gold, zinc, lead and tin concentrates to Axis powers. This action had a large impact since Germany had been a major buyer of these minerals.

Mining falls victim to protectionist sentiment in the 1920s

During the 1920s, tariff barriers were progressively erected with the aim of protecting Australia's infant manufacturing industries from cheap imports. This contributed to a downturn in mining activity, because it raised production costs at a time when prices of gold and copper were falling, or at best stable - thus forcing some companies out of business.

Special assistance for the gold industry in hard times

After the war, the government encouraged gold production by introducing income tax concessions in 1924 (income from gold has been exempt from income tax ever since, but this will end on 1 January 1991). In 1930, the Commonwealth Government offered gold mining companies a bonus

of £1 an ounce (later reduced to 10 shillings) on increased production. Government incentives continued with the Western Australian Government (supported by the Commonwealth), initiating the State Prospecting Scheme in 1933 to encourage gold exploration. The *Sales Tax (Exemptions and Classifications) Act 1935* (Cwth) exempted mining machinery and equipment from sales tax.

World War II also extracts its price

World War II heralded another period of increased government intervention in the mining industry. Because of the strategic nature of coal and the need to ensure supply during the war, the NSW coal industry became subject to more and more controls by the Commonwealth Government. After 1943, steel and iron production contracted because of shortages of labour, materials and transport. Also progressive depletion of economically viable sources of supply (in terms of then existing technologies) occurred and industrial strife plagued the coal industry.

Aluminium emerges as a strategic metal

The emergence of aluminium as a strategic metal during the war led to the development of a domestic aluminium manufacturing industry. In 1945, the Government established the Australian Aluminium Production Commission to supervise the construction of an aluminium refinery and smelter in Tasmania.

Post-war diversification

After the Second World War, the diversity of mining in Australia increased with a flood of discoveries that led to Australia becoming a leading producer of aluminium, coal, iron, nickel, manganese, tin, zinc, zirconium and lead. The increasing number and diversity of post-war mineral discoveries were attributable to factors such as: improvements in exploration, extraction and treatment technologies; accumulated knowledge of Australia's mineral make-up through geochemical and geophysical investigations; and an influx of overseas capital. This occurred at a time of a general expansion in the world economy (and Japan in particular) - which created an increasing demand for minerals, pushing up prices.

Coal's troubled times lead to establishment of the Joint Coal Board

With Australia's almost total reliance on coal for its energy needs, and growing unrest in the industry, the NSW and Commonwealth Governments introduced the Coal Industry Acts in 1947 which led to the creation of the Joint Coal Board (JCB) and the Coal Industry Tribunal. Queensland soon followed the NSW example. The JCB was granted far-reaching powers enabling

it to regulate most aspects of the industry in NSW - including general conditions within the industry; the introduction and operation of machinery; employment and recruitment; management and development of coal mines; the price of coal; acquisition and disposal of any property or rights; and even whether new mines could open or old ones close.

The NSW coal miners strike of 1949, in which Prime Minister Chifley sent in troops to work the mines, was something of a turning point for industrial relations in the coal industry. As a consequence, some reforms were introduced and there was some improvement in the traditional adverserial nature of employer-employee relations, as both sides began to take a more reasonable attitude to solving mutual problems.

The hunt is on to discover uranium

At the British government's request, the search for uranium began in 1944 at Radium Hill and Mount Painter where traces of uranium had been previously found. The first significant uranium find, though, was at Rum Jungle in 1949 - a year after the Commonwealth Government began offering tax-free rewards for uranium discoveries. In 1952, profits from the treatment and processing of uranium were made tax exempt. In 1953, a private company, Consolidated Zinc Pty Ltd, took over the Rum Jungle mine at the Government's request, with open-cut mining beginning the next year. In the same year, the Commonwealth *Atomic Energy Act* was passed which ensured that all uranium in the Northern Territory remained the property of the Commonwealth. The Tasmanian and Victorian governments quickly did the same in their States.

Moves to larger-scale operations

With the advent of large-scale mining operations (and large mining companies), governments began to respond with specific legislation dealing with individual mining projects (or mining companies). Such legislation spelt out the terms and conditions of mining leases. In Western Australia, the first such piece of legislation was the *BHP Steel Industry Agreement Act 1952.* Successive Western Australian Governments, as well as other State governments, have also attempted to increase the extent of local processing of minerals (particularly iron ore) by incorporating processing commitments into agreements. The provision of mine-specific infrastructure is also typically covered in project-specific Acts of State Parliaments. In NSW, social infrastructure obligations are set out in the *Environmental Planning and Assessment Act* and are therefore an integral part of the process of obtaining consent for a project to proceed.

Gold is singled out for further special assistance

In 1954, the Commonwealth Government introduced the Gold Mining Assistance Act which provided subsidies to compensate producers for rising costs during a period when the price of gold was fixed under the gold standard. The subsidy was removed following a 1975 IAC inquiry into the production of gold.

Embargo lifted on iron ore exports

In December 1960, the Commonwealth Government lifted the 1938 export embargo it had placed on iron ore exports because of fears that Australia's deposits were not large enough to fulfil both domestic and export needs. Also, during this period, the Western Australian Government refused

to issue prospecting licences or mining leases to companies wishing to search for iron ore. However in 1960, with export prices for metals and coal rising significantly and a change in Western Australian Government policy, mines such as Mount Tom Price, Shay Gap, Mount Newman and Robe River went ahead.

Aboriginal land rights are recognised by the Commonwealth Government

In 1972, the Commonwealth Government adopted a policy of self-determination in respect of Aboriginal land whereby the (inalienable) title to extensive tracts of land (mainly in the Northern Territory) was transferred to aboriginal groups. The *Aboriginal Land Rights (Northern Territory.) Act 1976* also allows traditional Aboriginal people to be compensated for minerals recovered from their lands. Although not granted mineral rights in respect of their lands, the Aboriginal people were given the right to veto new mining projects on their land. However, the Commonwealth Government can overrule any veto if it considers such a course to be in the national interest._[1] This new policy of self-determination maintained the 1952 decisions of the Federal Parliament and the NT Legislative Council which permitted mining on Aboriginal reserves - provided royalties paid in respect of mineral production on Aboriginal reserves were used to benefit all Aborigines residing in the Territory.

The environment takes centre stage as a popular issue

Since the 1960s, governments' responses to environmental concerns have increasingly affected the mining industry. State and Commonwealth Governments increasingly reserved land for preservation, conservation and recreation purposes; as well as legislated to limit harmful emissions of toxic substances into the air, water and soil. The Commonwealth Government passed its Environment Protection Act in 1974 and in 1979 NSW introduced its Environment Protection Act. The Commonwealth's *Environment Protection (Impact of Proposals) Act 1974* led to the Fraser Island sandmining inquiry, with the result that mining was banned under Regulation 9 of the Customs (Prohibited Exports) Regulations, despite the Queensland Government having previously given its approval. The *Australian Heritage Commission Act 1975* established the Heritage Commission, which advises the Commonwealth Government on protection of Australia's National Estate. Thus, whereas the mining industry once enjoyed priority in access to land, it now had to compete with other potential uses of certain land.

The trend towards greater concern for the environment has continued during the 1980s and is shaping up to be a major determinant of land-use decisions in the 1990s and beyond. A National Conservation Strategy for Australia was developed in 1983 by the Commonwealth Government in consultation with other interested parties. Its role is to provide a framework within which industry can operate and seeks to achieve a balance between the need to develop Australia's natural resources and the need to preserve the environment for future generations.

Restrictions are placed on uranium

In 1972 there was an abrupt turn-round in government policy towards uranium mining. In 1971, the coalition government had announced its intention to lift quantitative restrictions, while maintaining export controls. However, in December 1972 the newly elected Labor government

[1] For a more detailed history of Aboriginal Land Rights Legislation see Attachment 4A to Section 4 of Volume 3.

effectively stopped further exploration by placing strict limits on uranium exports. This action was taken because the Government apparently believed that if Australian supplies were restricted the price of uranium would increase rapidly, benefiting Australia (Barnett 1988). The ban delayed development of further mines pending formulation of policies on issues such as: foreign involvement in projects; Aboriginal land rights; environmental considerations; and marketing arrangements. For example, Mary Kathleen (by this stage Australia's major uranium mine) could only export one fifth of its known deposits. As a result of a policy vacuum created while the Fox Commission completed its inquiry and reports, development and further exploration stagnated while the price of uranium soared on world markets. It was not until 1980 that uranium mining began at Nabarlek, whilst Ranger commenced in 1981 (with the Commonwealth Government's Australian Atomic Energy Commission taking a 72.5 per cent equity in the project). In November 1983, a special meeting of the Labor Party Caucus agreed to continue the mining and export of uranium from Ranger and Nabarlek, but opposed development of any new mines (except for Olympic Dam). This effectively established the present `three mines' policy.

Introduction of the Fringe Benefits Tax affects many mining ventures

On 1 July 1986 the Commonwealth Government introduced its Fringe Benefits Tax with responsibility for paying the tax falling on those providing benefits. In the case of the mining industry, taxes had to be paid on benefits such as provision of minesite housing - benefits which mining companies claimed were necessary to attract and retain suitable labour. Introduction of the tax had the effect of increasing labour on-costs, particularly in respect of workers located in remote areas.

The mining industry is effectively denied access to more land

There has been a recent move toward adoption of `Wilderness Areas' as an extra tier of land classification for conservation purposes. In 1987, the South Australian Government introduced its Regional Reserve classification scheme, which provides for the conservation of wildlife and of prominent natural features of the land, while permitting utilisation of natural resources under agreed conditions. The first of these Regional Reserves (the Inniminka Regional Reserve in South Australia's far north) was established in 1988.

Establishment of the Resource Assessment Commission

In November 1988, in a renewed commitment to the National Conservation Strategy for Australia, the Commonwealth Government announced establishment of the Resource Assessment Commission (RAC), to advise on natural resource use decisions. "The RAC will provide an opportunity for all levels of government, interested groups and individuals to have their views considered before the Commonwealth makes major land decisions" (Kerin 1988).[2] After an Environmental Impact Study for Coronation Hill was completed at considerable cost to the proponents in October 1989, the Government decided to refer the project to the RAC with a twelve-month reporting deadline.

[2] Minister for Primary Industries and Energy, Minister for the Arts, Sport, The Environment, Tourism and Territories, Minister for Resources, *Conservation and Development – Resource Assessment*, Media Press Release, November 198.

Sustainable development engages everyone's attention

The concept of sustainable development is now engaging the attention of governments. The frameworks which evolve in response to such concerns are likely to have a major impact on the future of mining and mineral processing activities in Australia. Issues such as the optimal rate of resource depletion, environmental degradation/rehabilitation, land access and energy efficiency limiting greenhouse warming are therefore likely to increasingly shape the policies of governments towards mining in the future.

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Thus, both State and Commonwealth Governments have been intimately involved in many aspects of mining and minerals processing activities in Australia, largely shaping the environment in which these industries have operated historically, and continue to operate today. But it should not be presumed that such detailed interventions continue to be in the best interests of the Australian community. This inquiry provides an opportunity to review the efficacy of current government involvement in mining and mineral processing activities.

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APPENDIX H

ASSISTANCE TO MINING AND MINERALS PROCESSING INDUSTRIES

H ASSISTANCE TO MINING AND MINERALS PROCESSING INDUSTRIES

This appendix presents estimates of assistance provided by Australian governments to minerals processing industries, together with preliminary estimates of assistance to mining. The focus of the estimates is on border assistance (eg the tariff) and its effects on the input costs of mining and minerals processing industries. In the study, the effects of assistance are examined within the Commission's effective rates framework. Also discussed are some of the issues relevant to the assessment of assistance and the interpretation to be placed on the estimates reported in this appendix.

Estimates of assistance to minerals processing industries have been regularly published by the Commission (formerly the Industries Assistance Commission (IAC)) as part of its annual reporting function. The Commission has, however, not previously reported on assistance to mining. The only available estimates of assistance to mining industries are those published by the Australian Bureau of Agricultural and Resource Economics (ABARE,1988) based on data provided by the IAC.

This appendix presents assistance estimates that have been made for minerals processing industries, together with preliminary estimates for mining industries. Estimates of mining assistance are not strictly comparable with those for the minerals processing industries. This is because detailed industry cost data are available for the minerals processing industries from the manufacturing census conducted by the Australian Bureau of Statistics (ABS), whereas, for the mining industry, estimates have been made using information from ABS's input-output tables to derive detailed industry cost structures, supplemented by information about industry output levels from the 1987-88 ABS mining industry collection and other sources.

Some general principles of assistance measurement are discussed in section H1. Estimates of assistance to the minerals processing industries, together with projections of what assistance levels are likely to be at the end of current tariff phasings in the mid-1990s, are presented in section H2. Preliminary estimates of mining assistance for 1983-84 and 1988-89, and projections for the mid-1990s are reported in section H3. Following presentation of estimates some of the issues relevant to the interpretation of the estimates are discussed.

H1 Measurement of assistance

Government interventions, such as tariffs on imports, allow domestic prices to be set at levels higher than would otherwise be possible. As a consequence, domestic consumers and industrial users pay more for imported goods and for domestically produced substitutes than would be the case in the absence of border assistance. Producers respond by shifting resources between areas of production, depending in part on relative levels of assistance. Thus:

. at one level (ie before adjustments are made in response to changes in relative prices), estimates of assistance reflect the initial price effects of interventions; and

. at another level (ie after producers and consumers have completed their adjustments), the resulting changes in production and consumption patterns and possibilities may be regarded as the ultimate effects of assistance.

In this study, the initial price effects of assistance are being examined within the Commission's effective rates framework. In doing so, the study examines the initial price pressures induced by assistance to industry outputs and on inputs.

Measurement of assistance within this framework requires identification and quantification of the initial price effects of government interventions. Assistance estimates have been derived using export parity for goods exported and import parity for goods sold only on the domestic market. For example, for internationally traded goods subject to tariffs, the initial price effect of the intervention is estimated by assuming that domestically-produced good prices are raised by the same proportion as tariffs raise the price of imported substitutes.

Measurement of assistance also requires a choice being made of an appropriate point in the production and distribution chain at which to make the initial price comparisons. For manufacturing, including minerals processing, comparisons have been made at the `basic value' level, that is, on an ex-factory basis for local production and on a landed duty paid (ldp) basis for imports. In practice, to determine the level of domestic production for these comparisons, manufacturing census data published by the ABS are adjusted to exclude, from the value of manufacturing sales, the value of outward freight and cartage and sales commissions. It also has involved estimating the full selling value of production undertaken on commission by manufacturing establishments for others (including the full value of inputs to that production). The comparable (ie basic value) point of valuation for domestic mining activities is ex-mine.

In all studies, the cost, insurance and freight (cif) valuation of imports, plus duty, is used to represent the landed duty paid (ldp), or basic value of those goods.

Effective assistance is delivered through changes in both the returns from outputs (at basic values) and the cost of inputs (from both domestic and imported sources of supply) required in production. Nominal rate measures are used to give estimates of the initial returns and cost effects of assistance on outputs and inputs, respectively. Effective rates take account of both and provide a net measure of assistance to industry afforded by government interventions. Effective rates are expressed as a share of industry value added (at unassisted prices) whereas nominal rates are expressed as either a share of outputs or a share inputs (also valued at unassisted prices), as appropriate.

H2 Minerals processing

Estimates of Commonwealth government assistance to the minerals processing industries are provided on an annual basis as part of the Commission's measurement system for manufacturing industries. These estimates are made at the 4-digit Australian Standard Industry Classification (ASIC) level and cover the period since 1968-69.

Assistance estimates

Assistance to minerals processing industries' output (ie articles produced), intermediate inputs (ie materials used) and value added are given in the following three tables which provide estimates of:

. average nominal rates of assistance to outputs (Table H1);

. average nominal rates on materials used (Table H2); and

. average effective rates (Table H3).

The estimates take into account the major forms of assistance afforded by the Commonwealth Government on products of these industries and on the materials used by them. The major form of assistance is tariffs on competing imports.

The tables show that the framework of assistance to the minerals processing industries has remained relatively stable over the 1980s and, under current tariff phasings, is not projected to change much by the mid-1990s.

Nominal rates of assistance

As indicated in Tables H1 and H2, there was virtually no change in the assistance provided to outputs or on materials used by the mineral processing industries under reference during the 1983-84 to 1987-88 period. The reduction in the estimates for 1988-89 reflect the initial lowering of tariffs made on 1 July 1988 under the program of phased reductions announced in the May 1988 Economic Statement. These initial adjustments included the removal of the 2 per cent revenue duty on many imports and the phased lowering of higher duty rates (except for those applicable to Textiles Clothing and Footwear (TCF) and Passenger Motor Vehicles (PMV)) to either 15 per cent or 10 per cent. The mid-1990s estimates reflect the completion, by July 1992, of the lowering of higher duty rates to either 15 per cent or 10 per cent, and announced changes to the TCF and PMV assistance arrangements.

On average, the minerals processing industries receive less assistance on outputs than is provided for manufacturing industries generally. The average nominal rate of assistance on outputs of the minerals processing industry group Basic metal products in 1988-89 was 5 per cent, compared to 10 per cent for manufacturing as a whole. The levels are slightly lower than in 1983-84, when nominal rates were 6 per cent for Basic metal products and 13 per cent for manufacturing. The projections to the mid-1990s indicate a prospective lowering of assistance to mineral processing outputs to 4 per cent, compared to 8 per cent for manufacturing as a whole.

There are significant disparities in assistance to inputs and outputs within the processing group. Higher levels of assistance are provided to the outputs of the Basic iron and steel and the Non-ferrous metal basic products industries (including casting, rolling, drawing and extruding activities) than to the Non-ferrous metal smelting and refining industries (Table H1). The penalties of assistance on the material inputs to the Basic iron and steel group are also somewhat higher than penalties on inputs to the non-ferrous metal groups (Table H2). However, for industries which are

Table H1: Average nominal rates on outputs for selected mineral processing activities, 1983-84 to 1989-90 and mid-1990s
(Per cent)

ASIC codes	*Industry*	*1983-84*	*1984-85*	*1985-86*	*1986-87*	*1987-89*	*1988-89*	*1989-90* [p]	*Mid-1990s* [f]
2941	Iron and steel basic products	8.8	8.6	8	7.8	7.2	6.6	6.4	6.1
2942	Iron casting	16.2	15.6	15.3	14.8	14.6	13.5	12.6	9.5
2943	Steel casting	23.2	18.9	18.2	18.5	18.5	17.2	16.4	13.1
2944	Iron and steel forging	15.2	12.8	12.8	12.8	15.1	16.6	15.8	13
2945	Steel pipes and tubes	15.4	14.7	14.2	13.9	13.7	12.5	11.5	9
294	Basic iron and steel	10.1	9.7	9.1	8.9	8.4	7.8	7.4	6.7
2951	Copper smelting, refining	0.9	0.9	0.9	1.3	1.2	1.2	1.2	1.1
2952	Silver, lend, zinc smelting, refining [a]	0	0	0	0	0	0	0	0
2953	Alumina	0	0	0	0.2	0.1	0	0	0
2954	Aluminium smelting	0	0	0	0	0	0	0	0
2955	Nickel smelting, refining								
2956	Non-ferrous metals nec smelting, refining [a]	1.5	1.5	1.5	1.6	1.7	0.4	0.4	
2957	Secondary recov. Etc of non-ferrous metals nec	1.8	1.8	1.9	1.8	1.9	0.4	0.4	0.3
295	Basic non-ferrous metals and products	0.3	0.3	0.3	0.5	0.4	0.2	0.2	0.2
2961	Aluminium rolling, drawing, extruding	11.7	11.8	11.9	12.1	11.9	11.1	10.4	7.9
2962	Non-ferrous metals, nec rolling extruding	7	7	7	7	7	7	7	6.8
2963	Non-ferrous metal casting	8.8	8.9	9.3	9.4	9	7.3	6.7	5.4
296	Non-ferrous metal basic products	10	10.1	10.2	10.3	10.2	9.5	9	7.4
29	Basic metal products	6.1	5.9	5.7	5.6	5.4	4.9	4.7	4.2
21-34	Total Manufacturing	13.1	13.1	12	11.6	11.2	10.1	9.6	7.8

p Preliminary
f Forecast
a Assistance estimates combines because individuals production data are confidential.
Source: Commission estimates

Table H2: Average nominal rates on materials used for selected mineral processing activities, 1983-84 to 1989-90 and mid-1990s[a]
(Per cent)

ASIC codes	*Industry*	*1983-84*	*1984-85*	*1985-86*	*1986-87*	*1987-88*	*1988-89*	*1989-90* [p]	*Mid-1990s* [f]
2941	Iron and steel basic products	7.3	6.9	6.5	6.3	6.1	5.5	5.5	4.9
2942	Iron casting	4.5	4	3.8	3.7	3.9	3.7	3.6	3.1
2943	Steel casting	4.1	3.5	3.4	3.4	3.7	3.5	3.3	2.8
2944	Iron and steel forging	6.8	6.7	6.4	7.1	7	6.6	6.4	5.9
2945	Steel pipes and tubes	12.2	11.4	10.4	9.9	9.4	9	8.6	7.4
294	Basic iron and steel	7.5	7.1	6.7	6.5	6.3	5.7	5.6	5
2951	Copper smelting, refining	1.6	1.7	1.8	2.5	2.9	1.3	1.2	1.2
2952	Silver, lend, zinc smelting, refining [b]	0	0	0	0.1	0.1	0.1	0.1	0.1
2953	Alumina	4.5	4.7	5	8.5	6.4	4.7	4.2	2.7
2954	Aluminium smelting	1	1	1	1.3	1.8	1.3	1	0.9
2955	Nickel smelting, refining								
2956	Non-ferrous metals nec smelting, refining [b]	1.8	1.7	1.8	1.5	1.6	0.1	0.1	0.1
2957	Secondary recov. Etc of non-ferrous metals nec	1.6	1.5	1.5	1.7	1.7	0.1	0.1	0.1
295	Basic non-ferrous metals and products	2.1	2.2	2.3	3.6	3.1	2	1.8	1.3
2961	Aluminium rolling, drawing, extruding	1.8	1.8	1.8	1.8	1.8	0.1	0.1	0.1
2962	Non-ferrous metals, nec rolling extruding	1.7	1.7	1.7	1.8	1.8	0.1	0.1	0.1
2963	Non-ferrous metal casting	1.8	1.5	1.8	2	2.1	0.4	0.4	0.4
296	Non-ferrous metal basic products	1.8	2.2	1.8	1.9	1.9	0.1	0.1	0.1
29	Basic metal products	4.5	4.3	4.2	4.7	4.4	3.4	3.3	2.8
21-34	Total Manufacturing	8.3	8.1	7.6	7.4	6.9	6.3	6.2	5.3

p Preliminary
f Forecast
a "Materials used" inputs to production are inclusive of selected intermediate inputs but are exclusive of fixed capital inputs.
b Assistance estimates combines because individuals production data are confidential.
Source: Commission estimates

Table H3: Average effective rates for selected mineral processing activities, 1983-84 to 1989-90 and mid-1990s[a]
(Per cent)

ASIC codes	*Industry*	*1983-84*	*1984-85*	*1985-86*	*1986-87*	*1987-88*	*1988-89*	*1989-90*[b]	*Mid-1990f*
2941	Iron and steel basic products	12	12.3	11	10.8	9.5	9	8.3	8.6
2942	Iron casting	27.5	26.9	26.5	25.6	25	21.3	21.3	15.7
2943	Steel casting	38	30.8	29.7	30.1	30	26.4	26.4	21
2944	Iron and steel forging	30	23.7	24.2	23.1	29.4	32.4	32.4	25.7
2945	Steel pipes and tubes	20.9	20.3	20.7	20.8	21.2	16.4	16.4	11.7
294	Basic iron and steel	15	14.8	13.7	13.5	12.6	10.9	10.9	10.1
2951	Copper smelting, refining	-7.7	-8.2	-10.1	-14.8	-20.1	0	1.1	0.4
2952	Silver, lend, zinc smelting, refining [b]	-0.2	-0.2	-0.3	-0.3	-2.1	-0.4	-0.4	-0.4
2953	Alumina	-8.8	-9.1	-9.8	-9.8	-12.1	-9.1	-8.1	-5.1
2954	Aluminium smelting	-1.7	-1.7	-1.7	-1.7	-3	-2.2	-1.7	-1.6
2955	Nickel smelting, refining								
2956	Non-ferrous metals nec smelting, refining	-0.3	-0.3	-0.4	1.9	2	2.6	2.6	2.6
2957	Secondary recov. Etc of non-ferrous metals nec	2.4	2.9	3.4	2.7	2.5	2	2.1	1.5
295	Basic non-ferrous metals and products	-5	-5.2	-5.6	-9	-7.9	-5	-4.3	-2.9
2961	Aluminium rolling, drawing, extruding	45.7	46.7	46.8	47.5	46.8	49.1	49.1	35.1
2962	Non-ferrous metals, nec rolling extruding	29	29	29.3	28.8	28.4	35.6	35.6	34.9
2963	Non-ferrous metal casting	17	17.2	18	18	17	15.3	15.3	11.3
296	Non-ferrous metal basic products	36.2	36.8	37.1	37.4	26.7	39.4	39.4	30.5
29	Basic metal products	10.1	10	9.2	8	7.8	8.6	8.2	7.5
21-34	Total Manufacturing	21.8	22.4	20.2	19.3	19.2	17.1	15.9	12.4

p Preliminary
f Forecast
a In completing estimates of effective rates inputs to production are inclusive of intermediate but not fixed capital inputs.
b Assistance estimates combines because individuals production data are confidential.
Source: Commission estimates

relatively intense users of petroleum products (like Alumina) there is the added penalty of excise, which is reflected in the relatively high nominal rate on inputs.

Effective rates

Table H3 shows that there has been little change in effective assistance to most minerals processing industries over the period 1983-84 to 1987-88 and little is projected to occur by the mid-1990s under current policies. This reflects stability in assistance provided to both outputs of the industries and to materials used. On average, the Basic metal products group of industries receive significant assistance, but considerably less than manufacturing as a whole. The initial price effects of assistance would raise domestic prices relative to world prices and would tend to flow onto a lower levels of international trade in these activities once producers and consumers have adjusted to those higher costs.

There has been (and will remain under current policies) substantial disparities in effective rates of assistance within the Basic metal products group of industries. In particular, Basic non-ferrous metal smelting and refining activities receive negative net assistance, while assistance to both iron and steel and non-ferrous metal casting, rolling, drawing and extruding activities is high, even by manufacturing standards. The high effective rates for these metal product processing activities arise from the presence of no (or relatively low) assistance to major inputs (eg basic metals), and average (or above average) assistance to outputs.

H3 Mining

No assistance estimates for mining industries are available from the Commission's current estimation systems and neither the agriculture nor manufacturing systems could be easily adapted to provide estimates for mining. For mining, information about industry activity levels are available from the ABS census of mining establishments. However, detailed input cost data are not available from the mining industry census - as they are for manufacturing - and use has therefore been made of ABS input-output data and supplementary material to derive cost structures for the mining industry.

Outline of estimation methodology

The ABS 1987-88 mining industry collection, together with a specially adapted version of the 1980-81 ABS input-output tables, supplemented by other sources, have been used to divide mining into individual industries and obtain a detailed cost structure, including the major products produced, commodities used and components of value added. Through the use of the input-output methodology, it has been possible to introduce estimates of the nominal rate of assistance on fixed capital as well as intermediate (material) inputs. (By comparison, assistance to minerals processing only includes assistance to intermediate inputs to production.)

Measurement of assistance to outputs and estimation of the costs incurred in producing those outputs has been made on an ex-mine basis to be consistent with the ex-factory basis used for manufacturing (including minerals processing), the ex-farm basis used for agriculture, and cost, insurance and freight (cif) plus duty basis used for valuing imports.

A special feature of mining is the treatment of naturally occurring mineral deposits as a factor of production, or value adding factor. A share of some of the returns to mineral deposits are appropriated directly from the mine as royalties and those flows are reflected in ex-mine values of industry output and value added estimates. Some mineral returns, however, are appropriated beyond the mine site (eg as is acknowledged to be the case for some rail charges for black coal). Hence, reported ex-mine values are understated. To provide mining estimates of output and value added comparable to those for manufacturing and agriculture, an attempt has been made to identify and measure such collections of mineral factor returns (ie quasi royalties) and to adjust ex-mine and value-added data accordingly.

The significance of mineral returns in determining the level of mining industry output and relative importance of industries within the sector, and how these may change over time is reflected in Table H4. This table provides estimates of the share of individual mining industry outputs in total mining production for 1980-81 and 1987-88. For both years, output has been valued to both incorporate mineral returns and to exclude those returns. Estimates are shown on both bases. The estimates reported indicate that the level of mineral returns, particularly for the fuel industries, has a significant impact on the relative importance of mining industries.

The 1987-88 structure is adopted in this study.

Levels of border assistance

Border assistance to the output of mining industries is low because most mining products enter at zero or low rates. The main effect of border assistance is therefore through the effects of those interventions on the input costs of mining.

Assistance estimates for 1988-89

Table H5 provides the Commission's estimates of nominal and effective assistance prevailing in 1988-89. The estimates take account of the effect of border interventions on outputs and inputs of intermediate and capital goods. The table shows that border assistance to output is virtually zero. This situation represents a slight change from the pre-July 1988 situation (not shown in the table) when some items were subject to the 2 per cent revenue duty.

Border assistance raises the cost of intermediate and capital inputs which together comprise about half of total inputs. The remainder of industry inputs are contributed by returns to minerals, costs of labour, and certain indirect taxes (eg payroll taxes, but not commodity taxes on good and service inputs which are included in intermediate inputs). Table H4 shows that the price-raising effect of border assistance is estimated to be over 2 per cent for intermediate inputs and nearly 4 per cent for capital inputs. The combined cost of intermediate and capital inputs to mining is increased by nearly 3 per cent.

Table H4: **Comparison of the importance of mining activities, 1980-81 and 1987-88 output levels [p]**
(Per cent)

ASIC Codes	*Description*	*Before mineral costs*		*Including mineral costs*	
		1980-81	*1987-88*	*1980-81*	*1987-88*
111,2	Ferrous metal ores	10.5	8.7	8.2	8.0
1121	Bauxite	2.6	2.3	2.0	2.2
1122	Copper ores	3.0	2.2	2.3	2.0
1123	Gold ores	2.3	10.7	1.7	9.3
1124	Mineral sands	1.5	1.9	1.1	1.7
1125	Nickel ores	2.4	1.3	1.8	1.2
1126	Silver-lead-zinc ores	5.5	4.0	4.3	3.6
1127	Tin ores	1.5	0.3	1.1	0.3
1128	Uranium ores	2.2	1.1	1.6	1.1
1129	Non-ferrous metal ores nec	1.5	0.6	1.1	0.6
1201	Black coal	25.2	26.8	20.6	25.8
1202	Brown coal	1.2	1.6	0.9	1.4
1300	Crude oil and natural gases [b]	15.0	16.5	34.5	23.9
1401-1505	Other minerals	7.1	6.9	5.3	6.2
1611,2	Petroleum and mineral exploration (own account)	8.6	6.9	6.2	6.0
1620	Mining and exploration services nec [a]	9.8	8.0	7.1	6.9
	Total	100.0	100.0	100.0	100.0

p Preliminary
a Share estimated on the basis of the sector comprising a constant proportion the mineral extraction activities.
b Not under reference
Source: Commission estimates

There is some variability between industries with the estimated cost of assistance to capital items being highest for Ferrous metal ore and mineral exploration activities (at around 6 per cent of the cost of capital) and lowest for non-ferrous metal ores group at around 3 per cent. For intermediate inputs, estimates of the cost of assistance vary between 1 per cent for Mining and exploration services nec to over 3 per cent for industries in the Non-ferrous metals group.

After account is taken of the effects of assistance to outputs and inputs, the estimated average effective rate of assistance to mining is negative at about -2 per cent. This indicates that the initial impact of border assistance is to raise net domestic costs above international levels, reducing competitiveness in both import-competing and export-oriented markets. The initial impact of assistance would be to discourage domestic mining activity.

Table H5: **Effects of border assistance by mining industry, 1988-89** [p]
(Per cent)

ASIC codes	Industy	Nominal rates				Effective Rates
		Output	Intermediate and fixed capital inputs			
			Intermediate	Capital	Combined	
	Ferrous metal ores	0.0	2.8	5.5	3.8	-4.1
111,2	Ferrous metal ores					
	Non-ferrous metal ores					
1121	Bauxite	0.0	3.3	2.8	3.0	-1.9
1122	Copper ores	0.0	3.4	2.8	3.3	-3.9
1123	Gold ores	0.0	3.2	2.8	3.1	-2.7
1124	Minerals sand	0.0	3.1	2.8	3.0	-3.2
1125	Nickel ores	0.0	1.7	2.8	2.1	-2.1
1126	Silver-lead-zine ores	0.0	3.4	2.8	3.2	-2.9
1127	Tin ores	0.0	3.4	2.8	3.2	-3.1
1128	Uranum ores	0.0	2.9	2.8	2.8	-2.3
1129	Non-ferrous metal ores nec	0.0	3.4	2.8	3.2	-2.8
	Coal, oil and gal					
12	Black coal	0.0	2.8	3.4	3.0	-2.2
1202	Brown coal	0.0	2.0	3.4	2.3	-1.5
1300	Crude oil and natural gases	0.0	1.3	3.4	2.6	-1.5
	Other minerals					
1401-1505	Other minerals	0.7	3.0	4.9	3.5	-2.7
	Services to mining					
1611,2	Petroleum and mineral exploration (own account)	0.0	1.8	6.3	1.9	-9.1
1620	Mining and exploration services nec	0.0	0.9	6.3	2.0	-3.0
	Total mining	0.0	2.4	3.7	2.8	-2.4

p Preliminary
a In the disaggregation of estimates from the input-output industry level to the ASIC class level, it has been assumed that the commodity composition of capital within each industry (eg Non-ferrous metal ores) is similar. Reflecting this assumption, similar nominal rates on fixed capital are reported within each industry group (ie Non-ferrous metal ores, coal oil and gas and services to mining).
b Estimated with respect to total unassisted intermediate and fixed capital inputs.
c In completing estimates of effective rates, inputs to production are inclusive of intermediate and capital inputs. *Source:* Commission estimates

Changes over time

The effect of border assistance on industry costs declined over the period 1983-84 to 1988-89 and is expected to decline further to the mid-1990s. Table H6 shows that the estimated nominal rate on intermediate and capital inputs (combined) was 3.4 per cent in 1983-84, reduced to around 2.8 per cent in 1988-89 and is projected to decline to 2.1 per cent by the mid-1990s. The estimates presented indicate that this trend is characteristic of all mining industries. Table H7 provides estimates of the average effective rate of assistance to mining for the period 1983-84 to the mid-1990s. As would be expected, this measure of assistance has shown an upward trend from its initial negative level. In 1983-84, average effective border assistance was estimated to be negative at about -2.5 per cent, changing insignificantly to about -2.4 per cent in 1988-89. Negative effective assistance due to border interventions is projected to change to be about -1.8 per cent by the mid-1990s.

Other measures

In addition to border assistance, mining industries are influenced by Commonwealth and State government regulations, controls, expenditures and charges. The effect of many potentially important interventions on the costs of the mining industry, particularly those derived from the compliance costs of regulation, are difficult to estimate. However, there are a number of interventions involving government expenditures that can be quantified and brought into the assistance evaluation framework. For example mining industries only receive a partial rebate on the diesel fuel excise for off-road use. The cost penalty associated with the partial rebate has been estimated by ABARE to exceed $30 million for mining. Recognising this cost penalty leads to a marginal decline in the average effective rate for 1988-89 from -2.4 per cent to -2.6 per cent. The effect on assistance to individual industries is similarly small.

Assistance to the use of value adding factors in mining is also provided by governments. A major intervention has been the exemption of gold mining income from taxation. This exemption was to be repealed from 1 January 1991. The Treasurer's estimate of the amount otherwise payable was of the order of $300 million 0in 1987-88. Taking this estimate into account, the measured effective rate for gold mining increases from Ä2.7 per cent to around 12.5 per cent. It would make little difference for the sector as a whole - changing the measured effective rate from around -2.4 per cent to about 1.3 per cent.[1]

[1] As indicated, the estimates of assistance to gold mining reflect the gross effect of exemptions from the taxation. Some of this gross effect is clawed back by the taxation of dividends of gold mining companies and capital gains derived from equity holdings in gold companies and thus the net, or flow of funds, assistance effect of the exemption would be less than indicated by the gross measure reported above. In its estimates, ABARE has attempted to account for the claw back.

Table H6: Average nominal rates of border assistance on inputs to mining, 1983-84, 1988-89 and mid-1990s [a,p]
(Per cent)

ASIC codes	*Industry*	*1983-84*	*1988-89*	*Mid-1990s [f]*
	Ferrous metal ores			
111,2	Ferrous metal ores	4.6	3.8	2.8
	Non-ferrous metal ores			
1121	Bauxite	3.5	3.0	2.3
1122	Copper ores	3.9	3.3	2.5
1123	Gold ores	3.6	3.1	2.3
1124	Mineral sands	3.7	3.0	2.3
1125	Nickel ores	2.4	2.1	1.6
1126	Silver-lead-zinc ores	3.7	3.2	2.4
1127	Tin ores	3.7	3.2	2.4
1128	Uranium ores	3.3	2.8	2.1
1129	Non-ferrous metal ores nec	3.7	3.2	2.3
	Coal, oil and gas			
1201	Black coal	3.6	3.0	2.2
1202	Brown coal	2.6	2.3	1.7
1300	Crude oil and natural gases	3.2	2.6	1.8
	Other minerals			
1401-1505	Other minerals	4.2	3.5	2.7
	Services to mining			
1611,2	Petroleum and mineral exploration (own account)	2.3	1.9	1.5
1620	Mining and exploration services nec	2.8	2.0	1.6
	Total mining	3.4	2.8	2.1

p Preliminary
f Forecast
a In completing estimates of nominal rates of assistance, inputs to production are inclusive of intermediate and capital inputs.
Source: Commission estimates.

H4 Referencing assistance to value added

Industry assistance deals with incentives afforded by government interventions to employ factors of production in alternative industrial activities. The concept is therefore tied to industry products and inputs to production, and is summarised by a measure of value added in production. In the effective assistance framework, the net subsidy effect of assistance for an industry is estimated by deducting the tax effect of assistance on inputs from the gross subsidy effect of assistance on outputs, while the effective rate of assistance is obtained by dividing the net subsidy equivalent by value added at unassisted prices (ie recorded value added less the net subsidy effect).

Value added is a measure of the returns to primary factors of production (labour, land, natural resources and fixed capital) combined. The effective rate of assistance, by measuring the change in those returns, provides an indication of the incentives for the deployment of primary factors of production in alternative activities.

Table H7: Average effective rates of border assistance to mining, 1983-84, 1988-89 and mid-1990s [a,p]
(Per cent)

ASIC codes	*Industry*	*1983-84*	*1988-89*	*Mid-1990s [f]*
	Ferrous metal ores			
111,2	Ferrous metal ores	-4.3	-4.1	-2.4
	Non-ferrous metal ores			
1121	Bauxite	-0.4	-1.9	-1.5
1122	Copper ores	-1.5	-3.9	-3.1
1123	Gold ores	-3.1	-2.7	-2.1
1124	Mineral sands	-3.2	-3.2	-2.5
1125	Nickel ores	-2.4	-2.1	-1.6
1126	Silver-lead-zinc ores	-3.4	-2.9	-2.2
1127	Tin ores	-2.1	-3.1	-2.3
1128	Uranium ores	-2.6	-2.3	-1.7
1129	Non-ferrous metal ores nec	-2.7	-2.8	-2.1
	Coal, oil and gas			
1202	Brown coal	-1.6	-1.5	-1.1
1300	Crude oil and natural gasesb	-1.9	-1.5	-1.1
	Other minerals			
1401-1505	Other minerals	-2.8	-2.7	-2.0
	Services to mining			
1611,2	Petroleum and mineral exploration (own account)	-10.9	-9.1	-7.2
1620	Mining and exploration services nec	-4.1	-3.0	-2.4
	Total mining	-2.5	-2.4	-1.8

p Preliminary
f Forecast
a In completing estimates of effective rates, inputs to production are inclusive of intermediate and capital inputs.
b Not under reference.
Source: Commission estimates.

The use of value added as a measure of returns to primary and as a reference measure in effective rate calculations needs to be qualified. Value added as estimated is essentially a short-term measure of total economic activity for which exchange occurs in monetary terms. However, as an indicator of income, value added has a number of deficiencies including the omission of non-marketed activities (eg community preferences of wilderness areas). Such non-marketed activities may place a higher value on minerals in *situ*, to preserve a region for an alternative land use, than can be obtained from the sale of those minerals at market prices. To the extent that this occurs, returns to minerals and the value of mining industry outputs, as estimated, would be understated. In turn, value added from a unit of mining output would also be understated and any market based effective assistance measures, per unit of output, overstated.

In addition, environmental degradation and natural resource depletion constitute potentially significant costs that possibly should be deducted from the gross value of output to complete a measure of value added that does not entail reductions in future income-producing capacities. To the extent that those costs are not adequately recognised and covered in statistical analyses, value added (and income available from that value added for consumption without any permanent loss in wealth) would be overstated. To the extent that value added per unit of output is overstated, measures of effective assistance per unit of output would be understated.

H5 Comparisons of assistance

Comparisons of levels of effective assistance afforded different activities is a relatively straight forward indicator of the extent to which the relative incentives to use resources in particular activities (as measured by the market based estimates of returns to value-adding factors) have been changed by government intervention. Nevertheless, caution is required when drawing inferences about the actual effect on resource allocation.

To begin with, comparisons of effective rates provide information in a *static* framework and an evaluation of the *impact* of variations in the incentives environment on the allocation of the community's resources goes well beyond the scope of the effective rate measure. This would require account to be taken of the manner in which assistance alters production and consumption decisions. For example, there may be primary factor or institutional limitations on levels of output or entry to particular activities. When such limitations prevail, changes in government interventions analysed in the effective rate framework may mean that, although there are substantial income transfers between institutions, the extent to which activity levels expand (or contract) will be limited.

Thus, in making intersectoral comparisons of assistance, the following points need to be recognised:

. The Commission's measures of assistance to mining, agriculture and manufacturing (including minerals processing) do not incorporate all forms of intervention which discriminate between industries and sectors. The preliminary study of mining has been restricted to border assistance at this stage. The coverage adopted for other activities is similarly confined to measures involving the Commonwealth Government which discriminate directly between activities. Since the means by which industries are assisted differs to some degree between the sectors, the coverage is not the same for each sector;

. The Commission's assistance estimates for mining, manufacturing and agricultural activities use different data sources, which means that comparisons of assistance measures within sectors are more consistent than between sector comparisons; and

. There are intrasectoral disparities in assistance due to significant pockets of economic activity which are relatively highly assisted. Consequently, simple intersectoral comparisons of sectoral levels of assistance should be treated with some caution, as they may ignore far greater differences in assistance levels among industries within the same sector - which are also important sources of loss in community welfare.

REFERENCES

ABARE (Australian Bureau of Agriculture and Resource Economics) 1988, *Primary Industry Assistance in an Economy-wide Context*, Discussion Paper 88.1, AGPS, Canberra.