PRODUCTIVITY COMMISSION

The Australian Black Coal Industry

Inquiry Report

Volume 1: Report

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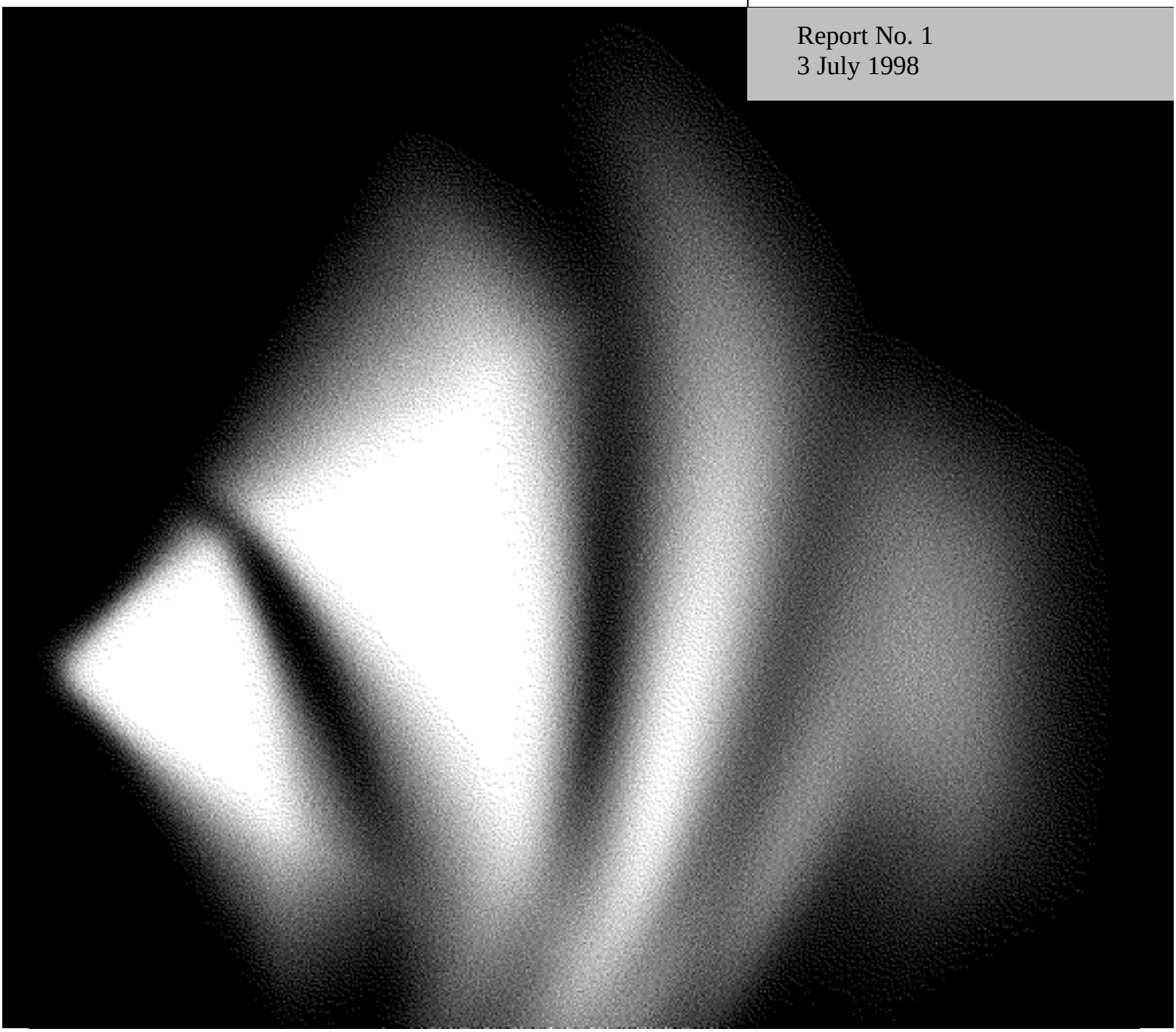
3 July 1998



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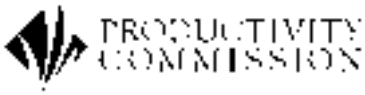

3 July 1998

The Honourable Peter Costello MP
Treasurer
Parliament House
CANBERRA ACT 2600

Dear Treasurer

In accordance with Section 11 of the *Productivity Commission Act 1998*, I have pleasure in submitting to you the report on the Australian Black Coal Industry.

Yours sincerely

John Cosgrove
Presiding Commissioner

TABLE OF CONTENTS

This report comprises two volumes. Volume 1 contains the Overview and the body of the report. Volume 2 comprises supporting appendices.

		Page
Abbreviations		XIII
Terms of Reference		XVIII
OVERVIEW		**XXI**
1	**INTRODUCTION**	**1**
1.1	The Australian black coal industry	1
1.2	Contemporary issues in the black coal industry	5
1.3	The inquiry's terms of reference and the Commission's approach	7
1.4	Conduct of the inquiry	8
2	**THE CHANGING MARKET FOR BLACK COAL**	**11**
2.1	Introduction	12
2.2	Supply and demand outlook for the black coal industry	13
2.3	Factors increasing competition in the black coal market	16
2.4	The dynamic nature of the international black coal market	27
2.5	Price discrimination and collective price negotiation	31
2.6	Barriers to international trade in coal	35
3	**INDUSTRY PERFORMANCE**	**37**
3.1	Introduction	37
3.2	Industry-wide performance	38
3.3	Productivity of Australian coal mines	44
3.4	The Commission's benchmarking study	53
4	**WORK ARRANGEMENTS: THE CONTEXT**	**63**
4.1	Introduction	63
4.2	Labour market features	64
4.3	Industrial relations systems	68

4.4 Development of work arrangements in black coal mining 79

5 WORK ARRANGEMENTS IN AUSTRALIAN BLACK COAL MINES 87

5.1 Introduction 87
5.2 Size and composition of the workforce 89
5.3 Hours of work and roster arrangements 105
5.4 Remuneration and on-costs 114
5.5 Functions, tasks and skills 122
5.6 General procedures 133
5.7 Conclusion 138

6 WORK ARRANGEMENTS: ENABLING CHANGE 141

6.1 Introduction 141
6.2 Managers and workplace change 144
6.3 Unions and workplace change 155
6.4 Employees and workplace change 163
6.5 Adjusting to change 167

7 COAL RAIL TRANSPORT 175

7.1 Introduction 175
7.2 Efficiency and prices of coal rail freight services 177
7.3 Structure of rail authorities 186
7.4 Removing implicit royalties and monopoly rent 192
7.5 Introducing competition into rail freight 196
7.6 Price setting for rail access 205

8 THE COAL WATERFRONT 217

8.1 Introduction 217
8.2 Australian coal ports 218
8.3 Coal waterfront cost comparisons 222
8.4 Pricing issues 228
8.5 Other issues 235

9 GOVERNMENT REGULATION AND SAFETY 243

9.1 Introduction 244
9.2 The Australian black coal industry's safety record 244
9.3 The regulation of safety in the coal industry 248
9.4 How coal mining OHS legislation compares with other OHS legislation 250
9.5 Problems with the current approach 255
9.6 Alternative regulatory approaches 260
9.7 The Joint Coal Board 272
9.8 Local governments 276

10 ROYALTY ARRANGEMENTS 279

10.1 Current royalty arrangements in NSW and Queensland 279
10.2 Criteria for assessing royalty systems 282
10.3 Alternative royalty collection methods 283
10.4 Evaluation of alternative royalty systems 284
10.5 Royalties collected through rail freights 290
10.6 Participants' views on royalty arrangements 292

11 MODELLING THE EFFECTS OF IMPROVED PERFORMANCE 295

11.1 Introduction 297
11.2 Scenario 1 (the base case): steady productivity growth 298
11.3 Scenario 2: no further productivity growth 301
11.4 Scenario 3: accelerated productivity improvements 304
11.5 Scenario 4: accelerated productivity improvements leading to lower coal prices 308
11.6 Scenario 5: accelerated productivity improvements in coal coupled with best practice productivity in rail transport of coal and accelerated removal of excess rail charges 311
11.7 State and Territory results 314
11.8 Summary 314

REFERENCES

LIST OF BOXES — VOLUME 1

2.1 The Taiwan Power Company: an example of the increasing use of tenders and spot purchases 20

2.2 Deregulation of the Japanese power industry 21
2.3 The United States: a 'swing producer' in international coal trade 28

4.1 Federal industrial relations arrangements: a snapshot 72
4.2 The twenty allowable matters in Federal awards 73
4.3 The 'no disadvantage' test in the Federal jurisdiction 75
4.4 Coal Industry Tribunal of Western Australia (CITWA) 76

5.1 Examples of informal restrictions on changes to shift and roster arrangements in black coal mines 109

6.1 The role of unions in Federal agreement-making 162
6.2 Restructuring at Drayton Coal 174

7.1 Independent Pricing and Regulatory Tribunal (IPART) 199
7.2 Queensland Competition Authority (QCA) 203

8.1 The coal waterfront labour force 226
8.2 Westshore Terminals' approach to the coal chain 240
8.3 Cumberland mine's *line* balance approach 242

9.1 The NSW Coal Mines Regulation Act 1982 249
9.2 Examples of prescriptive requirements in NSW coal mining legislation: explosives 252
9.3 Examples of prescriptive requirements in Queensland coal mining legislation: showering facilities 254
9.4 Compliance costs at BHP's Elouera mine 258
9.5 NSW Review of Mine Safety 265
9.6 Review of the Queensland Coal Mining Act, 1925 268
9.7 Incentives for companies to invest in safety 270

10.1 Phasing in of new royalty arrangements in Queensland 281
10.2 Purchase of private coal titles by the NSW Government 282
10.3 The neutrality of rent-based royalties 285
10.4 The effect of specific and ad valorem royalties on mining output 289

LIST OF TABLES — VOLUME 1

3.1 Profitability measures — NSW Coal and Australian coal and Australian minerals industries 43

5.1 The impact of the retrenchment list on mine labour productivity and unit labour costs 95
5.2 Summary of the impact of LOFO on mine labour productivity and unit labour costs 100
5.3 An overview of leave provisions: Australian black coal,

	metalliferous and US black coal mines	112
5.4	Proportion of individuals with annual income of $52 000 or more, selected occupations, black coal mining compared with metal ore mining, Australia 1996	115
5.5	Major labour costs per employee, black coal mining compared with metalliferous mining, Australia, 1993–94	117
5.6	Comparison of penalty rates in Australian black coal, metalliferous and US black coal mines	119
5.7	An overview of training in the United States and United Kingdom	132
6.1	Coal mining employment and unemployment rates for selected labour force regions, NSW and Queensland, November 1997	167
6.2	Employment by occupation, mining and all industries, August 1997	170
6.3	Employment in coal mining regions, 1986 to 1996	172
7.1	Average distance from the mine to the port	181
7.2	Weighted average coal rail charges and average distance carried, 1996	182
8.1	Australian coal ports and terminals, capacity and throughput, 1997	219
8.2	Coal port pricing categories	224
9.1	Lost time in Queensland coal mines, 1996–97	245
9.2	Comparative safety performance at BHP operations	248
10.1	Black coal royalties in NSW and Queensland, 1996–97	280
11.1	Scenario 1 (base case): economy-wide projections	300
11.2	Economy-wide impact of Scenarios 1 to 5	304
11.3	Output and employment by State and Territory in the base case, Scenario 2 and Scenario 3	315

LIST OF FIGURES — VOLUME 1

1.1	Black coal production for export and domestic markets and by mine type	2
1.2	Black coal industry output and employment	3
1.3	Mine to port costs of producing coal, 1996	4
1.4	Real export prices for Australian coal	6
2.1	Real export coal prices	13
2.2	Australian black coal exports	14
2.3	Benchmark prices compared with spot prices	17
2.4	Supplying countries' share of Asian thermal coal market	21
2.5	Share of Asian coking coal market	23
2.6	PCI and coke rates in Japanese furnaces	24

2.7	European and Japanese coal prices	29
2.8	European thermal coal price and US thermal coal exports	29
3.1	Profitability measures for coal mining, oil and gas extraction and metal ore mining	41
3.2	Net capital expenditure by the black coal industry for NSW and Queensland	42
3.3	Variation in total productivity within truck and shovel mine, categories	58
4.1	Black coal industry employment by State and mine type	65
4.2	Real full-time average weekly total earnings for black coal, metal ore mining and all industries	66
4.3	Industrial disputes, days lost per ‘000 employees per year, 1970–1997	67
7.1	Weighted average freight rates for NSW and Queensland, 1996	182
8.1	Coal port capacity and throughput, 1997	220
8.2	Waterfront charges, by category of charge and port, 1994	225
9.1	Average fatal injury frequency rates, selected Australian industries	245
9.2	Lost time injury frequency rates for coal and metalliferous mining, 1987–88 to 1996–97	247
9.3	Fatal injury frequency rate, underground and open cut coal mining	247
11.1	Base case: thermal coal indicators, 1997–98 to 2009–10	299
11.2	Base case: coking coal indicators, 1997–98 to 2009–10	299
11.3	Scenario 2: impact on coal mining, 1997–98 to 2009–10	302
11.4	Scenario 3: impact on the black coal industry, 1997–98 to 2009–10	305
11.5	Scenario 4a: impact on the black coal industry, 1997–98 to 2009–10	310
11.6	Scenario 4b: impact on the black coal industry, 1997–98 to 2009–10	311
11.7	Scenario 5a: impact on the black coal industry, 1997–98 to 2009–10	312
11.8	Scenario 5b: impact on the black coal industry, 1997–98 to 2009–10	313
11.9	Economy-wide effects of Scenarios 2 to 5a	316
11.10	Coking coal production, exports and employment in 2009–10, Scenarios 1 to 5	

11.11 Thermal coal production, exports and employment in 2009–10, Scenarios 1 to 5 317

VOLUME 2 — APPENDICES

A Conduct of the inquiry A1

B Coal and coal mining B1

C The Australian black coal industry C1

D The international coal market D1

E History of industrial relations in the Australian black coal industry E1

F Black coal awards F1

G Black coal agreements G1

H Metalliferous awards and agreements H1

I US black coal agreements I1

J Statutory positions J1

K The work models K1

L Economy-wide effects of productivity change L1

M Issues in modelling productivity change M1

REFERENCES — VOLUME 2

List of boxes — Volume 2

List of tables — Volume 2

List of figures — Volume 2

BENCHMARKING CONSULTANCY — VOLUME 2

ABBREVIATIONS

$A	Australian dollar
$US	United States dollar
ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ACIRL	Australian Coal Industry Research Laboratories
ACIRRT	Australian Centre for Industrial Relations Research and Training
ACSA	Australian Collieries Staff Association
ACSA Award	*Coal Mining Industry (Supervision and Administration) Interim Consent Award, 1990, New South Wales and Tasmania*
ACT	Australian Capital Territory
AGA	Australian Gas Association
AIRC	Australian Industrial Relations Commission
AMMA	Australian Mines and Metals Association
AMWU	Automotive, Food, Metals, Engineering, Printing and Kindred Industries Union
AUSAID	Australian Agency for International Development
AWAs	Australian Workplace Agreements
AWTE	Average Weekly Total Earnings
AWU	Australian Workers Union
BHP	BHP Coal Pty Ltd
BIE	Bureau of Industry Economics
BLS	United States Bureau of Labour Statistics
BN	Burlington Northern
CA	Certified Agreement

CEO	Chief Executive Officer
CEPU	Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union of Australia
CFMEU	Construction, Forestry, Mining and Energy Union
cif	Cost Insurance and Freight
CIT	Coal Industry Tribunal
CITWA	Coal Industry Tribunal of Western Australia
CMI	Coal Mines Insurance Pty Ltd
CMQB	NSW Coal Mining Qualifications Board
CMR	Coal Mines Regulation
cntk	Cents Per Net Tonne Kilometre
CoPS	Centre of Policy Studies
CPI	Consumer Price Index
CSOs	Community Service Obligations
CTC	Competitive Tendering and Contracting Out
DBCT	Dalrymple Bay Coal Terminal
DEETYA	Department of Employment, Education, Training and Youth Affairs
DPIE	Department of Primary Industries and Energy
DWR&SB	Department of Workplace Relations and Small Business
EAF	Electric Arc Furnace
EFAs	Enterprise Flexibility Agreements
EIA	Energy Information Agency (US)
fob	Free-on-board
GBE	Government Business Enterprise
GDP	Gross Domestic Product
GNE	Gross National Expenditure
GOCs	Government Owned Corporations
GT	Gas Turbine

Gw	Gigawatt
Gwh	Gigawatt hour
Hospitality Award	*Hospitality Industry – Accommodation, Hotels, Resorts and Gaming Award 1995*
HVCC	Hunter Valley Coal Chain
IAC	Industries Assistance Commission
IC	Industry Commission
ICR	International Coal Report
IEA	International Energy Agency
ILO	International Labour Organisation
IPART	Independent Pricing and Regulatory Tribunal
IPP	Independent Power Producers
IR	Industrial Relations
IR Act	*Industrial Relations Act 1988* (Cth)
JAG	Joint Advisory Group
JCB	Joint Coal Board
JFY	Japanese fiscal year
JSM	Japanese steel mill
kt	Kilotonne
kw	Kilowatt
LAP	Labour adjustment package
LAXT	Los Angeles Export Terminal
LMPCP	Labour Management Positive Change Process (US)
LOFO	last on, first off (retrenchment)
MIM	Mount Isa Mines
Mt	Million tonnes
MUA	Maritime Union of Australia
mw	Megawatt
mwh	Megawatt Hour

NAIRU	Non-Accelerating-Inflation Rate of Unemployment
NCC	National Competition Council
NEM	National Electricity Market
NILS	National Institute of Labour Studies
NLRA	*National Labour Relations Act* (US)
NLRB	National Labour Relations Board (US)
NMITAB	National Mining Industry Training Advisory Body
NSW	New South Wales
NSWMC	New South Wales Minerals Council
NT	Northern Territory
NTF	National Training Framework
OECD	Organisation for Economic Cooperation and Development
OHS	Occupational Health and Safety
OPEC	Organisation of Petroleum Exporting Countries
P&E Award	*Coal Mining Industry (Production and Engineering) Interim Consent Award, September 1990*
PCI	Pulverised Coal Injection
PCQ	Ports Corporation of Queensland
PJ	Peta Joule
PWCS	Port Waratah Coal Services
QBOE	Queensland Board of Examiners
QCA	Queensland Competition Authority
QCB	Queensland Coal Board
QLD	Queensland
QMC	Queensland Minerals Council
QMITAB	Queensland Mining Industry Training Advisory Body
QR	Queensland Rail
RAC	Rail Access Corporation
RAP	Regional Assistance Program

RRR	Resource Rent Royalty
RSA	Rail Services Authority
SA	South Australia
SCI	Statement of Corporate Intent
SCPL	Shell Coal Pty Ltd
SRA	State Rail Authority
sub.	submission
Tas	Tasmania
TFP	Total Factor Productivity
TPA	Trade Practices Act
trans.	transcript
UMSS	United Mining Support Services
UMWA	United Mine Workers of America
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
Vic	Victoria
WA	Western Australia
WBP	World's Best Practice
WR Act	*Workplace Relations Act 1996*

TERMS OF REFERENCE

I, Peter Costello, Treasurer, under Part 2 of the Industry Commission Act 1989 hereby:

1. refer international competitiveness of the Australian black coal industry to the Industry Commission for inquiry and report with 12 months of receiving this reference;

2. specify that in making its recommendations the Commission identify ways of improving the international competitiveness of the Australian black coal industry which are consistent with improving the overall performance of the Australian economy;

3. request that the Commission report on:

   (a) sound, objectively determined benchmarks of productivity performance for Australian black coal mines, best practice in comparable international black coal mines and best practice in analogous Australian metalliferous mines, identifying the reasons for differences in productivity performance between the specified groups. Components investigated should include management, labour, machine performance and mine geology;

   (b) cost components from the mine to the port for exported Australian black coal, including wages and other onsite mine costs, royalties, and infrastructure charges and comparison of the costs with those of overseas black coal mines and Australian metalliferous mines, with an explanation of the differences;

   (c) safety arrangements and performance of Australian black coal mines, and how they compare with international counterparts and Australian metalliferous mines, recognising previous Commission work on occupational health and safety;

   (d) work arrangements in the Australian black coal mines, compared with international counterparts and Australian metalliferous mines; and

   (e) methods by which Australia's major competitors have implemented micro-economic reform in their black coal industries, the success of those measures, and their applicability to the Australian black coal industry;

4. specify that the Commission report, where appropriate, on implementation strategies for its recommendations;

5. specify that the Commission avoid duplication of any recent substantive studies undertaken or underway elsewhere; and

6. specify that the Commission have regard to the established economic, social, regional development and environmental objectives of governments.

PETER COSTELLO

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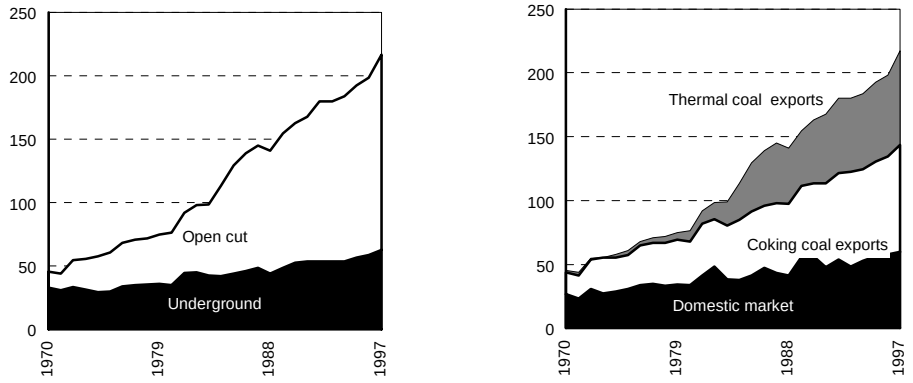
PETER COSTELLO

Black coal in Australia

- Black coal is classified broadly according to its end use as either *thermal coal* or *coking coal.* Thermal coal is used mainly for the production of electricity, and coking coal is converted to coke for use in steel making.
  - Australia's black coal production is now divided fairly evenly between coking and thermal coal.
  - Coking coal commands a price premium over thermal coal. For the first three quarters of 1997–98, the average fob price for hard coking coal exports was around $A72 per tonne compared with about $A48 per tonne for thermal coal.
- Coal is produced from two distinct types of mines, surface (open cut) and underground.
  - There are about 120 black coal mines in Australia, half of which are underground mines.
  - About 70 per cent of coal production is from open cut mines.
- Black coal is mined predominantly in Queensland and New South Wales, but also in South Australia, Western Australia and Tasmania.
  - Queensland and New South Wales produce approximately equivalent amounts of black coal.
  - NSW accounts for about 80 per cent of underground production, and Queensland for about 60 per cent of open cut production.
- Queensland accounted for nearly 70 per cent of Australia's coking coal exports in 1997. New South Wales accounted for about 63 per cent of Australia's thermal coal exports.

Black coal production and exports (Mt)



OVERVIEW

This report is about the performance of Australia's black coal industry and factors which affect its capacity to remain strong and competitive in the face of changing domestic and export markets. Work arrangements in black coal mining, transport infrastructure and government regulation of the industry are the key issues.

The Australian black coal industry

Black coal is Australia's largest export industry.

Black coal is Australia's largest export industry. In 1997, it accounted for 10 per cent ($8.8 billion) of Australia's merchandise exports and more than 1 per cent of GDP.

Australia is the world's largest coal exporter.

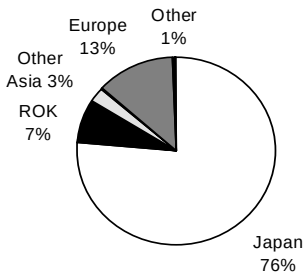
Australian black coal production has more than quadrupled since 1970 when more than half of Australia's production was used domestically. In 1997, more than 90 per cent of coking coal and about 60 per cent of thermal coal production was exported, major markets being Japan, Korea, Taiwan and Europe. Australia is now the world's largest coal exporter, accounting for nearly 30 per cent of world coal trade.

The industry has many natural advantages.

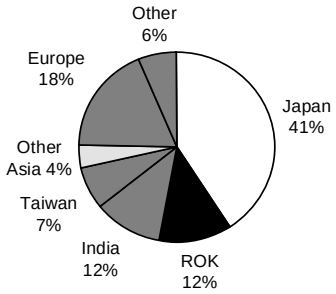
Australia is a successful black coal exporter because:

- it has abundant supplies of good quality coal;
- coal deposits are readily accessible;
- coal deposits are relatively close to shipping ports;
- it has established rail and port facilities;
- it is close to major Asian coal markets; and
- it has a reputation as a reliable supplier.

Australian coking coal exports

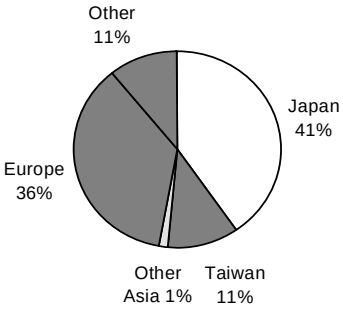


1980

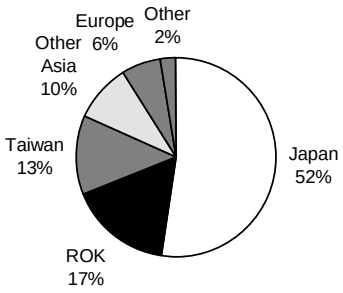


1997

Australian thermal coal exports

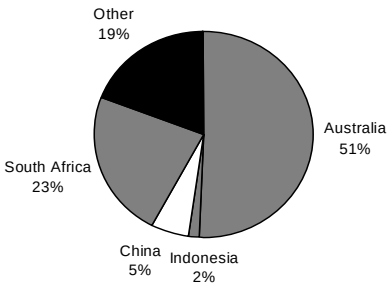


1980

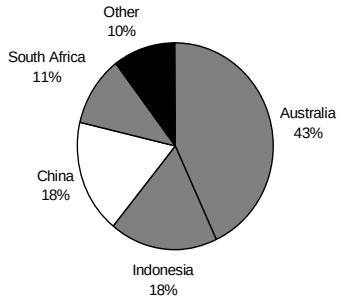


1997

Share of Asian thermal coal market

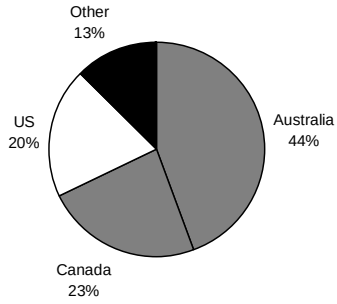


1985

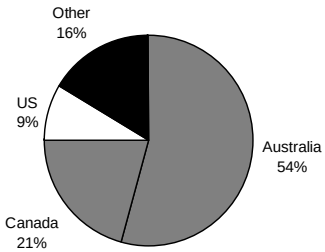


1996

Share of Asian coking coal market



1985

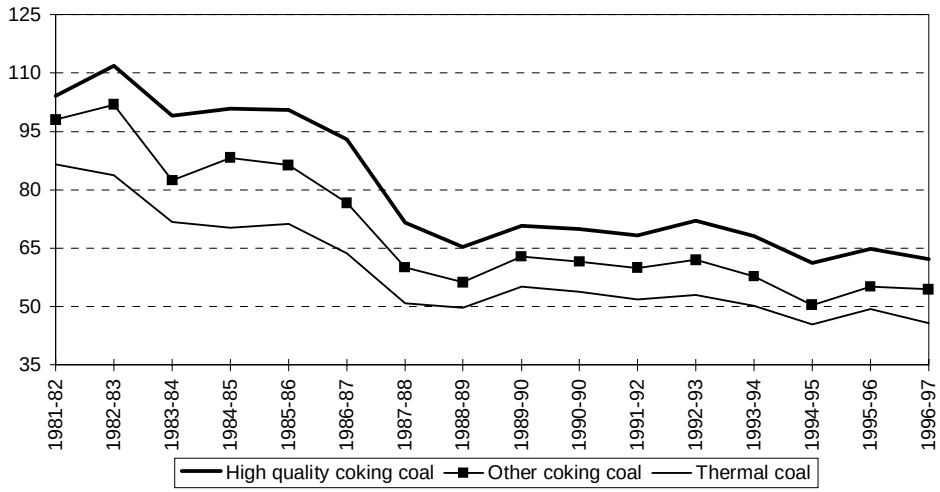


1996

The market for coal has become more competitive.

However, since the mid-1980s Australian black coal producers have experienced increasing price pressure from competition in both export and domestic markets.

Real export prices for Australian coal ($A1996–97/t)



Export market price pressures

Export markets are under pressure from new low cost suppliers, ...

Since 1990, both Indonesia and China have increased coal exports rapidly and now supply more than one third of thermal coal imported by Asian countries. Both of these suppliers are low-cost producers and are close to Australia's traditional coal export markets. In addition, the United States has recently enhanced its capability as a coal exporter to Asia.

... technological change in user industries, and ...

Technological change in steel production has reduced the amount of coking coal needed to produce a given quantity of steel and has increased the scope for substitutability between different types of coal as inputs to the steel making process. These changes have reduced the premium which Australian producers can command for high quality coking coal.

... changing marketing arrangements.

The emergence of new suppliers to the world coal market and increasing competition in the electricity and steel markets have had an important influence on the basis on which coal is traded. Buyers are

purchasing a greater share of their requirements by tender or on the spot market where price competition is more intense. Less coal is being sold under long-term contracts where prices may include a premium for reliability of supply.

Domestic market price pressures

Competition in the national electricity market is affecting black coal prices, ...

Since 1996, when the national electricity market was introduced, competition between electricity producers has exerted downward pressure on domestic black coal prices. These pressures will intensify as physical and contractual constraints on interstate trade in electricity are removed progressively.

... as is competition from alternative fuel sources.

Competition from alternative fuel sources such as gas and brown coal will become more effective as the full potential benefits of competition in the electricity market are realised.

Barriers to international trade in coal

There are barriers to trade in black coal.

Although other countries' barriers to trade in coal are low compared with those applying to agricultural products and many manufactured goods, significant reduction and distortion of coal trade occurs through tariffs, quotas, and subsidies, and through preferential tariff arrangements that favour some coal exporting countries over others.

Some of these trade barriers are being dismantled progressively, but this should not detract from the importance of Australia vigorously pursuing further liberalisation of international trade in coal.

Industry performance

Output, exports, employment

The black coal industry has a record of strong growth in production ...

Australian coal production increased by nearly 70 per cent between 1970 and 1980, more than doubled in the next ten years, and has averaged growth of 4 per cent per annum since 1990.

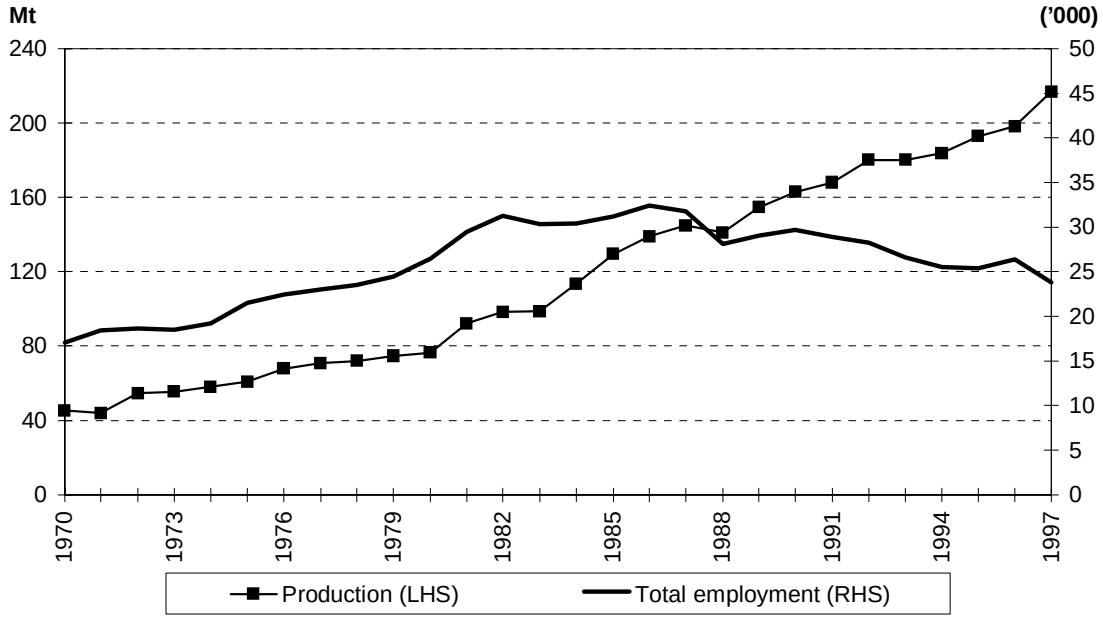
... and exports, ...

Export volumes more than doubled between 1970 and 1980, increased a further 150 per cent in the following decade and have averaged nearly 5.5 per cent annual growth since 1990.

... but employment has declined.

Despite high output growth, employment levels declined from a peak of around 33 000 in 1986 to 24 000 in 1997.

Black coal industry output and employment



Profitability

There is significant variability between mines in the

quality of the coal resource, in the quality of management, and in work arrangements.

Profitability varies between individual mines.

As a consequence, there is significant variation in profit performance between individual coal mines and companies, the most profitable mines generally being newer ones which have negotiated flexible work arrangements with their employees.

On average, recent profitability has been poor.

On average, the recent profitability of black coal mining has been poor and well below the average for other mining activities.

Productivity performance

Productivity performance must improve.

A key question for this inquiry is the actual and potential productivity performance of Australian black coal mines. Given the increasingly competitive environment, and poor profitability, it is clear that the industry's performance will need to improve in order for it to take advantage of the potential growth opportunities in export markets.

Productivity varies between mines.

While there is evidence that some Australian coal producers are highly productive, many producers made submissions citing poor performance of their own mines and of the industry in general.

Poor management contributes to low productivity.

Some producers conceded that low productivity was due in part to poor mine management.

Previous studies which have benchmarked the performance of Australian black coal mines also show that there is much variability of performance among mines.

A comprehensive study commissioned for this inquiry compared a sample of Australian black coal mines with better practice United States coal mines and Australian metalliferous mines.

Performance falls well short of Australian metalliferous and US black coal mines, ...

The study results indicate that, on average, productivity of major operations in the sampled Australian truck and shovel and longwall mines lagged around 20 to 30 per cent behind better practice US coal mines and Australian metalliferous mines. However,

... but Australian draglines perform very well.

Queensland draglines were close to 20 per cent more productive than the selected better practice US coal mines while NSW dragline operations were roughly on a par with the US mines.

It was found that the productivity of the best-performing Australian truck and shovel and longwall operations in the sample was not far behind that of the best practice US mine.

There is scope to do better.

This variability of performance indicates that there is scope for many Australian black coal mines to improve their performance considerably.

Submissions to this inquiry, and the benchmarking studies, attribute the poor productivity performance of Australian black coal mines to restrictive work arrangements, which result in the inefficient utilisation of equipment and high labour costs.

Work arrangements

Inefficient work arrangements have a long history.

The work arrangements which exist in Australian black coal mines today, and about which mine owners and managers complain, have their roots in the early history of coal mining in Australia.

In the past, a captive domestic market ...

They evolved first at a time when coal was sold to a captive domestic market for use in essential industries such as electricity generation, steel production, in homes and in rail and sea transport. The industry achieved a special status and a culture developed of maintaining supply at all costs.

... placed no discipline on cost increases.

Pressure for higher wages and changed working conditions, backed by the threat of strikes and disruption to supply, was usually successful. Consequent cost increases, whether caused directly by wage increases, or indirectly through inefficient work arrangements, were simply passed on to consumers.

Continuity of supply was especially important.

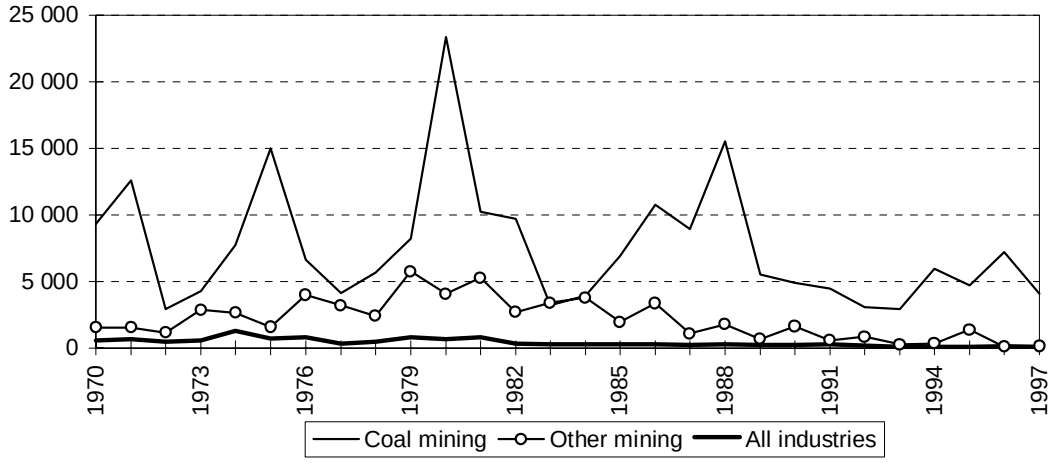
As export markets for coal developed, the culture of maintaining supply at all costs continued. Japanese buyers attached importance to continuity of supply and, with limited alternative sources available, entered

into long-term contracts at prices favourable to Australian coal producers. Export markets initially were very profitable.

Strong unions emerged. These circumstances were conducive to the emergence of strong industry unions and a highly unionised workforce.

Workers in the black coal industry tend to be in full-time employment, older, predominantly male and from an English-speaking background.

Industrial disputes, days lost per '000 employees



When compared with the total employed labour force, the Australian black coal workforce has:

- high earnings;
- a very high level of unionisation;
- a very high level of industrial disputes;
- high levels of days lost to sick leave and workers' compensation leave;
- low levels of voluntary labour turnover; and
- low levels of tertiary qualifications.

The industry attained a special status through legislation and The traditional notion that the black coal industry had unique characteristics which warranted special treatment was reinforced by State and Federal

regulations.

industry-specific legislation and regulations.

Legislation mainly directed towards safety in both New South Wales and Queensland influences:

- the site management structure for each open cut and underground mine;
- the number of staff required at each level on site by setting out the functions to be undertaken by each position; and
- the nature of management at each mine by setting out the qualifications, training and experience required for each position, as well as the functions to be performed.

A passive management style developed, with unions taking the initiative.

In this environment, mine managers' efforts were focussed more on complying with the regulations and maintaining supply than on pursuing production efficiency. In concert with weak competition in the product market until the mid-1980s, the legislation gave rise to a passive mine management style, providing scope for union representatives to take the initiative in industrial relations and human resource management.

Recommendation 1

Governments should facilitate improvement in management by increasing the choices available to owners and managers in managing mines. They should not prescribe:

- **the management hierarchy at the mine site;**
- **the bundle of skills held by mine managers (including management experience); and**
- **the functions of mine managers.**

(Chapter 6)

Recommendation 2

The Coal Mining Qualifications Board (NSW) and the role in the coal industry of the Board of Examiners (Qld) should be abolished.

(Chapter 5)

Recommendation 3

The role of employees in carrying out safety inspections should not be restricted by regulation to union nominees.

(Chapter 6)

At the Federal level, and in Western Australia, tribunals whose charters included ensuring continuity of coal supply were established to deal with industrial disputes. This tended to insulate the industry from workplace reform occurring elsewhere in the economy. In 1995 the Coal Industry Tribunal was abolished and the industry was brought into mainstream industrial relations under the AIRC. The Coal Industry Tribunal of Western Australia is currently under review.

Past management and industrial practices are not sustainable.

Competitive pressure now being faced by the coal industry has led to the growing realisation that past management and industrial practices are no longer sustainable. It has focussed attention also on changing work arrangements which unnecessarily restrict productivity as the major means of improving the industry's competitiveness.

Restrictive work arrangements

There are still many productivity-restricting work arrangements which ...

Some mines have negotiated new workplace agreements which do not contain any of the productivity-restricting work arrangements of the past. Such developments are encouraging. But a multitude of productivity-restricting work arrangements are still found in other Australian black coal mines.

... reduce mine managers' ability to achieve efficiency, ...

An effect of these arrangements is to reduce the flexibility of mine managers to employ the quantity and quality of labour best suited to the circumstances of a particular mine and to make optimum use of employees' skills. In this context, arrangements relating to seniority, demarcation, allocation of tasks, and the use of contractors are particularly restrictive.

... lead to over-

An indirect effect of these arrangements is to

capitalisation, ... encourage over-capitalisation of mines in order to compensate for work practices which underutilise equipment — for example, demarcation between production and engineering employees and restrictions on staggering 'crib breaks'.

... and raise labour costs. Overall, these arrangements increase unit labour costs, which can threaten the viability of mines.

Achieving change

Management is primarily responsible for achieving change. The compelling force changing restrictive work arrangements is the more competitive market for black coal. Primary responsibility for achieving change and driving continuous improvement lies with management.

Change is occurring, ... Indeed, much of what has been achieved to date can be linked directly to the recognition by managers, workers and unions that, in the absence of change, some mines would become uncompetitive and have to close.

At some mines under threat of closure, companies have negotiated new arrangements with their workforce; others have given their mines over partially, or in total, to contractors as a means of circumventing restrictive work arrangements.

For example, at Cyprus Coal's Baal Bone mine in New South Wales employees recently agreed to sweeping changes which included an end to demarcation rules and a two year moratorium on pay increases. In Queensland, Mount Isa Mines contracted out to Thiess the open cut operations of its Collinsville and Newlands mines.

Productivity-restricting work arrangements

Work arrangements which restrict productivity in Australian black coal mines include:

- the lack of merit-based recruitment mechanisms — through the

requirement to use 'retrenchment lists' of previous industry employees and selection from the list based on seniority in NSW;

- retrenchment on the basis of seniority;
- restrictions on the use of casual, part-time employment and on the use of contractors;
- the allocation of overtime on the basis of seniority and restrictions on the amount of overtime worked;
- informal restrictions on changing shift and roster arrangements;
- the use of seniority in allocating personnel to shifts;
- practices which contribute to relatively high levels of idle time, such as 'early knock off' and restrictions on staggering 'crib breaks';
- seniority-based allocation of personnel to annual leave;
- seniority-based promotion;
- strict enforcement of demarcations between production work and engineering work, and between the work of production and engineering employees and supervisory staff;
- rigid job demarcations through State coal industry legislation which specifies 'statutory positions' and their associated functions and qualifications;
- the possible inefficient allocation and inappropriate type of supervisory training from a workplace perspective as a result of its determination in coal-specific legislation;
- basing pay on skill accumulation rather than the application of skills;
- the allocation of training (and therefore tasks) based on seniority;
- the limited focus of communication and consultative arrangements; and
- the negative approach to dispute resolution at some mine sites.

Innovative work arrangements now exist at some open cut greenfield sites and are spreading to new underground mines and brownfield sites.

... but the process is difficult.

The process has not been easy. It has been expensive, and has required strong management to negotiate with employees who are represented by strong unions.

At some mines, progress in improving work arrangements has been minimal, with many restrictive award provisions being transferred directly into new

agreements — for example, at the Muswellbrook mine.

State legislation remains a problem.

Some legislative and institutional impediments to change have been removed. Although some mines have achieved important changes, State legislation which stifles management initiative and encourages a compliance mentality remains a key barrier to improved mine performance.

Changes in the Federal sphere are in the right direction, ...

The Workplace Relations Act appears to have provided a facilitative environment by moving the Federal industrial relations system in a direction which:

- focuses on agreements at the workplace as the centrepiece for bargaining;
- sees the role of awards as a 'safety net' with a limited coverage of matters;
- restricts the extent to which the AIRC can intervene to settle disputes, as well as limiting the matters subject to arbitration; and
- places limits on industrial action such as that undertaken outside a 'protected' bargaining period.

But there are still many impediments to achieving timely change embedded in the legislation and awards.

... but awards still contain some provisions which impede change.

For example, a 'custom and practice' award provision, together with the requirement to maintain the status quo during industrial disputes, provides considerable scope for unions to delay the introduction of continuous change strategies on the grounds that proposed changes constitute variations to agreed award provisions.

Furthermore, since 'custom and practice' varies between mine sites, and since not all customs and practices are documented, there is considerable uncertainty as to the extent of coverage of work arrangements in awards.

A positive initiative has been the recent exclusion of some seniority-based provisions from one of the main coal industry awards as part of the award

simplification process.

However, the AIRC's decision to include 'custom and practice' as an allowable matter in black coal industry awards maintains a key impediment to change in the industry.

Effects of change

Changes to inefficient work arrangements are likely to produce substantial economy-wide gains.

The Commission's assessment is that the productivity enhancing effects of changes to work arrangements are likely to produce substantial economy-wide gains. This view is confirmed by modelling undertaken by the Centre of Policy Studies at Monash University.

The modelling suggests that real GDP could be around 0.4 per cent higher than otherwise by 2009–10, and real private consumption 0.9 per cent higher, as a result of feasible, accelerated productivity change in the black coal industry. In today's dollars, this would represent additional annual income of around $3 billion in 2009–10.

There is likely to be a continuation of the trend of job loss in aggregate in the black coal industry over the next decade. The size of the job loss (and consequent adjustment) would be reduced by changing work arrangements which currently restrict productivity growth.

Recommendation 4

The following should not be included as part of the allowable award matters in the black coal industry:

- **'custom and practice';**
- **retrenchment lists and seniority-based recruitment;**
- **provisions which require retrenchment based on seniority alone;**
- **restrictions on the use of part-time, casual or temporary employment or on the use of contractors;**
- **bonuses;**

- **specific demarcation provisions;**
- **prescriptive training provisions; and**
- **provisions relating to the process of negotiating change.**

(Chapters 4 and 5)

Transport infrastructure

Efficient transport infrastructure is essential.

The performance of the coal chain, which includes rail transport, coal terminals and shipping ports, has an important influence on the international competitiveness of the Australian black coal industry. Rail freight (excluding royalties) averages around 15 per cent, and waterfront charges about 6 per cent of the fob cost of export coal.

The coal industry, railways and coal ports in Australia have a strong mutual interdependence in that coal is the single largest commodity transported by rail, export coal is transported almost exclusively by rail, and the ports and terminals used by the industry are dedicated mainly to coal.

Modelling the effects of improved performance

The Centre of Policy Studies (CoPS) at Monash University was commissioned to model the potential industry and economy-wide effects of productivity change in the black coal industry.

Overall, the CoPS results underline the importance of productivity improvements for this export-oriented industry. Confirming expectations, the results also indicate that the economy and the community at large can benefit substantially from a more efficient coal industry. Productivity improvements expand the productive capacity of the economy.

Modelling suggests that real GDP could be around 0.4 per cent higher than otherwise by 2009–10, and real private consumption 0.9 per cent higher, as a result of feasible, accelerated productivity change in the industry. In today's dollars, this would represent additional annual income of the order of $3 billion in 2009–10.

Under reasonable assumptions about conditions in international coal markets and the response of coal export prices to cost reductions, improvements in both labour and capital productivity would benefit the coal industry and its employees.

By encouraging higher investment, higher productivity growth has the potential to slow job losses in the industry which have been occurring for many years and which are likely to continue in the absence of improved productivity. On the other hand, the modelling indicates that a failure to maintain the industry's present competitiveness would lead to lower output and investment growth, and accelerate job losses. Thus higher productivity growth could reduce the need for relocation of coal industry workers.

Not surprisingly, the two major black coal producing States, NSW and Queensland, benefit from expansion of the sector, while other States, particularly those which are export-oriented, are estimated to experience somewhat slower growth than otherwise.

It should be borne in mind that the modelling results are illustrative only, designed to focus on the impact of productivity change on the coal industry and the economy at large. In practice, productivity changes in the coal industry will occur in the context of myriad unforseen changes in the industry itself and in the domestic and international economies.

Rail transport

High freight rates have eroded some of the industry's natural advantage.

Australia has an advantage in the international supply of black coal because Australian mines are much closer to ports than their international competitors. However, some of this advantage has been eroded by very high freight rates caused mainly by:

- State governments using rail charges as a means of taxing the coal industry; and
- the productivity performance of State rail authorities being around 20 per cent lower than that of better operations overseas.

State reforms have improved the efficiency of rail pricing, but the pace of change is slow.

The practice of using freight charges to make monopoly profits or collect implicit royalties is being discontinued gradually, with both the New South Wales and Queensland Governments intending to eliminate excess charges by 2000. This has already reduced rail freight charges and encouraged improved performance by rail authorities, but the slow pace of change has delayed the potential benefits of more complete pricing reform.

The introduction of third party access to rail infrastructure, if pursued vigorously by State governments, and if supported by fair and transparent access regimes, offers significant opportunities to improve the productivity of coal rail freight services.

Effective third party access to rail infrastructure has been delayed.

Although State governments have commitments to provide third party access to rail infrastructure, they have been slow to develop access regimes acceptable to the National Competition Council. This has delayed the achievement of the benefits of competition in coal rail freight.

Recommendation 5

The NSW and Queensland Governments should facilitate the early establishment of comprehensive rail access regimes that can be certified by the National Competition Council as effective.

(Chapter 7)

Pricing principles and

A further concern is that the pricing of rail freight by

practices are not transparent.

government enterprises in NSW and Queensland is not transparent. The Commission considers that a set of principles and practices should be developed in each State which will generate efficient prices and provide the private rail freight and coal industries with confidence in the fairness of pricing.

Recommendation 6

In New South Wales and Queensland, pricing principles and asset valuations used to determine prices for access to rail infrastructure should be made public. So too should any related recommendations prepared by the NSW Independent Pricing and Review Tribunal and the Queensland Competition Authority.

Freight customers should have a right of appeal to these bodies regarding the application of the principles on a case-by-case basis.

The role of the regulation and arbitration units of IPART and QCA should be clearly defined and delineated.

Parties should be able to use an independent arbitrator of their choice for dispute resolution.

(Chapter 7)

The coal waterfront

Australian coal ports and terminals perform well.

In general, Australian coal ports and terminals perform well by international standards in terms of physical throughput and pricing. However, there is scope for improvement.

A recent capacity constraint at the Port of Newcastle is being addressed through better utilisation of existing facilities, and progress is being made on expanding the capacity of the port.

The level and structure of waterfront charges is an issue.

Inquiry participants raised issues concerning the level and structure of some government-imposed components of total waterfront charges. An issue is whether governments earn an excessive rate of return

on infrastructure used for exporting coal.

At present the target rates of return for Queensland's port corporations are not published, and there is no external discipline on the pricing practices of either the Queensland or New South Wales port corporations.

Greater transparency is needed.

In the Commission's view, there should be greater transparency of target rates of return, methods of valuing assets, and pricing practices of port corporations. Making the port corporations in Queensland and New South Wales subject to prices oversight would impose discipline on them not to generate excessive returns on their assets.

Recommendation 7

The Queensland Government should publish the target rates of return for its port corporations' assets.

The New South Wales and Queensland Governments should bring their port corporations within the prices oversight jurisdiction of the Independent Pricing and Regulatory Tribunal and the Queensland Competition Authority, respectively.

(Chapter 8)

Government regulation and safety

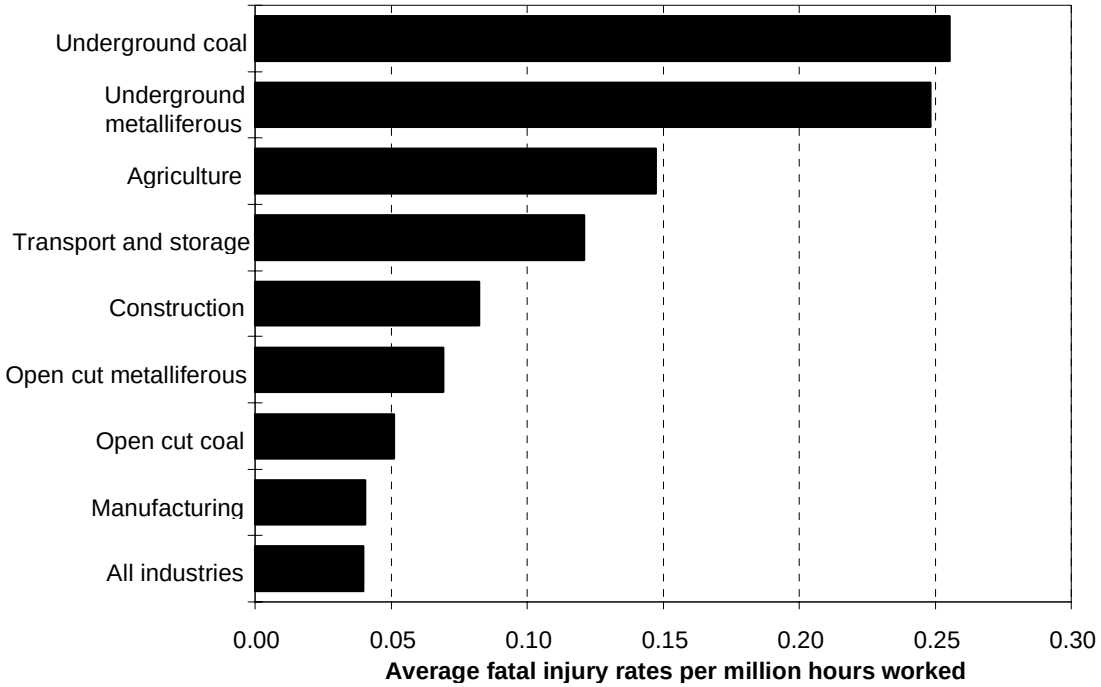
Occupational health and safety

Underground coal mining is hazardous.

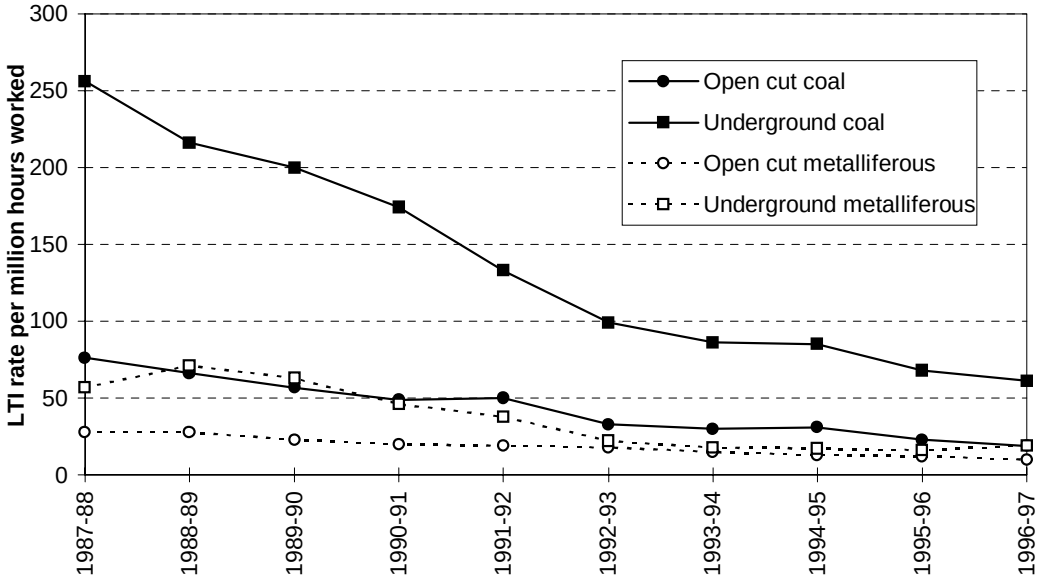
Underground coal mining is a hazardous industry. The industry's fatality rate is about six times the Australian industry average. However, the low injury record of some mines indicates that accidents are preventable if hazards are managed effectively.

The rate of fatal injury in the open cut coal mining sector is slightly higher than that for all Australian industries.

Average fatal injury frequency rates (1991 – 1997)



Lost time injury frequency rates



Within the mining industry, coal mining has a similar fatality rate to metalliferous mining, but a higher lost time injury rate. On all indicators, the underground sector of the black coal industry has a worse safety record than the open cut sector.

Injury rates have declined but the fatality rate remains high.

The industry's progress in improving safety is mixed. Between 1987–88 and 1996–97 the lost time injury rate has been reduced significantly, but the fatality rate remains high.

OHS legislation is different for coal mining.

The occupational health and safety (OHS) legislation applying to the black coal industry is very different from the general OHS legislation that applies to almost all other Australian industries. Together with other mining industries, black coal mining is one of the few industries subject to industry-specific legislation.

Regulations prescribe how hazards are controlled and how mines are managed.

The legislative approach to OHS in most other industries makes workplace parties responsible for safety under a 'duty of care' approach. In contrast, coal mine safety regulations still prescribe how particular hazards are to be controlled and how mines are to be managed to ensure safety.

Submissions to this inquiry argued that the current approach to OHS in the coal industry is not conducive to good safety outcomes, encourages an apathetic approach to safety, and imposes high compliance costs on firms without commensurate improvements in safety.

Many safety regulations are inappropriate or redundant.

Participants pointed to regulations which are redundant and not appropriate to particular mines, the prescriptive nature of most regulations, and regulations developed for the underground sector and inappropriately imposed on open cut operations.

To improve safety outcomes in the coal industry, an alternative to the current regulatory approach is required. Workplace parties need to bear more responsibility for safety.

The Commission

The Commission accordingly favours an approach to

favours an alternative approach to safety.

regulating OHS in the black coal mining industry under which workplace parties are legally responsible for mine safety through their duty of care. The duty of care would require companies to develop safety management plans in consultation with their employees and would be enforced vigorously.

Recommendation 8

Workplace parties (principally employers) should be legally responsible for mine safety through their duty of care.

Underground coal mines should be regulated separately from the open cut coal sector, which should be covered by OHS legislation governing metalliferous mining or the general legislation governing OHS in other industries.

(Chapter 9)

Under the regulatory approach proposed by the Commission:

- companies would be required to develop and periodically review mine safety management plans in consultation with their employees. These plans would identify all safety risks at a mine and contain procedures for the management of these risks;
- mines would be guided in developing safety management plans by codes of practice, guidance notes and advice from safety consultants and coal inspectorates;
- existing regulatory requirements would be reviewed and rationalised to remove obsolete regulations and detailed provisions prescribing the management of minor hazards;
- regulations prescribing the management of serious hazards would be redrafted along performance or management system lines, and existing regulatory prescription would be

recategorised as codes of practice;

- regulations prescribing management positions would be abolished and the need for regulations prescribing other safety positions would be reassessed;
- there would be vigorous enforcement, with an emphasis on deterrence, so that workplace parties had the incentive to comprehensively assess and control the hazards of their work;
- inspectorates would conduct random audits of mines to ensure that mine safety management plans addressed mining hazards and had been implemented;
- coal inspectorates would issue an enforcement policy and publish details in their annual reports about actions taken against companies in respect of significant derelictions of their duty of care; and
- maximum penalties applying to the coal industry would be brought into line with those applying to other industries.

The Joint Coal Board

The Joint Coal Board (JCB) was established under Federal and New South Wales legislation in 1946. Its main function was to regulate the industry and ensure the maintenance of coal supplies in New South Wales.

The JCB has four core businesses.

The JCB's four core businesses now are:

- to manage an occupational health service that delivers health assessments, injury management, work environment monitoring (including dust monitoring) and health education to the NSW coal industry;
- to maintain a fully funded workers' compensation insurance scheme for people working in the NSW coal mining industry (known as Coal Mines

Insurance);

- to provide an information service on production, employment and accidents; and
- to conduct international training courses, funded by the United Nations, on the utilisation of coal in an environmentally sustainable manner.

The JCB should be abolished.

The Commission sees no need for continuation of the JCB. Its existence tends to reinforce the perception that the coal industry is 'special'. In the interests of creating a more efficient industry, this perception must change. Abolition of the JCB, with its functions transferred to the NSW Department of Mineral Resources, WorkCover and other public and private providers as appropriate, would help to bring the regulation of the coal industry into line with that of other industries.

The legislated monopoly which Coal Mines Insurance currently enjoys should be abolished, enabling coal mining companies to insure with whom they choose. Coal Mines Insurance could compete for business against other insurance providers.

Recommendation 9

The Joint Coal Board should be abolished and its functions taken over by the NSW Department of Mineral Resources, WorkCover and other public and private providers as appropriate.

If it were decided to retain the workers' compensation role of the JCB, Coal Mines Insurance should be corporatised and required to compete for business against other insurance options.

(Chapter 9)

Royalty arrangements

Coal royalties are

Miners pay State governments for the use of black coal

currently levied on mine output.

resources through royalties. In NSW, royalties are levied as a dollar amount per tonne of production (specific rate royalty), and in Queensland as a percentage of the value of production (ad valorem royalty).

Ad valorem royalties are superior to specific rate royalties.

These royalty systems have the advantage of being easy to administer. Ad valorem royalties have the additional benefit of varying with price and therefore partly responding to changes in the value of the resource. Specific rate royalties take no account of differences in the various types of coal or of changes in coal prices over time.

In principle, a resource rent royalty would be more efficient ...

In principle, a resource rent royalty would be superior on efficiency grounds as a company's royalty liability would depend on the value of its resource, and would vary with changes in mining costs and coal prices. Such a royalty would not distort mining production decisions.

... but would be complex and costly to administer in the black coal industry.

In practice, however, the potential complexity and cost of administering and complying with a resource rent royalty for black coal has caused State governments to rely on output-based royalty schemes.

Nevertheless, there are strong arguments for making royalties more responsive to market conditions. In NSW, the replacement of specific rate royalties with ad valorem royalties would allow royalty levels to move with world coal prices, better reflect the value of coal resources, and encourage the economic exploitation of low grade coals.

Recommendation 10

The NSW Government should adopt an ad valorem royalty system.

(Chapter 10)

Implementation of recommendations

The Commission's recommendations arising out of this inquiry relate largely to matters within the jurisdiction

of State governments and their instrumentalities. However, the potential economy-wide gains which could flow from improved productivity performance are sizeable.

Accordingly, the Commonwealth Government has reason to take an interest in implementation of the recommendations, which range across a number of policy portfolios.

There would be advantage in joint Commonwealth and State government discussion of the recommendations. This could occur either in the Council of Australian Governments or in a meeting of Ministers with portfolio responsibilities for matters covered by the Commission's recommendations.

1 INTRODUCTION

This chapter provides a brief description of the Australian black coal industry and introduces some contemporary factors influencing its performance. It then outlines the main issues raised by the inquiry and how the Commission has approached its task.

1.1 The Australian black coal industry

The Australian black coal industry has undergone substantial change over the past few decades. Rapid development of large open cut mines in Queensland transformed the industry from one which essentially supplied local power stations to one geared to exporting. This transformation, together with a period of strong increases in coal prices, generated high levels of profitability for mining companies and high levels of income for miners. However, less favourable market conditions in recent times have posed new challenges for the industry.

Australia's coal output is now divided fairly evenly between coking and thermal coal. The former is used in the production of steel while thermal coal is used in electricity generation and as an industrial energy source.

The black coal industry accounts for more than one per cent of GDP, almost twice the size of the Australian iron and steel industry. In December 1997, around 23 800 people were employed in the black coal industry.

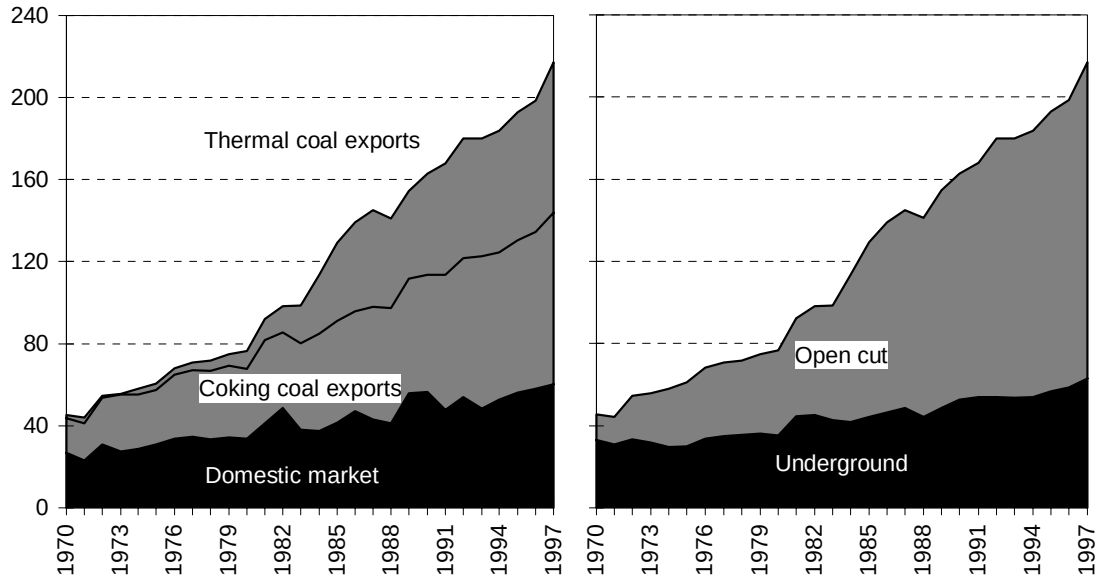
Black coal is Australia's largest export industry. In 1997, black coal exports amounted to $8.8 billion, equivalent to 10 per cent of the value of Australia's total merchandise exports. While Australia ranks only sixth among coal producing nations, it is the world's largest coal exporter. Australia accounts for around 30 per cent of world trade in coal. Australia's principal coal customer is Japan, which takes nearly half of total exports, followed by the Republic of Korea, Taiwan and India.

Australian black coal production has more than quadrupled since 1970. At that time, more than half the production was used domestically, and the limited exports were of coking coal. In the wake of large increases in oil prices in the 1970s, world demand for thermal coal increased substantially, and Australian thermal coal exports expanded from just over one million tonnes (Mt) in 1970 to almost 74 Mt in 1997. This was equivalent to an annual growth rate of almost

15 per cent in thermal coal exports. Coking coal exports also have grown since 1970, but at a much slower pace (see Figure 1.1).

By 1997, exports accounted for 72 per cent of Australian black coal production, a major change from the early 1970s, when the industry was mostly a supplier to the domestic electricity and steel markets. Of the coal sold presently to the domestic market, almost 80 per cent is thermal coal used in electricity production.

Figure 1.1: **Black coal production for export and domestic markets and by mine type** (Mt)



Sources: JCB and QCB (various).

More than 95 per cent of Australia's black coal comes from NSW and Queensland, in roughly equal proportions. In the 1970s, production was concentrated in NSW. However, Queensland has enjoyed a greater rate of growth since then. Coking and thermal coals are produced in both States. Queensland is the dominant coking coal exporter, accounting for about 70 per cent of Australian coking coal exports, and NSW is the dominant thermal coal exporter, accounting for close to 70 per cent of Australian thermal coal exports.

The growth in output since the 1970s has been mainly in open cut mining, which now accounts for over 70 per cent of Australia's production (see Figure 1.1). This form of mining is quite similar to quarrying, and the mining of many other Australian minerals such as iron ore.

While the output of the Australian coal industry has increased by more than 380 per cent since 1970, mine employment has grown by only 39 per cent from 17 100 to 23 800 persons. Figure 1.2 presents data on industry output and mine employment. Industry employment peaked at 32 700 in December 1986 and has fallen gradually since then. Among other influences, this reflects:

- the growth of capital-intensive open cut mining;
- the introduction of more capital-intensive underground mining techniques (longwall mining); and
- improvements in labour productivity.

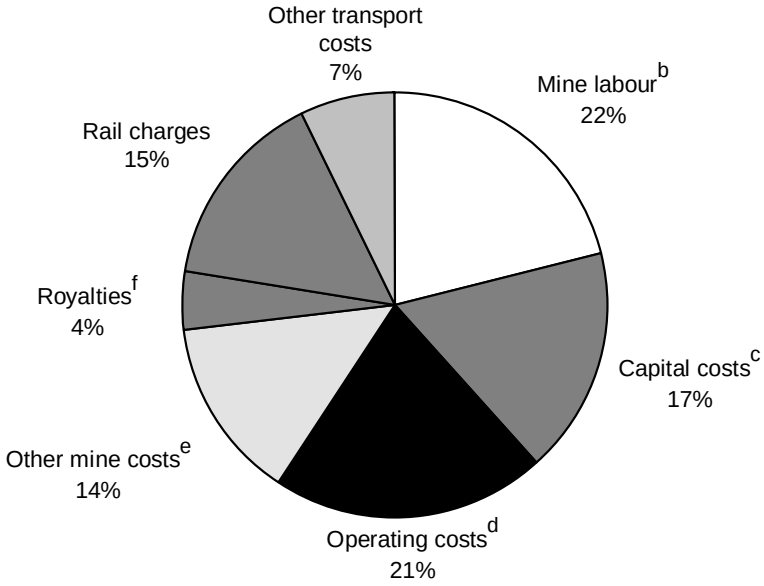
Figure 1.2: **Black coal industry output and employment**[a]

a Employment at June.
Sources: JCB and QCB (various).

Although the Australian coal industry has moved to more capital-intensive types of mining, labour remains a major cost, together with mine capital costs, mine operating costs and transport costs (see Figure 1.3).

The Australian black coal industry is also a major contributor to State government revenue. The Commission estimates that the industry contributed $636 million in royalties to the NSW and Queensland Governments in 1996–97, equivalent to 2.8 per cent of own revenue in these States.

Figure 1.3: **Mine to port costs of producing coal, 1996**[a]



a This is a classification of costs (including profit) in the free on board price of coal. It includes all costs of mining and transporting coal, other than ocean freight.

b Labour costs include direct and indirect costs such as payroll tax and workers' compensation payments. They do not include labour in preparation plants, stockpile and loading facilities and administration.

c Capital costs are associated with the raising of finance for the project and the purchase of plant and equipment in the mine. They include the capital cost of the coal preparation plant and associated infrastructure.

d Operating costs include mining equipment, repairs and spare parts, explosives, fuel, haulage, road maintenance, pumping, drainage, power and water charges.

e Other mine costs include replacement and refurbishment costs to maintain existing production; materials, labor and operating costs for the running of the preparation plant, stockpile and loading facilities at the mine; and any administration costs, including at the mine and head office.

f Royalties include royalties, super royalties and the research/long service leave levies.

Source: Barlow Jonker 1997.

Australia's largest black coal miner is BHP, which accounts for around 25 per cent of industry output. The next largest is Rio Tinto, with about 14 per cent of production. Other companies involved include Oakbridge, Shell and MIM. For the greater part, the owners of Australian coal mines are drawn from diversified mining companies, energy companies and electricity generators.

The level of foreign investment in Australia's black coal industry is significant. The Commonwealth Department of Primary Industries and Energy estimates that in 1997, about 50 per cent of black coal production capacity was owned by Australian interests, 22 per cent by Japanese interests, 12 per cent by European interests and 11 per cent by US interests (sub. 43, p. 3).

More detailed information on the Australian black coal industry is provided in Appendix C.

1.2 Contemporary issues in the black coal industry

Historically, black coal has been a vital input into the development of the Australian economy. It has been tied closely to other industries such as the electricity generation industry, Australia's rail network, the steel and other mineral refining industries, as well as providing an important source of domestic heating in the past. Reflecting this, the black coal industry has been subject to a greater degree of government intervention than any other Australian industry for many years.

Government intervention in the black coal industry has included:

- the Commonwealth and NSW Governments' establishment, in 1946, of the Joint Coal Board (JCB) which had extensive powers over the industry, including the right to prevent mines closing and to limit mine production;
- the Queensland Government's establishment, around the same time, of the Queensland Coal Board, with similar powers to the JCB;
- the Commonwealth Government's establishment, in 1946, of the Coal Industry Tribunal, and the WA Government's establishment of the Coal Industry Tribunal of Western Australia — special, separate tribunals to conciliate and arbitrate on coal disputes;
- the NSW and Queensland Governments' establishment of separate occupational health and safety legislation for the coal industry;
- NSW and Queensland legislation restricting most coal haulage to rail;
- Commonwealth legislation providing for long service leave for coal industry workers based on their length of industry service, irrespective of their length of service with their current employer; and
- Commonwealth export controls.

While some of this regulation has been removed over the last five years, black coal is still subject to a significant amount of industry-specific legislation.

The Australian black coal industry was insulated from strong competition until the mid-1980s (see Chapter 2). A number of factors contributed to this. First, much of the industry's output was destined for the domestic electricity industry, which was insulated from competition and therefore able to pass on cost increases to customers.

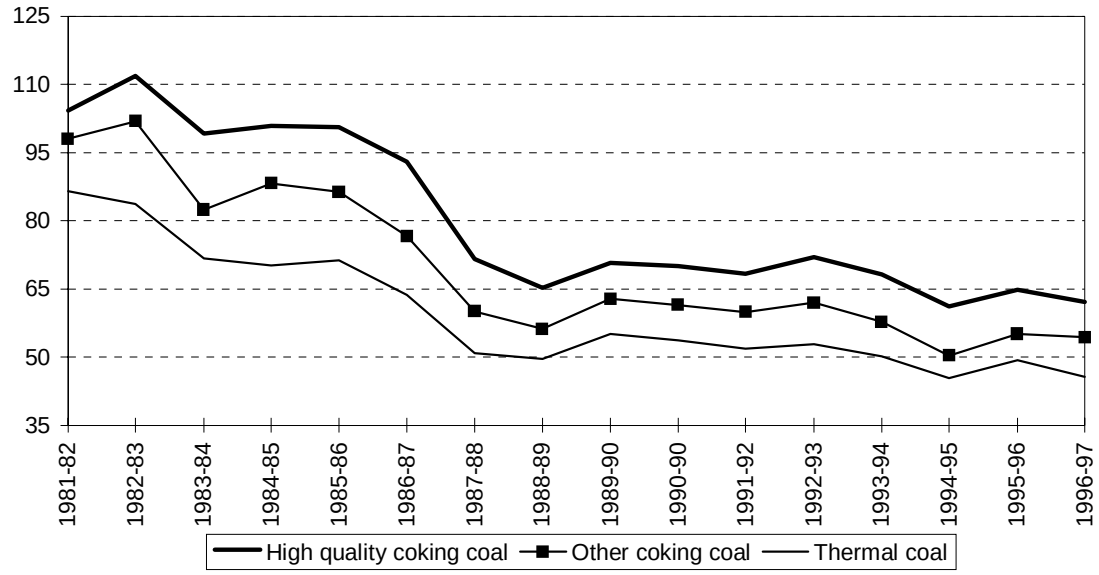
Second, Australia was one of the few suppliers of high quality coking coal to the Asian market and alternative steel making technologies were not yet common.

Third, in the late 1970s, when international demand for thermal coal increased, coal was competing in an energy market against oil, and OPEC-inflated oil prices provided a comfortable margin within which coal producers could set prices.

However, since the mid-1980s, competition in the international and domestic coal markets has been increasing. This has led to lower coal prices and placed pressure on Australian producers to improve productivity (see Figure 1.4 and Chapter 2). This changing market environment raises four questions:

- What is the effect on coal mine productivity of current work arrangements, transport infrastructure and government regulations?
- What are the implications of this changing competitive environment for work arrangements, transport infrastructure and government regulations?
- Are there any unjustifiable impediments to the industry lifting productivity and adjusting to a more competitive environment?
- If productivity in the coal industry increased, how would this affect employment, output and exports in the coal industry and the rest of the Australian economy?

Figure 1.4: **Real export prices for Australian coal** ($A1996–97/t)



Sources: ABARE (1997a,b,c and d).

1.3 The inquiry's terms of reference and the Commission's approach

It is against this backdrop of government involvement in the industry and a changing market environment that the Commonwealth Government called this inquiry. The Government asked the Commission to report on the industry's performance, and to benchmark the performance of Australian black coal mines against Australian metalliferous mines and overseas black coal mines. The Government also asked the Commission to recommend ways of improving the industry's international competitiveness. Specific matters on which the Commission was asked to report include work and safety arrangements, royalties and infrastructure. The full terms of reference are reproduced on page XVIII.

The Commission adopted a four step approach to its task. It began by investigating the changing market in which the Australian black coal industry operates. This analysis revealed the competitive pressures facing Australian producers.

The Commission then sought to measure the industry's performance. The aim was to determine the scope for productivity improvement, and to identify the causes of any shortfalls in productivity performance. The analysis was informed by the results of a survey of the performance of over 40 Australian and US black coal and metalliferous mining operations.

After assessing the industry's performance, the Commission considered whether there was a need for action by governments to ensure that the industry could reach its productivity potential. A key issue here was whether changes in the competitiveness of the market would provide sufficient incentives for the industry to improve productivity, without the need for any action by governments. Alternatively, government institutions and arrangements developed under different market circumstances may have hampered coal producers' ability to respond to more competitive conditions.

The Commission approached the question of what governments could do to enhance the coal industry's future from an economy-wide perspective. That is, it considered reforms that would be consistent with improving the overall performance of the Australian economy. This reflects the Commission's charter, and the terms of reference for the inquiry.

Finally, the Commission engaged the Centre of Policy Studies at Monash University to estimate, in quantitative terms, the impact of improvements in coal industry productivity on the overall economy.

The structure of the report reflects this four step approach:

- Chapter 2 examines the changing market for black coal;
- Chapter 3 assesses the performance of Australian black coal mines;
- the following chapters consider the scope for government reform
  - Chapters 4, 5 and 6 describe and evaluate work arrangements;
  - Chapters 7 and 8 consider transport infrastructure;
  - Chapter 9 assesses other government regulations and safety;
  - Chapter 10 discusses royalty arrangements; and
- Chapter 11 presents the economic modelling results which provide estimates of the effects on the coal industry and the broader Australian economy of improvements in the coal industry's productivity.

There are a number of issues affecting the Australian coal industry that the Commission did not attempt to cover in this report. These included:

- government policies affecting exploration and mine development; and
- the impact of environmental policies on the coal industry, and the coal industry's effect on the environment (for example, mine site rehabilitation).

These issues are vital to the industry and the welfare of the community. However, it was necessary to contain the scope of the inquiry, and for this reason these issues were not covered. In determining the inquiry's scope, the Commission was guided by the matters raised in the terms of reference.

1.4 Conduct of the inquiry

In preparing this report, the Commission drew on evidence from a range of sources, and sought input from people interested in and knowledgeable about the industry. The Commission received 52 submissions prior to the draft report and 16 submissions in response to the draft report. The Commission held an initial round of public hearings and a second round of hearings in response to the draft report. In total, 16 individuals and organisations gave evidence at the hearings. The trade union movement did not participate in the inquiry.

The Commission visited open cut and underground mines in NSW, Queensland and Western Australia to gain an appreciation of the conditions under which coal is mined, and why certain issues, such as safety and capital utilisation, are particularly important for this industry. The Commission also visited some mines and ports in the United States and Canada to assist its understanding of

the strengths and weaknesses of Australia compared with other coal-producing nations.

The Commission engaged consultants to assist it to understand the economy-wide effects of productivity change in the black coal industry, and to benchmark the performance of black coal mines. In January 1998, the Commission held a public workshop to discuss the preliminary results of these studies and to gain feedback on the approaches being taken by the consultants. More than 50 people attended the workshop. The Commission held a second workshop on benchmarking in June 1998 when more results from the mine survey had been received.

The modelling and benchmarking consultancies were refereed independently, and summaries of the referees' comments are reproduced in this report. The full referee reports are available on request.

In January 1997, the Government had asked the Commission to undertake a study on working practices in the black coal industry. That study was incorporated into this inquiry, following receipt of the inquiry's terms of reference.

This inquiry was sent to the Industry Commission under the *Industry Commission Act 1989*. During the course of the inquiry, the Productivity Commission was established and the Industry Commission abolished. Under the transitional provisions in the legislation, the inquiry was completed as if it had begun under the *Productivity Commission Act 1998*.

Further information about the Commission's conduct of the inquiry and public participation is provided in Appendix A.

2 THE CHANGING MARKET FOR BLACK COAL

The Australian black coal industry was insulated from strong competition until the mid-1980s. Factors contributing to this included regulation of the domestic electricity market, the limited number of suppliers of coking coal to the Asian market, and the high price of oil. However, developments such as the collapse of oil prices in the mid-1980s have ushered in a new era of competition in the international coal market.

World demand for coal is projected to grow by about 2 per cent a year between now and 2010, but prices are expected to fall in real terms by about 2 per cent a year. In the domestic market, demand for thermal coal is expected to grow, but at a slower rate than electricity output, as the share of electricity generated from gas increases.

In both the thermal and coking coal markets, price reductions are being driven by structural changes in the market which are increasing competition. In the thermal coal market, the changes include the emergence of new low-cost suppliers, the deregulation of electricity markets, and the increasing use of tenders and spot purchases of coal. In the coking coal market, producers are facing competition from new coal-switching and coal-replacing technologies.

As well as becoming more competitive, the coal market is becoming more dynamic. The market is undergoing considerable change, creating new opportunities for producers flexible enough to respond and threats for others. These developments indicate that Australian producers must cut costs and lift productivity in order to remain competitive and build market share.

Evidence that buyers can pay different prices for coal from different countries may reflect diversification strategies or the benefits of regional trade that may arise within a narrow price range. It does not indicate that the market is uncompetitive.

While barriers to international trade in coal are generally low, significant benefits would flow to Australian coal producers from further trade liberalisation.

2.1 Introduction

The Australian coal industry was insulated from strong competition until the mid-1980s. A number of factors contributed to this. First, until the mid-1970s, most of the industry's output was destined for the domestic market, principally the electricity industry. At that time, government regulation protected the electricity industry from competition, and governments were more concerned with ensuring continuity of electricity supply than with the price competitiveness of that supply. This made it easy for coal producers to pass on cost increases to generators, and for generators to pass these costs on to businesses and households in the form of inflated electricity prices. ACIL Economics and Policy (1997b) said:

> This more readily manageable market of the past allowed electricity producers to enter into long term contracts with coal suppliers and to pass on to consumers (subject to contractual arrangements) any increases in power generation costs, including coal supply costs. This resulted in a system of average cost pricing for coal and for coal mines to be 'tied' to generators for extended periods. (p19)

Pacific Power commented that there were few alternatives to coal as an electricity fuel source, as no economic or accessible gas or oil resources had been discovered in NSW, and there were limited hydro resources (other than the Snowy Mountain Scheme). While gas was available (via the AGL pipeline) as a residential and industrial energy source, it had a limited market share because its price was not competitive against coal-fired electricity (sub. 39, p. 6).

Second, in the 1960s and 1970s, Australia was one of the few suppliers of coking coal in the Asian market. Japan had invested in Australian black coal mines on the basis of long-term supply contracts which ensured high profitability for those mines. This was done to secure raw materials for Japan's protected steel industry. Other suppliers were mines on the east coast of the United States, which had a transport cost disadvantage in supplying Asian markets — and later Canada, which started to develop coking coal mines in the mid-1970s. Alternative technologies which reduced the use of coking coal in steel production were not yet widespread.

Third, in the early 1980s, when Australia expanded thermal coal exports, coal was competing in an energy market against oil, and oil prices were at historically high levels. Between 1980 and 1986, oil prices were 2–3 times higher than thermal coal prices (measured in energy equivalent units), supporting strong demand for thermal coal and providing a comfortable margin within which coal producers could set prices. However, in 1986 oil prices fell substantially. This collapse in oil prices led to a sharp reduction in coal prices,

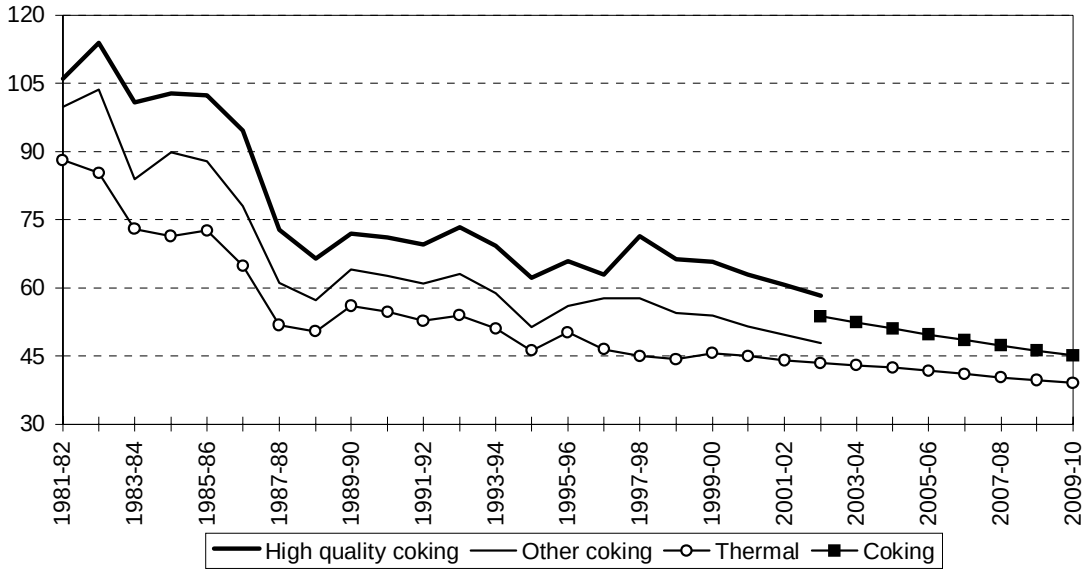
ushering in a new era of competition in the international coal market (see Figure 2.1).

2.2 Supply and demand outlook for the black coal industry

World demand for coal is projected to grow by about 2 per cent a year between 1997–98 and 2009–10.[1] Despite this growth, real world coal prices (in Australian dollars) are projected to fall by more than 2 per cent a year over the same period (see Figure 2.1).

If Australia is able to maintain its share of world coal trade, the volume of coal exports is projected to grow by about 2 per cent annually, so that by 2009–10 it would be 26 per cent higher than the 1997–98 level (see Figure 2.2). Coal export projections are discussed further in Appendix L (Attachment L1).

Figure 2.1: **Real export coal prices**[a] ($A1996–97/t)

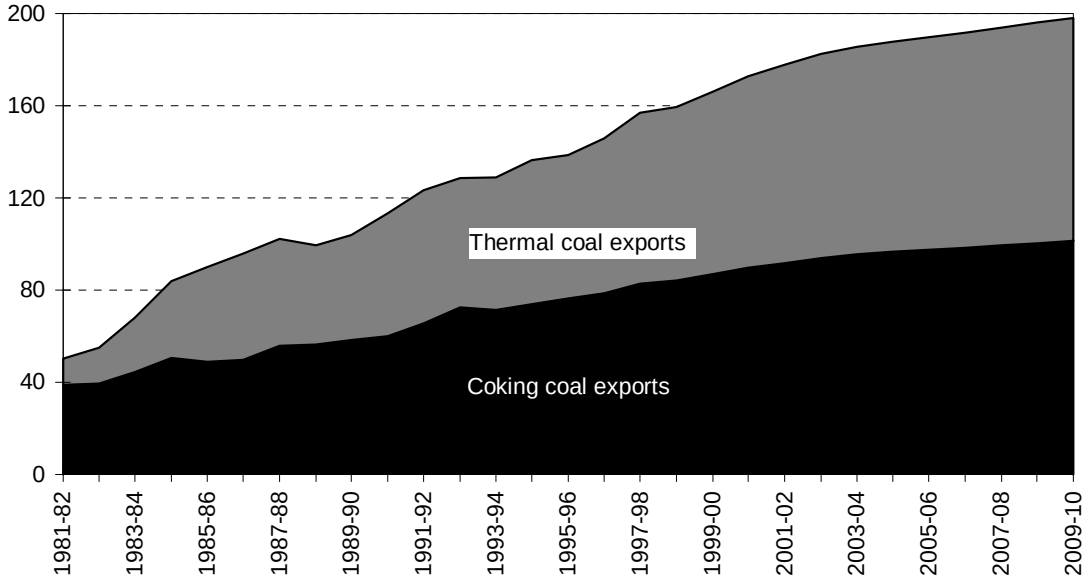


a Actual weighted average of export prices to 1996–97, projections from 1997–98 onwards. Coking coal price projection is not separated into high quality and other categories after 2003–04.

Source: Commission estimates based on ABARE (see Appendix L, Attachment L1).

[1] These estimates are based primarily on ABARE forecasts for world coal demand and supply (see Appendix L, Attachment L1).

Figure 2.2: **Australian black coal exports**[a] (Mt)



a Actual exports to 1996–97, projections from 1997–98 onwards.
Source: Commission estimates based on ABARE (see Appendix L, Attachment L1).

2.2.1 Factors underlying the outlook for thermal coal trade

Australian thermal coal exports are projected to grow somewhat faster than coking coal exports over the period 1997–98 to 2009–10. This reflects:

- growth in Asian economies over the period which will increase demand for electricity and electricity fuel sources; and
- an increase in the share of electricity generated from coal in Asian countries.

ABARE has revised down its medium-term forecasts (1997 to 2002) of annual growth in Asian thermal coal imports from 6.2 per cent to 5.3 per cent following the Asian financial crisis. Despite recent instability, ABARE (1998a) concluded:

> The recent devaluation of currencies in some countries of Asia and associated wider economic impacts have lowered expectations about the rate of growth in thermal coal demand in the Asian region. However, low energy resource endowments in many countries in the region, the established technologies and economics of coal fired power generation, the relatively low and stable fuel costs, and assumed relatively high rate of economic growth over the medium-term mean that this region still has the greatest prospects for growth in world thermal coal imports. (p. 129)

In relation to the share of electricity generated from coal, BHP commented:

> Coal-fired electricity represented 24 per cent of electricity consumption amongst Asian APEC members in 1980. By 1992, this had risen to 40 per cent, and is projected to rise to 54 per cent by 2010. (sub. 43, p. 14–15)

ABARE expects real thermal coal prices to fall because of strong growth in supply, and productivity improvements which will reduce suppliers' costs. Illustrating how technology is reducing costs, BHP commented that mines are now using 240 tonne trucks and draglines with 100 cubic metre buckets — double the size commercially available twenty years ago (sub. 30, p. 5).

The NSW Minerals Council reported that in the 1998 annual price negotiations, contract export prices (denominated in US dollars) for the Japanese steaming coal market fell by 8.4 per cent (sub. DR60). The depreciation of the Australian dollar is likely to have cushioned Australian producers from the full effects of this price cut.

2.2.2 Factors underlying the outlook for coking coal trade

Australian exports of coking coal are projected to grow by close to 2 per cent a year between 1997–98 and 2009–10. As coking coal is an input into steel production, demand forecasts for coking coal generally reflect projections of steel output.

However, an additional influence on coking coal demand is the intensity of use of coking coal in steel production. In recent years, the use of coking coal per unit of steel production has been falling as a result of technological developments. These include:

- electric arc furnaces — which produce steel without the use of coke at all; and
- pulverised coal injection (PCI) techniques — where the quantity of coking coal in the blast furnace is reduced and replaced with PCI coals, which are weak coking coals or thermal coals.

As a result, demand for coking coal is growing at a slower rate than steel production. These technological developments are discussed further in Section 2.3.2.

2.2.3 Domestic market for black coal

Almost 30 per cent of Australian black coal production is used in the domestic market, of which 78 per cent is used to generate electricity. Domestic electricity production is projected to grow at an average annual rate of more than

3 per cent a year between 1997–98 and 2009–10, slightly faster than growth in the economy as a whole (see Appendix L, Attachment L2).

However, sales of thermal coal to the domestic electricity industry are expected to grow at the slower rate of 1 per cent a year, reflecting an increase in the share of electricity generated from gas.[2] The share of electricity generated from black coal is expected to fall from 59 to 52 per cent between 1995–96 and 2009–10, whereas the share generated from natural gas is expected to grow from 9 to 21 per cent. This reflects:

- the deregulation of the gas market, which is expected to increase gas availability and reduce gas prices;
- the suitability of gas for meeting intermediate and peak electricity demand;
- the lower capital cost of installing small-scale, gas-fired electricity generation plants compared with coal-fired plants; and
- environmental considerations, as producing electricity from gas involves lower greenhouse gas emissions.

Brown coal also will increase competitive pressures on black coal. While ABARE (1997g) does not expect black coal to lose market share to brown coal in electricity generation, this was disputed by Pacific Power and Powercoal. Pacific Power (sub. DR55, p. 1) said that "evidence from the National Electricity Market suggests that NSW black coal is already being displaced by Victorian brown coal". Powercoal (trans., p. 23–24) observed that Victorian power stations fired by brown coal had lower fuel costs, had implemented labour cost reductions following privatisation, and were taking market share from NSW generators.

Domestic sales of coking coal are projected to fall by more than 1 per cent a year between 1997–98 and 2009–10, reflecting the increasing use of electric arc furnaces and PCI coal in domestic steel production.

2.3 Factors increasing competition in the black coal market

A number of factors suggest that competition is increasing in the thermal, coking and domestic coal markets. These are discussed below.

[2] These estimates are based primarily on forecasts by ABARE (1997i) (see Appendix L, Attachment L2).

2.3.1 Competition in the international market for thermal coal

Factors increasing competition in the international thermal coal market include:

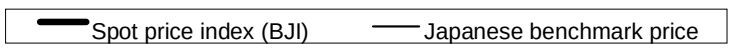
- changes in the way in which coal is sold;
- the emergence of low-cost suppliers; and
- increasing substitutability between types and sources of coal.

Changes in the way in which coal is sold

Australia's largest coal customer is Japan, which accounts for more than half of Australian thermal coal exports. Traditionally, Japanese power utilities developed long-term relationships with coal producers, buying coal under long-term contracts, with annual price and volume negotiations. The Japanese power utilities operated in a co-ordinated manner in negotiating prices with coal suppliers. These negotiations resulted in various annual 'benchmark' prices for the various grades of coal (see Appendix D).

In 1996 and 1997, Japanese power utilities started buying a greater share of their coal on the spot market and via tenders, reducing the importance of benchmark prices. This enabled them to achieve considerable savings as spot prices have been consistently lower than 'benchmark' prices (see Figure 2.3).

Figure 2.3: **Benchmark prices compared with spot prices**[a]



a The spot price index is compiled by Barlow Jonker. The Commission has selected the benchmark price for coal that is equivalent in quality to that used for the spot price index.

Source: Australian Coal Report (1997).

In 1998, the Japanese power utilities discontinued collective negotiations of benchmark prices in favour of tendering and individual negotiations with suppliers. Chubu, the first utility to agree with suppliers on price, revealed the highest price it paid for coal, but the average price it paid is not known (Australian Coal Report 1998a). Since this settlement, four other power utilities have conducted individual negotiations with suppliers to determine the terms of long-term contracts. In addition to these individually negotiated long-term contracts, the Australian Coal Report (1998b) has estimated that the Japanese power utilities will purchase almost 20 per cent of their coal through tenders and spot purchases in 1998.

Of the major non-Japanese electricity producers in the region, Taipower in Taiwan is buying all its coal on the spot market or under tendered, long-term contracts (see Box 2.1), while Kepco in the Republic of Korea, is buying around 20 per cent of its coal requirements on the spot market, but has indicated a willingness to increase this to 35 per cent (ICR 1998d). Taiwan and the Republic of Korea purchase 30 per cent of Australian thermal coal exports.

The increasing willingness of Japanese customers to enter into more short-term and competitive coal supply arrangements reflects:

- recent reforms to the Japanese electricity industry; and
- the greater depth and diversity of coal supplies in the Asian market.

Since 1995, the Japanese Government has been introducing structural reforms to the Japanese electricity industry to enhance competition. The Government has announced that its aim is to reduce Japanese electricity prices to internationally competitive levels by 2000 (see Box 2.2). This is placing pressure on Japanese utilities to seek lower cost fuel sources, and to give greater consideration to the cost competitiveness of fuel sources, not just their reliability. This has prompted utilities to increase the share of lower priced, spot coal purchases in their overall portfolio of coal purchases.

At the same time, the emergence of new coal suppliers in the Asian region, such as Indonesia and China, and the enhancement of export capability in traditional suppliers such as the United States and South Africa, have reduced the risks associated with buying coal on the spot or tender market. Exxon summarised the situation:

> Japanese customers, which comprise the largest market for Australian exporters, want the following from their suppliers:
>
> 1) Suppliability (as it relates to the long term stability of supply)
> 2) Quality, coal fit for the intended uses
> 3) Reliability of Supply (as it relates to short term dependability of supplier)
> 4) Competitiveness (is the supply economic relative to world market price)

> Historically, the Japanese placed emphasis on the first three factors over the fourth. To secure them, they were willing to pay a premium over the price the market would have suggested otherwise.
>
> The environment has now drifted to where the Japanese are sufficiently comfortable with suppliability and more concerned with price competitiveness. This has occurred as a result of maturation of the Utility purchasers within the market, and the cost pressures commensurate with utility deregulation in Japan over the last couple of years. This change in focus has contributed to the breakdown of the traditional 'benchmark' pricing practice with the Japanese, placing downward pressure on prices to bring them more in line with the world market price. Consequently, the market is moving in the direction of increasing spot sales vis a vis long term contracts. In addition, because of the reduced concern over the security of supply, the length of long term contracts has also shortened in recent years. (sub. 3, pp. 1–2)

These developments — namely, the desire by Japanese utilities to minimise costs, the rise of alternative coal suppliers, and the change in the way in which coal is sold — are increasing competitive pressures on coal suppliers. Camberwell Coal explained:

> The Japanese power utilities, threatened by the development of IPPs (Independent Power Utilities) in Japan, have realised that they are paying too much for their coal compared to other power utilities in Asia. ...
>
> The introduction of the tender system for deciding the award of long term contracts and the use of 3 monthly spot tenders to purchase up to 30 per cent of coal requirements has put Australian thermal coal under intense competition from low cost producers such as Indonesia, China and South Africa. (sub.13, p. 2)

Emergence of low-cost suppliers

In 1985, Indonesia and China were minor suppliers into the Asian region. However, since 1990 both countries have increased exports rapidly and now supply over a third of thermal coal imported by Asian countries. This has contributed to a reduction in Australia's share of the Asian thermal coal market (see Figure 2.4).

Indonesian thermal coal exports have increased from 1 million tonnes (Mt) to 36 Mt over the last 10 years, and are forecast to grow to 50–60 Mt by 2005 (Camberwell Coal, sub. 13, p. 2). This compares with Australia's projected thermal coal exports of 64 Mt in 2005.

Box 2.1: **The Taiwan Power Company: an example of the increasing use of tenders and spot purchases**

The Taiwan Power Company (Taipower) is the state-owned electricity utility. It is one of the largest single buyers of thermal coal in the Asian coal market. In 1996, Taipower purchased over 25 Mt of thermal coal, equivalent to about 40 per cent of Australia's thermal coal exports or almost 20 per cent of total Asian thermal coal imports (IEA 1997). Taipower purchases its coal through various forms of tender. It uses long-term contracts to supply 70–90 per cent of its requirements and a three month spot tender system to supply the rest.

Taipower has been awarding contracts, of five to seven years duration, on the basis of the lowest price bid for the first year of the contract. Subsequent years are priced at the Japanese benchmark price. Through this system, Taipower is able to secure coal at discounts of up to $US15/tonne in the first year. This discount can be equivalent to a reduction of $US3/tonne from the Japanese benchmark price over the life of the contract. At the 1996–97 benchmark price, this would amount to a discount of around 10 per cent. More recently, Taipower also has introduced one year open tenders, usually for around 500 000 tonnes a year, to take advantage of falling prices.

Taipower also puts to tender up to 1 Mt of coal every three months. These tenders are open to all suppliers and are considered spot sales. A tender consists of a three month delivery schedule of shipments (usually eight or more vessels of 65 000 tonnes). Suppliers bid for as many of the shipments as they desire. A shipment is awarded to the lowest bidder.

For all open tenders, Taipower determines a detailed specification for the coal required and the criteria for evaluating tenders. The minimum quality specifications are tight but are not mine-specific, facilitating comparisons between coal from different countries and encouraging the maximum competition between sellers. A typical tender specification includes:

Gross calorific value (kcal/kg, as received)	5 900 min.
Total moisture (as received)	15% max.
Ash content (air dried)	18% max.
Sulphur content (air dried)	1.25% max.
Volatile matter (air dried)	24% min.

Delivery within 10 days from shipment date.

Sources: Camberwell Coal (sub. 13, p. 2), Taiwan Power Company, Invitation for Bid No. 87-ON-L1102 and Taiwan Power Company, Invitation for Bid No. TPC8103.

Box 2.2: **Deregulation of the Japanese power industry**

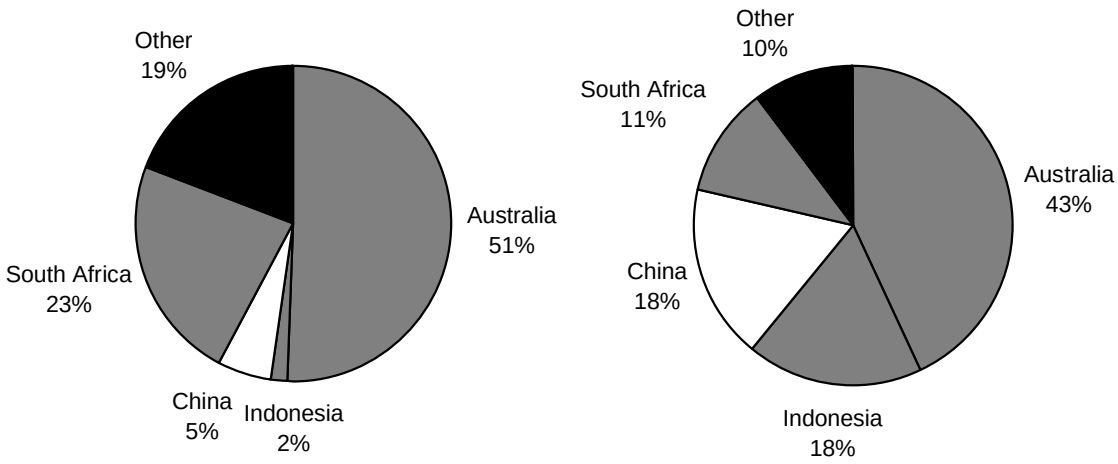
In 1995, the Japanese Government partially deregulated the electricity sector facilitating greater competition. The major change was to allow independent power producers (IPPs) to enter the wholesale power market. However, full competition was limited to new generating capacity and the amount open to bidding by the IPPs was controlled by existing utilities. The bidding outcomes in the wholesale market suggested that the IPPs could supply electricity at prices 10 to 35 per cent below those of the large utility companies. Coal-fired generation accounted for over 46 percent of new IPP capacity.

In July 1997, the Ministry of International Trade and Industry began formulating a legal framework for the new competitive bidding system which would allow the IPPs to compete for all new generating capacity for the first time. In addition, work began on plans for the deregulation of the electricity transmission and distribution sectors.

These actions were consistent with the Japanese Government's *Action Plan for Economic Structure Reform* announced in May 1997. The goal of the Plan is to reduce Japanese electricity prices to internationally competitive levels by 2000. The Plan is being revised in light of commitments made at the Framework Convention on Climate Change in Kyoto.

Source: Information supplied by the Commonwealth Department of Primary Industries and Energy.

Figure 2.4: **Supplying countries' share of Asian thermal coal market**



Source: IEA (1997).

Data collected by Barlow Jonker (reproduced by Rio Tinto in sub. 22, p. 21) and Minec (1997) indicate that Indonesian mines have lower cash costs than most Australian mines. This suggests that, if world prices fall as projected, Indonesia's expansion poses a significant threat to marginal Australian producers.

In addition, Indonesia's location removes the benefit of transport costs that in the past has provided some insulation for Australian producers from competitors such as the United States and South Africa. In relation to the competitive threat posed by Indonesia, Rio Tinto commented:

> The strong growth of Indonesian supply is at the expense of Australian growth. Australian coal mines must lower their costs to survive in this environment, and to do this productivity must be increased. (sub.22, pp. 17–18)

The effect of the Asian financial crisis on Indonesian coal exports is uncertain. While the large depreciation of the Rupiah would be expected to increase the competitiveness of Indonesian exports, the International Coal Report (1998f) stated that the costs of most Indonesian coal mines are denominated in US dollars, and therefore it is not clear whether Indonesian coal exports have become more competitive.

Increasing substitutability between sources of coal

Historically, a factor limiting competition between coal producers was buyers' preference for coal from a particular mine. This reflected the fact that electricity producers had configured their boilers to coal of a particular specification, and knew that coal from a particular mine met that specification. These preferences reduced substitutability between different coals, and also between mines with chemically similar coals, as coal from different mines had not been tested in the boiler to ensure equivalent performance.

More recently, greater market information has reduced this coal-boiler specificity. Buyers have identified the physical characteristics of coal that underpin good boiler performance, and are using this information to identify coals which are equivalent in use. Armed with this information, they are in a better position to assess the substitutability of coals, and are therefore more willing to vary their sources of supply. The specifications in Taipower's tender are an example of this (see Box 2.1). This heightened substitutability has increased pressure on coal suppliers to provide competitively priced coal.

2.3.2 Competition in the international market for coking coal

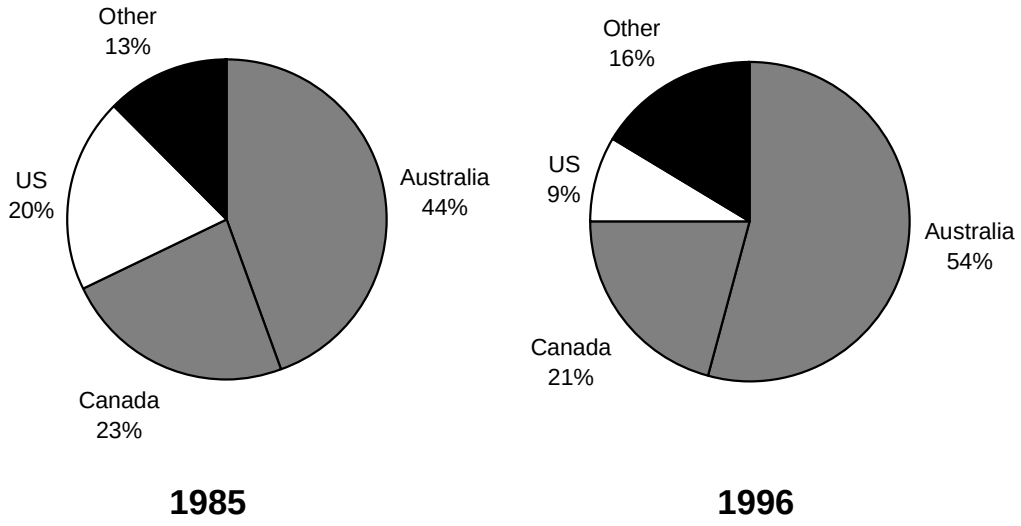
Between 1985 and 1996, Australia increased its share of the Asian coking coal market (see Figure 2.5). Indeed, BHP's Australian operations alone accounted for 20 per cent of the world's seaborne trade in coking coal. Camberwell Coal observed:

> There is not the same degree of competition on price in the hard coking coal market because Australia's main competitors are US and Canadian producers with similar cost structures. (sub. 13, p. 3)

However, while competition from other producers (principally the United States and Canada) is not as strong as it is in the thermal coal market, coking coal producers face other competition in the form of:

- increasing substitutability between coals in steel production;
- new technology which eliminates the use of coking coal in steel production;
- heightened competition in the international steel market; and
- the threat that countries (such as China) with large coking coal production for their domestic market could increase their export capability (see Section 2.4).

Figure 2.5: **Share of Asian coking coal market**



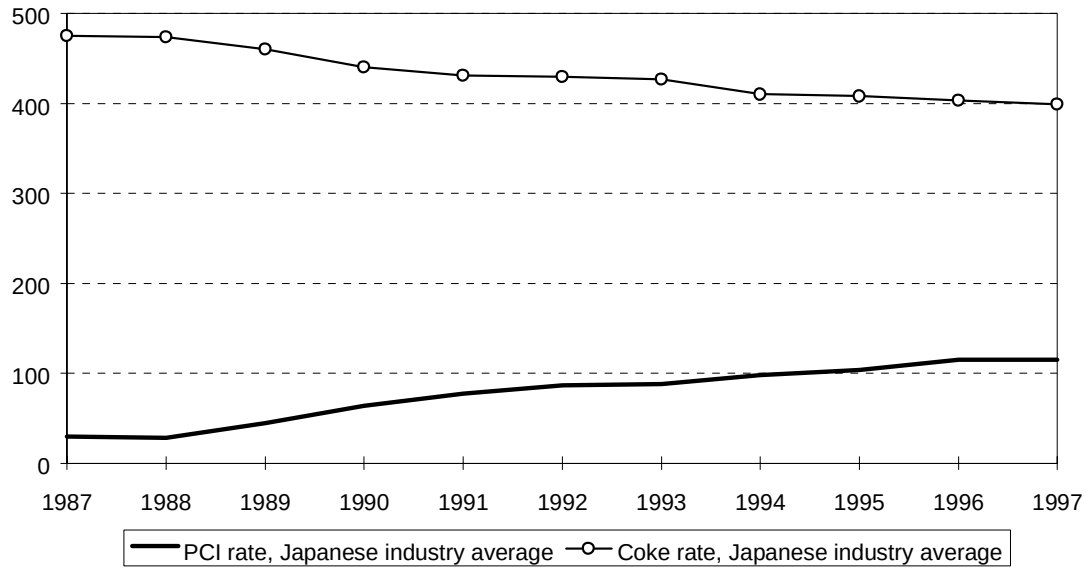
Source: IEA (1997).

Substitutability between coals in steel production

Traditionally, some steel producers used only coking coal in the blast furnace. However, some Japanese producers are now reducing costs by replacing coking coals with a blend of high quality coking coal and PCI coal, which are weak coking coals or thermal coals (see Appendix B). This mixture reduces costs because, while steel makers pay a premium for high quality coking coal, this is more than offset by the lower price they pay for PCI coal compared with coking coals. Figure 2.6 shows the increasing substitution of PCI coal for coke in Japanese steelworks over the last 10 years. ABARE (1997e) observed:

> ... the choice of the coking coal blend is reported to have become somewhat more responsive to the coals most readily available rather than adhering to strict technical aspects (Hutchison 1996). This suggests that, even in the short run, the coking coal mix is responsive to some extent to relative coal price changes as steel mills aim to minimise costs, taking into account the impact of the coal blend on coke quality. (p. 254)

Figure 2.6: **PCI and coke rates in Japanese furnaces** (kilograms per tonne of hot metal)



Source: MCIS (1997).

As a result of this development, coking coal producers are now facing competition from PCI coal producers. This competition is likely to intensify in the future as technological developments enable steel makers to achieve higher PCI rates in steel production. Barlow Jonker (1997) forecast that the use of PCI coal in Japanese blast furnaces will increase from 114 to 200 kilograms per tonne of steel by 2005.

New technology

Coking coal is facing competition also from technology that does not use coke in steel production, such as electric arc furnaces. While this technology is more expensive than traditional blast furnaces, it is considered to have good environmental characteristics. According to BHP, the share of steel produced in electric arc furnaces is expected to grow from 33 per cent in 1996 to 45 per cent by 2012 (sub. 30, p. 7). BHP commented:

> In the longer term, iron making technology will be targeted at eliminating coke and sinter operations to reduce costs and to address possible greenhouse implications. It is conceivable that within 20 years, viable iron ore reduction processes will be developed which do not require coking coal. (sub30, p. 7)

Increased competition in the Japanese steel industry

Over the last decade, the Japanese steel industry has been facing increasing competitive pressure from Korean and Taiwanese steel makers. Since 1980, Japanese steel producers' share of Asian steel production has fallen from 63 per cent to 34 per cent.

As in the electricity industry, this increase in competition is leading Japanese steel producers to adopt more competitive arrangements for buying coking coal. The most obvious sign of this is the decision of the Japanese steel producers to abandon benchmark pricing.

Benchmark pricing was a system whereby Japanese steel producers agreed to negotiate collectively in setting coking coal prices with suppliers such as BHP (see Appendix D). This pricing system contained some price-quality anomalies between types of coking coal which proved untenable as the steel market became more competitive. In 1996, the Japanese decided to end benchmark pricing, and since then Japanese steel companies individually have negotiated prices, quantities and coal quality with coal suppliers. Camberwell Coal explained:

> Two years ago, the JSM [Japanese steel mills] scrapped the benchmark system, and each steel mill now conducts an individual price negotiation with each of its suppliers. Camberwell supplies all six major steel mills and has a different price for each mill, whereas 2 years ago our price was the same for each mill. Tonnage supplied to some mills has increased and dropped to others. (sub13, p. 1)

2.3.3 Domestic market for black coal

As about 30 per cent of black coal produced in Australia is used in the domestic market, mostly in the electricity industry, competition in this market also has major effects on the industry. The most significant development in this regard

has been the advent of the National Electricity Market and market trading in 1996.

Power station dispatch now depends on competitive pricing. Power stations which price above the market clearing rate are simply not dispatched — there is no market for their output. This is leading power stations to put pressure on their coal suppliers, as the lowest price that power stations can bid economically is their short-run marginal cost, which is dictated by their fuel costs.

While the full effects of electricity market reform will not be felt by coal companies until physical and contractual constraints to interstate trading and competitive fuel sourcing are removed (around 2000 to 2005), a number of participants said that changes are already affecting coal companies. Rio Tinto observed:

> Following the establishment of a competitive electricity market, electricity prices are set through a competitive bidding process and have reduced significantly. This is having an impact in New South Wales where generators are responding by seeking to change the terms upon which they purchase coal to provide lower prices, more flexibility, fewer long term contracts and more short term purchases. For the coal producers, this is directing more pressure on prices. A similar impact is expected in Queensland. (sub.22, p. 24)

Pacific Power (sub. DR55) said that there was some evidence that NSW electricity generators had already taken steps to renegotiate existing long-term coal supply contracts primarily to obtain lower costs. Powercoal commented that the new competitive environment will require coal mines to operate much more flexibly:

> ... the real emerging issue ... is flexibility. ... What generators are wanting is the coal companies to manage part of their risk. And in fact, what they're wanting coal companies to do is manage both volume risk and price risk, in that very volatile electricity market.
>
> That is new territory for many coal mines because most mines are set up to produce X number of million tonne per year, and the marketing people sell at whatever price they can get for that type of tonnage. But with generators, they're saying they want much more flexibility than what they've looked at in the past. And in this case you could see flexibility of, say, plus or minus 30 or 40 per cent of the volume they require. ... So I can see mines of the future having to be much more flexible in the way they operate. (trans.,pp. 25–26)

Powercoal argued that this market imperative for flexible production also had implications for government regulation, including equipment approvals and approvals for longwall mining.

The introduction of the National Electricity Market is the culmination of a series of changes in the electricity industry designed to make the industry more

competitive and efficient. Pacific Power commented on how the industry's coal sourcing philosophy had evolved through three phases:

- *security of dedicated supply* — in the first phase (prior to the 1980s), there were restricted coal supply options, and therefore security of supply was the dominant consideration. In this phase, power stations directly owned mines;
- *multi-sourcing to single power station* — in the second phase (1980s), the coal industry was more developed, enabling power stations to obtain coal from a number of mines, subject to cost effective transport; and
- *competitive sourcing* — in the third phase (1990s), power stations moved towards competitive sourcing of coal via open tendering. (sub. 39, p. 7)

2.4 The dynamic nature of the international black coal market

The international black coal market is very dynamic and subject to uncertain developments. The fundamentals underlying the market are often changing, creating new opportunities for producers flexible and fast enough to respond, while posing threats to other producers. Examples illustrating the dynamic nature of the market are given below.

Changes in technology, such as the use of PCI coal in steel production, have created both opportunities and threats for coal producers. This change poses a threat to producers of some types of hard coking coal, but has expanded market opportunities for producers of premium coking coals and PCI coals. ABARE (1997c) said:

> ... purchases of semisoft coking and PCI coals are expected to continue to grow at the expense of some types of hard coking coal as Japanese steel mills continue to minimise the cost of raw materials used in their blast furnaces.
>
> The expanding use of lower quality coking coals requires that a greater volume of premium quality coking coals be used, to maintain the efficiency of blast furnace steel production. Premium quality hard coking coals are expected to remain in short supply over 1997–98, potentially exerting upward pressure on prices. (p. 333)

Developments in competitor nations also influence the market. For example, the opening of a new bulk cargo export terminal in Los Angeles in October 1997 will increase the ability of US producers to supply coal into the Asian market, constraining Asian coal prices. The role of the United States as a 'swing producer' in the international coal market is outlined in Box 2.3.

Box 2.3: **The United States: a 'swing producer' in international coal trade**

The United States is considered to be a 'swing producer' capable of supplying both the European and Asian coal markets. By directing supplies according to where coal prices are greatest, it limits the extent to which prices in the Asian and European markets can diverge. This is illustrated in Figure 2.7 which shows how prices in both markets move together. Of course, transport costs still provide a buffer between the markets.

Parallel price movements also illustrate the broader point that suppliers in each market are competing indirectly against each other. While transport costs segment the markets to some degree, the ability of suppliers such as the United States and South Africa to supply either market links the markets, such that competitive developments in the European market affect the Asian market.

The US also has a track record of responding quickly to market developments, as evidenced by the responsiveness of its coal exports to international coal prices (see Figure 2.8). This is particularly significant in the context of US production capacity. The United States produces over four times as much coal as Australia annually, so that a small increase in production or diversion of output from the domestic market to the export market could have a large effect on supply and prices in the world market.

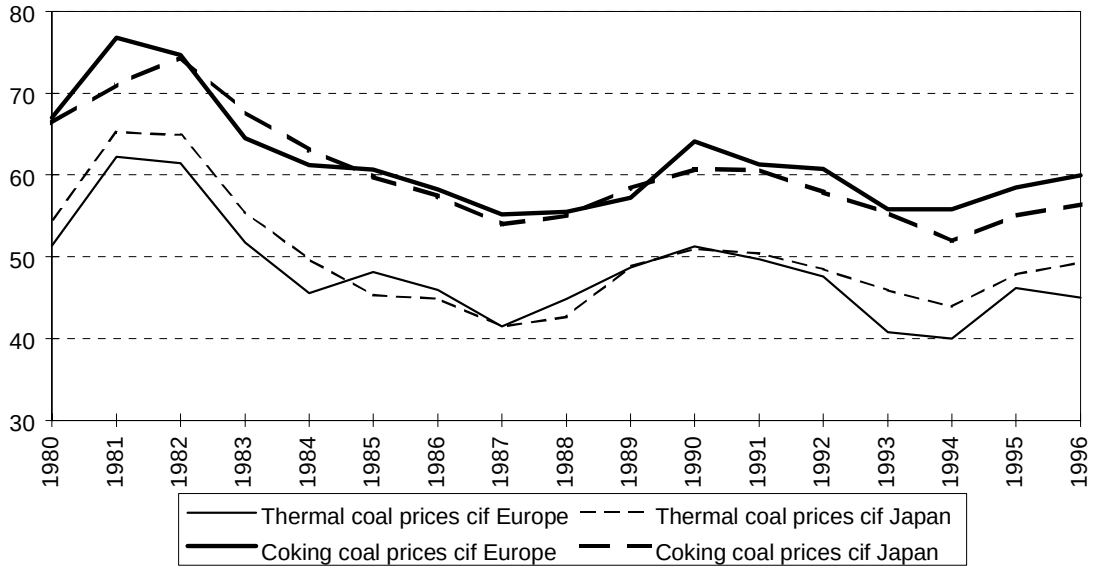
However, a limiting factor has been US port capacity. Barlow Jonker (1997) estimated that US port capacity is 160 Mt a year, of which 40 Mt is on the west coast — 1996 exports were 81 Mt. In this context, enhancement of US port capacity, through the development of the LA export terminal, will raise the export capability of the United States and seems likely to have a constraining effect on coal prices in the Asian market.

Source: Productivity Commission.

The rise of new, low-cost suppliers is another example of the dynamism of the market. For example, BHP, the world's largest exporter of coking coal, commented on the effect of China's coke production capacity on the coking coal market:

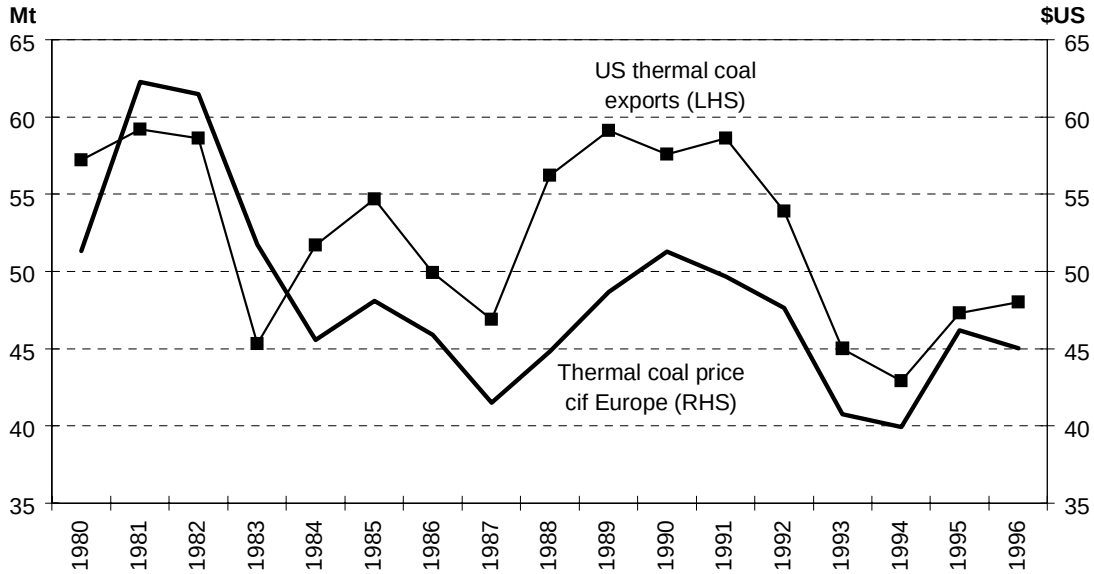
> The traded coke market, representing 4–5 per cent of global production, has always been extremely volatile. Once used mainly as a means of disposing of temporary surplus or covering temporary shortfalls of metallurgical coal, it has been dominated over the last few years by low cost Chinese coke exports (1997 forecast to exceed 10 Mt) which have soaked up all import demand and kept coke prices low. The Chinese coking capacity will effectively defer decisions to build new capacity, affecting the longer term outlook for coking coal. This is particularly a threat to the major growth areas for coking coal in SE Asia and India. (sub. 30, p. 6)

Figure 2.7: **European and Japanese coal prices** ($US)



Source: IEA (1997).

Figure 2.8: **European thermal coal price and US thermal coal exports**



Source: IEA (1997).

However, BHP also acknowledged that there was considerable uncertainty about the competitive threat posed by China:

> [BHP's] experience with China suggests that although there are some extremely good ports in China, port capacity *per se* is a restraint. The railing system is also a restraint, and the third part of the equation is the potential for the Chinese economy in its own right to materially increase its steel make. And at the end of the day that could be the most important of the three, that China's demand for domestically produced steel soaks up coal that otherwise could be put through a strained infrastructure into the export market. (trans., p. 179)

BHP concluded that the Australian coal industry needs to be able to respond to demand that fluctuates both with steel production and with fluctuating export supply capacity (sub. 30, p. 6).

Changes in government policy also affect market dynamics and the fortunes of Australian producers. For example, changes in US environmental policy contributed to Australia's share of the European thermal coal market falling from 8 to 4 per cent between 1990 and 1996. McLean (1997) said:

> A combination of domestic legislation in the United States, which discriminates against the use of high sulphur coals in that country and has therefore forced the remaining producers on to the export market, coupled with large new coal mine developments in South Africa, Colombia and Venezuela, has seen Australia, as the most distant supplier, lose much of the tenuous hold it once had on the European thermal coal market. (p. 270)

Recent developments in East Asian financial markets also have uncertain ramifications for Asian thermal coal demand. ABARE (1998a) reported that the currency devaluations in Indonesia had led to the immediate postponement of 13 proposed independent power projects and the review of a further nine of the 29 projects for which agreements had already been reached. Independent power projects in Malaysia, Thailand and the Philippines also are being reviewed. Despite this, ABARE (1998a) said:

> However, the impact of Asian financial instability on independent power project development is expected to be modest over the medium term as governments seek to secure future energy supplies by renegotiating or compensating those projects which have encountered difficulties. There has already been some evidence of this in Thailand (Power in Asia 1997). Therefore, although some project specific delays can now be expected, independent power project development is still expected to significantly contribute to thermal coal import growth in South East Asia. (p. 130)

These events serve to highlight the range of factors affecting the international coal market and the pace at which the market changes. They underline the importance of Australian coal producers being flexible and market-responsive, varying the level, mix and destination of output in response to market developments.

2.5 Price discrimination and collective price negotiation

The preceding sections have highlighted:

- the downward trend in international coal prices;
- factors increasing competition in the thermal and coking coal markets; and
- the dynamic nature of the international coal market.

These developments indicate that Australian producers must cut costs and lift productivity in order to remain competitive and build market share.

This view of the competitiveness of the market and the appropriate business strategy for Australian coal producers was challenged, however, by Asia Pacific Strategies (sub. 1, 50, DR53 and trans., pp. 159–175). Asia Pacific Strategies argued that:

- Japanese buyers act as a cartel;
- demand for Australian coal is not responsive to price — there is an effective ceiling on Australian coal exports to Japan; and
- as a result of the above, the normal business strategy of lowering costs or enhancing quality to build market share does not work.

These concerns partly reflect the concentration of the Japan-Australia coal trade. Japan's share of Australia's coal exports was 46 per cent in 1997, having declined from 69 per cent in 1980, and Australia's share of Japan's coal imports was 54 per cent in 1997, having increased from 43 per cent in 1980. These changes, at least at face value, cast doubt on the argument that Japanese coal buyers exercise cartel power to limit Australia's share of Japan's coal market. Japan has declined significantly in relative terms as a market for Australian black coal, while Australia's share of the Japanese coal market has grown.

Asia Pacific Strategy's concerns are based also on econometric studies indicating that Japanese buyers paid different landed prices for coal supplied by different countries, which could not be explained by quality differences (ABARE 1997f, Koerner 1996 and sub. 1). There are at least four possible explanations for such price differences.

The first is that Japan may have price setting power in the international coal market, and manipulates the volume of coal purchased from different countries to minimise its overall coal supply costs. Under this scenario, Japan would take advantage of differences in the price sensitivity of supply of different countries. In determining the quantity of coal it would buy from any one country, it would take into account the effect of its additional demand on the price of all coal from that country. By being careful not to allow its demand to inflate prices, especially in countries which supply a large share of its coal imports, Japan

would minimise its overall coal supply costs, while paying different prices to different coal suppliers.

However, this explanation of price differences seems unlikely. While Japan is a large buyer in the Asian market, its share of world coal imports is around 27 per cent, and its share of world coal consumption (covering traded and domestically produced and consumed coal) is only about 3 per cent. If Japan attempted to suppress prices, over time coal producers would develop alternative markets and reduce production, and some coal producing nations (for example, Germany) would substitute imported coal for domestically produced coal. Thermal coal would become more attractive as a fuel source, and steel producing technologies which used coking coal would become more competitive. These market responses would limit the extent to which Japan's actions affected world prices, especially over the longer term.

Furthermore, Japanese buyers are no longer negotiating coal prices collectively, and the volume of coal purchased by any one company is insignificant compared with world trade (see Appendix D). These considerations cast doubt on ABARE simulations (1998b) that world coking coal trade is best represented by an oligopsony market structure.

The second reason why Japanese coal buyers may be willing to pay different prices for coal supplied by different countries may be to diversify supply. Buyers may be willing to pay a higher price to gain some coal from alternative sources, even if this inflates coal supply costs in the short term. This strategy would guard against the possibility of supply disruption or monopoly pricing by suppliers, and therefore is consistent with a cost-minimising strategy in the long run.

There is certainly evidence that Japan values diversity of coal supplies. Japanese coal buyers have invested in coal mines and transport infrastructure in Australia, Canada and the United States. BHP commented:

> In the last 30 years, Australia has captured a substantial part of the growth in the coking coal market as well as displacing less competitive foreign tonnage. While Australia has the potential resources to continue this trend, it should be noted that it took only a perception of Australian unreliability in the 1980s, due to industrial activity, to foster the development of alternate supply from Canada, despite it being technically less attractive and higher cost. The fact that this year the Japanese Steel Mills (JSM) reaffirmed tonnage commitments to the Quintette and Bullmoose mines in Canada to 2002 indicates a lingering unease with a perceived over-reliance on Australian supply. (sub.30, p. 6)

However, while Japanese buyers value supply diversity, coal companies have provided evidence that in the face of increasing competition in markets for products which make use of black coal, Japanese buyers are now placing greater

emphasis on the price competitiveness of coal supply (see Section 2.3). Asia Pacific Strategies' claim that there is a ceiling on coal imports from Australia implies that Japanese buyers would pursue supply diversity at any cost. This seems unlikely given increasing competition in final markets and Australia's current share of Japanese coal imports.

The third possible reason why coal prices may vary between countries is because of non-commercial considerations such as political interference in coal purchasing practices. BHP claimed that its share of the Japanese market had been limited despite delivering coal at a lower cost than US coal. It concluded:

> Undoubtedly political pressure (eg US 'trade balance' considerations) can be exerted on such joint purchase schemes far more effectively than under an individual purchase system. (sub.30, p. 8)

In this context, the breakdown of co-ordinated purchasing by the Japanese steel mills and power utilities should reduce the incidence of coal purchasing policies based on factors other than delivered price and quality.

Finally, differences in prices paid by Japanese buyers may reflect the possibility that within a certain price range, Japan and Australia find it to their mutual advantage to trade with each other, rather than to seek out alternative buyers and sellers. This may be a factor explaining Australia's large share of Japanese coal imports, and Japan's large share of Australian coal exports.

The mutual advantages of Australia and Japan trading together may be because of lower transport costs (as compared with trading with other countries), or established commercial relationships between the trading partners (see Smith 1977 for a more complete discussion). These special benefits give rise to rents in the Japan-Australia coal trade — that is, there are a range of prices which Australian coal suppliers would be willing to accept before seeking other buyers, and similarly there are a range of possible prices that Japanese buyers would be willing to pay before seeking alternative coal suppliers.

The distribution of rents between buyers and sellers can be influenced by whether buyers or sellers form a cartel to negotiate prices (Smith 1977). In this context, Japanese buyers' past practice of collectively negotiating prices led to concerns that Japan could be capturing all of the benefits of the Japan-Australia coal trade.

However, empirical work conducted by ABARE (1993) indicated that the rents from trade were being shared fairly equally between Australia and Japan. Other evidence (ABARE 1997f) that Australia receives slightly higher prices for thermal coal sales to Japan than to other Asian countries suggests that Australia is capturing a share of the rents from trade. Evidence by Koerner (1996) that Japan pays higher prices for coking coal sourced from Canada and the United

States supports the view that Japan is sharing in the rents from the Japan-Australia coal trade, as well as paying a premium for supply diversity.

The abandonment of collective negotiation by the Japanese steel mills in 1996 and the Japanese power utilities in 1998 should reduce concerns that Japanese buyers are using uncompetitive buying practices to capture a disproportionate share of the rents from the Japan-Australia coal trade. However, some have argued that Australian coal producers should negotiate collectively to increase their share of the gains from trade (Koerner 1996 and CFMEU 1997). This approach was not supported by any Australian coal producers which participated in this inquiry. BHP said:

> It has been suggested that Australia should respond with a single industry face. However, there is no doubt the JSM would react adversely to any comparable selling group from Australia. Even if it was possible to organise a coal selling cartel, the negative impact on hard coking coal would outweigh any positives. Major customers would see it as an attempt to artificially control supply — something that countries like Japan, Korea and Taiwan, which are totally reliant on imports, would find unconscionable and which they would profoundly reject. (sub. 30, p. 8)

Collective negotiation would signal to Asian buyers the value of diversifying supply, which would reduce the market share that Australian producers could otherwise obtain at any given price. It would also be difficult to implement, particularly in the context of a market that is changing rapidly. For example, changes in world prices, the emergence of new buyers and suppliers in the region (such as, the Republic of Korea, Taiwan, Indonesia and China), and changes in transport costs (for example, the Los Angeles export terminal) all affect the size of the rents from the Japan-Australia coal trade and the prices at which trade with other countries becomes favourable. There is considerable risk that attempts to maximise Australia's share of the benefits of trade could lead to a reduction in the overall level of Australia's coal trade at significant cost to the Australian coal industry.

The decline in Japan's share of Australian coal exports from 69 per cent to 46 per cent between 1980 and 1997 may indicate that Australia is diversifying its customer base, or that the additional benefits to Australia of trade with Japan are declining, especially given the rise of other buyers in the region such as the Republic of Korea and Taiwan.

In summary, differences in prices paid by Japanese buyers for coal obtained from different countries could be explained by the desire to diversify supply, political influence on coal purchasing decisions, and the gains from trade between Australia and Japan. In relation to supply diversification, there is evidence that Japanese buyers are now placing greater emphasis on competitive

pricing in response to increasing competition in steel and electricity markets. The demise of collective negotiation by Japanese buyers should reduce the scope for political interference in coal purchasing decisions, or for manipulating the distribution of rents in the Japan-Australia coal trade. Together with other evidence of increasing competition in the coal market, this indicates that to build market share and improve profitability, Australian producers need to cut costs and improve productivity.

2.6 Barriers to international trade in coal

Barriers to trade in coal are low compared with those applying to agricultural products and many manufactured goods (see Appendix D). For example, Japan, the Republic of Korea and Taiwan, which together account for 45 per cent of world black coal imports, have tariffs below 2 per cent and negligible subsidies. Nevertheless, significant reduction and distortion of coal trade occur through:

- tariffs and subsidies that protect domestic coal industries; and
- preferential tariff arrangements that favour some coal exporting countries over others.

The Australian Coal Association said:

> Of the internationally traded mineral commodities, coal is perhaps the most affected by the existence of tariffs, import bans and quotas and domestic production subsidies in European and Asian markets.
>
> It is important that the federal government, through multilateral and bilateral interventions, maintain pressure on our trading partners for the winding back and eventual elimination of these market distorting measures. Unencumbered coal trade can only advantage both Australian suppliers and overseas consumers, especially those developing countries which will rely heavily on low cost energy to fulfil their significant growth aspirations. (sub.31, p. 2)

Likewise, BHP observed:

> Further distortion of the global coal market by trade barriers of one kind or another is unlikely to ever be of benefit to the Australian coal industry, given its exposure and reliance on coal exports compared with domestic demand and Australia's limited trading power status. NAFTA, for example, has affected Australian coal competitiveness in South America. (sub.30, p. 8)

Members of the European Union provide high levels of protection to their domestic coal industries. For example, Germany has budgeted to provide more than $A8 billion of subsidies to its domestic coal industry in 1998, and France and Spain provided around $A1 billion of subsidies in 1996 and 1997, respectively.

However, member countries are reducing their subsidy levels to comply with European Union trade and subsidy rules. For example, the German Government abolished coal import quotas in 1995, and has announced that subsidies will be cut by 40 per cent between 1998 and 2005. This trade liberalisation has expanded market opportunities for Australian coal producers. Australian coal exports to Germany increased almost four-fold in the year after the removal of German import quotas.

Preferential tariff arrangements, usually linked to membership of trade blocs or bilateral trade agreements, are particularly damaging to Australian coal producers, as they can provide a significant price advantage to competitor countries which have preferential access. BHP explained the effect of the North American Free Trade Agreement (NAFTA) on exports to Chile:

> In the case of Chilean coking coal imports (a market where Australia once held a dominant share) tariff free access for Canadian coal (while tariffs remain on Australian coal) has forced a substantial price cut on Australian suppliers to seek to retain that market. (sub. 30, p. 8)

Liberalisation of the international coal trade is in Australia's interest. Participants' comments highlight the market opportunities that can flow from trade liberalisation, and the costs to the Australian coal industry of other countries' protection or preferential tariff arrangements. This underlines the importance of continued pursuit by Australia of free international trade in coal.

3 INDUSTRY PERFORMANCE

The coal industry has achieved large increases in production and exports in the last 30 years, although it has lost some of its share in the strongly growing Asian thermal coal export market. Employment has not increased in line with output, as the industry has adopted more capital-intensive technologies and inefficiencies in the use of labour have been addressed more actively.

However, falling prices and poor productivity in many mines have meant that profitability in some sectors of the industry has been low and declining. Nonetheless, new investment continues to occur, suggesting that it is expected to be more profitable on average than returns on existing coal assets. Available data suggest that average returns to Queensland coal mines are considerably above those in NSW.

An extensive study of the productivity of key processes in a sample of Australian coal mines, using better practice United States coal mines and Australian metalliferous mines as benchmarks, was undertaken for the Commission. The study results provided a mixed message. They indicated that, on average, productivity of major operations in the sampled Australian truck and shovel and longwall mines lagged around 20 to 30 per cent behind better practice US coal mines and Australian metalliferous mines. However, Queensland draglines were close to 20 per cent more productive than the selected better practice US coal mines while NSW dragline operations were roughly on a par with the US mines. In addition, the productivity of the best performing Australian truck and shovel and longwall operations in the sample was not far behind that of the best practice US mine. This variability of performance suggests that significantly higher productivity is achievable in many Australian coal mines.

3.1 Introduction

The Australian thermal and coking coal industry has grown substantially since the early 1970s, based largely on its performance in rapidly expanding export markets. As coal has been substituted for oil in power generation, and overall power requirements of the Asian region have increased significantly, there has been particularly strong growth in exports of thermal coal.

Initially this growth, together with sharp rises in coal prices, generated high profits. This led State governments (through royalties and above-normal profits on rail services) and employees (through wage increases and conditions of employment) to seek some of the benefits of industry prosperity. More recently, however, with coal prices falling in real terms and new competitors emerging, industry profitability has declined significantly, especially for older underground mines.

Returns to government have declined much more slowly. As indicated in later chapters, the NSW and Queensland Governments have recognised the need to reconsider their attitude to the nature and amount of coal royalties and returns on port assets and the need to achieve better productivity in the provision of rail freight services. State governments claim that by 2000 rail freight charges will be set on a commercial basis with no monopoly rents or implicit royalties.

Average weekly earnings of managers and employees in the coal industry have continued to grow, although at a slightly diminished rate (see Chapter 4). However, some mines, particularly those opened only recently, have achieved lower labour costs through better management and improved work arrangements enabling increases in the industry's average productivity. The change in ownership of mines with poor profitability has also offered the opportunity for some revisions in terms and conditions of employment and improved management and work arrangements.

3.2 Industry-wide performance

This section briefly considers performance of the Australian black coal industry with regard to output, exports, employment and profitability. Industry productivity is examined in Section 3.3. Other aspects of performance are examined in later chapters: industrial disputes in Chapter 4 and workplace safety in Chapter 9.

3.2.1 Output, exports and employment

Over the last 30 years the Australian black coal industry has grown from a relatively small inwardly-focused industry to become the world's largest coal exporter. The impetus for this impressive expansion in both coking and thermal coal has been strong economic growth in the Asian region, initially in Japan but more recently in the Republic of Korea, Taiwan and India. At the same time, the impact of significant oil price increases in the 1970s led to the substitution of coal for oil in electricity production. The large coal price increases which

initially accompanied this demand growth provided the stimulus to investment in exploration and the development of new mines.

Australian coal production increased by nearly 70 per cent between 1970 and 1980 and then more than doubled in the next ten years (see Appendix C). Growth in the 1990s has been slower, averaging around 4 per cent per annum. Export growth rates were even more spectacular. The Australian coal industry and supporting rail and port infrastructure achieved more than a doubling of coal export volumes between 1970 and 1980 followed by an increase of nearly 150 per cent over the next decade. Export volumes have averaged more than 5 per cent annual growth since 1990.

Since 1985, Australia has increased its share of the Asian coking coal export market from 44 to 54 per cent, reflecting in part the high quality of Australian coking coal. Australia's share of the Asian thermal coal export market, however, has fallen from 51 to 43 per cent as China and Indonesia developed as alternative low-cost supply sources.

Despite high output growth, employment in the black coal industry grew relatively slowly from 27 600 in 1980 to around 32 700 in 1986, before declining gradually to 23 800 in 1997. Average annual coal industry output (saleable) per employee has increased continuously from 2800 tonnes in 1980 to 8400 tonnes in 1997, a compound annual growth rate of around 6.7 per cent.

The main factors behind the significant increase in labour productivity underlying these figures are:

- the increased share of production coming from the more capital-intensive open cut sector;
- the decreased use of the more labour-intensive bord and pillar technology in favour of longwall techniques in underground mines; and
- a general substitution of capital for labour and some improvements in work and management practices.

Because most of these influences relate to new technology or industry structure, labour productivity is not a reliable indicator of productivity performance in the Australian coal industry.

Similarly, differences in labour productivity between countries are generally not useful as indicators of relative productivity performance. Production techniques vary significantly between countries. Low wage producers like South Africa use more labour-intensive techniques and hence will tend to achieve much lower labour productivity than high wage countries like Australia. The mix of output produced from open cut and underground mines also will affect aggregate labour productivity significantly.

3.2.2 Profitability

Many participants have described the current era as one of 'profitless prosperity' — that is, although coal tonnages and exports have been increasing, average profits have been shrinking. Callide Coalfields argued:

> The Australian coal industry is increasingly subject to the rigours of unrestrained global competition. This has put downward pressure on prices, and, due to the high cost of operating coal mines in Australia, has decreased the profit margin for investors to a level that seriously undermines the industry's status as a worthwhile investment option. (sub.6, p. 7)

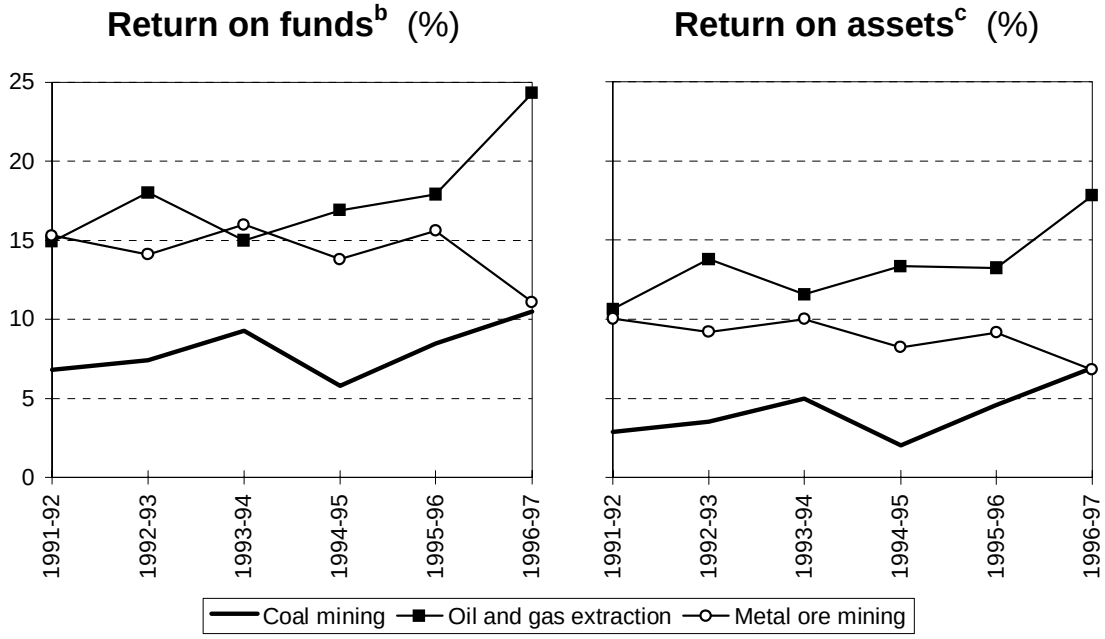
In recent years, average profitability in Australian black coal mining has been low.[1] The rate of return on funds and the rate of return on assets provide broad measures of the profitability of an industry. Between 1991–92 and 1996–97, returns in the coal industry have been consistently lower than in other mining industries. The return on funds has averaged half that in metal ore mining while return on assets has averaged just over half of that in metal ore mining. The return on funds has averaged half that in oil and gas extraction while return on assets has averaged a third (see Figure 3.1). Over the same period, return on assets in the manufacturing sector was well over double that in coal mining (ABS Cat. No. 8140.0).

This poor average profitability will mask significant variation between individual mines, companies and States. Greater variability can be expected between individual producers in coal mining than in many other sectors of the economy because:

- profitability can be influenced significantly by a mine's location and geology. For example, open cut mines generally have lower production costs than underground mines;
- prices achieved for coal output will vary according to the type and quality of coal; and
- there has been considerable variation in the introduction of more productive work arrangements.

[1] Reported profitability ratios include brown coal which could not be excluded on confidentiality grounds. However, the ABS has indicated that the reported profitability ratios are not influenced significantly by the inclusion of brown coal.

Figure 3.1: **Profitability measures for coal mining, oil and gas extraction and metal ore mining[a]**



a 1996-97 data are preliminary.

b Earnings before interest and tax as a percentage of total shareholders' funds and non-current liabilities.

c Total operating profit before tax as a percentage of the total book value of assets.

Source: ABS (Cat No. 8414.0 and unpublished data).

It is likely that average profitability in Queensland coal mines is higher than in NSW for the following reasons:

- Queensland accounts for over 70 per cent of Australia's coking coal exports and, in particular, dominates exports of premium hard coking coals. These are more valuable than the thermal and semi-soft coking coals that account for the majority of NSW coal production and export;
- Queensland has a much higher proportion of coal being mined by the generally lower-cost open cut methods. In 1997, nearly 90 per cent of Queensland's black coal production came from open cut mines, whereas just over half of NSW's output was from open cut mines; and
- there is some indication that Queensland mines achieve higher average productivity. Queensland truck and shovel and dragline operations covered by the Tasman Asia Pacific benchmarking study reported in Section 3.4 attained nearly 20 per cent higher productivity than those in NSW.

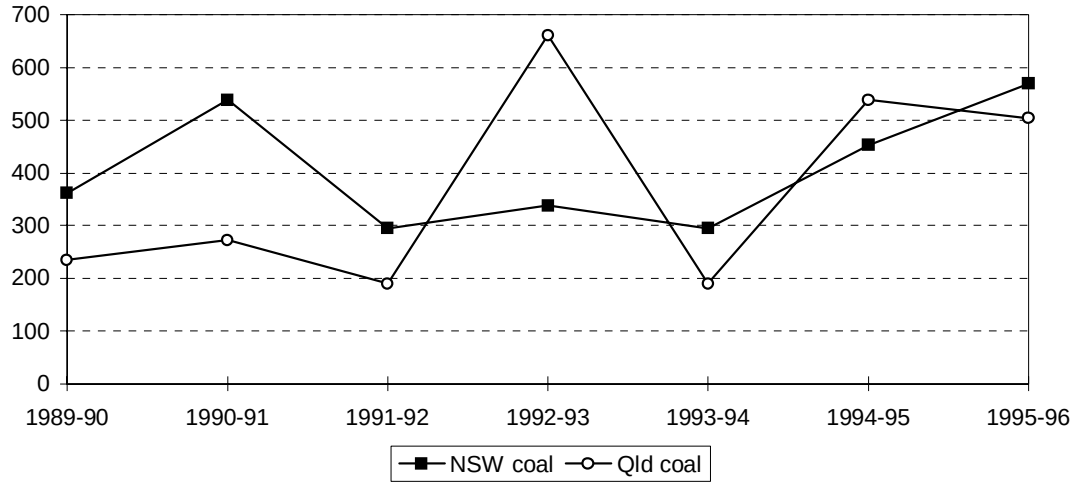
While no direct profitability data are available for Queensland, results of a survey for the NSW Minerals Council (1997a) provide support for this view.

Average return on funds in the NSW coal industry over the last six years was 6.2 per cent (see Table 3.1). These figures are conceptually comparable to the ABS return on funds figures for the whole Australian coal industry, which averaged 8.1 per cent. As production is split evenly between NSW and Queensland, it is likely that returns in Queensland on average have been around 4 per cent higher than in NSW over this period.

The Minerals Council survey also provides evidence that the low profitability has not been restricted to the 1990s. Return on shareholders' funds in the NSW coal industry over the last 14 years was just 1.5 per cent when the loss-making years of the mid-1980s are included (see Table 3.1). This was little more than a sixth of the average rate of return earned by all mining.

The above profitability measures reveal a long period of generally low returns for Australian black coal mining, particularly in NSW. An industry with such a poor long-term profitability performance might be expected to be showing declining output and little new investment. This has not happened. Indeed, investment in new mines has continued, averaging well over $350 million in both NSW and Queensland between 1989–90 and 1995–96 (see Figure 3.2). Production has grown constantly in both States and continued solid expansion in output is forecast.

Figure 3.2: **Net capital expenditure by the black coal industry for NSW and Queensland** ($m)



Source: ABS (Cat. No. 8414.0 and unpublished data).

Table 3.1: **Profitability measures — NSW coal and Australian coal and Australian minerals industries** (%)

	Return on funds		*Return on shareholders' funds*		
Year	*Coal Mining*[a]	*NSW Coal*[a]	*Australian Mining Industry*[b]	*NSW Coal*[b]	*NSW Coal*[c]
1983–84	na	na	4.4	-6.2	-4.8
1984–85	na	na	5.7	-3.3	-0.7
1985–86	na	na	5.1	-5.6	7.5
1986–87	na	6.0	6.4	-7.1	-0.7
1987–88	na	-0.6	15.6	-11.2	-8.5
1988–89	na	7.4	18.3	5.8	3.8
1989–90	na	11.9	23.4	17.0	9.5
1990–91	na	9.3	11.8	5.6	6.1
1991–92	6.8	5.0	8.1	2.8	4.7
1992–93	7.4	7.1	10.2	6.9	9.2
1993–94	9.3	9.7	10.3	9.9	9.7
1994–95	8.5	2.6	5.3	0.1	4.7
1995–96	8.5	9.7	9.2	6.2	8.8
1996–97	10.5	2.8	2.9	0.3	2.0
Average 1991–92 to 1996–97	8.1	6.2	7.7	4.4	6.5
Average 1983–84 to 1996–97	-	-	9.8	1.5	3.7

na Not available.
a Including abnormals, excluding extraordinary items.
b Including abnormals and extraordinary items.
c To 1988–89 excludes extraordinary items; from 1988–89 excludes abnormal and extraordinary items.
Sources: ABS (Cat. No. 8414.0 and unpublished data) and NSW Minerals Council (1997a and previous years).

There are a number of reasons for this apparent contradiction. First, once mine-specific infrastructure development has been undertaken, it is a sunk cost with no value in any other use. Hence, even if profitability is low, a mine may continue and even expand as long as it provides some return above avoidable costs. The industry committed to large investments in the early 1980s on the back of high coal and energy prices and forecasts of continuing rapid expansion in export demand for Australian coal. The unforseen fall in coal prices in the

mid-1980s rendered many of these investments much less profitable than expected. Since then some of the investments undertaken by the industry have been profitable at new lower prices, but the legacy of past less profitable investments continues to drag down average profitability. The continued decline in prices and increase in costs have led to poor profitability even for some of the industry's more recent productivity success stories. For example, Camberwell Coal observed:

> The industry continues to go through peaks and troughs, lots of money is spent when things look rosy, then we all fall in a heap, just like we are about to do now. I think the investment will dry up. It is certainly, in our own company, having just spent last week with our shareholders in Japan, their patience is at an end and we are not making an adequate return and it has been clearly spelled out to me that we have got to turn that around. (trans., pp. 46–47)

A second and related point is that poor profitability mines may be sold at a considerable capital loss — and indeed have been. Although such mines would show low returns on historical investment costs, they may be providing reasonable returns on purchase price to the new owners. For example, the Clarence coal mine in NSW which was closed in February 1998 due to poor productivity is being purchased by Centennial Coal. Despite its poor recent performance, the new owners have expressed confidence that the mine will contribute to earnings in its first full year.

Third, profitability often varies significantly between mines because of large differences in work arrangements. New mines and those reopened after sale are more likely to achieve these more productive arrangements. Rio Tinto observed such a process:

> The steaming coal industry, particularly in Australia, is entering a period of substantial rationalisation. Exxon and ARCO have announced their intention to exit Australian coal. Smaller operators have to date shown interest in purchasing these operations, and have been more successful than larger owners in introducing reforms which have ensured survival of the mines. (sub22, p. 22)

Shell, in discussing the use of integrated work teams, also indicated the productivity advantages available to some newer mines:

> Now there are examples again of that, but they are greenfield operations... They have the advantage of a far more flexible workforce and the associated efficiencies that flow from that. (trans., p. 218)

3.3 Productivity of Australian coal mines

A key question for this inquiry is the actual and potential productivity performance of Australian black coal mines. The recent and prospective market

conditions outlined in Chapter 2 indicate that the Australian industry is selling into an expanding Asian market, particularly for thermal coal. However, increasing low-cost supply from countries such as Indonesia, South Africa, and China means that the market will be particularly competitive. This outlook, together with the industry's recent poor profitability, indicates that major improvements in performance will be needed if the industry is to take full advantage of its potential growth opportunities.

The Commonwealth Department of Primary Industries and Energy observed:

> Australia is currently the world's largest coal exporter, and should remain so for the foreseeable future. However, this status cannot be taken for granted, and the Australian industry must work to remain competitive in the world market. The fundamental challenge for the Australian industry is to stay competitive with low cost suppliers elsewhere in the market. (sub.43, p. 5)

This section considers the views of participants and others on the coal industry's productivity and examines two recent benchmarking studies of the productivity of a sample of Australian coal mines.

It should be noted that productivity is only one part of cost competitiveness. Other factors include input prices, exchange rates, mine location and geology. For example, high productivity does not guarantee international competitiveness if input prices are significantly higher than those of overseas competitors. Input prices also may have an impact on mine productivity. (For example, high overtime rates may reduce capital productivity by making 7 day a week operations uneconomic.)

3.3.1 Participants' views

The inquiry received numerous submissions from coal producers citing the poor productivity performance of their mines and of the industry in general. Together with the results of earlier studies, these submissions suggest widespread poor productivity performance in Australian coal mining, the roots of which go back many years. However, it should be noted that not all mines are likely to be performing badly — the benchmarking studies cited below show significant variations in productivity between individual Australian black coal mines.

A number of industry participants argued that the Australian coal industry had significantly lower productivity than in other countries and several also cited the much higher productivity achieved by Australian metalliferous mines. They generally attributed this outcome to inefficient work arrangements at black coal mines. Some also conceded that poor management had contributed to low productivity directly, as well as indirectly through facilitating the development and continuance of poor work arrangements (see Chapter 6).

Exxon claimed that Australian coal mines were well short of productivity levels achieved by overseas coal mines and Australian metalliferous mines. It cited experience at its Lemington mine:

> Prior to divestment in 1994, Exxon owned and operated the Rawhide and Caballo surface mines in the Powder River Coal Basin in the state of Wyoming. The Caballo Mine employed a truck/shovel fleet consisting of a P & H 4100 shovel and 240 ton trucks. During initial performance testing, the shovel demonstrated 30 second swing times and achieved a productivity of 3000 BCM/hr. This productivity level was consistently achieved during subsequent ongoing operations at Caballo.
>
> Exxon's Lemington Mine also employs a 4100 shovel/240 ton truck fleet. The Lemington shovel demonstrated the same swing and productivity capabilities during its initial performance test; however, it has only achieved productivities of 2000 BCM/hr on an ongoing operating basis since its commissioning in 1996. Although a portion of the 50% productivity shortfall can be attributed to differences in external influences such as geology; the factors outlined above constitute the principal reasons for the performance differences. (sub3, p. 4)

The non-geological factors cited by Exxon as mainly responsible for this result reflected an industrial relations environment which severely restricted its ability to manage mines in the most productive manner. Exxon also observed that the high overtime rates of pay and limitations on shift length made seven day rosters excessively costly, causing lower capital productivity:

> The resulting under-utilisation of high cost capital severely disadvantages the Australian black coal industry vs its international competitors who operate on a 7-day basis. For example, from Exxon's own world-wide benchmarking efforts 4100 class electric powered shovels can be operated 80 percent of calendar time, while the same benchmark for 5-year old 240-ton haul trucks is 77 percent. 1996 calendar operating time at ECMAL's Hunter Valley operations for these equipment types was 50 and 35 percent, respectively, reflecting the fact that the equipment is not scheduled 30 per cent of the time because weekend premiums are prohibitive. (sub. 3, p. 9)

Rio Tinto (sub. 22) indicated that its Australian coal operations generally had not performed to their potential. This was in contrast to its other mining interests in iron ore and bauxite which had improved productivity significantly since the early 1990s. It cited numerous costly work arrangements not now observed in its non-coal operations as the cause of this unsatisfactory coal result. It also observed that unsatisfactory management of employee relations during the industry's strong growth years contributed to the establishment and maintenance of these practices.

Camberwell Coal observed that Australian mine costs (reflecting productivity and input prices) were universally higher than the lowest cost overseas exporters:

> We have totally lost our competitive edge, I don't think you will find one Australian mine that is in the bottom third of the export cost of production, and that is a pretty severe indictment on the coal industry in Australia, particularly in the Hunter Valley. (trans., p. 45)

Thiess Contractors (sub. 15), a firm with considerable experience as a contractor to the black coal and other mining sectors, submitted that in its experience mine productivity and management systems in the black coal industry were inferior to those in the metalliferous sector. It observed many unsatisfactory work arrangements in black coal which, together with poor management, led to this unsatisfactory performance.

Ensham's CEO also expressed criticism of coal industry management:

> Part of the present management culture in the industry is to shelve or ignore the hard problems and utilise vital resources on marginal issues which have little immediate impact on the bottom line. (Foots 1998, p. 4)

However, Rio Tinto observed:

> Apportionment of blame, however, is an unproductive exercise. What is more important is that a variety of forces is at work — pressure on coal price, more competition — which will call for a change in management behaviour. (sub. 22, p. 48)

A number of participants indicated that productivity in their mines had improved in recent years as a result of improved work arrangements. This suggests that performance is variable between companies depending partly on the ability to remove restrictive work arrangements or, in the case of new mines, to avoid introduction of such arrangements. Camberwell Coal indicated that its productivity had been considerably above that of other Hunter Valley mines because it had negotiated a favourable agreement with the CFMEU on opening in 1991 (trans., pp. 47–48). However, it added that further progress had been difficult, with its most recent agreement not delivering promised changes:

> The last agreement was negotiated back in 1995 and there were wage increases put into the agreement. In terms of that agreement that really hasn't delivered what we expected. We are now producing similarly to what we were doing back in 1995, even though we paid for some changes. (trans., p. 49)

Callide Coalfields also indicated that it had achieved some improvements in productivity but that important impediments to attaining higher productivity remained:

> ... we have just entered into our fourth generation of enterprise agreements and we've been successful in doing things that have made our operations far more efficient. But we're still faced with the award base. Everything seems to tend to operate from that award base which is very restrictive ... (trans., p. 222)

Mr John Maitland, the General President, Mining and Energy Division of the CFMEU, has stated that there have been significant productivity-enhancing changes in work arrangements contained in union-negotiated agreements in recent years. He argued:

> We are willing to change. The productivity statistics of the last decade show that we have changed. But we don't see a corresponding willingness to change by investors and management ... (Maitland1997, p. 12)

Whether such changes have been sufficient to achieve competitive work arrangements and productivity levels is discussed below and in Chapters 5 and 6.

3.3.2 Benchmarking productivity performance

Benchmarking is a business management technique initially developed to compare and improve the performance of individual businesses. It is a process of searching for, measuring and implementing better practices, through comparisons with other organisations (or with different parts of a single organisation). Macneil et al (1993) offered the following definition of benchmarking:

> ... a method for continuous improvement that involves an ongoing and systematic evaluation and incorporation of external products, services and processes recognised as representing best practice. (p.14)

Benchmarking is a universal concept, having application to all sectors of the economy. The main focus of benchmarking has been at the level of the individual firm or production unit, where detailed data exist and the operations being studied are well understood by the benchmarkers.

The preferred method of benchmarking depends on the goal to be achieved. Where an organisation wants to analyse its performance only, it could undertake internal benchmarking. Where it wishes to compare its own methods with the world's best, process-based benchmarking with partners recognised as having the best processes of that kind is used.

All types of benchmarking have one general strength — they create impetus for positive change in an organisation. A second major strength of benchmarking is its quantitative nature. It involves the collection of comparable data. When undertaken thoroughly and carefully, benchmarking generates information that is more robust than the subjective views that underlie most qualitative assessments of an organisation's performance. Furthermore, as the collection of the benchmarking data is an empirical exercise, it requires the benchmarker to

scrutinise an organisation in great detail, thereby raising the possibility of performance-enhancing insights irrespective of quantitative results.

The quantitative approach adopted in benchmarking is also conducive to *before* and *after* analyses. This encourages organisations to adopt a dynamic sense of continual review and refinement of strategies for improved performance.

Finally, the pursuit of better performance standards encourages analysis of the causes of difference between organisations. This is the most significant benefit of benchmarking. In the light of comparative information, organisations can develop a better understanding of what drives both their performance and the performance of others.

A potential role for benchmarking in public policy is to provide some yardstick of performance of publicly-owned natural monopolies. Because such organisations generally face very limited competitive pressures, alternative approaches are needed to generate high levels of performance. Benchmarking can play a part here by providing an indication of productivity relative to comparable operations in Australia and overseas.

However, benchmarking has a number of limitations, some of which are particularly relevant to its use for public policy analysis. A key requirement for accurate benchmarking is a comparison of *like* with *like*. Such comparisons can be difficult to make when a number of variables bear on performance. For example, in coal mines, the geology varies, as does the type of equipment being utilised. Frequently, a *like* with *like* comparison is difficult and hence the initial benchmarking results require significant adjustment or qualification. In such situations the results should be seen as indicative rather than precise measures of performance.

To be precise and meaningful, benchmarking requires extensive and accurate information, some of which might not be normally collected by the organisations concerned. This level of detail, however, varies with the type of benchmarking undertaken. For example, internal benchmarking for some organisations involves relatively little information. Conversely, generic benchmarking of Australian black coal mines with world's best practice is information-intensive. In addition, because benchmarking for governments is often undertaken from outside the organisations being examined (particularly any overseas benchmarking partners), there will be problems of incomplete understanding of the factors driving observed performance differences.

A further limitation of benchmarking derives from its very purpose. This is to measure an organisation's present performance against recognised better practice. As such, for organisations that lead their fields, benchmarking has limited benefits. Furthermore, organisations that are not achieving world's best

practice can tend to focus on catching up to an existing benchmark when the real challenge is determining how to become the firm setting the benchmarks.

An important limitation of benchmarking as a tool for public policy analysis is that the solutions to identified deficiencies often lie in the hands of the organisations being examined rather than with government. However, mere involvement in benchmarking analysis may draw governments into making policy responses on matters which are essentially the responsibility of private sector organisations. The role of government is to provide the appropriate policy framework within which the private sector can effectively resolve these problems.

For these reasons, benchmarking of the performance of business enterprises has limited application to matters of public policy. It has a useful contribution to make in estimating gaps in performance. But beyond that, unless the factors underlying the performance gap are within the realm of public policy, the analysis of the performance gap is best carried out by the organisations concerned.

The Commission has undertaken generic benchmarking of a number of processes within coal mines in order to ascertain the existence and extent of a performance gap between certain mining processes in Australian and international mines. It has been suggested by participants that some of the factors that underlie a performance gap between certain Australian and international coal mines reflect the impact of public policy. Where that is the case, those issues are discussed in greater detail later in this report.

3.3.3 Previous benchmarking studies

This section briefly outlines the results of two comprehensive international benchmarking studies of Australian coal mine productivity carried out in recent years. Both studies focused on benchmarking the productivity of key processes involved in particular mining technologies rather than attempting to cover whole-of-mine productivity. They also estimated the productivity of all inputs involved in these processes (total factor productivity), rather than just a single input such as labour or capital.

Swan Consultants (1994)

In 1994 Swan Consultants, on behalf of the Australian Coal Association, undertook a productivity benchmarking comparison of *high-performing* Australian open cut and underground coal mines against *international best practice*. The international mines were nominated by the Australian participants as recognised world leaders in performance. Data from a total of 18 mines (ten

Australian and eight from the United States), covering three mining technologies, were used in the study. While this small number of mines somewhat limits the generality of the results, they are nonetheless useful indicators of relative performance. The study measured the productivity of the combination of inputs used in producing a single mine output.

For truck and shovel open cut operations (comparing two Australian and four US mines), productivity of the Australian mines needed to increase by nearly 70 per cent to match the US mines. Swan estimated that about one fifth of this gap reflected geological disadvantages of the Australian mines — a large number of relatively thin seams. The rest reflected low capital utilisation at one Australian mine and much lower labour productivity at both Australian mines. The latter was explained by differences in leave, roster and work arrangements together with overstaffing at the poorly performing Australian mine.

For open cut dragline operations, Swan benchmarked the productivity of five Australian mines against that of two leading US mines. As a group, the five Australian mines performed at a level similar to those in the United States. However, the three better-performing Australian mines had over 20 per cent higher productivity than the US mines while the other two Australian operations were around 15 per cent below US performance. This indicated that a productivity improvement of about 40 per cent was needed for the poorer group of Australian dragline operations to match the three high-performing mines.

About half of the gap between the two groups of Australian mines was due to site characteristics which affected dragline performance. The poorly performing Australian mines had low utilisation of available capital and lower labour productivity, reflecting poor work arrangements.

In underground longwall mines, three Australian mines were compared with two US mines. The Australian mines needed to increase productivity by about 20 per cent to reach their US counterparts. This reflected better capital utilisation in the US mines, because of longer periods of utilisation, and better labour productivity, partly due to less time lost for leave and during work breaks and shift changes.

Tasman Asia Pacific (1997)

In 1997, Rio Tinto commissioned Tasman Asia Pacific (Tasman) to undertake a benchmarking study comparing and analysing the productivity performance of Australian open cut coal mines with those of US (mostly) and some Asian mines as well as with Australian truck and shovel metalliferous mines. The study measured the total factor productivity of key processes in each of truck and shovel and dragline operations for 1996 or 1995–96. The methodology was

similar to that adopted in the Swan study, but underground mines were not examined. However, a larger number of mines (27 separate operations from 18 mines) were involved, giving the results somewhat wider applicability and enabling a breakdown of the results by State.

For truck and shovel mines, Tasman benchmarked four NSW coal mines, five Queensland coal mines, three US coal mines and five Australian metalliferous mines. Australian metalliferous mines had the highest estimated productivity. US coal mines averaged 8 per cent lower productivity than this benchmark. To achieve the Australian metalliferous productivity levels, Queensland coal mines needed to increase productivity by about one third while NSW coal mines required almost a 50 per cent rise in their productivity.

These averages masked major variations between individual Australian coal mines. For example, the best performing NSW coal mine, while still having productivity lower than the best-performing metalliferous mine was more than twice as productive as the worst-performing Australian coal mine. Further analysis indicated that low productivity in using trucks (low speed and low utilisation) was an important part of the poor performance of Australian coal mines.

Low labour productivity in Australian coal mines also contributed significantly to their poor overall productivity. NSW coal mines needed to increase labour productivity by about 66 per cent and Queensland coal mines by around 40 per cent to match the levels achieved by Australian metalliferous mines. Overstaffing and considerably more idle time in Australian coal mines were the key factors in this result.

For those costs covered by the study, the costs per tonne of material moved in Australian coal mines were above those of US coal mines by even more than suggested by productivity gaps. Higher wage costs per employee in Australian mines pushed costs per tonne of material in NSW mines to nearly 90 per cent above that of US coal mines. For Queensland, the gap to US mines was 65 per cent.

For dragline operations, two NSW mines, five Queensland mines and three US mines were benchmarked. The results showed that the Queensland mines represented the best practice of the three groups examined, being over 20 per cent more productive than the US and around 30 per cent above the NSW mines. As with truck and shovel coal mines, significantly higher prices of inputs disadvantaged Australian dragline mines compared with the US benchmark coal mines. There were large variations in individual mine productivity performance around the group average, but because of the small

sample size confidentiality considerations precluded an analysis of these differences.

Partial productivity measures indicated that better geology assisted productivity in Queensland mines, but they also benefited from better dragline performance compared with NSW and around 25 per cent higher labour productivity than in both the United States and NSW. The labour productivity performance partly reflected lower lost time during shift changes and the higher leave component in NSW mines.

3.4 The Commission's benchmarking study

The terms of reference for this inquiry requested the Commission report on benchmarks of productivity performance of Australian black coal mines compared with best practice in comparable international coal mines and in analogous Australian metalliferous mines. The Commission considered that this task required a new and more comprehensive benchmarking study to be undertaken, rather than relying solely on the existing published benchmarking studies cited above, which covered a limited number of mines or did not examine all major technologies.

Accordingly, after considering expressions of interest from eleven firms, the Commission contracted Tasman Asia Pacific (Tasman) to undertake a benchmarking study of the productivity of the Australian coal industry. The principals of Tasman have undertaken productivity benchmarking work for The Australian Coal Association, Rio Tinto and Shell. Draft versions of the study were presented to public workshops organised by the Commission in January and June 1998. The final report has benefited significantly from contributions by workshop participants.

Tasman examined key mining processes in a representative sample of Australian open cut and underground coal mines compared with better practice US coal mines and Australian metalliferous mines. Because of the depth of its coverage and the relatively large number of mine operations being surveyed, the Tasman work is the most comprehensive benchmarking study undertaken on the productivity of the Australian black coal industry. It covers all three major mining technologies and makes comparisons with better practice mines in both the US black coal industry and the Australian metalliferous sector. By covering a relatively large number of mines (which have been specifically selected using cost data to cover the whole range of performance levels), the study provides a good representation of the Australian coal mining industry. It has also been able to compare performance between mines in NSW and Queensland and, within the limits imposed by confidentiality requirements, present insights into the

causes of the wide productivity differences between Australian coal mines observed in earlier studies.

The Executive Summary of Tasman's report is presented in Volume 2 of this report. The methodology and main findings are outlined below.

3.4.1 Coverage and methodology

The inquiry terms of reference specified comparison of the productivity performance of Australian black coal mines with *best practice* US coal mines and Australian metalliferous mines. However, it is often difficult to identify consistent best practice across all the operations in an entire organisation or firm. This is particularly so in mining where the operating environment can vary significantly between mines and even between years in individual mines. Hence, Tasman has identified US coal and Australian metalliferous mines which can be termed *better practice*. That is, they are mines which are recognised as averaging consistently high productivity across their operations. However, in any given year there may still be significant variations between productivity of these better practice operations. This was shown by the significant variation in productivity observed in the sampled better practice Australian metalliferous mines and US coal mines.

Better practice coal mines in the US are recognised as among the most productive in highly developed, high wage countries. Tasman indicated that low wage countries were not appropriate benchmark partners:

> Many other countries that were nominated as having efficient mines had wage rates much lower than those in Australia so were not suitable comparisons for a total productivity analysis. This was mainly because these low-wage countries had much larger relative work forces and different operating practices. These countries included Indonesia, South Africa and Chile. (Tasman Asia Pacific 1998, p. 6)

The objective in selecting Australian coal mines for the survey was to develop a representative cross-section of mines for each of the three main mining technologies. Labour productivity data from Barlow Jonker (1997) were used to choose coal mines covering a cross-section of performance levels. The high response rate to the survey ensured that this objective was achieved. In total, responses were obtained from 44 mine operations out of 52 from which data were requested. These operations consisted of 27 Australian coal operations, 4 Australian metalliferous mines and 13 US coal operations. In total the survey covered a little under 40 per cent of total run-of-mine coal produced in Australia.

It is important to recognise that the above process for selection of mines will tend to create a performance gap between Australian coal mines and the US coal and Australian metalliferous benchmarks. As Tasman observed:

> The rationale for selecting better practice international comparisons rather than average international comparisons is to show the scope for improvement in the Australian industry and ways of achieving that improvement. This is the primary objective of benchmarking. (Tasman Asia Pacific 1998, p.6)

That the performance target is achievable by Australian coal mines is demonstrated by the fact that the best practice Australian operations in each of the three major mining technologies approached or exceeded the performance of best practice US mines. The sampled Queensland coal draglines were on average significantly more productive than the US coal benchmarks. In addition, Australian metalliferous mines averaged very close to US coal better practice average productivity in truck and shovel operations. Because the Tasman results are for a sample of Australian coal mines in an industry with clearly highly variable performance between firms, the results should be seen as broad indicators rather than precise measures of industry wide performance. The analysis by Tasman is particularly valuable in indicating causes of poor performance and the potential for productivity improvement by Australian mines.

Because of the importance of like with like comparisons in ensuring meaningful benchmarking, the study focused on a number of key mining processes that are relatively homogeneous between mines and which have well defined common outputs. Including all activities undertaken in a mine in a particular year would cause considerable difficulties in estimating a common output measure. It also would mean comparing very different mixes of activities. For example, some mines do not have washeries and the level of development activities varies significantly between longwall mines from year to year. Focusing on key homogeneous processes allows more precise analysis of measured differences in productivity. Attempts to compare whole-of-mine productivity introduce complications such as different functions performed at various mines (for example, washeries) and varying treatment of corporate overheads by different companies. Significant and somewhat arbitrary adjustments would be needed in order to estimate like with like comparisons.

Many maintenance activities and associated labour inputs were excluded from mine inputs for open cut mines because of concerns about unreliable and inconsistent reporting of data and the significant variability in maintenance expenditure from year to year. A mine sampled in a year when it had a higher than usual maintenance program would register an unrepresentative, low productivity performance. Adequate allowance for such factors would have

been very difficult in the broad industry-wide benchmarking exercise required by the Commission. However, excluding maintenance inputs from the analysis does cause some problems. Maintenance is a significant cost in coal mining and efficient maintenance programs are important in generating consistently high productivity. Mines in which above average maintenance expenditure results in significant output gains are likely to be biased towards higher productivity in the Tasman study because the bulk of their maintenance inputs will not be included.

Mine geology will often have an important influence on observed productivity. However, as it is not a factor which reflects on management or workforce performance it is desirable to remove its impact as far as possible from performance measures. The Tasman study did this in a number of ways. It does not cover certain activities, such as development work, in which geology has a particularly important effect. Bord and pillar mines, where productivity is very dependent on geology, were not considered. In measuring output in truck and shovel mines, both waste and coal were included in order not to disadvantage mines with greater overburden. Nonetheless, there remain important impacts of geology on productivity which cannot be removed without a detailed mine by mine analysis not practical in this broad multi-firm survey. However, in some cases poor geology can have the perverse effect of stimulating high productivity in a mine because this is essential for its survival.

The study also obtained significant quantitative and qualitative information from participating mines to allow causes of measured productivity differences to be diagnosed. Hence, as well as observing productivity variations between groups of mines, it is possible to gain insights into some of the important factors underlying performance differences.

The study measured the productivity of all of the inputs (factors of production) used in the operations being benchmarked. This measure is termed total factor productivity. Focusing on the amount of output produced per unit of one type of input only (for example, labour), can produce very misleading productivity estimates if the proportion in which inputs are used varies significantly between mines. For example, comparing labour productivity between Australian coal mines and those in countries with very low wages would not be appropriate as Australian mines generally use much more capital-intensive methods and technologies which generate higher labour productivity.

3.4.2 Results

The key results of the Tasman study are now examined for each of the three main coal mining technologies used in Australia. It is worth reiterating that

these results are from a reasonably representative sample of Australian black coal mines and compare their performance with better practice US black coal mines. The inherent difficulties in benchmarking noted above — in particular, the significant variability between the geologies of individual mines — mean that the average results should be taken as indicative rather than exact measures of the average productivity of Australian coal mines. Nonetheless, the significant gaps between Australian and better practice US performance and the very large differences in productivity between Australian coal mines suggest that some important lessons can be learned from an analysis of the results.

Truck and Shovel operations

For open cut mines using truck and shovel techniques, output was defined to cover the total movement of material (including distance transported). Measuring output only as coal production would disadvantage unreasonably mines with large amounts of overburden, while ignoring distance carried to stockpiles or processing would bias the results against mines with a large transport task. Inputs were physical quantities of labour, various types of capital (trucks, shovels, drills etc.) and materials. These were weighted by their shares (averaged across the sample of mines) in total cost to give an index of total input usage.

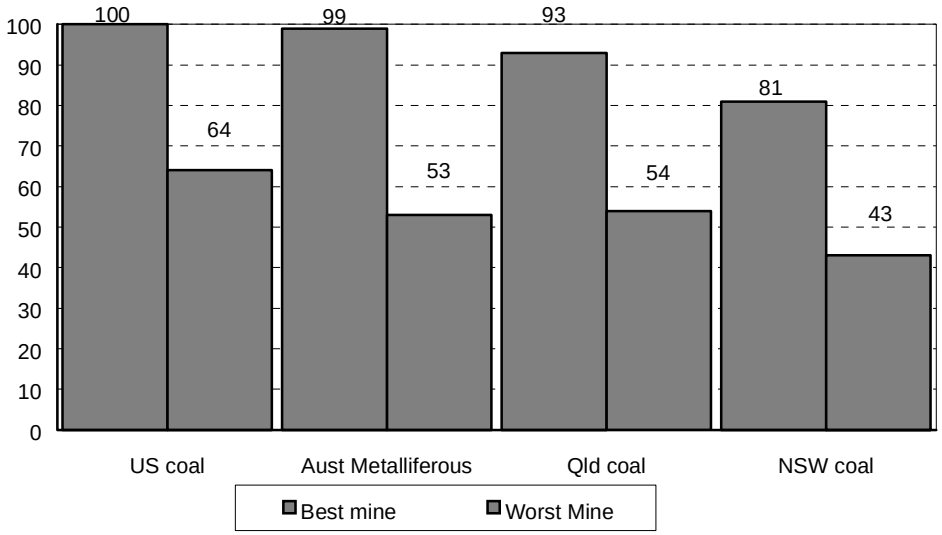
Information on truck and shovel operations was obtained from six NSW coal mines, six Queensland coal mines, four Western Australian metalliferous mines and six US coal mines.

In the study sample, Australian truck and shovel coal operations performed poorly compared with better practice US coal mines and Australian metalliferous mines. On average NSW mines needed to increase productivity by about 40 per cent to match the sampled better practice US coal mines, while Queensland mines required a more than 15 per cent increase. As average productivity in Australian metalliferous mines was only marginally below that in US coal mines, the productivity gap between Australian coal and metalliferous mines was also similar.

However, as shown in Figure 3.3, these average results masked significant variability in productivity between individual mines in all of the four groups of mines examined.

The gap was particularly large in NSW coal, where the worst-performing mine needed to increase its productivity by nearly 90 per cent to match the best-performing NSW mine. The gap between the best-performing Australian coal mines and the frontier US mine was small (less than 10 per cent) for Queensland but more substantial (about 25 per cent) for NSW.

Figure 3.3: **Variation in total productivity within truck and shovel mine categories** (index: best mine = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

All but one of the Australian coal truck and shovel operations sampled were at mines also undertaking dragline operations. It is possible that truck and shovel operations in these mines tended to be involved in the more difficult work while the more capital-intensive draglines specialised in the easier to mine areas. Also, management may place more emphasis on achieving high productivity in the capital-intensive dragline work.

Partial productivity indicators (units of output per unit of a single input) show that the sampled Australian coal mines had poor labour productivity and use of trucks, particularly in NSW. On average, the six NSW truck and shovel mines in the sample needed to increase labour productivity by nearly 70 per cent to match labour productivity in the six US mines, while Queensland mines needed a 40 per cent boost to achieve US levels.

The survey indicated that the major cause of this poor labour productivity performance was overstaffing (high ratio of labour hours worked to machine hours) and much higher idle time (for example, time leaving and joining shifts). Chapter 5 discusses some of the work arrangements which would have led to this poor average labour productivity in the sampled Australian coal mines.

Truck productivity was also low in Australian coal mines relative to better practice US mines due partly to low capacity utilisation of trucks and also reflecting poorer productivity when operating.

The cost impacts of the productivity differences between US and Australian coal mines were further accentuated by higher input costs faced by Australian mines. For the Australian mines examined, the mine cost disadvantage was considerably greater than the cost differential because of higher cost of labour per hour worked.

Dragline operations

Tasman measured output for dragline operations as the total of prime and re-handled overburden moved. The largest inputs were the dragline equipment, labour, explosives and electricity.

Unlike truck and shovel operations, the eight sampled Australian draglines (three in NSW and five in Queensland) performed well compared with the five US benchmark mines. The US mines required a nearly 20 per cent increase in productivity to match average productivity in Queensland draglines, while NSW mines were only 5 per cent behind the US operations. The NSW operations had 25 per cent lower productivity than those in Queensland. On average, productivity of Australian draglines was more than ten per cent above that of the US benchmark mines.

While performance differences between individual Australian dragline operations were not as large as in truck and shovel, they were still significant, with a gap of around 30 per cent between the best and worst mine. This was similar to the gap observed between the best and worst US mines.

Some of the productivity advantage observed in Queensland draglines reflected geological advantages which required less inputs such as explosives. Analysis of partial productivity indicators showed that superior productivity of dragline equipment was also important in the good performance of Queensland coal mines. Compared with US draglines, the sampled Queensland mines used their dragline equipment for more hours and were also somewhat more productive when in use. While NSW draglines had similar hours of operation to those in Queensland, they needed to increase their productivity when in use by more than 20 per cent to match Queensland.

On average, labour productivity in the surveyed NSW and US operations needed to increase by nearly 20 per cent to match that achieved in the Queensland mines. Some of this more favourable result for Australian dragline operations compared with the US reflected good work arrangements (meal breaks in field, ‘hot seat’ changes, all year round operations) which generally matched those in the US mines. Such arrangements are necessary to obtain high productivity from expensive dragline equipment. On average, NSW coal mines had considerably greater idle time during shifts than in the United States and

Queensland but the greater use of more labour-intensive equipment (for example, bulldozers) in US mines meant that measured labour productivity was still similar in the United States and NSW.

As with truck and shovel operations, higher prices for inputs (labour and explosives) paid by the selected Australian dragline mines meant that their costs per cubic metre were well above those of US mines.

Longwall operations

Output for longwall operations was run-of-mine coal produced by the longwall. Coal produced during development activities was excluded. Major inputs were longwall equipment, labour and electricity.

On average, the seven Australian longwalls surveyed needed to increase productivity by 25 per cent to match the two US benchmark operations. As was the case with truck and shovel operations, the best Australian longwall was quite close to (just over 10 per cent below) the productivity of the best US mine, which itself is recognised as a world's best practice performer.

The major cause of the measured productivity gap was relatively low labour productivity in the Australian operations. Labour averaged 34 per cent of costs for the nine mines and labour productivity in the Australian mines needed to increase by close to 40 per cent to match that of the US longwalls. The survey was able to identify much greater idle time in Australian mines (particularly joining and leaving shifts) as an important cause of this result. In addition, geological disadvantages and possibly work practices and overmanning would have led to some of the lower labour productivity in the Australian mines. The use of significant contract labour in the best practice US mine would have allowed greater flexibility to match labour input to changes in production.

Productivity of capital equipment in the Australian black coal mines was comparable to that in the US mines except for longwall shearers (a relatively small input cost), where planned extra capacity in some Australian mines led to lower utilisation rates.

3.4.3 Conclusions

Although covering only a sample of Australian black coal mines, the productivity benchmarking studies reported above provide some important insights into the industry's average relative performance and the significant variability of performance between individual mines.

First, the benchmarking analysis indicates that, on average, Australian truck and shovel and longwall coal mines have much lower productivity than the US mines examined. This confirms results from earlier benchmarking studies.

Second, a good deal of the observed poor labour productivity and some of the capital productivity variations are the result of inefficient work arrangements (including overmanning) and high leave entitlements. The analysis of work arrangements in Chapter 5 indicates that some of the conclusions from the benchmarking analysis are likely to apply to a broad cross-section of the industry.

Third, Australian metalliferous mines were the best performers in truck and shovel operations, while Queensland dragline coal mines achieved productivity levels well above their US counterparts. These results indicate that parts of the Australian mining industry are capable of performing at very high levels of productivity.

Fourth, some differences in productivity reflect geological conditions which were on average more favourable in US mines.

Finally, even when the sampled Australian coal mines were able to achieve relatively high productivity (Queensland draglines), high prices of inputs meant that their unit production costs were only on a par with the US mines examined. Those that already had poorer productivity were disadvantaged even further by higher input prices. However, these cost comparisons will be influenced significantly by exchange rate movements.

The results of the Tasman benchmarking study are only for a sample of mines at one point in time. Anecdotal evidence suggests that the pressure of declining coal prices, together with significant changes in the industrial relations environment over the last decade, has created an environment in which improved management and labour force performance are both necessary and feasible. Comparison of the results of the smaller Swan Consultants (1994) study (which aimed to select high performing Australian mines) with those of the current Tasman Asia Pacific (1998) work are suggestive of an improvement in relative productivity of Australian open cut coal mines in recent years. While the sampled Australian truck and shovel mines in the Swan Consultants study needed to increase productivity by 70 per cent to match productivity in the US mines, the comparable figure in the Tasman Asia Pacific survey was 30 per cent. Australian draglines surveyed by Swan Consultants averaged around the same productivity as their US counterparts while in the Tasman Asia Pacific (1998) study they were around 7 per cent ahead. However, there was a small increase in the productivity gap observed for longwalls.

The results of the Tasman Asia Pacific (1998) benchmarking study suggest that, on average, productivity of Australian coal mine truck and shovel and longwall operations and NSW dragline operations can be improved substantially. The productivity performance of truck and shovel operations at Australian metalliferous mines and in the better of the sampled Queensland coal mines, together with the high productivity of Queensland coal mines' dragline operations and of one of the Australian longwalls, shows that Australian mines can be highly productive. The analysis of work arrangements in Chapter 5 indicates significant scope for changes that would assist in improving average industry productivity towards better practice levels.

4 WORK ARRANGEMENTS: THE CONTEXT

Historically, the major features of the Australian black coal labour market include a relatively high rate of union membership, relatively high wages and high levels of strike activity and industrial disputation. Industrial tribunals have played a major role in the determination of employment conditions.

One of the factors influencing the competitiveness of any firm is the institutional setting within which its labour market operates. As product markets have become more competitive, Australia's industrial relations institutions have been encouraged to move towards an enterprise bargaining framework.

By and large, with regard to labour market regulation, Australian black coal mines operate under the Federal jurisdiction while metalliferous mines fall under both Federal and State jurisdictions. While the Federal and Queensland jurisdictions have increased their institutional flexibility recently, the institutional arrangements of the Western Australian industrial relations legislation system enable a greater degree of workplace flexibility.

The 'custom and practice' provision in awards has resulted in the formalisation of all types of informal work arrangements in the Australian black coal industry. This provision inhibits unnecessarily the ability of workplaces to respond to changing circumstances. In addition, since not all customs and practices are documented at each mine site, uncertainty is created. This uncertainty increases the costs associated with change. Accordingly, this provision should not be included as an allowable award matter under the Federal award simplification process.

4.1 Introduction

The central focus of this chapter is an examination of the historical and institutional context within which work arrangements in Australian black coal mines operate. (Information on the history of industrial relations in black coal is provided in Appendix E.)

Work arrangements are the set of practices and rules which influence the way that jobs and tasks are performed within the workplace. They may be introduced

intentionally (via awards or agreements) or may develop over time as a result of custom and practice. As such, work arrangements consist of both formal and informal practices and rules. They also involve management practices and rules.

While many factors influence the competitiveness of mines — for example, the quality of coal, geological conditions, reliability of supply, timeliness in delivery and transport costs — the impact of work arrangements on the competitive performance of firms is of central concern for this inquiry. From this perspective, one means of improving competitiveness is by improving the impact of work arrangements on productivity. Arrangements which enable more outputs to be produced with the same quantity of inputs, or the same outputs with fewer inputs, can improve competitiveness while maintaining (or improving) remuneration levels in the black coal industry. Unless productivity improvements are captured completely by remuneration increases, the consequence of higher productivity is lower unit costs of production. Unit production costs can decline also as a result of reductions in the direct costs of employing labour (such as wages, allowances, bonuses, payroll taxes, workers compensation, superannuation payments and other on-costs).

It has long been recognised in OECD countries that a necessary precondition for improved competitiveness, productivity and efficiency is labour market flexibility — where flexibility is the ability to adapt continuously to new circumstances (OECD 1986). Such flexibility is essential for the survival of any business in a highly competitive environment. This process of adaptation can be either internal or external to the workplace.

Following an overview of the major features of the black coal labour market, this chapter reviews the different industrial relations frameworks within which the Australian black coal and metalliferous mining and the US black coal mining industries operate. The different legislative arrangements on industrial relations have clear implications for the milieu within which formal work arrangements operate and change over time. The relative flexibility of the black coal labour market from the institutional (or external) perspective is examined in this chapter. The chapter also provides an overview of the development of formal work arrangements in Australian black coal mines. The following chapter examines the flexibility of work arrangements from a workplace (or internal) perspective.

4.2 Labour market features

This section provides an overview of the main features of the black coal labour market. It discusses employment trends, trade unions and unionisation rates,

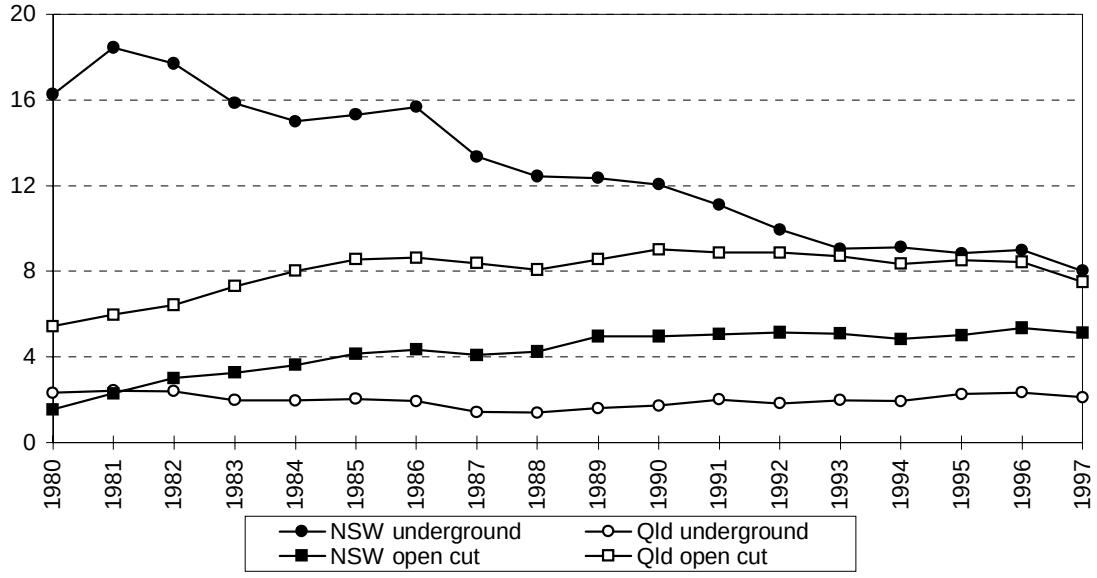
wages, lost working time, labour turnover and other characteristics of the black coal workforce. This section draws on detailed data located in Appendix C.

Employment

Employment in the black coal industry has declined by 27 per cent from its peak in December 1986 to 23 800 in December 1997. This employment loss has been concentrated in NSW, where reductions in underground mine employment exceeded rises in open cut mine employment. Aggregate employment in Queensland mines remained relatively stable over the same period in both underground and open cut mines, although employment fell in 1997 (see Figure 4.1).

Employment in the black coal industry represented 0.3 per cent of total Australian employment in 1997.

Figure 4.1: **Black coal industry employment by State and mine type**[a] ('000)



a Employment in or about a coal mine or coal preparation plant. It includes administrative, technical and clerical staff. It also includes employees from both the mine operators and outside contractors. Employment as at December of each year.

Sources: JCB and QCB (various).

Trade unions and unionisation rates

The Australian black coal industry has a history of high levels of unionisation. Between 1986 and 1997, the unionisation rate in the black coal industry remained at over 92 per cent. In comparison, the rate of unionisation among the

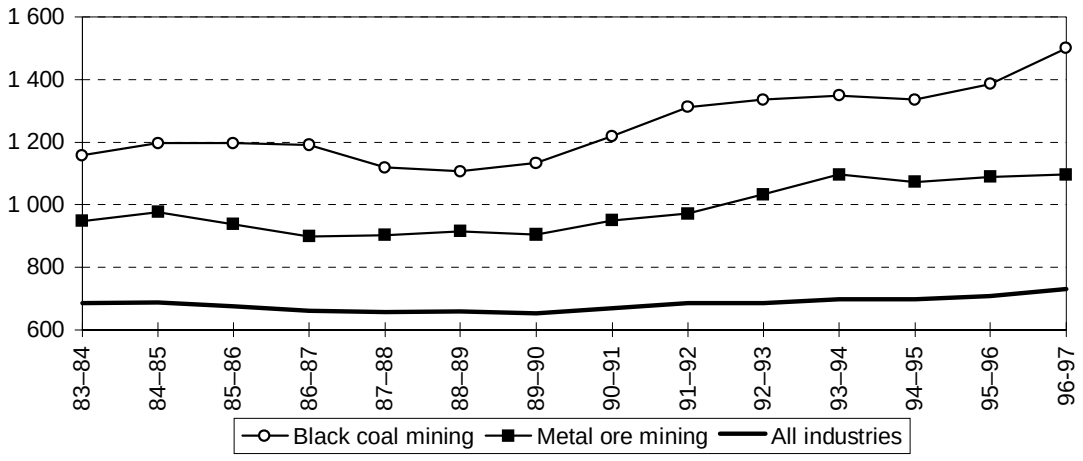
total Australian employed labour force fell from 46 to 30 per cent over the same period (ABS unpublished data).

The Construction, Forestry, Mining and Energy Union (CFMEU) and the Australian Collieries Staff Association (ACSA) are the two main industry unions. The CFMEU covers coal face workers, mechanics and drivers of plant and equipment. The ACSA has industrial coverage of all professional, semi-professional and clerical employees in the coal industry. Two other unions, the Automotive, Food, Metals, Engineering, Printing and Kindred Industries Union (AMWU) and the Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union of Australia (CEPU), also have coverage in the black coal industry.

Earnings

Employee earnings are high in the black coal industry relative to both average earnings for all industries and in similar industries (see Figure 4.2). In 1996–97, full-time average weekly total earnings (AWTE) in the black coal industry were 1.4 times those in metal ore mining industries and 2 times full-time AWTE for all industries (ABS unpublished data). In 1996–97, this equated to annual average earnings of almost $80 000 for black coal employees, compared with $57 000 in metal ore mining and $38 000 in all industries.[1]

Figure 4.2: **Real full-time average weekly total earnings for black coal, metal ore mining and all industries** ($A1996–97)



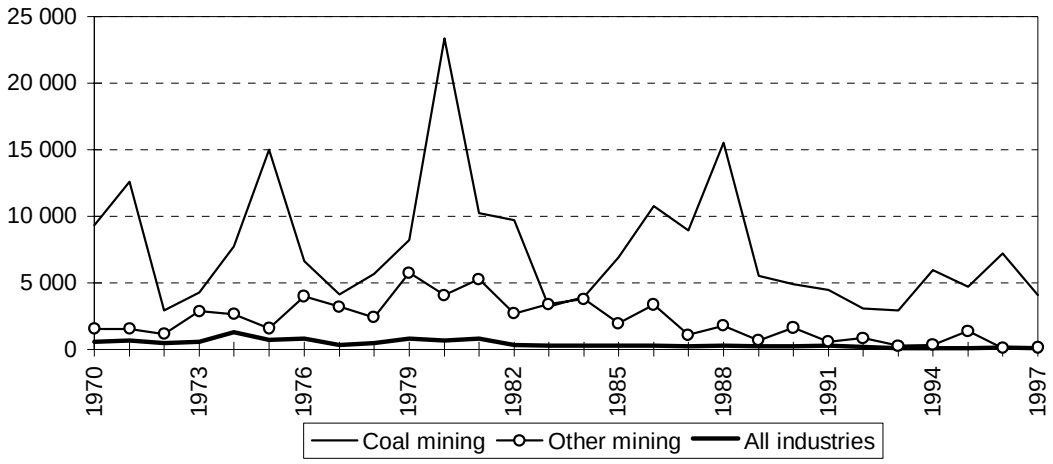
Source: ABS (Cat. No. 6203.0 and unpublished data).

[1] Annual earnings are calculated by averaging ABS quarterly observations of AWTE and multiplying by 52.

Working days lost

The black coal industry has a high level of working days lost compared with other industries. This is a combination of days lost due to sickness, workers' compensation and industrial disputes. In 1996, sick leave was 1.7 times the Australian average and workers' compensation leave was 4 times the all industries average (ABS unpublished data). Since 1990, the number of days lost due to industrial disputes has averaged seven times the mining industry average and 35 times the average for all industries (see Figure 4.3).

Figure 4.3: **Industrial disputes, days lost per '000 employees per year, 1970–1997**



Source: ABS (Cat No. 6101.0).

Labour turnover

For the year ended February 1996, voluntary labour turnover rates in black coal mining were less than half the average for all industries (4.7 per cent compared with 9.9 per cent, respectively) (ABS unpublished data).

Other characteristics

Over 98 per cent of black coal employees come from an English speaking background (compared with 86 per cent for the total employed labour force), 90 per cent were born in Australia (76 per cent), less than 2 per cent are female (43 per cent), 42 per cent are 45 or older (30 per cent), while only 6 per cent have tertiary qualifications (26 per cent).

In summary, when compared with the total employed labour force, the Australian black coal workforce has:

- **high employee earnings;**
- **a very high level of unionisation;**
- **a very high level of industrial disputes;**
- **high levels of days lost to sick leave and workers' compensation leave;**
- **low levels of voluntary labour turnover; and**
- **low levels of tertiary qualifications.**

The black coal workforce tends to be in full-time employment, older, predominantly male and from an English speaking background.

4.3 Industrial relations systems

Different legislative frameworks influence the environment within which formal work arrangements in black coal and metalliferous mines operate and change over time. Accordingly, this section examines issues associated with the institutional flexibility of Australia's Federal and State industrial relations systems and the counterpart system in the United States.

4.3.1 Background to Australia's industrial relations systems

Since Federation, Australia has had a highly centralised system for establishing employment and working conditions, with a primary role being given to industrial tribunals in both State and Federal legislation. The main vehicle by which these tribunals influenced wages and conditions has been and is still largely through awards.[2] Awards specify the wages and basic conditions of employment applying to a particular occupation or, in some cases, an industry. Changes to awards were generally either a result of national wage case decisions made by the Australian Industrial Relations Commission (AIRC) (which resulted in flow-ons from Federal to State awards) or via industry cases considered by the AIRC (typically with flow-ons to other awards). However, since most awards specify *minimum* conditions, there was also another informal layer of negotiation outside the formal tribunal system (in the form of direct bargaining, between employers and employees, of over-award wages and conditions) (Hawke and Wooden 1997b).

[2] While awards in the Federal system bind the parties who are respondents to an award, in the State systems, awards apply by common rule to all employees and employers in the particular industry.

There are seven industrial relations systems in Australia. One system operates at the Federal (including the Territories) level of jurisdiction while other systems operate within each of the six States.[3] Outside these industrial relations jurisdictions, conditions of employment can be determined also through the common and contract law systems. This occurs where a union 'log of claims' has not been served on an employer in the Federal jurisdiction or where there is no relevant State award.

Industrial relations arrangements in Australia's black coal industry fall almost entirely under the Federal jurisdiction. The exception is Western Australia (WA), where black coal mines operate under that State's jurisdiction. In contrast, while Federal as well as State jurisdictions cover industrial relations arrangements in the metalliferous mining industry, State arrangements predominate.

At the time of writing, the primary (or parent) award in the black coal industry is the *Coal Mining Industry (Production and Engineering) Interim Consent Award, September 1990* (P&E Award).[4] This is a consent Award between the CFMEU and the employers and employer organisations who are party to the Award. This Award, like many metalliferous mining industry awards, is minimum rates in character. It is currently being simplified in accordance with the *Workplace Relations Act 1996* (WR Act) (see Section 4.3.2).

Since the mid-1980s, both Federal and State industrial relations systems have moved towards a less centralised industrial relations framework with greater emphasis on enterprise level negotiations. These industrial relations changes stem largely from economic pressures, including increased competition in product markets (Hawke and Wooden 1997a,b).

Linkages between product and labour markets

Labour markets and product markets are inextricably linked. Generally, previous regulatory arrangements in the labour market essentially provided a 'parallel insurance mechanism' which reinforced the insurance against

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[3] The Victorian Government has handed responsibility for industrial relations matters to the Federal jurisdiction.

[4] Under s.158A of the former *Industrial Relations Act*, all awards were to be modernised and consolidated. Accordingly, the P&E Award was re-written and re-organised and was handed down in December 1997 as *The Coal Mining Industry (Production and Engineering) Consolidated Award 1997*. Since this process did not involve changes to any entitlements or conditions and many of the submissions for this inquiry refer to specific clauses in the former (1990) P&E Award, in this report the Commission continues to refer to the former, rather than the modernised, P&E Award.

inefficiency and uncertainty provided by protected product markets. The reduction of product market protection, together with the stronger export orientation of Australian industries (including black coal) and the increased globalisation of investment, has reduced the scope for such 'parallel insurance' in the labour market. These changes have increased the need for greater flexibility in the labour market (and in its institutions and regulations) to ensure competitiveness via enhanced productivity and efficiency at the workplace (Blandy and Baker 1987).

As discussed in Chapter 2, it is only relatively recently that effective competition in Australia's domestic and export markets for black coal has occurred. These changes, in turn, have created concomitant pressures on the black coal labour market and the various infrastructures supporting that market. By contrast, Australia's various metalliferous mining product markets have been subject to a high degree of effective international competition for at least 15 years. For example, major changes in a number of cost and market forces at Robe River's mining operations in the mid-1980s ultimately led to pressure to remove a series of restrictive work arrangements (Gethin 1990).

Indeed, the explicit recognition of the link between productivity and flexibility by the then Australian Conciliation and Arbitration Commission was first made in March 1987 (in a decision described as the 'Second Tier Principle') and again in August 1988 (in another decision, described as the 'Structural Efficiency Principle'). Since that time, continuing economic pressures have seen the gradual introduction of an enterprise bargaining framework and the development of associated principles by the AIRC, explicitly recognising the link between flexibility and competitiveness at the level of the enterprise.

The CFMEU has contended that the black coal industry recognised the need to adjust earlier than the AIRC, since formal enterprise bargaining in this industry was introduced as early as 1990 — at least a year before the AIRC's 1991 determination of enterprise bargaining principles (Maitland 1997). Indeed, the Coal Industry Tribunal's (CIT) September 1988 (arbitrated) industry restructuring decision responded to deteriorating market conditions at the time by extending shift lengths, introducing year round production, extending overtime and introducing less prescriptive rostering arrangements (see Appendix E). Even so, as discussed below, many enterprise bargains struck between management and employees after that time have been similar in nature, and seem to be more representative of 'pattern bargaining' than enterprise bargaining.

4.3.2 The Federal system and its relationship to black coal

While each of the Australian States has direct regulatory powers over industrial relations under their respective constitutions, industrial relations legislation in the Federal arena was founded upon the so-called arbitral power in Australia's Constitution. This power does not allow the Federal Parliament to legislate generally about employment terms and conditions but does permit the establishment of industrial tribunals which have the power to act (via conciliation and arbitration) where an inter-State dispute exists. By its nature, the Federal system implicitly supported an adversarial arrangement, since it was only through conflict (an inter-State dispute) that the formalised process could be utilised. Moreover, while Federal (and State) legislation defines the framework within which tribunals and commissions operate, the bodies usually operate on the basis of previously (self) determined principles which provide practical directions for legal interpretation of industrial matters. Hence, industrial relations institutions operate through two formal mechanisms — legislative and interpretative (Hawke and Wooden 1997b).

Within the black coal industry, the former CIT was one such tribunal. Since the abolition of the CIT in 1995, industrial matters have been dealt with by the coal industry panel of the AIRC. Importantly, the AIRC was required to pay regard to previous decisions of the CIT. However, this provision was repealed by the *Workplace Relations and Other Legislation Amendment Act 1996*. The role of the CIT within the context of change is discussed in Chapter 6.

The WR Act — which now governs most black coal mining industrial relations — stipulates that awards are to be simplified to operate as a 'safety net' of fair and enforceable minimum wages and conditions of employment (see Box 4.1). Provisions are considered allowable (and therefore included in a new simplified Award) if:

1. their subject matter is covered by the twenty allowable matters (see Box 4.2);
2. they are considered incidental to the twenty allowable matters and necessary for the effective operation of the Award; or
3. in exceptional circumstances, parties have made genuine attempts to reach agreement and conciliation has failed. In this case, the AIRC may arbitrate and decide that an exceptional matter is allowable.[5]

[5] In this case, the provision can relate only to a single matter and has restricted application (to a single business). While a Full Bench of the AIRC may apply an exceptional matter to more than a single business, this is subject to a number of tests (set out in the WR Act). Decisions over exceptional matters do not form part of the award simplification process.

The *intention* of the WR Act provisions is to limit the scope of awards to the regulation of terms and conditions of employment — excluding issues such as the organisation of work and organisational security (Corrs Chambers Westgarth 1997b). Other matters outside allowable matters are to be agreed at the enterprise or workplace level.

Box 4.1: **Federal industrial relations arrangements: a snapshot**

- Awards move towards a 'safety net' of twenty allowable matters — establishing minimum pay and conditions of employment (see Box 4.2).
- Agreements at the workplace or enterprise level to be the main focus for bargaining in the future.
- Three types of formal agreements are available: Certified Agreements (CAs) — either union or non union collective agreements; and Australian Workplace Agreements (AWAs) — individual agreements between employees and an employer.
- Third parties: Australian Industrial Relations Commission (AIRC) and the Employment Advocate. The AIRC has jurisdiction for the approval of enterprise agreements, conciliation and determining applications of unfair dismissal, making and varying awards to settle disputes and determining representational rights of employee organisations. The Employment Advocate is responsible for approving AWAs as well as investigating alleged breaches of the 'freedom of association' provisions.
- 'No disadvantage' test to apply to CAs and AWAs for their approval / certification by relevant third party (see Box 4.3).
- Protected industrial action is available during the negotiation of an agreement but industrial action is prohibited during the life of an agreement.
- Secondary boycotts are prohibited and penalised under the *Trade Practices Act.*

Source: Department of Workplace Relations and Small Business.

The Full Bench of the AIRC, in its review of the *Hospitality Industry – Accommodation, Hotels, Resorts and Gaming Award 1995* (Hospitality Award), determined a statement of principles for the process of award simplification required by the WR Act. In particular, it stated that each award would need examination and consideration of any special circumstances relevant to that award. Furthermore, while the Full Bench made no requirement for an award to contain provisions relating to any of the twenty allowable matters, it stated that award simplification would not involve a general review of award entitlements.

Box 4.2: **The twenty allowable matters in Federal awards**

The range of issues to be dealt with in awards is limited to the following matters:

1. classification of employees and skill-based career paths;
2. ordinary time hours of work and the times within which they are performed, rest breaks, notice periods and variations to working hours;
3. rates of pay generally (such as hourly rates and annual salaries), rates of pay for juniors, trainees or apprentices, and rates of pay for employees under the supported wage system;
4. piece rates, tallies and bonuses;
5. annual leave and leave loadings;
6. long service leave;
7. personal/carer's leave, including sick leave, family leave, bereavement leave, compassionate leave, cultural leave and other like forms of leave;
8. parental leave, including maternity and adoption leave;
9. public holidays;
10. allowances;
11. loadings for working overtime or for casual or shift work;
12. penalty rates;
13. redundancy pay;
14. notice of termination;
15. stand-down provisions;
16. dispute settling procedures;
17. jury service;
18. type of employment, such as full-time, casual and regular part-time employment and shift work. This, however, does not include limiting the number or proportion of employees that an employer may employ in a particular type of employment or the maximum number of hours for regular part-time employees;
19. superannuation; and
20. pay and conditions of outworkers.

Award provisions must be of 'minimum rates' in character as opposed to paid rates. Parties to existing awards have until 1 July 1998 to bring the award into line with these matters.

Source: *Workplace Relations Act 1996.*

In so far as the scope of a simplified award is concerned, the Full Bench stated that awards should not prescribe detail or processes which were dealt with more appropriately by agreement at the workplace. Importantly, the Full Bench determined that awards should not prescribe work practices that impede the efficient performance of work or contain provisions that restrict productivity, while being mindful of employee fairness considerations.

The *process* of award simplification in the black coal industry involves two stages. The first stage is the determination of allowable matters. In this first stage, allowable matters are to be determined, as far as possible, by negotiation and conciliation between the parties. Only where conciliation has failed is the determination of allowable matters by arbitration. The second stage involves a review of the Award to ensure that it does not include matters of detail more appropriately dealt with by agreement at the workplace and that it does not contain provisions or prescribe work arrangements that restrict efficiency or productivity.

At the time of writing, the parties to the P&E Award were involved in the first stage of the award simplification process but this had not been finalised. Nonetheless, an arbitrated AIRC decision of 26 May 1998 (CN 40113 of 1998) does provide some determinations on those matters over which agreement had not been reached. Two matters are currently the subject of appeal, however. The implications of the negotiations as well as the arbitrated decision (including the appeal) are referred to in the appropriate sections throughout this and the following two chapters.

The process for simplifying the ACSA Award has not yet been determined.

In addition to the changes to awards set out in the WR Act, the Federal Government has used the corporations power in the Constitution to provide industrial relations regulation through means other than conciliation and arbitration. In particular, this power enables an extension of the agreement-making options available to the parties in the Federal jurisdiction. Under previous legislation, certified agreements (CAs) made collectively with unions were the main form of agreement. While non-union agreements (known as Enterprise Flexibility Agreements [EFAs]) were also possible under previous legislation, technical and procedural difficulties virtually ensured that EFAs were limited in number (Hawke and Wooden 1997b). The WR Act now allows for three types of agreement: non-union CAs, union CAs and individual agreements (called Australian Workplace Agreements [AWAs] which can be made also by a group of individuals). The WR Act promotes agreement-making as the principal means of ensuring that matters affecting the relationship between employers and employees rest with the employer and the employee at

the workplace. However, the certification of both CAs and AWAs is subject to a 'no disadvantage' test (see Box 4.3).

Box 4.3: **The 'no disadvantage' test in the Federal jurisdiction**

- Applies to both AWAs and CAs.
- Takes as the reference point the relevant award or an award designated by the approving body — the Employment Advocate for AWAs, the AIRC for CAs — as appropriate for the employees concerned in the agreement, plus any other law considered to be relevant by the approving body.
- Operates as a global rather than a line-by-line test.
- Special cases in the application of the test — the Supported Wage System and for employees undertaking an approved apprenticeship or traineeship.
- An agreement passes the 'no disadvantage' test if, on balance, it would not result in a reduction in the overall terms and conditions of employment of employees against the benchmark.
- The AIRC has the additional power to approve an agreement that results in a reduction in overall terms and conditions of employment, if it considers that approval is not contrary to the public interest.
- The test applies to the group with the CA and to the individual with an AWA.

Source: Department of Workplace Relations and Small Business.

4.3.3 The State systems and relationships with black coal

Until recently, most States also have relied on conciliation and arbitration as the main platform for their respective industrial relations legislation. However, a number of States have either pre-dated or mirrored the recent changes to the Federal system while WA has adopted a different approach.

Notable features of those State industrial relations systems which are most important with respect to the location of metalliferous mining areas include:

- the similarity of the Queensland and the Federal industrial relations systems — the major difference being that scrutiny of individual contracts remains with the Queensland Industrial Relations Commission and not with a new specialised Employment Advocate or commissioner;
- the primacy of the award system in NSW, with enterprise bargaining undertaken only by collective agreement — either with a union or, in the case of non-union agreements, with a majority of 65 per cent of employees

in a secret ballot. Individual bargaining in NSW is restricted to part-time work;

- the lack of provision for individual bargaining in South Australia. The award system operates as the basis for a 'no substantial disadvantage' test for both union and non-union Enterprise Agreements. These agreements are vetted by the Office of Employee Ombudsman prior to approval by the Enterprise Agreements Commissioner; and
- the operation of a dual system in WA whereby pay and conditions are established either by an award or a Workplace Agreement (which are either union or non-union collective agreements or individual agreements). In WA, a Workplace Agreement replaces an award and its approval is not subject to a 'no disadvantage' test against an existing award but instead must meet five legislated minimums covering mostly pay and leave entitlements.

While the WA legislation is generally the most flexible in Australia — largely as a result of its 'opting out' arrangement — industrial relations arrangements for black coal mining workplaces remain within the award system in that State. Its industrial relations matters remain isolated from general industrial relations because they are dealt with by the Coal Industry Tribunal of Western Australia (CITWA) (see Box 4.4).

Box 4.4: **Coal Industry Tribunal of Western Australia (CITWA)**

The reasons for establishing the CITWA after the Second World War largely mirrored those which led to the establishment of the CIT in the Federal system (Chamber of Commerce and Industry of Western Australia 1994). Currently, its functions and operation are determined by the*Coal Industry Tribunal of Western Australia Act 1992* (WA).

An important feature of this legislation, which contrasts with the legislative environment in which the former CIT operated, is that the CITWA is subject to appeal as regards both its decisions and its jurisdiction to the Full Bench of the WA Industrial Relations Commission (IRC) and then to the Industrial Court of WA.

While the CITWA generally sits in association with the broader WA industrial relations legislation, black coal mining is now the *only* industry in WA with its own separate tribunal. Although the broader WA industrial relations legislation does not exclude the black coal industry from its horizon, any decision of the CITWA can over-ride a decision of the WA IRC (although there is no known precedent established as to which organisation has the final say). Importantly, the legislation does not limit the ability of black coal industry employers and employees to 'opt out' of the traditional award system and make individual agreements (subject to legislated minimums).

Under its legislation, the CITWA must be reviewed every five years. Such a review is currently being conducted by the Senior Commissioner of the WA IRC who is also the Chairman of the CITWA. The review is due to be completed at the end of 1998.

The Commission suggests that the Western Australian Government consider abolishing the Coal Industry Tribunal of Western Australia with a view to bringing black coal industrial relations arrangements under the umbrella of the Western Australian Industrial Relations Commission. Pertinent to such consideration is the Commission's discussion on the effects of the abolition of the CIT (see Chapter 6).

4.3.4 The United States system of employee relations

As discussed in Chapter 3, the United States was chosen as an appropriate benchmark against which to compare the performance of Australian black coal mines. Reflecting that choice, this section examines issues associated with external or institutional flexibility in the US system of employee relations.

In contrast to Australian industrial relations systems, there is a distinct dichotomy in the regulatory arrangements governing workplaces in the United States depending on whether the workplace is unionised or non-unionised. Non-unionised workplaces (which represent the majority of black coal mining workplaces, as well as workplaces more generally[6]) are subject to meeting only certain legislated minimum entitlements and to common law contractual arrangements in their employee relations. On the other hand, unionised workplaces must comply also with regulations embodied in the *National Labor Relations Act* (NLRA) which establishes the framework within which parties are free to negotiate the contents of an agreement and, in the case of unionised black coal mine sites, with the *National Bituminous Coal Wage Agreement of 1993*. In the United States, there is no provision for compulsory conciliation or arbitration by a third party, although the National Labor Relations Board (NLRB) is charged with overseeing the system of bargaining for unionised workplaces. Importantly, the NLRA excludes supervisors and managerial staff from the definition of an employee. Further, competition between unions for employee coverage in a worksite is allowed — that is, until the completion of a ballot to choose which union is afforded exclusive coverage, employees have a choice of union coverage. Hence, a union agreement in a black coal mine may

6 Information from the (US) Bureau of Labor Statistics (BLS) shows that in 1997, the unionisation rate of employed wage and salary workers in mining was 13.9 per cent compared with a figure of 14.1 per cent across all wage and salary workers in the United States. (Detailed data for black coal mining wage and salary workers are not available.)

not necessarily be undertaken with the United Mine Workers of America (UMWA). For example, the BHP-owned Navajo mine in New Mexico is a union mine at which the approved union is the International Union of Operating Engineers Local 953. Similarly, the UMWA is not necessarily restricted to providing coverage for mine workers.

External industrial relations arrangements governing non-unionised workplaces are much more flexible than the industrial relations arrangements faced by unionised workplaces in the United States. This is largely due to the fact that, in non-unionised workplaces, any changes which do not violate minimum legislated conditions are within the prerogative of management.

Since the only formal work arrangements in non-union workplaces are the minimums set by legislation, there appears to be very little public information available on the range of work arrangements within non-union mine sites. Generally, unionised workplaces pay higher wages to their employees (known as the union wage effect) but this pay differential is narrowed significantly due the employer's fear of its labour becoming unionised (the union threat effect).[7] That is, while the wages and other entitlements for employees are likely to be similar between union and non-union workplaces, there is still likely to be at least some difference between the work arrangements in the two types of workplaces — otherwise there would be no advantage in workplaces remaining non-unionised (and it would appear that many workplaces fight costly legal battles to remain non-unionised). In particular, while the pay and other entitlements received by black coal mining employees are likely to be similar at union and non-union mines, other types of work arrangements, such as those which unnecessarily inhibit productivity, are likely to be absent within non-union black coal mines. During the Commission's visit to US mine sites, while there was no direct evidence on the pay differential between union and non-union mines, the productivity of non-union mines was said to be higher because managers did not face the 'time costs of change' which they say are associated with union mine sites.

The Commonwealth and Queensland Governments have recently enhanced their industrial relations legislation and institutions so that they are now more responsive to changing circumstances faced by enterprises. However, the institutional arrangements offered by the Western Australian legislation

[7] BLS data show that in 1997 median weekly earnings of full-time wage and salary workers in the mining industry were $US717 for union workers and $US668 for non-union workers. The comparable figures across all industries were $US640 and $US478, respectively. (Detailed data for black coal mining earnings are not available.)

(via its 'opting out' mechanism) and the United States legislation are more conducive to workplace flexibility.

4.4 Development of work arrangements in black coal mining

Formal work arrangements are established in the Australian black coal mining industry via the following four vehicles.

1. Awards — in particular:

   – the P&E Award which covers basic semi-skilled work, semi-skilled plant and machine operators and skilled trades levels in the Federal jurisdiction and the *Coal Mining Industry (Miners) Award 1990* which covers similar types of employees in the WA jurisdiction;

   – *The Coal Mining Industry (Supervision and Administration) Interim Consent Award, 1990, New South Wales and Tasmania* (ACSA Award) (Federal jurisdiction), as well as the equivalent Federal Award for Queensland ACSA members and *The Coal Mining Industry (Deputies) Award* (under the WA jurisdiction), all three of which cover all professional, semi-professional, supervisory, semi-supervisory, administrative and clerical employees in the coal and oil shale industry;

   – *The Coal Mining Industry Interim Consent Award (Deputies and Shotfirers) 1990* (Federal) and *The Coal Mining Industry (Deputies) Award 1990* (WA) which covers Deputies; and

   – a small number of enterprise-specific Federal awards, such as at Camberwell Coal and Shell's Moranbah North mine.

2. Agreements — typically such agreements are union CAs, although there are also around one hundred AWAs in the industry and one EFA under the former Federal industrial relations legislation. There are also collective agreements under the respective WA awards.

3. Industry-specific legislation — the *Coal Mines Regulation Act 1982* (NSW) and the *Coal Mining Act 1925* (Qld).

4. Custom and practice — which refers to informal, often unwritten, mostly mine-specific, historically developed work rules and norms. Although they may have emerged in a short-term ad hoc way, they tend to be used as tradition-based precedents in practice. Most importantly, as a result of the inclusion of a 'custom and practice' provision in the P&E and ACSA Awards, customs and practices have become formal work arrangements (see Section 4.4.1 below).

Appendix F summarises the P&E and ACSA Awards in the black coal mining industry. The similarity between these two awards is notable. Although each is currently subject to the award simplification process, they establish the benchmarks by which enterprise agreements are currently negotiated and subsequently certified by the AIRC.

Rio Tinto submitted that history is important in understanding the relatively inflexible nature of awards in the industry today and the lack of distinction between underground and open cut mines in the development of formal work arrangements:

> Restrictions placed on employing new recruits brought the culture of underground coal mining to the surface [mining sector]. ... In the same way, the conventional emphasis placed on maintaining continuous supply of coal to customers survived the transition to open cut. ... The consensus was that the coal must be kept moving at almost any cost. The coal unions knew this and naturally used it to seek higher wages, improved conditions and a privileged, unique status in Australia's industrial relations system.
>
> The historical development of coal bequeaths a modern legacy which is manifested in a romanticised view of the coal industry, based on an irrelevant vision of underground coal mining. Even open cut coal mining is seen as extremely hazardous employment where the boss is a bastard and the only certainties are the coal in the ground, the mate you have crib with and the union. That romanticised view buttresses resistance to change and partly accounts for the poor employee relations performance of the industry. (sub. 22, pp. 46–47)

Wooden, Robertson and Cernaz (1996) found that the Australian coal mining industry agreements remained highly dependent on the industry awards. The Department of Workplace Relations and Small Business (DWR&SB) confirmed this view:

> The Department considers that, while a significant proportion of coal companies have engaged in agreement-making under the various legislative provisions, most coal agreements have imported many of the underpinning award provisions or are silent on key working arrangements. (sub. 40, p. 7)

Appendix G documents eight recent black coal mine agreements,[8] the contents of which tend to confirm the Wooden et al and DWR&SB findings. Nonetheless, while improvements in flexibilities across most of these agreements relative to the P&E Award have been minor, it is also the case that significant changes to work arrangements have occurred in at least two of the

[8] According to the DWR&SB, over the period 1 December 1995 to 31 March 1998, there have been 137 certified agreements in the black coal mining industry, 37 of which are based on the agreement-making clauses in coal industry awards and thus work in tandem with the relevant award.

agreements (Ensham and MIM's Oaky Creek mine). Although not documented in Appendix G, MIM's other mines have made similar changes (see Menzies 1998). These agreements, together with the interim decision on an enterprise-specific award for Shell's Moranbah North coal mine, as well as some decisions emanating from the award simplification process for the P&E Award, are other examples of the increasing flexibility of formal work arrangements in this industry.

Work arrangements in the black coal industry are also influenced strongly by various aspects of State coal industry legislation. In particular, regulations establish statutory positions and outline in detail their associated functions and qualificational requirements (see Appendix J). Further discussion is provided in Chapters 5 and 6.

Comparisons with Australian metalliferous and United States black coal mines

Formal work arrangements in Australia's metalliferous mining industry are also established in numerous awards, agreements and relevant legislation. A feature complicating comparisons between black coal and metalliferous mines is that, unlike the black coal industry, there is no single Federal parent award in the metalliferous mining sector. Nonetheless, on the basis of a comparison of various State and Federal metalliferous mining awards and Federal agreements, Wooden et al (1996) concluded that "awards and agreements applying to coal mining have left it with less flexible work arrangements and higher costs than comparable awards and agreements have left metalliferous mining" (p. v).

Appendix H presents an overview of a small number of recent awards and (collective) agreements which are representative of arrangements in the metalliferous mining sector. As outlined above, the WA industrial relations system enables employers and employees who fall under that jurisdiction to 'opt out' of the traditional award system and make individual agreements (subject to a small number of legislated minimums). This has been done by a major metalliferous producer in Western Australia — Hamersley Iron. No such WA individual agreements are publicly available for documentation in Appendix H.

Even so, a broad comparison of Appendix H with Appendices F and G reveals that the Australian metalliferous mining sector tends to display a greater degree of flexibility in formal work arrangements than its counterpart black coal mining sector. Moreover, as far as the State legislative impact on work arrangements is concerned, the comparisons between these two sectors reveal a similar story. This is discussed further in Chapters 5 and 6.

Finally, Appendix I presents information on formal work arrangements (covering production and engineering employees) in unionised workplaces in the US black coal mining industry. Comparison of this appendix with Appendices F and G reveals that the main US union agreement (the *National Bituminous Coal Wage Agreement of 1993*) is about as prescriptive as the P&E Award (a view reached also by Maitland 1997, p. 10).

Discussions with producers during the Commission's visit to the United States indicated that, as a result of the inflexibility of this unionised agreement, firms for some considerable time have been establishing non-union mines, closing union mines and initiating union agreements with unions other than the UMWA. As mentioned earlier, BHP's New Mexico Navajo mine has a collective agreement with the International Union of Operating Engineers, Local 953.

4.4.1 Custom and practice

Custom and practice involves informal rules and norms which are often *unwritten*.[9] However, during industry visits, the Commission was told that in the black coal industry many (sometimes over one hundred) customs and practices are catalogued in a so-called 'industrial file' kept at many mine sites. For example, MIM stated:

> In October 1996, ... when we attempted, with the assistance of the AIRC, to make sense of all issues governing employment, we discovered that in addition to the Production and Engineering Award, Oaky Creek employment conditions were governed by a further 360 matters of agreement or recognised customs and practices. (Menzies 1998, p. 2)

Many black coal customs and practices appear to have developed in the previous era when mine managers were prepared to sacrifice productivity performance for volume so as to ensure continuous power generation (see below and Chapter 6).

Importantly, 'custom and practice' in the black coal industry has become a formal arrangement as a result of its inclusion in both the P&E and ACSA Awards (clauses 31 and 30, respectively). Although currently subject to appeal, a recent AIRC arbitrated decision during the first stage of the award simplification process (CN 40113 of 1998) has maintained the 'custom and practice' clause in the P&E Award as an allowable matter through its

[9] This explains why there is often a marked contrast between the formal rules set down in awards, agreements or organisational handbooks, and what happens in practice (Sutcliffe and Callus 1994).

determination as incidental and necessary for the operation of the Award. The AIRC's grounds for retaining this clause was that it had "a special reference in the coal industry having regard to the history and circumstances of award regulation in the industry" and that it "is in the nature of a machinery provision which assists in the proper interpretation and application of the substantive award provisions". Having said that, it remains to be seen whether or not the result of the appeal against the inclusion of this clause in the award or the second stage of the award simplification process will result in the removal (or modification) of this clause as an allowable award matter.

The relevant clauses prescribe that each Award is not to be read as interfering with existing custom and practice, except where stated (see Appendix F).

> The way production and maintenance employees go about their work is governed by a strict code (sometimes written, sometimes not) enforced by their union through industrial action or the threat of it. This code revolves around the maintaining of 'custom and practice' established either on the site or elsewhere in the industry. (Rio Tinto, sub. 22, p. 60)

A number of recent CAs in the black coal mining industry, however, specifically preclude the employer from being bound to either existing and/or future customs and practices (see Appendix G).

Comparisons with Australian metalliferous and United States black coal mines

While provisions relating to custom and practice do not appear in the small number of metalliferous awards and agreements documented in Appendix H, the main union agreement in the United States does provide that "all prior practice and custom not in conflict with this agreement shall be continued". By contrast, non-unionised US mines do not seem to be bound by such arrangements.

Effects of custom and practice

There appear to be two main effects of institutionalising custom and practice in the black coal industry awards.

First, as documented in previous sections and in the following chapter, and as noted by Rio Tinto below, many such customs and practices may restrict productivity:

> Many custom and practice issues constitute uncompetitive work practices such as:
> - restrictions on the use of contractors
> - minimum manning practices
> - demarcations between maintenance, production and staff employees
> - inflexible allocation of employees to shifts

- inflexible meal breaks during shifts
- early shift finish 'tolerance time'... (sub. 22, pp. 60–61)

Moreover, since many custom and practice work arrangements are based on seniority, they tread into areas more traditionally viewed as areas of management prerogative (see also Chapter 5):

> Seniority in terms of length of service at a particular mine, [is] frequently the primary determining factor when deciding issues such as: ...
>
> - allocation of training opportunities
> - allocation of overtime
> - allocation to shift
> - promotion to higher levels of pay
> - allocation of annual leave.
>
> In most industries, the ability to make these decisions is a business issue, taken on efficiency and other grounds. In the coal mining industry, the union insistence on custom and practice, the costs of change and the award severely limit the ability of management to make such decisions. Seniority is the basis for many important decisions ... (Rio Tinto, sub. 22, p. 61)

The second main effect of institutionalising custom and practice in both industry awards is that the costs of change are increased unnecessarily and the ability of the workplace to respond to changing circumstances is inhibited unnecessarily. This is by virtue of the fact that such arrangements become award conditions/entitlements and possibly subject to third party involvement if negotiations over changing them break down.

> In endeavouring to bring about change and to help those managers to manage in the style that reflects best practice, we keep coming up with all these institutional barriers which stop us, ie, custom and practice as entrenched within the award is an award provision. If you've already done it that way for the last x number of years, that's the way you will continue to do it.
>
> ... And that's where a level of the frustration arises. Many people have fallen back on to old practices because they can't bring about the desired change, the necessary change. And they happen in a number of areas, and if you take the employment chain right through from recruitment right through to the age based compulsory retirement, the whole of one's working life, is prescribed somewhere or other by a regulation or an award or an agreement or custom and practice. And that change is very resistant. (NSW Minerals Council, trans., pp. 89–90)

Furthermore, BHP also argued that progress in changing a number of customs and practices had been limited:

- Right to use contractors when business needs dictate;
- Acceptance of continuous improvement without undue delays;
- Shift roster and work hour flexibility;
- Flexibility between work streams and wages employees and staff;

- Right to outsource when clearly cost effective;
- Restrictions on overtime;
- Specific equipment manning issues; ...
- Crib flexibility; ...
- Removing seniority where it is a barrier to improved business performance. (sub. 30, p.15)

Although rare, when it has suited, management also appears to have relied on the custom and practice provisions in the two awards. For example, in 1996, MIM's Newlands mine asserted a right under the custom and practice provision to suspend without pay for misconduct where no award or common law right existed. Managerial practice in this case was affirmed by the AIRC (CN 40642 of 1996).

The fact that some customs and practices may be documented in the 'industrial file' while others are not creates uncertainty as to what constitutes 'custom and practice'. By implication, this uncertainty also increases the costs associated with change. The role that custom and practice plays in negotiating change and disputes is discussed further in Chapters 5 and 6.

The costs of change and the loss of management prerogative in changing customs and practices are compounded by a convention which ensures maintenance of the status quo until the award is varied to fit the altered conditions (see Chapter 6). In other words, if a management proposal to change an existing custom and practice is disputed, it forms part of the dispute resolution procedure (see Section 5.6.2). This convention, unless specifically altered by agreement, inhibits the ability of the workplace to respond, on a continuous basis, to future changes in circumstances.

The role that custom and practice plays in determining work arrangements in Australia's black coal industry should not be under-estimated. While many customs and practices may restrict productivity, the major effect of institutionalising custom and practice is that it provides a vehicle to stifle the implementation of so-called continuous change strategies. This is largely due to the fact that there are many customs and practices at each mine site. These can be included in the ambit of matters which can be subject to third party conciliation and arbitration and must remain unchanged until the Award is varied to fit the altered conditions. This unnecessarily increases the cost of change.

'Custom and practice' in the black coal industry has become part of formal arrangements as a result of its inclusion as a provision in awards. While many custom and practice arrangements may restrict productivity and efficiency, the major effect of institutionalising custom and practice is that it can hamper mine performance by limiting its ability to respond, on a

continuous basis, to future changes in circumstances. In addition, since not all custom and practice arrangements are documented at each mine site, uncertainty is created as to what constitutes 'custom and practice'. This uncertainty also increases the costs associated with change, thereby further restricting productivity and efficiency.

While there is no direct role for government in cases where management agrees to the insertion of a general 'custom and practice' provision within enterprise agreements, the costs associated with such provisions suggest that they should not form part of an award.

Recommendation:

'Custom and practice' should not be included as part of the allowable award matters in black coal industry awards.

5 WORK ARRANGEMENTS IN AUSTRALIAN BLACK COAL MINES

While many factors influence the competitiveness of black coal mining in Australia, the impact of work arrangements is considerable. Black coal mines operate with a multitude of work arrangements which restrict productivity. Almost all of these arrangements raise unit labour costs and reduce competitiveness unnecessarily. Some arrangements (such as the exclusive use of seniority to allocate overtime, annual leave, promotion and training, and restrictions on the use of contractors) are discriminatory, as well as detrimental to mine performance.

Work arrangements in Australian black coal mines appear to be less conducive to improved productivity than those in Australian metalliferous mines and non-unionised United States black coal mines, but similar to those in United States unionised black coal mines.

The principal means of enhancing the competitiveness of Australian black coal mining workplaces is to change those work arrangements which unnecessarily restrict productivity. In this way, the productivity of labour and the utilisation of capital will be raised and, in turn, unit production costs will fall. This process should be facilitated by not including such arrangements as allowable matters in black coal industry awards. The Australian Industrial Relations Commission has begun to move in this direction.

5.1 Introduction

The central focus of this chapter is an examination of the effects on productivity of formal work arrangements in Australian black coal mines. As discussed in the previous chapter, flexible work arrangements are a necessary precondition for improved competitiveness, productivity and efficiency.

The flexibility of a number of formal work arrangements within Australian black coal mines is compared with that of Australian metalliferous mines and black coal mines in the United States. Formal work arrangements are those established in awards, agreements, the specific black coal industry legislation

and 'custom and practice'. The impact of these work arrangements on productivity and unit costs of production is also discussed.

The flexibility of work arrangements at the mine site is examined in five areas (based on the work of NEDO 1986 and OECD 1988):

1. the size and composition of the workforce — that is, the employer's ability to adjust the size and composition of the workforce to meet changes in demand;
2. hours of work and rosters — the employer's ability to adjust the quantity and timing of labour input (working hours and the timing of work) without modifying the number of employees to meet changes in demand and to permit more intensive use of capital equipment;
3. remuneration and on-costs — the employer's ability to adjust both wages (including any bonuses) and on-costs to meet changes in the product market;
4. functions, tasks and skills — the employer's capacity to move labour to different tasks within the workplace (which depends on the range of tasks employees can perform and the spectrum of their skills); and
5. general procedures — this relates to the processes for consultation and negotiation upon which the other aspects of flexibility within the organisation are discussed.

This analytical framework is based on an employer's perspective. Clearly, however, it is not in an employer's long-term interest to exploit the workforce by demanding an unreasonable amount of flexibility. In such circumstances, it is likely that worker effort and therefore productivity would be significantly below its optimal level. Moreover, the employer's ability to attract and retain employees would be undermined greatly by such action. Hence, the drive for flexibility at the mine site (to enhance competitiveness in the product market) is at the same time counterbalanced by the need, in a competitive labour market, to offer attractive terms and conditions of employment (to ensure the recruitment and retention of a highly productive workforce).

Each of the five aspects of flexibility is discussed in the sections below. The approach is to commence by describing the relevant features of the P&E and ACSA Awards, agreements, legislation and custom and practice affecting a number of work arrangements within Australian black coal mines. A comparison with arrangements in Australian metalliferous mines and black coal mines in the United States is then undertaken before the impact of the selected work arrangements on workplace performance is discussed.

The consequences (albeit interim) of the current P&E Award simplification process are discussed in the appropriate sections throughout this and the

following chapter. The process for simplifying the ACSA Award had not commenced at the time of finalising this inquiry.

5.2 Size and composition of the workforce

This section discusses the degree of flexibility of work arrangements that affect the size and composition of the workforce. It focuses on recruitment, retrenchment, and the use of casuals, part-time employment and contractors.

5.2.1 Recruitment

Prior to award simplification, the P&E Award provided for preference of employment to union members (party to the Award) and specified that new recruits were to be chosen from a list of retrenched miners ('the retrenchment list'). In NSW, miners were to be chosen from the retrenchment list in order of seniority. In Queensland, employers had to give preference of employment to miners previously employed in mines owned by the same company or, at the very least, give preference to CFMEU division members.

While there are no formal restrictions on recruitment in the ACSA Award, an informal retrenchment list appears to have existed at some mines. The Camberwell Coal submission documented the existence of both the ACSA and CFMEU retrenchment lists, and also noted their apparent demise — at least at Camberwell — since the introduction of the *Workplace Relations Act 1996* (WR Act).

> In the main, unions in the industry have a closed book policy on recruitment which in turn means hiring personnel on the basis of merit is non-existent (other than from within that union). This significantly restricts a company's ability to hire the best person for the job. It restricts the ability of companies to introduce new 'blood' and new ideas into the industry. This is particularly important in the staff area, where the ACSA's policies are particularly restrictive. It is extremely difficult to introduce new blood into supervisory, managerial and administrative jobs. The ACSA even allows its members who take voluntary redundancy packages back onto the retrenched lists. This means a member of the ACSA can voluntarily leave one job with a large 'pay out' and then be placed on the retrenched list and so gain preference for re-employment back into the industry. In contrast the UMW [United Mine Workers branch of the CFMEU] policy gives no preferential rights to employees who take voluntary redundancy packages. In our case, since the introduction of the Workplace Relations Bill, we have not experienced problems in the recruiting of white or blue collar workers. (sub. 13, p. 10)

Several of the Certified Agreements (CAs) outlined in Appendix G include union preference clauses and a number also include provisions requiring recruitment in order of seniority.

Preference in employment to union members is prohibited under the WR Act and, as part of the P&E Award simplification process, the AIRC has determined that provisions providing for preference in recruitment to union members are neither allowable nor incidental or necessary for the operation of the P&E Award (CN 37716 of 1997 and CN 40113 of 1998). Similarly, preference in recruitment to retrenched mineworkers also was ruled neither allowable nor incidental or necessary for the operation of the P&E Award (CN 37716 of 1997 and CN 40113 of 1998).[1]

In relation to agreements, recent amendments to the WR Act make it clear that the AIRC "must refuse to certify" agreements containing clauses contravening the freedom of association provisions of the Act. Further, the amendments provide for removal of clauses in existing agreements that contravene these provisions. Clauses specifying preference in recruitment to *union members* can no longer be incorporated in agreements. Arguably, clauses specifying preference in employment to *retrenched mineworkers* may still be included in agreements.

Comparisons with Australian metalliferous and United States black coal mines

The *Queensland Mining (Non-coal) Award* has a similar provision relating to preference of employment to union members (in this case, members of the Australian Workers' Union (AWU)) and recent metalliferous agreements also contain union preference clauses (see Appendix H). In fact, Wooden et al (1996, p. 39) found the pervasiveness of union preference in metalliferous agreements to be similar to that in black coal.

Retrenched members lists also apply at unionised US coal mines. The *National Bituminous Coal Wage Agreement of 1993* between the United Mine Workers of America (UMWA) and the Black Coal Operators' Association provides for a 'panel' of retrenched miners (similar to the Australian retrenchment list) with the filling of all permanent vacancies and new jobs created during the term of

[1] However, in relation to the provision providing for preference of employment to miners previously employed in mines owned by the same company in Queensland, the AIRC suggested that this clause may be rewritten so as to confine its operation to that of a stand-down provision, thus making it allowable. The AIRC specified that this should be addressed by the parties in the second stage of the simplification process. Employers are appealing this decision.

the Agreement to be made on the basis of seniority. Further, the Agreement includes a JOBS Program which specifies that the first three of every five job openings are to be filled by laid-off employees covered by the Agreement in order of seniority and according to geographic location (see Appendix I).

In contrast, there are no legislative or other restrictions external to the workplace on recruitment among non-unionised coal mines in the United States apart from anti-discrimination legislation applying to both unionised and non-unionised mines. Any restrictions on recruitment at non-unionised mines would exist only by agreement at the workplace.

Effects of recruitment restrictions

A number of submissions pointed to the implications of the retrenchment list for the Australian black coal industry. For example, Rio Tinto stated that the provisions facilitated the transfer of the culture from underground mining to open cut mining in the 1960s (sub. 22, p. 45). The NSW Minerals Council suggested that recruitment on the basis of seniority acts as an impediment to best practice:

> To ensure an organisation has available to it the skills and experience required not only to perform existing tasks, but also to adapt and innovate, companies must select the best staff available. (sub. 25, p. 16)

While there are two caveats (outlined below), the retrenchment list is likely to affect mine performance negatively in the long term, essentially by limiting the pool of labour to which a mine has access. In fact, in some cases, there is no 'pool', and a mine manager is restricted to taking the applicant on the top of the list. Restricting recruitment in this way affects mine labour productivity and unit labour costs adversely in four main ways.

First, management's ability to develop the skill composition of the workforce best suited to the needs of the particular mine is restricted — depending on how P&E Award clause 22(c) exemption (vi)(c) is applied.[2] If workers on the retrenchment list do not have the requisite skills and the mine is not granted the skill-related exemption, the mine must do without the exact skills required, train incumbent workers, or recruit contractors with the requisite skills. While the first and second options tend to increase unit labour costs, the last is often not

[2] Clause 22(c)(vi)(c) states that an exemption from use of the retrenchment list may be granted where there is a requirement by the employer for new labour to have special skills and none of the retrenched members who responded to the advertisements holds those skills.

an option — traditionally, many mines have been restricted in their ability to hire contractors, as outlined in Section 5.2.3.[3]

Second, the transfer of knowledge and skills between industries is restricted by limiting the ability of those working outside black coal mining to gain employment in the industry. Where this reduces the rate of innovation, it means that productivity growth will be unnecessarily slow. Thiess Contractors stated:

> ... the retrenched list system was clearly perceived by employers as a real impediment to the implementation of innovation and cultural change within the industry. (sub. 15, p. 12)

Third, employers are prevented from competing for the most productive workers. (While an employer is not compelled to hire from the retrenchment list where potential recruits have higher than average absenteeism records, no such exemption relating to the relative productivity of workers on the retrenchment list exists. Hence, employers cannot choose between job applicants on the basis of relative productivity.) Removing the list and allowing employers to compete for the most productive workers would be likely to increase labour productivity at mines that were successful in attracting the most productive recruits.

Fourth, workers are provided with an opportunity to resist changes to work arrangements. There are three possible mechanisms by which this might occur. In all three cases, the impact of the list on mine performance is to reduce labour productivity (because changes that would improve productivity are impeded) and increase unit labour costs compared with what would prevail in the absence of the list.

(i) The retrenchment list adds to miners' perceptions of job security within the industry, creating the perception that a retrenched worker will be able easily to find employment at another mine. This may reduce the incentive for miners to adopt changes to work arrangements that would improve mine performance and reduce their risk of redundancy. (In economic terms, the retrenchment list reduces the expected cost to the worker of retrenchment.) Exxon noted how the retrenchment list adds to miners' perceptions of job security:

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[3] The second option adds to training costs and reduces dynamic efficiency because of the training time required during which the productivity of the worker is below potential. In the event that mines are not restricted in their use of contractors, the contract premium may be above the ordinary rate for a permanent worker with similar skills — tending to increase unit labour costs over and above that existing without the retrenchment list. However, the labour productivity of contractors may also differ from that of permanent workers, making a comparison of unit labour costs difficult. If the mine decides to make do with the skills currently available to it, labour and capital productivity will be reduced unnecessarily.

> ... The worker recognises that if for any reason he/she were to lose his/her job (perhaps through partial retrenchments or mine closures), he will be placed on a retrenchment list and the Union will secure them employment elsewhere within the industry. (sub. 3, p. 5)

In fact, the retrenchment list has not ensured job security within the industry, as the decline in employment since the mid-1980s attests (see Chapter 1).

(ii) The retrenchment list may increase worker resistance to change by reducing the inflow of new workers to the industry (because while the list prevails, retrenched workers must always be employed in preference to outsiders) and contributing to low labour turnover at the industry level. Employees working in the same industry with the same work practices for long periods have significant investment in skills associated with traditional work arrangements. Because of this investment, incumbent workers may resist change (if they can) because this means they will not have to expend effort in learning new skills. On the other hand, new entrants to the industry must invest in new skills anyway — so they will be indifferent to investing in the skills associated with either traditional or new arrangements (assuming that the cost to new entrants of investing in both is identical). By reducing the inflow of new entrants to the industry, the retrenchment list (in combination with the industry legislation which also limits the ability of outsiders to gain work) is therefore likely to increase resistance to change.

(iii) Several submissions suggested that retrenchment lists foster employee commitment to the union at the expense of their commitment to the individual mine because recruitment is associated with the union, not the mine (as it is the union which maintains the list). This may reduce the ability of mine management to introduce arrangements specific to an individual mine because employees may prefer instead to abide by (possibly conflicting) union determinations. For example, the NSW Minerals Council and Exxon, respectively, hold this view:

> Recruitment strictly from union lists. ... Reinforces allegiance of employee to union; ... (sub. 25, p. 31)

> Employment security is also provided by the seniority system where senior workers know their individual performance is irrelevant as to whether they will retain employment in a downsizing. The award also dictates that when redeploying retrenched workers, seniority is the sole determinant. Given the above, the worker views his association with the Union as a guarantee of lifetime employment, a guarantee the company cannot provide. (sub. 3, p. 5)

There are, however, two caveats to the above list of four factors adversely affecting mine performance.

First, the use of retrenchment lists may reduce recruitment costs by providing a ready-made list of experienced applicants, thus minimising unit labour costs. However, it must be said that if the retrenchment list benefited firms in this way, a *rule* would not be required for its adoption. Further, the list is compiled on the basis of criteria determined by the union, not the employer, and the sole basis for selection is seniority rather than skill, ability or range of experience.

Second, where mines have an incentive to poach trained/skilled workers from other mines to avoid the costs of training the workers themselves, the retrenchment list may act as a barrier to poaching — that is, it may be one means of preventing any free rider problem with respect to training. Where the list has been successful in addressing any free rider problem and has prevented industry training falling below the optimal level, removing the list may result in an increase in the scarcity of certain skills, leading to a fall in labour productivity. Camberwell Coal provided some evidence of poaching by mines of trained casual workers, suggesting that an incentive to poach exists:

> ... we thought that we would be able to have a pool of trained casual people available in the industry so that once they got trained we could call on them for holiday relief. What we found was that we just became a training school for everybody. We'd train them to be a truck driver and then, bang, they'd get a job in the industry. ... We were training people for four weeks, using them for a couple of weeks and then found that the next set of school holidays they weren't available because they had a permanent job and that's fine. (trans., p. 56)

However, two qualifying points should be made in regard to poaching.

- The retrenchment list, with its associated costs, is unlikely to represent the best way of addressing any poaching problem; and
- the retrenchment list is not the only factor that currently limits free riding. (For example, P&E Award training and wage arrangements also inhibit poaching.) Hence the impact on mine performance of removing the retrenchment list would depend on the bundle of work arrangements in place at the time.

Table 5.1 summarises the impact of the retrenchment list on mine labour productivity and unit labour costs.

Retrenchment lists and seniority-based recruitment detract from enterprise performance in the long term by restricting the criteria on which recruitment can be based. The Commission accordingly welcomes the exclusion of such provisions from the P&E Award as part of the award simplification process in black coal.

Table 5.1: **The impact of the retrenchment list on mine labour productivity and unit labour costs**

Impact of retrenchment list on mine performance	*Labour productivity*	*Unit labour costs*
Sub-optimal skill composition: Where retrenchment list prevents recruitment of workers with necessary skills, alternatives are to:		
train existing workers;	Reduced	Increased
hire contractors (traditionally, mines restricted in their ability to engage contractors); and	Unclear[a]	Unclear[a]
do without skills.	Reduced	Increased
Prevents transfer of knowledge from other industries.	Reduced	Increased
Cannot compete for best workers.	Reduced	Unclear[b]
Increases worker resistance to change.	Reduced	Increased
Caveats:		
Prevents poaching of skilled workers (free rider problem with respect to training).	Increased	Unclear[c]
Reduces recruitment costs.		Reduced

a The productivity of contractors may differ from that of permanent workers and it is difficult to compare the contract premium with the cost of permanent award workers.

b Total labour costs may increase if more productive workers are paid more in the absence of the list.

c Total labour costs may change because training costs may fall, but the wage premium for certain sets of skills may rise (if the wage system allows this).

It has been claimed that retrenchment lists (together with seniority-based retrenchment) are discriminatory in their impact on the composition of the black coal mining workforce. This issue is discussed in Section 5.2.2.

5.2.2 Retrenchment

Prior to award simplification, both the ACSA and the P&E Awards specified that retrenchment was to be determined exclusively on the basis of seniority. The P&E Award specified that, when reducing the size of the workforce, an employer must adhere to the principle of 'last to come, first to go' (or last on, first off [LOFO]). The P&E Award also contained a number of provisions specifying that employers discuss with unions and their employees decisions that may involve retrenchment. Under the ACSA Award, retrenchment was also on the basis of seniority, although couched in different terms — that is, preference in retaining employment was to be given to members of the ACSA according to length of service at the mine.

However, both Awards allowed individual mines to reach agreement with their workforces (and union representatives) overriding the seniority in retrenchment provisions. As the NSW Minerals Council noted:

> Some companies have been able to secure agreement with the union to limited variations of this clause. (sub. 25, p. 17)

Despite this provision for override, LOFO still applied at the majority of mines. Rio Tinto contended (citing 1996 NILS data):

> ... there are no known [enterprise] agreements which relinquish the P&E Award clause requiring forced redundancies by seniority (last in-first out). (sub22, p. 50)

LOFO provisions cover retrenchment in all but two of the black coal agreements outlined in Appendix G. At Ensham, retrenchment is to be based on merit whereas, at Stratford, LOFO will be used where an agreement overriding use of it cannot be reached.

As part of the award simplification process for the P&E Award, the AIRC has determined that provisions dealing with "the manner of selecting the persons whose employment is to be terminated in a redundancy situation" are neither allowable nor incidental or necessary for the operation of the P&E Award (CN 37716 of 1997 and CN 40113 of 1998). In coming to this decision, the AIRC made reference to the Full Bench decision in *ACSA v Gordonstone* (P9213, 4 March 1998) which determined that LOFO was neither allowable nor incidental to or necessary for the effective operation of the ACSA Award.

However, this decision does not prevent LOFO provisions being included in agreements.

Employers and unions also agreed — as part of the award simplification process for the P&E Award — to delete from the Award provisions requiring that employers discuss with unions and their employees decisions that may involve retrenchment.

Comparisons with Australian metalliferous and United States black coal mines

There are no seniority provisions covering retrenchment at metalliferous mines covered by the *Queensland Mining (Non-coal) Award*, although preference of employment in retrenchment is to be given to financial members of the Australian Workers Union (AWU). None of the metalliferous agreements summarised in Appendix H includes seniority-based retrenchment provisions and Wooden et al (1996) found that only about 14 per cent of the sample of metalliferous agreements they studied placed restrictions on hiring or firing.

Retrenchment at unionised coal mines in the United States is determined by seniority. However, there are no requirements for employers to discuss with unions or employees decisions that may involve retrenchments as specified in the P&E Award prior to award simplification. The right to discharge is vested exclusively with the employer (see Appendix I). At both unionised and non-unionised mines in the United States, retrenchment must comply with anti-discrimination legislation and the *Worker Adjustment and Retraining Notification Act* which requires an employer to provide 60 calendar days' notification of plant closings and mass lay-offs. Otherwise there are no restrictions on retrenchment at non-unionised mines except by agreement.

Effects of seniority-based retrenchment

Rules specifying that retrenchment is to be based on seniority alone significantly restrict the flexibility available to companies in adjusting their workforces. As a direct result, mines will be unlikely to achieve the labour productivity and unit labour cost outcomes that would be possible with greater flexibility. This is because, while LOFO provisions may offer some efficiencies in the immediate process of 'downsizing', their long-term costs can detract significantly from a mine's overall performance.

Undertaking retrenchment on the basis of LOFO may have some advantages as a means of reducing the size of the workforce:

- where it contributes to employee perceptions that the retrenchment process has been fair. This may reduce any consequent potential productivity loss resulting from disruption due to downsizing. (However, LOFO is not a necessary condition for this to occur. There may be alternative, lower cost measures that similarly reduce any disruption caused by downsizing.); and
- where LOFO results in the most experienced/skilled workers being retained, redundancy payouts and therefore unit labour costs will be minimised relative to a non-LOFO scenario involving retrenchment of more senior workers.

However, retrenchment based solely on seniority can impose significant costs on enterprises in the long term, reducing labour productivity and increasing unit labour costs by:

- limiting the ability of mine management to improve the productivity of its workforce by retaining the most productive workers. At mines where workers have been retrenched and LOFO applied, average labour productivity would be below what it otherwise would have been if retrenchments had occurred on the basis of relative productivity;

- preventing the mine from adjusting its workforce on the basis of skills, leading to a mismatch of skills over time (where skill deficiencies could occur in both the level of competence required as well as in the nature or type of skills required);
- increasing the incentive to train more senior workers in preference to new recruits.[4] While this can lead to inefficiency in the allocation of training, reducing the returns to training, it also can increase total training costs where longer tenure workers are paid more;
- reducing the incentive for individual workers to differentiate themselves on the basis of productivity (since retrenchment is not based on productivity comparisons). In other words, new recruits are the first to be made redundant whether they are relatively highly productive or not. This means that, where LOFO provisions apply, labour productivity is likely to be lower than it otherwise would have been and unit labour costs higher;
- increasing recruitment costs (and thus unit labour costs) where mines allocate more resources to recruitment in order to avoid accidentally hiring low productivity workers. (Although, where LOFO is applied in concert with retrenchment lists, this effect is unlikely as retrenchment lists prevent mines from discriminating between job applicants on the basis of relative productivity); and
- increasing wage costs. Where more senior employees are paid more — perhaps because they have acquired more skills — LOFO will increase unit labour costs directly by resulting in the clustering of employees at the top end of pay scales.

Overall, in the long run, retrenchment based solely on seniority can only harm the competitiveness of an individual mine. The Australian Mines and Metals Association (AMMA) argued the importance of long-run considerations over short-term efficiencies associated with LOFO:

> The industry operates in a dynamic trading environment. To survive this environment, innovative work practice requirements based on best practice arrangements are essential. The time is fast approaching when all within the industry will have no choice but to recruit the best available people, commensurate with business requirements, in order to compete in the global market place. In respect to reducing workforce numbers to meet changing work circumstances, a different approach also needs to be adopted. While the current 'last on first off' approach is administratively convenient, the black coal industry will continue to face pressures to retain those employees best placed to ensure the future success of the business. (sub. 14, p. 4)

[4] Although, under the work models, seniority already applies in the allocation of training.

This would tend to suggest that a requirement to use LOFO as the basis of retrenchment should not be included in awards, allowing mines the freedom to choose the best available approach to reducing the size of their workforce. In practice, the best available approach to retrenchment is often likely to include consideration of seniority — but in conjunction with other factors such as skill, as Shell has suggested:

> It is generally accepted that length of service in conjunction with other selection criteria is a legitimate indicator in determining which employees will be retained in time of redundancies. However, there is no support for the contention that retention of employees shall be determined by gate seniority exclusively. (sub29, p. 9)

The inclusion of provisions in awards requiring that retrenchment be based on seniority alone can only harm the competitiveness of an enterprise by restricting the set of factors that an employer can take into account when determining how to reduce the size of the workforce. The Commission accordingly welcomes the exclusion of such provisions from the P&E Award as a result of the black coal industry award simplification process.

The long and short-run effects of LOFO provisions are summarised in Table 5.2.

Discrimination and composition of the workforce

The retrenchment list and LOFO have had a significant effect on the characteristics of the black coal mining labour force. As Appendix C shows, compared with other industries, the black coal mining labour force has a higher proportion of men, an older age structure, and a higher proportion of people born in Australia. The retrenchment list and LOFO leave little scope for mines to employ and retain 'new' people, effectively limiting the ability of those not traditionally employed in coal mining to gain employment — for example, women, or younger people not related to black coal miners (and therefore, not eligible for the 'father-son' rule). This has led to claims that such Award provisions are, in practice, discriminatory. For example, Rio Tinto argued:

> ... seniority is, of course a discriminatory system for managing employees. It means that merit can rarely be a factor taken into account in employment decisions. The losers from seniority decisions will be highly capable younger people, women and people of non Anglo-Saxon and indigenous backgrounds, all of whom effectively face high barriers to entry into the coal mining industry. (sub. 22, p. 62)

Whether such provisions in the P&E Award constitute discrimination at law has not yet been resolved. According to Rio Tinto:

Table 5.2: **Summary of the impact of LOFO on mine labour productivity and unit labour costs**

Impact of LOFO	*Labour productivity*	*Unit labour costs*
Long-term impacts		
Skill mismatch (level of skill and nature of skill) — labour underutilisation, training costs, increased risk of introducing new technology.	Reduced	Increased
Limited ability to retrench on basis of productivity.	Reduced	Increased
Reduced incentives for individual workers to differentiate themselves on the basis of productivity.	Reduced	Increased
Suboptimal allocation of training — incentive to train only longer tenure workers.[a]	Reduced	Increased
Increased recruitment costs to reduce potential for mistakenly hiring inefficient workers.		Increased
Clustering of workers at top end of pay scale.		Increased
Short-term impacts		
Decreased disruption due to downsizing.	Increased	
Reduced redundancy payouts.		Reduced

a Reinforced by seniority provisions under the work models.

> The seniority provisions are also protected by provisions of the Sex Discrimination Act, which preserves discriminatory acts done in accordance with an award, and by provisions of the Workplace Relations Act saving certain discriminatory provisions of awards. ... State anti-discrimination laws also permit discriminatory award clauses to continue to operate. (sub. 22, p. 62)

The NSW Minerals Council noted:

> Several companies have endeavoured to use the Workplace Relations Act to remove Clause 24 [LOFO] without success. Impediments include the existence of bargaining periods being in place which restrict the capacity of the AIRC to arbitrate. Applications have been made to the Federal Court to test the standing of this clause. ... The question of discrimination relating to the application of Clause 24 remains unresolved. (sub. 25, p. 18)

While unresolved at the Commonwealth and State legislative level, retrenchment based solely on seniority appears to conflict with the spirit of the International Labour Organisation (ILO) Convention on Discrimination (Convention 111), ratified by Australia in 1973.

The Commission draws attention to the fact that retrenchment lists and seniority-based retrenchment are discriminatory in practice.

5.2.3 Use of casuals, part-time employment and contractors

Casuals, part-time employment and contractors are considered together in this section because in certain circumstances they can offer mines similar benefits — that is, greater flexibility in varying hours of work or the size of the workforce. In other words, these types of employment — in combination with permanent full-time employment — allow mines to match capital and labour requirements to outputs more accurately over time, increasing labour and capital utilisation and, thus, productivity. In the words of the CEO of Ensham:

> ... the EFA [enterprise flexibility agreement] allows utilisation of labour at Ensham for a number of different circumstances: permanent, casual, contractor.
>
> This flexibility of labour allows special outside skills, expertise or equipment not regularly available at Ensham to be used, as well as eliminating the need to carry extra employees for relief or peak loads. (Foots 1996, p. 156);
>
> ... Included in the advantages of this is Ensham doesn't have to commit to unnecessary capital such as Dragline Bucket Repair Facilities, Cable Repair Facilities, Major Workshops etc. (Foots 1996, p. 164)

Contractors, casuals or part-time employees offer particular benefits in situations where tasks are required only infrequently or where special skills or equipment are required — for example, to undertake maintenance, highwall mining or environmental clean-up. Contractors also can offer access to expertise from outside black coal mining. For example, Thiess Contractors contended:

> The diversity of our projects in mining and also in civil construction means that Thiess brings to any mining challenge a range of solutions and expertise beyond that often available to an individual mining company. Accordingly, we and our clients have seen the advantages that can be gained from adopting mining methods that cross over from a more metalliferous style operation and even techniques that stem from our civil engineering expertise. (sub. 15, p. 6)

In addition, access to increased flexibility via the use of these types of employment is increasingly important in light of the product market changes that have occurred (outlined in Chapter 2). Powercoal illustrated the importance of workplace flexibility at coal mines supplying a deregulated electricity market, where contracts between generators and coal mines are increasingly specifying coal volumes that are contingent on the amount of electricity sold:

> Now, if you have a coal that can either go to the generator or into the export market, you can manage [contingency contracts] quite simply by the variety of markets. But if you have a coal that is not suitable for other markets, you have to have this idle capacity sitting there to service [the contingency contract with the electricity generator]. So, therefore, I could envisage times where you might have a mine working say at a million tonne a year capacity, as a base case, and then bringing in contractors to mine the other million tonne a year, ... [or] it might be in steps of so much per month .... You can adjust that by stockpiles to some extent,

> but you don't normally carry a million tonne of stock .... So, flexibility in that case would mean bringing in contractors to operate for so many months of the year. ... Otherwise, you would have full-time labour that's sitting idle for so many months of the year, and obviously one cannot afford to do that in those type of markets. (trans., p. 32)

In some situations, employees with long-term contracts (which may include permanent workers as well as contractors) are preferable to those employed on a relatively short-term or casual basis. Permanent or longer tenured employees allow mines to avoid the transaction costs associated with engaging short-term workers and avoid unnecessary training costs where mine-specific knowledge is of particular value in undertaking tasks. In addition, part-time employment is impractical in many cases in mining because of continuous rostering and the distance required to travel to remote locations (QMITAB 1998, p. 39).

In the past, significant restrictions circumscribed the use of contractors, casuals and part-time employees and such restrictions still exist at many mines. However, the use of contractors and casuals has been increasing in black coal mines with the increasing ability of managers to negotiate workforce agreements that differ significantly from the P&E Award. In fact, contracting companies (such as Thiess Contractors) have been engaged to carry out mining operations — previously considered core work — in a number of open cut mines. Burton and Collinsville are two examples. In both cases, the workforce agreements negotiated by Thiess Contractors dispense with some of the restrictive work arrangements specified in the P&E Award.

Restrictions on the use of casuals, part-time employment and contractors

Prior to award simplification, it was the lack of formal provisions in black coal awards covering the employment of contractors, casuals and part-time workers that restricted their use. There was no provision for casual or part-time work or the use of contractors in the P&E Award, circumscribing all three types of employment and restricting the nature of allowable employment to full-time, permanent. Restrictions on part-time work are inconsistent with the intent of the ILO Convention C175, The Part Time Work Convention, 1994, which states:

> Measures shall be taken to facilitate access to productive and freely chosen part-time work which meets the needs of both employers and workers, ... (Article 9 ILO Convention C175)

Australia has not yet made a decision concerning ratification of this convention.

While the ACSA Award similarly has no provisions for contractors, it does provide for casual and temporary work subject to union approval.

Formal provisions relating to contractors are contained in the State coal mining industry legislation (NSW and Queensland) — which limits the ability of mines to appoint contractors to certain statutory positions — and in enterprise agreements.

A number of informal 'custom and practice' type provisos covering the use of contractors in black coal mining were outlined in the submissions. These differ between sites and, as documented in the submissions, include specifications or rules that:

- increase the transaction costs involved in engaging contractors, such as extended negotiation processes for obtaining union approval. For example:

  > Companies in general have to go through a long arduous process to get union approval to use contactors on site. (Camberwell Coal, sub. 13, p. 12);

- restrict the contracting companies or workers that can be engaged. For example, the *Drayton Coal Industrial Agreement 1996* locks Drayton into using the United Mining Support Services (UMSS) for supplemental labour (sub. 48). UMSS is part-owned by the mine workers union;
- otherwise influence the costs associated with engaging contractors — for example, by restricting contractors' conditions of employment; and
- specify the types of tasks that contractors can undertake — for example, according to Exxon:

  > Certain work, eg bathhouse cleaning, is a 'prohibited' activity for the use of contractors as a result of entrenched custom and practice. ... If the Union believes the work could be considered 'core work', its position will be that the company needs to hire additional full-time employees. (sub. 3, p. 6)

The Commission notes that, arguably, the second and third points above involve instances of anti-competitive behaviour in the market for labour services. However, these restrictions are unlikely to be covered by the relevant provisions of the *Trade Practices Act 1974* (Cth) given that the relevant Part (Part IV except s.48) does not cover acts, arrangements, contracts or understandings relating to "remuneration, conditions of employment, hours of work or working conditions of employees".[5] Such restrictive provisions in employment agreements are covered instead by the industrial relations legislation — the aim of which is to promote and enforce agreements freely arrived at between employers and employees at the workplace level. **The Commission questions whether the industrial relations legislation gives adequate consideration to any adverse consequences of restrictive provisions in employment agreements for other businesses not party to an agreement (for example, in**

[5] Section 51(2) *Trade Practices Act.*

this case, suppliers in the market for supplementary labour services other than the UMSS).[6]

Comparisons with Australian metalliferous and United States black coal mines

According to Wooden et al (1996), while provisions for the employment of contractors are present in the majority of both black coal mining and metalliferous mining agreements, black coal mining agreements are much more likely to circumscribe closely the conditions under which contractors might be used. With the exception of Ensham and Southern Colliery, all of the black coal agreements outlined in Appendix G contain clauses circumscribing the use of contractors to varying degrees. The *Queensland Mining (Non-coal) Award* allows metalliferous mines to employ casuals and contractors as long as it is not a condition of employment and a certain weekly minimum pay level is reached.

Unionised mines in the United States also have limited ability to engage contractors. The main unionised agreement restricts the use of contractors for transport, repair and maintenance, rough grading in mine reclamation, and construction, in most cases allowing use of contractors only where consistent with custom and practice. In contrast, there are no restrictions on the use of contractors in non-unionised mines in the United States, except by agreement at the workplace.

Effects of restrictions on the use of contractors

Circumscribing or preventing the use of contractors can reduce mine labour productivity and increase unit labour costs by:

- forcing mines to carry excess (underutilised) capital and labour. Exxon commented:

> ... an outgrowth of [restrictions on the use of contractors] is that the coal industry tends to carry higher levels of regular employment to carry it through the heavier work periods, whereas other industries and international competitors operate with leaner workforces supplemented by additions of contract labour during periods of greater work requirements. (sub. 3, p. 6);

- increasing the transaction costs associated with engaging contractors because of the cost of complying with the restrictions;
- reducing the speed with which mines can respond to change in the short-term — for example, by engaging contractors to cover shortfalls in labour or capital;

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[6] Any adverse consequences of such restrictive provisions for the employer party to the agreement should be the responsibility of the employer concerned.

- restricting innovation and inhibiting the adoption of new more productive management and work arrangements by reducing access to both new ideas and alternative supplies of management and other skills; and
- limiting the options available to mines in obtaining access to capital.

Restrictions on the use of contractors, casuals and part-time employees detract from mine performance and deny employment opportunities to people who wish to work in this way.

5.3 Hours of work and roster arrangements

This section examines the degree of flexibility of work arrangements dealing with working hours and the timing of work. Four areas are examined — hours of work, shift and roster arrangements, paid breaks, and leave provisions.

5.3.1 Hours of work

Ordinary hours of work in the P&E Award are 35 hours per week. In the ACSA Award they range from 35 to 40 hours per week. It is not expected that the award simplification process will change these arrangements. All of the black coal agreements examined in Appendix G stipulate 35 ordinary hours of work.

Comparisons with Australian metalliferous and United States black coal mines

A number of submissions noted that ordinary hours in black coal mining are less than those stipulated in other industries. For example, Thiess Contractors noted that the 35 hour week (alongside a host of other entitlements) compares generously with the norm for similar workers — particularly in the Australian metalliferous mining industry — as well as broader society norms:

> These standards constitute a substantial additional labour cost compared to other Australian mining operations and necessarily limit the reserves which can be economically extracted. (sub. 15, p. 11)

Furthermore, the AMMA (sub. 14) noted that the *Gold Mining and Engineering Maintenance Award* (Qld) stipulates 40 ordinary hours and the metalliferous mining awards and agreements documented in Appendix H suggest that the metalliferous mining industry standard ordinary working hours in Queensland are around 38 hours per week. The comparisons undertaken by Wooden et al (1996) show that half of their sample of metalliferous mines provided for 38 ordinary hours per week while a further 42 per cent of such mines provided

for 40 ordinary hours per week. (The balance provided for even longer ordinary working hours.)

The US union agreement indicates that a 40 hour ordinary week is the norm among unionised US black coal mines. This is also the case among non-union mines in the United States (Appendix I).

In addition, a number of submissions cited informal work arrangements (that is, 'customs and practices') which inhibit the efficient use of overtime in black coal mining.[7] These include the allocation of overtime by seniority and (district union) restrictions on either the amount of overtime worked in a roster period or the total hours actually worked per week (sub. 22, p. 60 and sub. 25, p. 29). Examples of overtime restrictions were highlighted in Camberwell Coal's submission:

> There is a district limitation that provides for a maximum number of hours to be worked in any one week to be no more than 51 hours (35 hours ordinary plus 16 hours overtime). This does not allow our employees to work in excess of these hours if they wish to.
>
> Also there is a restriction on how this overtime can be worked — it must be worked in 'blocks'. E.g. Employees are only able to work one shift of overtime per week. The number of hours is not counted in this instance and if an employee only works two hours then that constitutes his overtime 'shift' for the week. This leads to people not working overtime unless they are offered an 8 hour shift which often does not suit the needs of the business. (sub. 13, p. 9)

Effects of hours of work restrictions

The labour cost effects of a relatively short ordinary time week operate through the consequent relatively high use of hours paid at overtime rates:

> The short duration of the working week coupled with the pressures placed on mining organisations to meet increasingly robust production targets, guarantees that overtime will be worked. ... At Callide Coalfields, overtime runs at around 20 per cent for both the production and engineering streams, and adds significantly to the overall labour costs of running the Callide operation. (Callide Coalfields, sub. 6, p. 8)

That is, while black coal mine industry production and engineering workers typically work an average of 43.5 hours per week (Wooden and Robertson 1997b), a comparatively high proportion of this average is worked (and paid) as overtime hours. However, while the lower ordinary hours is a factor

[7] Both the P&E and ACSA Awards state that employees are required to work reasonable hours of overtime (provided that at least 10 consecutive hours off duty eventuates after completing such overtime, excepting staff members in Groups G to P in the ACSA Award). The method of allocating overtime is not stipulated in either Award.

contributing to the relatively high levels of overtime in the black coal industry, other factors include: the low incidence of part-time, casual and contract employment; greater restrictions on the use of contractors; and the low incidence of twelve hour shifts.

The effects of seniority in allocating overtime as well as restrictions on how overtime is worked, respectively, include the following:

> An employee cannot complete a partly completed job on overtime, sometimes the level of skill required for a job means a specific person is needed. ...
>
> CFMEU district rule requires employees work no more than 14 hours overtime per week. Normal roster uses 5–7.5 of these hours leaving little for employer flexibility. (Rio Tinto, sub. 22, p. 60)

The relatively short ordinary hour week of 35 hours, on which overtime and penalty rate payments are based, imposes relatively high unit labour cost outcomes at black coal mines.

5.3.2 Shift and roster arrangements

A key aspect of working time in the mining industry is shift work. According to the P&E and ACSA Awards, the maximum shift length is eight hours. Longer shifts are possible only by agreement. In many cases, longer shifts (such as twelve hours) involve changing the roster system from a five to a four panel (or crew) system. In so far as roster arrangements are concerned, both awards state that an employee's place on the roster shall not be changed, except on one week's notice or payment at overtime rates. Whether this basis for allocating personnel to rosters will be maintained as an allowable award matter is to be considered during the second stage of the P&E Award simplification process.

Longer shifts have been reached by agreement in a number of Australian black coal mines (see Appendix G).

Comparisons with Australian metalliferous and United States black coal mines

Wooden et al (1996) show that 22 per cent of their sample of black coal mines had provisions for twelve hour shifts. This compares with a corresponding figure of 35 per cent among their sample of Australian metalliferous mines. Hence, the small sample of Australian metalliferous awards and agreements contained in Appendix H appears to be broadly representative of the fact that shift lengths longer than eight hours are not uncommon in metalliferous mines. In addition, Wooden et al (1996, p. 21) "find the presence of provisions for hours averaging over an extended period much more prevalent in the metal ores

mining sector than in coal mining". Furthermore, arrangements for changing rosters also appear to require significantly less notice by metalliferous mining employers than their counterparts in black coal. Similarly, there appears to be greater flexibility for metalliferous employees to swap rosters and shifts among themselves (Appendix H).

According to the main unionised agreement, in US unionised-mines the basic shift length is between seven hours and fifteen minutes and eight hours and each shift has regular starting times established in accordance with past custom and practice. Upon approval by two-thirds of union members at the mine, open cut mines may extend the work day to eight hour shifts. Individuals with the greatest seniority are to be given their shift preference. In so far as non-union mines are concerned, the *Fair Labor Standards Act* does not impose any restrictions on shift lengths or times.

Furthermore, while some submissions suggest that shift and roster arrangements in Australian black coal mines are becoming more flexible (via arrangements introduced by contractors) —

> The use of contractors has become more prevalent in the industry and is growing, and there has been a gradual emergence of more innovative work rosters and shift arrangements. (Queensland Mining Council, sub. 24, p. 5)

— other mines appear to face considerable informal restrictions on changing shift and roster arrangements, largely depending on the union district concerned (see Box 5.1). Indeed, the Queensland Government, BHP, Thiess Contractors and Rio Tinto submissions nominated shift and roster arrangements among their industry-wide restrictions.

Effects of restrictive shift and roster arrangements

Restrictions on shift lengths which prevent the introduction of the twelve hour shifts result in: unnecessary levels of non-productive (or idle) time associated with shift changeovers; overmanning (and therefore unnecessarily high labour costs) associated with a five panel compared with a four panel roster system; decreased capital utilisation; and an increased level of capital (especially the truck fleet) required at each mine. On the other hand, the relatively generous overtime pay provisions in the black coal industry may mean that twelve hour shifts are not cost-effective for some mines.

In addition to the effects of shift and roster restrictions outlined above, another informal arrangement (or 'custom and practice') involves the use of seniority provisions in the allocation of personnel to shifts. This results in a poor skills mix across and within shifts.

Box 5.1: **Examples of informal restrictions on changes to shift and roster arrangements in black coal mines**

One example was provided by Exxon:

> NSW Unions refuse to work shift lengths greater than 8 hours without payment of extra rates above the already high penalty rates contained in the industry awards. ... The combination of the above makes it prohibitively expensive to adopt a roster for 7-day operations. The resulting under-utilisation of high cost capital severely disadvantages the Australian black coal industry vs its international competitors who operate on a 7-day basis. (sub. 3, p. 9)

Another example came from Camberwell Coal:

> [While] Award provisions are general in respect to this clause, custom and practice and subsequent decisions of the Coal Industry Tribunal have reinforced that if companies wish to work 7 days per week 24 hours per day in the Northern District then we must work a 5 panel roster (that is 5 complete crews are required). This has a significant extra cost because of increased manning levels and penalty rates associated with the roster. In Queensland, Coal Mines are able to operate a more cost effective 4 panel roster (ie 4 complete crews) to cover 7 days per week, 24 hour per day operations. Effectively the 5 panel roster means that Hunter Valley mines must employ 20 per cent more people to maintain a 24 hour per day, 7 day per week operation than our competitors in Queensland or overseas. Of the 35.7 hours worked per week in the 5 panel roster, only 24 hours are paid at single time with the remaining hours paid at least at double time (higher on weekends). We would like to introduce a 4 panel 12 hour shift roster as this would allow us much more flexible allocation of our labour. The current system greatly increases the costs of employing labour to man equipment 24 hours per day, 7 days per week, particularly for shovel truck operations common in the Hunter Valley. In fact, the high cost of labour for continuous operation is a strong dis-incentive to the employment of more labour. As a result high cost equipment is under-utilised further adding to our cost structure. (sub. 13, p. 8)

Camberwell Coal pointed to other difficulties in establishing a four panel, 12 hour shift system as an alternative to the status quo:

> The current standards in the Coal Industry (NSW) on the working of 4 panel 12 hour shifts has been set with a recent agreement at BHP's Mt Owen Mine. The terms and conditions attached to the implementation of the 12 hour shift roster at Mt Owen do not provide any cost incentives from the current 5 panel 8.5 hours system that is currently operating in the Northern District. ... The metalliferous mining industry along with many other industries in Australia and our competitors overseas have adopted a 4 panel 12 hour shift system covering 7 day per week, 24 hour per day operations at no additional cost to the employer because of the mutual benefits of the system. The UMW refuses to consider 12 hour shifts on any realistic basis. (sub. 13, p. 10)

The costs to black coal mines of changing shift and roster arrangements in the past have been prohibitive and unnecessarily increased unit labour costs.

5.3.3 Paid breaks

The Australian Coal Industry Research Laboratories (ACIRL 1994), Swan Consultants (1994) and Tasman Asia Pacific (1997, 1998) all point to time lost during paid breaks in Australian coal mines as being greater than in Australian metalliferous and US black coal mines. According to Swan Consultants (1994), meal breaks and lost time while joining and leaving shifts amounted to approximately 18 per cent of shift hours in some Australian dragline mines. Rio Tinto, using material from Tasman Asia Pacific (1997), estimated the effect of idle time (mainly resulting from the time taken in joining and leaving shifts and travelling to and from the mine face) in terms of lost production to be considerable:

> For a hypothetical 8 hour shift, the Australian black coal mine employee works approximately 6.5 hours compared to their counterparts in the Australian hard rock industry who work 6.9 hours. ... This represents 24 minutes additional idle time per employee, per shift, every working day of the year. ... Applying this to 1995–96 coal industry production and employment (194 million tonnes from around 25,000 employees), over 11 million tonnes of lost production is due to idle time, amounting to more product coal than Australia's largest mine (Pacific Coal's Blair Athol Mine) produced in the same year. (sub. 22, pp. 8–9)

Production and engineering workers and some staff are entitled to meal (or 'crib') breaks paid at 30 minutes per shift. Further, they can work more than five hours without a break — only if they are paid at overtime rates beyond five hours. This is consistent with many other awards including metalliferous awards and in the United States (see below). Additional provisions in black coal relating to crib (meal) breaks and meal allowances on overtime are detailed in Appendix F.

Participants also pointed to a number of customs and practices applying at some mines in this area which contribute to high levels of idle time (and therefore relatively low levels of equipment utilisation), especially in open cut mines in the black coal industry. These include such practices as 'tolerance time' (resulting in 'early knock off') in open cut mines:

> Many custom and practice issues constitute uncompetitive work practices such as: ... early shift finish 'tolerance time' which is a hangover from the underground coal mines where 'shower time' was allocated at the end of each shift. (Rio Tinto, sub. 22, pp. 60–61).[8]

The cost of this arrangement is not insignificant, as noted by Camberwell Coal:

[8] Rio Tinto has ended this practice at its Hunter Valley No. 1 open cut mine and required employees to work their full shift length as specified in the P&E Award.

> ... approximately 10-15 minutes paid at double time must be allowed for shower or tolerance time at the end of each shift. The cost is approximately $2000 per annum per person. (sub. 13, p. 9)

However, Thiess Contractors observed:

> This is an arena in which the owners, managers, unions, employees, governments and industrial authorities all have significant historical responsibility.
>
> ... Greenfield sites do not typically attract such restrictions today but many existing operations are no doubt struggling with these and similar issues as a result of the historical legacy of the industry. (sub. 15, p. 8)

Other work arrangements in this area include restrictions on staggering crib breaks:

> Decision 3/1991 by the Newcastle Local Coal Authority, and decision 2/1991 of the Coal Industry Tribunal, preventing management at Hunter Valley No. 1 mine from staggering meal breaks in all but exigent circumstances. (Rio Tinto, sub. 22, p. 5)

The effects of this restriction on staggering crib breaks (which includes travel by open cut coal miners to and from their crib huts in order to eat together) are: lower levels of equipment utilisation; truck queuing problems associated with the return from crib; and the prevention of continuous operation of critical or priority pieces of equipment.

A number of recent black coal agreements, however, have introduced staggered crib breaks (Appendix G). In so far as comparison with the metalliferous mining sector is concerned, a similar length of meal break appears to be provided (30 minutes) as well as a minimum ten hour break between work days. In addition, paid rest pauses totalling twenty minutes per day are allowed in the *Queensland Mining (Non-coal) Award*. This practice also appears in the black coal industry but is not written into the parent Award. It is unclear from the examination of awards and agreements in Appendix G whether the practice of staggering meal breaks (or the taking of 'tolerance time') applies across the metalliferous mining sector.

A staggered 30 minute break appears in the US unionised agreement. No legislative requirements are faced by non-unionised mines in relation to the taking of paid breaks.

Provision for paid breaks is reasonable, not only for safety but for productivity reasons. It would appear, however, that a number of black coal mining work arrangements inhibit flexibility in the taking of breaks, thereby compromising continuous production, especially in open cut mines.

5.3.4 Leave provisions

Table 5.3 presents an overview of annual leave, long service leave and sick leave provisions in Australian black coal and metalliferous mines and unionised black coal mines in the United States. These comparisons are based on the P&E Award, a sample of awards and agreements in the metalliferous mining sector and the main unionised mine agreement in the United States, respectively. Additional factors relating to the flexibility of these leave entitlements are outlined below. Australian black coal mines generally provide higher leave entitlements than do Australian metalliferous or US black coal mines (Table 5.3). It is not expected that the award simplification process in the black coal industry will result in changes to these leave provisions.

Table 5.3: **An overview of leave provisions: Australian black coal, metalliferous and US black coal mines**

Type of leave	*Black coal*	*Metalliferous*	*US black coal (unionised)*
Annual leave	5 weeks; 6 weeks for continuous shift workers.	4 weeks; 5 weeks for continuous shift workers.	14 days minimum plus additional days depending on length of service (up to a maximum of 13 additional days for employees with 18 years of continuous service). Four additional days of floating vacation are also provided. Each employee is also entitled to a holiday on their birthday.
Long service leave	13 weeks for each 8 years of service.	13 weeks after 10 years of service.	No provision.
Sick leave	15 days per year cumulative without limit.	8–10 days per year Variable cumulation arrangements.	5 days per year minimum to a maximum cumulation of 10 days per year.

Sources: P&E Award, Wooden et al (1996) and *National Bituminous Coal Wage Agreement of 1993.*

The P&E Award places constraints on when annual leave can be given and taken — in not more than three periods, one of which is three weeks. (Similar annual leave entitlements and constraints are provided in the ACSA Award.) In addition, the allocation of annual leave appears to be subject to the 'custom and practice' of seniority rules in some mines (Rio Tinto, sub. 22). While the recent agreements set out in Appendix G do not result in reduced annual leave entitlements, there is some evidence of increased flexibility in the taking and allocation of such leave.

Wooden et al (1996) found that the Australian metalliferous sector appears to have less flexible annual leave provisions than the coal industry (see Appendix H).

The P&E Award also places conditions on when long service leave can be taken. Many participants also noted the coal-specific long service leave arrangements, which are portable between employers, as an example of a feature that reinforces the industry focus rather than the enterprise focus of employees. The NSW Minerals Council commented:

> We have a long service leave scheme which again entrenches the differences in this industry, its portable nature between companies, it again entrenches this view that employees work for the industry or for the union which will protect its continuing employment that their fortunes are not linked to the fortunes of the company. (trans., p. 79)

The Minister for Workplace Relations and Small Business has recently initiated a review of the funding arrangements for this scheme. In particular, the following two aspects of the scheme are to be reviewed:

- the need for continuing Commonwealth Government involvement in the funding arrangements; and
- the appropriateness of retaining a central industry fund when the primary focus for managing employee relations has shifted to the enterprise (Reith 1997).

The P&E and ACSA Awards provide for sick leave to be cumulative (without limit) and to be paid out on retirement or retrenchment. Employees must inform the employer within 72 hours of commencing sick leave (or by the completion of the first shift for staff members). While recent black coal mining agreements do not tend to dilute sick leave entitlements, in many instances the requirement to inform the employer is reduced from the 72 hours requirement in the P&E Award. Some innovative sick pay arrangements and absenteeism policies are seen in these recent agreements (Appendix G).

Provisions relating to accumulation and notification appear to vary between Australian metalliferous mines (Appendix H and Wooden et al 1996).

Among unionised mines in the United States, employees are required to notify the employer at least 24 hours in advance or at least two hours in advance in the case of sudden illness. Unused sick days can be paid in lieu or carried over to the next calendar year. However, the maximum accumulation is ten personal or sick leave days in any one year. Under the *Family and Medical Leave Act*, entitlements for sick leave and parental leave in non-unionised mines consist of up to twelve weeks protected, unpaid leave during any twelve month period.

Employees cannot accrue benefits during the period of leave but they have the right to return to their job upon completion of the leave (see Appendix I).

Effects of leave provisions

In summary, the effect of these relatively generous leave provisions is to increase the cost of labour in the black coal industry. Other effects include reduced labour and capital utilisation and the need for additional personnel to cover for employees on planned and unplanned leave. For example:

> The combination of 'employment protection' and extremely liberal industry leave policies (sick leave, annual leave, long service leave, domestic leave, workers' compensation program, etc) contribute to an absenteeism rate well above industry norms. Total absenteeism at ECMAL managed sites is at 15–20 per cent with approximately 8 per cent falling in the 'unplanned' (sick, workers' comp., domestic, etc) category. This level of absenteeism impacts management's ability to effectively operate the business, and leads to higher baseload manning complements and associated increased labour costs to cover for the non-working personnel. (Exxon, sub. 3, pp. 5–6)

The Australian black coal industry awards contain relatively generous leave entitlements. Maintaining these as allowable award matters in simplified awards would result in relatively high 'minimum' labour costs.

5.4 Remuneration and on-costs

This section examines the levels and flexibility of both wages (including any bonuses) and non-wage labour costs against the background of the significant changes which are occurring in the product market. In particular, the section examines base pay, penalty rates and bonus arrangements.

5.4.1 Base wage

Relative pay levels

A comparison of base award wages in the black coal industry with their metalliferous counterparts is complicated by several factors. First, while base wages covering the main occupations in the black coal industry may be found in the P&E and ACSA Awards, base wages in the metalliferous sector are spread across many State and Federal awards. Hence it is necessary to obtain a representative sample of metalliferous awards with which to make comparisons. Second, since minimum rates do not necessarily accord with actual pay, award-based wage comparisons are meaningless if one is seeking to compare the relative cost of labour between the two industries. In addition, the interaction of

various overtime and penalty rates and other entitlements complicates comparisons of wages and labour costs. Accordingly, other types of data (aside from award data) need to be examined to address the issue of relative pay levels and relative labour costs.

Chapter 4 found that employee earnings are high in the black coal industry when compared with average earnings for all industries and with earnings in similar industries.

A number of submissions point to relatively high (take-home) pay levels received by non-managerial black coal mine employees in their own mines (Camberwell Coal, sub. 13), in the industry in NSW (DWR&SB, sub. 40), or across the industry as a whole (Wooden and Robertson 1997b). Relatively high incomes are received also by employees in managerial, professional and associate professional occupations in the black coal mining industry (see Table 5.4).

Table 5.4: **Proportion of individuals with annual income of $52 000 or more, selected occupations, black coal mining compared with metal ore mining, Australia 1996[a]** (%)

Occupations	*Metal ore mining*	*Black coal mining*
Managers and administrators	83.3	93.6
Professionals	55.7	84.4
Associate professionals	41.7	83.0
Tradespersons and related workers	53.4	72.5
Intermediate clerical, sales, service workers	18.5	59.9
Intermediate production and transport workers	44.6	68.5
Total	**47.2**	**71.9**

a Population is wage and salary earners, Australia for metallic minerals, NSW and Queensland for black coal.

Source: ACIRRT 1998, based on ABS 1996 unpublished census data.

Many factors may have led to the relatively high pay levels observed in the black coal mining industry. Such factors could include high workforce productivity,[9] super-normal profit-sharing[10] activity by employers, monopoly

9 The relatively high pay levels may result from the payment of so-called 'efficiency wages'. This occurs where a wage premium is paid to encourage effort in cases where individual

power of trade unions, compensating differentials for undesirable or hazardous working conditions, and the male-dominated nature of the industry (Wooden and Robertson 1997b). The relatively capital-intensive nature of the industry and the relatively high level of fixed specific investments at individual mines may also contribute to relatively high pay levels. This is due to the relatively costly nature of strikes in such industries, in turn enhancing the bargaining power of unions and existing employees (see Chapter 6).[11] Distinguishing between these factors is a difficult task. Historical support for some form of super-normal profit-sharing combined with the monopoly power of trade unions is found in Mumford and Dowrick (1994).

As for the possibility of higher wages reflecting higher productivity in the black coal industry, a number of submissions point to the reverse. For example,

> The key point here is that rates of pay in coal are 25 per cent higher than in metalliferous mines. However, productivity in most coal mining activities is up to 48 per cent lower than metalliferous mining ... (Rio Tinto, sub. 22, p. 51)

Indeed, the informal 'custom and practice' of seniority-based promotion to higher pay levels has the effect of further uncoupling the link between productivity and pay.

The more hazardous and unpleasant nature of underground black coal mining would tend to suggest that underground mine workers would receive a higher compensating differential than their open cut counterparts. While the evidence presented above by DWR&SB appears to be at odds with this hypothesis, it may be that the higher productivity levels in open cut mines more than counterbalance the compensating differential factor in practice. In addition, it is questionable whether open cut black coal mining is inherently more dangerous than open cut metalliferous mining (see Chapter 9). Hence, the observed pay differentials between these two groups of (open cut) workers do not appear to be warranted on the grounds of the hazardous nature of the work.

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effort is not readily observed. The idea is that higher pay leads to a consistent work effort because the penalty from not performing at an acceptable level of productivity — namely, job loss — is more serious the higher the wage. (In cases where individual effort can be observed, piece rates or performance-related bonuses are not uncommon motivation mechanisms.)

[10] Super-normal profit is defined as the amount of profit which is above the profit level that would be observed in a competitive market situation. Another term for this is 'economic rent' and, hence, the term 'monopoly rent-sharing' is a common term in economic discussions.

[11] This proposition is difficult to sustain in circumstances where existing employees were easily replaced from the stock of unemployed.

Relative labour costs

Although pay received by employees represents a large part of the actual cost of labour, 'on-costs' paid by employers need to be added to the wage bill in order to gauge labour costs more accurately. This is the case in all industries. The issue here is whether such on-costs are unnecessarily high in the black coal industry.

The ILO (1966) definition of on-costs includes the cost of food, drink and other payments in kind, the cost of workers' housing borne by employers, employers' social security expenditures and the cost to the employer for vocational training, welfare services and miscellaneous items, such as transport of workers, work clothes and recruitment, together with taxes regarded as labour cost.

While the ABS *Survey of Major Labour Costs* excludes some items from the ILO definition, information on major labour on-costs includes: superannuation, payroll tax, workers' compensation and fringe benefits tax. This information indicates that the two major factors contributing to the relatively high labour costs per employee in the black coal mining industry, when compared with metalliferous mining and the total for all industries in 1993–94 were employee earnings and employer superannuation contributions (Table 5.5).

Table 5.5: **Major labour costs per employee, black coal mining compared with metalliferous mining, Australia, 1993–94** ($)

Industry	*Earnings*	*Super-annuation*	*Payroll tax*	*Workers' compen-sation*	*Fringe benefits tax*	*Total*
Black coal mining[a]	69 473	5 328	3 963	1 883	616	81 263
Metalliferous mining	58 263	2 822	3 040	1 857	1 510	67 492
Total all industries	26 654	1 480	1 056	566	266	30 022

a Calculated as coal mining in Australia excluding Victoria.

Source: ABS (Cat No. 6348.0 and unpublished data).

Camberwell Coal pointed to the relatively high employer superannuation contributions among black coal operations:

> Superannuation [is] approx 14–17 per cent [compared with] 6–7 per cent [average across all industries]. (sub. 13, p. 7)

While exchange rate variations make wage and labour cost comparisons between Australia and the United States somewhat problematic, Figure 3.13 in Tasman Asia Pacific (1998) shows that the labour cost per face hour worked (a

measure of unit labour cost) in truck and shovel operations is much lower in United States coal mines ($51 per hour) than in Queensland and NSW black coal mines ($69 and $75 per hour, respectively). The cost per face hour worked in truck and shovel operations in the United States was the same as observed in Australian hard rock mines. A similar story was observed in Tasman Asia Pacific (1997), although the cost gap between Australian black coal truck and shovel operations and their counterpart metalliferous and United States black coal operations has narrowed in the latest estimates.

The labour cost structure inherited by today's black coal producers is relatively high when compared with Australian metalliferous mines and United States black coal mines.

Some participants argued that, while this cost structure would not be able to be changed in the short run, it established the imperative for further increases in productivity in order to enhance competitiveness. For example,

> We've got to make sure that they don't continue to increase further, and the only way we can combat them is to try and get increases in productivity. I think the increases in productivity to try and get our unit costs down are probably easier to achieve than trying to wind back wages and conditions in absolute terms. (Camberwell Coal, trans., p. 58)

Camberwell Coal also argued that the increasing competitive pressures provided the opportunity to reduce some of the generous award conditions (at least for some producers):

> We are not advocating that Australian wages should drop to the low levels of our competitors. We are however saying that because our unit costs for labour are so high then our labour practices must be the most efficient and cost effective in the world which is not the case at present. We are also suggesting that there are a number of areas where significant savings could be introduced by setting aside some of the more favourable award and above award conditions that exist within the industry which were introduced in more favourable market circumstances than is faced by the industry at present. ... Certainly the time has come where higher wages and improved conditions cannot be bargained for changes to improve productivity. These changes must come without any increase in pay rates or conditions so that productivity increases lead to an immediate reduction in unit costs. This change in philosophy is necessary just so we can survive. (sub. 13, pp. 6–7)

The effects of a relatively high cost of labour are three-fold. First, it discourages investment in some potential new mines. Second, it results in a switch in demand from labour to capital, creating over-capitalisation at existing (and some other new) mines. A third effect is that it causes lower than desirable voluntary labour turnover, resulting in lack of 'fresh blood', inhibiting the transfer of new ideas to the workplace arising from the cross-fertilisation from

work experience in other industries. The failure of labour costs to adjust downwards where necessary inevitably results in quantity (that is, employment) adjustment in the relevant industry.

5.4.2 Penalty rates

Penalty rates are paid typically to compensate for any 'unsociable' hours that may have been worked. The various coal mining industry award penalty rates are specified in Table 5.6 (see also Appendix F). Australian black coal mine penalty rates are not expected to change as a result of the award simplification process.

Table 5.6: **Comparison of penalty rates in Australian black coal, metalliferous and US black coal mines**

	Australian black coal and metalliferous mines	*US unionised black coal mines*
Overtime	Time and a half for the first three hours and double time thereafter for Monday to Friday employees, and double time for all other employees.	Time and a half.
Shiftwork	115 per cent, except for permanent night shift workers, who are paid at 125 per cent of the ordinary rate. (Metalliferous mines more likely to have flat rate amounts which are set at levels likely to result in additional total labour cost which is below 115 per cent of total base hourly pay.)	Afternoon shift: US30 cents additional for each hour worked. Midnight shift: US40 cents additional for each hour worked.
Weekends	Time and a half for the first four hours on Saturday, and double time for all other hours on weekend.	Saturday work at time and a half, except overtime on a Saturday and all Sunday work paid at double time.
Public holidays	Double time and triple time for overtime on a public holiday.	Triple time.

Sources: Wooden et al 1996 and *National Bituminous Coal Wage Agreement of 1993.*

Wooden et al (1996) noted that agreements have changed these provisions in a minority of black coal mining operations (see also Appendix G). They also noted that the penalty rate arrangements in place in metalliferous mines do not differ greatly from those in black coal mines. However, shift premiums are the

exception to this observation — in metalliferous mines, there is a greater tendency towards flat rate amounts which are set at levels "likely to result in an additional total labour cost which is below 115 per cent of total base hourly pay" (Wooden et al 1996, p. 27).

Moreover, an informal arrangement (that is, a 'custom and practice') relating to the calculation of overtime on weekends and public holidays suggests that penalty rate costs are higher than in Australian metalliferous mines. For example, at Camberwell Coal:

> On weekends and Public Holidays we are subject to an increased penalty as the hourly rate for overtime purposes is the base rate divided by 30 rather than 35 thus giving an inflated hourly rate. To our knowledge this provision does not exist in any other industry. Effectively this means that the hourly rate paid for any time worked at the weekend is 233.3 per cent of the ordinary time rate for hours worked Monday to Friday (e.g. ordinary time hourly rate of $20.00/hour becomes a rate of $46.67 for all hours worked at weekends). (sub. 13, p. 8)

The Commission is unsure as to how widespread this 'custom and practice' is at other black coal mines. The ACSA Award specifies a similar provision relating to the calculation of overtime for certain types of staff members. In particular, for employees averaging 37.5 or 40 ordinary time hours per week, for the purposes of calculating overtime, the relevant weekly rate is divided by 35 (instead of 37.5 or 40 as would be appropriate).

In addition, it would appear that some mines, by virtue of either custom and practice or formal agreement, pay overtime and penalty rates at levels higher than stipulated by the P&E Award:

> Overtime provisions which allow the average worker to double their basic wage. With all overtime and weekend work paid at double-time rates, only 16 hours a week of overtime is required to double a workers wage. This level of overtime is easily achieved given that in addition to normal production and operational demands, nearly all training, company and/or Union meetings, participation in safety, continuous improvement and other employee involvement committees, etc. are conducted on overtime. (Exxon, sub. 3, p. 8)

> Night shift employees (other than those on permanent night shift) are only entitled to 15 per cent loading (award provision). We pay employees 25 per cent loading for night shift because of 'custom and practice'. Shift allowances must also be applied to overtime worked Monday to Friday and at weekends — effectively creating a situation where penalties apply to penalty rates which is foreign to the situation prevailing in other industries. (Camberwell Coal, sub. 13, p. 9)

A comparison of penalty rates in US unionised mines is found in Table 5.6, based on information from the main unionised agreement. The legislated minimum penalty rate for work beyond 40 hours per week in non-unionised mines is at least time and a half (Appendix I).

Overtime and penalty rates do not differ between Australian black coal mines and metalliferous mines, but tend to be higher than in United States unionised black coal mines.

5.4.3 Bonuses

According to Annexure 1 of the P&E Award, bonuses are to form the subject of individual mine agreements. The ACSA Award makes no provisions for bonuses, although the AIRC determined recently that a production bonus applying to Newlands Coal for staff members at that mine be inserted into the ACSA Award (NSW Minerals Council, sub. 25). Consideration of bonuses as an allowable matter in the P&E Award is to be dealt with in the second stage of the award simplification process.

Production bonuses in the black coal industry make up a hefty proportion of employee pay. For example, according to the NSW Minerals Council:

> ... the average weekly bonus [increased] from $217.80 in calender year 1990 to $310.9 in 1996. (sub. 25, p. 34)

More importantly, such bonuses appear to form part of the 'guaranteed' award-based pay arrangements with very few reflecting productivity or profitability. Thiess Contractors noted that bonuses have:

> ... been the subject of determinations by industrial authorities, despite its over-award nature, that go to the requirement for a substantial payment to be made. (sub. 15, p. 11)

Callide Coalfields stated, for example:

> The requirement to pay a coal bonus is a major hindrance to achieving cost effectiveness in the coal industry. ... For Callide Coalfields, the cost of paying the Coal bonus in the bonus year 1996 was $3.9 million, which is over 10 per cent of the total labour costs of running the Callide mining operation. ... Over time, the coal bonus has metamorphosed into a guaranteed payment, and the degree of productivity incentive associated with its payment has decreased. This has further eroded the benefit of the bonus to Coal Mine operators. (sub. 6, p. 4)

The size of these bonuses represents a significant proportion of the relatively high wage levels, which were observed earlier, among both managerial and non-managerial employees in the black coal mining industry.

Comparisons with Australian metalliferous and United States black coal mines

Confirming the earlier findings of Pragnell (1995), Wooden et al (1996) found a much greater incidence of performance-related pay clauses in black coal than in

metalliferous mining agreements. Their findings suggest that most of the Australian black coal schemes "operate as bonus arrangements based on achieving some pre-determined performance target, usually output related (e.g., coal tonnage or mine development metres)..." (p. 29). Importantly, they noted two caveats: first, if the performance targets are too easily achieved, they will be little different from over-award payments; and second, output bonus arrangements do not necessarily result in productivity-improving behaviour.

In particular, they found that the most common performance target provisions in recent black coal mining agreements relate to output and attendance.

The US unionised mine agreement establishes procedures and conditions for implementing bonus plans but does not specify the details of how the bonus is to be calculated. Non-unionised black coal mines in the United States are not legally required to provide such payments (Appendix I). Nonetheless, the existence of bonus arrangements in unionised mines is likely to provide an impetus to non-union mines to provide such bonuses.

While the amount or method of calculating the bonus is not prescribed in the P&E Award, the presence of the provision (in combination with the 'custom and practice' provision) effectively requires mines to pay bonuses which are generally based on output or attendance rather than on productivity or workplace profitability.

The NSW Minerals Council (DR trans., p. 22) drew attention to the potentially perverse consequences of a production based bonus for labour costs, highlighting the need to negotiate bonus schemes which better reflect the circumstances of individual mines. In their view, AIRC decisions did not always recognise this need and, hence, felt that that bonuses should not form an allowable award matter in the black coal industry.

Bonus schemes seem best left to individual parties to agree and determine in the light of the conditions applying at individual workplaces. The inclusion of bonuses as an allowable award matter, in conjunction with the maintenance of the 'custom and practice' clause as an allowable matter, results in a relatively high labour cost structure for Australia's black coal industry.

5.5 Functions, tasks and skills

This section analyses the flexibility of work arrangements dealing with the movement of labour to different tasks in the workplace. Since this also depends on the range of tasks able to be performed and the skills possessed, this section

also examines issues associated with skill acquisition. These arrangements are discussed in the following two sections on demarcation rules and training.

5.5.1 Demarcation rules

Task allocation in Australian black coal mines is determined to a large extent by demarcation rules, of which there are four main types.

Union-based demarcations

Two types of demarcation rules have evolved as a result of the structure of unions in the industry. First, a strict distinction is made between the work undertaken by managerial and non-managerial employees (called staff and production and engineering workers, respectively). Second, production work (mining/machine operation) and engineering work (maintenance) are also strictly segregated. Both distinctions arise out of the separate unions covering staff, production and engineering workers.

The demarcation between production and engineering workers has been given a legal basis in the work models contained in schedules to the P&E Award which separate workers into two streams — production and engineering. The work models arose out of award restructuring in the late 1980s, which in part aimed to reduce demarcation. As outlined in Appendix K, this was successful to some extent. It eliminated multiple job classifications by switching to a pay regime based on acquisition of a broad range of skills rather than narrow occupational definitions (the impact of which is discussed below), and rationalised pay levels. However, significant restrictions on task allocation remain because the models distinguish between production and engineering workers. Camberwell Coal illustrated the strictness of this distinction:

> One of the problems we have had from day one, and it was a situation we tried to address in the early days, is that we still have the demarcation in respect of our production people and our engineering people. When we started Camberwell off one of the philosophies that we had was that we really wanted a multi-skilled flexible team that we could use people when and where required, if that meant we had a tradesman in the workshop who really wasn't busy and we needed someone to operate a truck, that we could utilise that skill if the person was so skilled and trained.
>
> I suppose that we have been working since day one, to try and change that demarcation, but it is a district or national CFMEU policy that there is no cross-over between the production and engineering streams, other than for minor issues such as changing hoses, changing mirrors or — I suppose where we sit today, that would be one area for us that we could gain some substantial benefits by being able to utilise people more flexibly. (trans., p. 50)

Some mines (Ensham, Oaky Creek and Moranbah North are some examples) dispense with the stream approach. The CEO of Ensham has claimed that removal of this type of demarcation has contributed to an increase in employee utilisation of 30–40 per cent over the national work model contained in the P&E Award (Foots, 1997).

Occupation and equipment capacity

A third form of demarcation, as outlined in Appendix K, arises under the wage rates clause (no. 8) of the P&E Award, where there is significant scope for demarcation based on occupational definitions and equipment capacity. Mines that do not apply the work models and instead base their pay structure on clause 8, face nine groups of occupational classifications — with up to 32 job classifications within each group. In addition, some occupational classifications include different pay rates for operating equipment of different capacities.

Comparison with Australian metalliferous and United States black coal mines

In Queensland metalliferous mines covered by the *Queensland Mining (non-coal) Award*, there would appear to be less scope for demarcation. Employees are graded according to nine levels based on competencies which contain broad functional outlines. There is no separation by stream as in black coal. Similarly, in the metalliferous agreements outlined in Appendix H, there are no demarcation rules.

Anecdotal evidence also suggests that demarcation is less of a problem at Australian metalliferous mines — and also at some US mines. For example, Shell stated:

> ... if we go to other industries, metalliferous mining or general industry — I'm not saying that demarcation doesn't exist, I'm sure it does — you can always find examples — but in general those artificial demarcations have evaporated and the focus is on working within a responsible range of skills in a safe manner. (trans., p. 218)

Exxon compared its US and Australian mining experience:

> Clear demarcations exist between Production and Maintenance employees [in Australian black coal mining]. Work demarcations also exist between unionised Staff employees and those employed in the maintenance/production areas. The list of restricted practices is significant, effectively preventing companies from running their businesses in the most effective way. In other industries and at international coal mines, a multi-skilled approach is used where employees can be utilised in the areas for which they are trained.

> Using the Caballo [US] mine experience again as a single example, a shovel operator would carry his own tool box and often effect minor repairs himself. Replacing a trip rope may require an operator 5–10 minutes. Because this is a 'maintenance issue' at our Australian coal mines, the time lost in the call out of maintenance personnel to perform this work typically results in a 30 minute loss of production. Similar restrictions apply to activities such as cable moves, replacing bucket teeth, changing shovel shims, etc. Similarly, best practice longwall mines in the United States will utilise all available labour on the production unit to restore their high cost, high capacity longwall system from a down event rather than rely exclusively on 'maintenance' personnel to engage in this critical activity. (sub. 3, p. 6)

However, other US mines are not so flexible. In unionised US black coal mines covered by the main union agreement, there would appear to be three types of demarcation restrictions (see Appendix I). First, there are specifications which limit the ability to switch between prescriptive job classifications. (For example, in 'underground at deep mines' the Agreement specifies 38 job classifications, each containing numerous job titles — the 'beltman' classification alone includes 39 job titles.) Second, there are specifications which prevent supervisors undertaking 'classified' work; and third, there is demarcation of specific tasks. (For example, repairs on electrical components or power circuits are reserved for qualified UMWA electricians and the duties of oiler, groundman and drill helper are specified.) There may be other more informal demarcation rules in unionised US coal mines, but the Commission was unable to ascertain 'custom and practice' arrangements. By contrast there are no formal demarcation restrictions at non-unionised mines in the United States (Appendix I).

Legislative demarcations

The fourth type of demarcation rule is contained in the State coal industry specific legislation which sets aside certain functions for people with particular qualifications. The positions set out in the legislation and their associated functions and qualifications are described in detail in Appendix J.

The coal mining legislation is far more prescriptive in this respect, involving significantly more statutory positions, than that covering non-coal mines in both NSW and Queensland. The positions required in non-coal mines also are outlined in Appendix J.

The basis for creating these demarcations in the legislation is safety, and it is certainly the case that there are likely to be tasks in black coal mining that require specific knowledge or training before they can be carried out in a safe manner. However, whether or not the prescriptive demarcations in the coal legislation have contributed to a safe work environment in the black coal

industry is open to debate. As discussed in Chapter 9, safety performance in Australian underground black coal mining is poor, even though the industry has highly prescriptive legislation.

Effects of restrictive demarcations

Demarcation rules detract from productivity by significantly restricting the flexibility of the workplace in allocating tasks. The principal difficulty associated with demarcation rules is the inability to change the associated demarcation categories over time — in both the short and long term. The most appropriate way of combining and allocating tasks is likely to vary over time according to the changing circumstances of each individual workplace. For example, task allocation may need to be modified in the long term in response to technological change and the changing nature of skills required, or in the short term according to immediate priorities that might arise out of product market demands, geological faults or equipment failure. By limiting the ability of the mine to respond to change and make these necessary adjustments, demarcation rules unnecessarily depress labour productivity and increase unit labour costs.

Basing demarcation categories on historical precedent and the structure of unions in the industry provides an additional avenue by which demarcation rules in black coal mining adversely affect mine performance. The optimal allocation strategy is likely to depend on a combination of factors including skill requirements, gains from specialisation, gains from job variety or depth, priority task demands and, importantly, safety. The demarcation categories now existing in black coal mining (both legislative and otherwise) provide little scope for allocating tasks based on any of these factors at the mine level. This inflexibility leads directly to underutilisation of labour, skills and capital — for example, by increasing paid idle time whilst one group of workers waits for another to complete a complementary activity or because staff and engineering workers are unable to undertake production work despite having the skills to operate machinery — unnecessarily reducing labour productivity and increasing unit labour costs.

The demarcation rules that exist in black coal mining by virtue of the structure of unions in the industry, the job classifications in the pre-simplified P&E Award and the coal-specific industry legislation reduce workplace flexibility and dynamic efficiency by limiting the factors that can be taken into account in allocating tasks.

5.5.2 Training

Training can benefit both firms and workers — increasing worker productivity, and leading to higher wages. Other benefits to employees include increased job mobility and, possibly, reduced risk of unemployment. However, training is also costly. For example, at mine sites, where most training of non-managerial employees is on the job, decreased productivity while workers and machines are taken off production for training purposes will constitute a significant portion of training costs.

An efficient allocation of resources to training involves balancing these costs against the benefits of training. Since it is unlikely that, for each worker or team of workers, every increment in training will result in the same constant increase in the level of associated benefits, at some point, the costs of further training are likely to outweigh any associated increments in the value of output produced by a particular worker or team of workers. Hence, from the employer's point of view, if allocated inefficiently, training is likely to result in unnecessarily high unit labour costs. Where training allocation becomes more efficient, improvements in labour productivity may accrue both from a decrease in production time lost due to training and an increase in the amount of increment to the productivity of each worker that is attributable to training.

At present in black coal mining, there appear to be three types of barriers to the efficient allocation of training at the mine level. The nature and extent of training is determined in large part at the industry level — first by the State coal industry legislation and, second, by industrial awards and agreements. Third, many of the work arrangements in black coal mining also indirectly prevent mines from allocating training efficiently. These barriers are discussed in turn below.

Legislation

As mentioned above, the qualifications and training required of all levels of management to the first line supervisor level, as well as a number of other positions, are determined by the NSW and Queensland coal mining industry regulations. These regulations specify both the nature and extent of training required (see Appendix J).

The nature of the skills and the competence levels required to obtain these qualifications also are determined at the industry level by regulatory bodies — the NSW Coal Mining Qualifications Board and the Queensland Board of Examiners. The former (as its name suggests) is specific to the coal industry; the latter covers all mining in Queensland.

Mines are required by law also to provide a mine site induction for all new employees. The nature of this induction — at least in NSW — also is determined by regulation at the industry level (by Order 34 of the Joint Coal Board (JCB)[12]). In addition, JCB Order 34 requires NSW colliery managers to establish and maintain an approved training scheme (covering induction training, skills training, and retraining) and an accurate record of all training given to each mine worker.

While this prescriptive legal regime has been the traditional approach to ensuring safety — and extends to training in recognition of the links between training and safe work practices — it does not necessarily constitute the best approach to either training or safety. Some of the costs of such legislation are outlined in Chapter 6. In particular, by encouraging a 'compliance mentality' and a focus on technical knowledge to the exclusion of other types of skills (because certificates require technical knowledge only), the legislation may result in a lack of recognition that skills other than those specified in certificates may also be important. This will be especially problematic where the skill bundle specified by the legislation does not coincide with the most appropriate balance of skills at the mine level. Exxon stated:

> Unlike technical training, there is a need to improve the quality of 'people skills' within the industry through enhancements in supervisory training and general communication skills training. (sub. 3, p. 7)

In addition, detailing in legislation the skill structure of the workforce (that is, who holds which skills at any particular workplace) does not allow for innovation or variations of approach in human resource management. For example, while it is highly desirable for managers to have access to a range of skills and knowledge — including both technical, industrial relations and management skills — this does not necessarily require that they invest in such skills personally. An alternative might involve managers depending on the advice of a number of specialist assistants. However, the legislation does not allow for such differences of approach.

The prescriptive nature of the State coal-specific industry legislation with respect to the structure of the workforce and the qualifications associated with that structure does not encourage adequate recognition by management of the full range of skills likely to be of value in promoting high productivity mine performance. In addition, it does not allow innovations or improvements in management strategies relating to the skill structure of the workforce.

[12] JCB Orders are legal requirements.

The Coal Mining Qualifications Board (CMQB) and the role in the black coal industry of the Queensland Board of Examiners (QBOE) will be superseded once the Training Package under the National Training Framework (NTF) (discussed below) has been fully implemented in black coal mining. In particular, the establishment of detailed competence standards in the industry — developed by representatives of management, unions, regulatory authorities, technical experts, training/education providers and mines rescue services — in addition to the qualification quality assurance system associated with the NTF duplicate the work of the CMQB and QBOE. Importantly, the existence of bodies such as the CMQB and QBOE regulating training and qualificational requirements at the industry level contributes to the lack of enterprise focus in relation to training and management of skills in the industry. Implementation of the NTF, in conjunction with a less prescriptive approach to mine management (as discussed in Chapter 6), would increase the flexibility available to companies in adapting the skill structure of the workforce most appropriate to a particular mine.

Recommendation:

The Coal Mining Qualifications Board (NSW) and the role in the coal industry of the Board of Examiners (Qld) should be abolished.

Industrial relations

The second barrier to the efficient allocation of training stems from its formalisation in the P&E Award (as it stood prior to award simplification). Given the links between training, pay, productivity and safety, all parties (employers, employees and unions) have an understandably strong interest in training. Thus, it is no surprise that training constitutes a major employee relations issue. For example, around 70 per cent of the black coal agreements studied by Wooden et al (1996) contained a commitment to training. However, Exxon suggested that there has been inadequate recognition in the industry of the links between training and productivity:

> Training is not viewed as a significant factor affecting black coal industry competitiveness. (sub. 3, p. 7)

This is reflected in the way training is specified in the P&E Award. While there are no training provisions in the ACSA Award (as the training issues relating to the occupational coverage of ACSA are dealt with in the industry legislation discussed above), the P&E Award contains provisions specifying the training required at each level of the pay hierarchy (via the work models), the employment of apprentices, pay rates for apprentices and trainees, youth wages,

and other training wages specified as experience payments (one to two years of experience being required before the employee moves to a higher wage and the rate of pay for experience differing depending on the occupation).

Perhaps the most influential aspect of the P&E Award with respect to training is the work models. As outlined in Appendix K, the work models were developed by joint working parties at the national level, but CIT decisions required that they be implemented by agreement at site level. The models are contained in two of the six black coal agreements examined in Appendix G, and Wooden et al (1996) found they were included in just over half of the coal agreements they sampled. However, they also found that:

> ... only a little over half of the agreements concerned with implementing work models could be described as site specific, with the remainder being modelled very closely on the industry standard. (Wooden et al 1996, p. 31)

While the work models might differ in detail from mine to mine, their overall characteristics are the same — that is, workers are divided into two streams; pay is based on skill accumulation rather than application; and training costs are incurred by employers. A further characteristic of the models as they are specified in the P&E Award is that promotion and training are allocated on the basis of seniority.

The impact on mine performance of dividing workers into two streams has already been discussed. Some of the other characteristics of work models are also likely to detract from mine performance. Basing pay on skill acquisition rather than application is likely to increase unit labour costs by encouraging workers to acquire skills that are underutilised — adding unnecessarily to both training and wage costs. In addition, it does not allow scope for pay adjustments to account for scarcity of skills. Nor is there any recognition of quality of skills acquired (which also depends on training quality and innate ability). The allocation of training and promotion on the basis of seniority alone is likely to lead to the underutilisation of some skills and reduce the returns to training — unnecessarily increasing unit labour costs. Thus, in various ways, the work models limit the ability of employers to influence the most efficient combination of skills that each worker will attain and use.

Moreover, the structure of the work models — in particular, the seniority provisions and the pay system based on skill acquisition rather than skill application — also disturbs the nexus between training and productivity from the employee's point of view, contributing to the lack of focus on the link between training and productivity.

The way training is currently prescribed in the P&E Award results in significant costs to mine performance. Better outcomes would be reached if

training arrangements were more flexible and negotiated at the enterprise level.

Other work arrangements

The third main type of barrier to the efficient allocation of training at the mine site exists indirectly through other work arrangements. For example, restrictions on the amount of overtime that can be worked per employee (see section 5.3), the allocation of overtime on the basis of seniority and relatively generous leave provisions in black coal are likely to result in: higher than necessary training relative to other industries in order to maintain skill availability (unnecessarily increasing unit labour costs); and training allocation that will not necessarily reap the highest net return (from both the worker's and the company's point of view).

Government involvement in training in black coal

Government policy has encouraged a move towards competence-based training in all industries, most recently through the National Training Framework (NTF). The NTF was agreed in principle by the Commonwealth, State and Territory Ministers responsible for vocational education and training in November 1996. One of the major components of the NTF is the Training Package, representing a national vocational qualification and qualification assurance system developed by industry to meet current and emerging skill needs. A Training Package is being developed separately for black coal mining by the National Mining Industry Training Advisory Body (NMITAB). As part of this Package, a Traineeship is being developed at entry level for black coal. The CFMEU is playing a significant role in the development of the both the Training Package and Traineeship through its participation in the NMITAB.[13]

The Commission notes that a compulsory coal-specific Traineeship for black coal mining could create further barriers to potential employment of workers from outside black coal. The Commission therefore supports the current approach to adoption of the Traineeship on a voluntary basis.

Training in Australian metalliferous mining and in other countries

In the metalliferous sector, training is determined far less at the industry level than it is in black coal. As Appendix J shows, the metalliferous regulation is also far less prescriptive in relation to training than that for black coal. Given the greater enterprise focus in metalliferous and the lack of one overarching

[13] All national ITABs are structured to include industry stakeholders such as unions and employers.

industry award, individual metalliferous mines have more freedom to determine their approach to training at the site level. (Appendix H notes that the *Queensland Mining (non-coal) Award* has no provisions relating to training costs, but does specify the content of standard induction training. The Gunpowder and Mt Isa agreements both include provisions relating to training pay, with Gunpowder specifying that progression through the classification structure be based on the acquisition of skills.) Further, the metalliferous sector is lagging black coal in the development of a set of competences and Training Package.

Unionised mines in the United States are covered by relatively prescriptive training provisions under the main union agreement. However, it would appear that training at non-unionised mines is determined solely at the enterprise level. The NMITAB provided the Commission with a report of its 1992 overseas study mission, which visited the United States, France, Germany, the United Kingdom and South Africa to collect information about training. The report concluded that the two systems of most interest in the Australian context were those of the United States and the United Kingdom.

> [The US] industry's high labour productivity performance appears to be achieved without any government intervention or a national/state industry structure influencing training and accreditation.
>
> The UK is the model with which key aspects of the Australian reforms are most closely aligned. (NCS-MITAP 1992, p. 17)

Table 5.7 summarises the NMITAB mission's findings on these two countries.

Table 5.7: **An overview of training in the United States and United Kingdom**

Country	*Training*
US	No structured or standardised training, with control at the enterprise level. Training is "largely unaffected by any external agencies outside minimum legislated safety standards". (NCS-MITAP 1992, p. 7)
	The USA Coal Industry does not rely on portability or standardisation but focuses on enterprise and mine-based training by line supervision as well as availability of a large pool of skilled unemployed miners. (NCS-MITAP 1992, p. 7)
UK	Similar to Australian system based on national competence standards. This system is "bringing under scrutiny the role of all remaining statutory" bodies such as the Mines Qualifications Board. (p. 11)

Source: NCS-MITAP Tripartite Overseas Study Mission (1992) *Training for the future*, 7–30 November.

5.6 General procedures

This section focuses on the flexibility of general procedures covering the consultation and negotiation of change in the workplace. This includes dispute settlement arrangements.

5.6.1 Negotiating change

While the ACSA Award makes no provision for negotiating workplace change, prior to award simplification the P&E Award did so. In particular, employers were required to notify and discuss changes which had 'significant effects' with their employees and relevant unions — where significant effects included: termination of employment; major changes in the composition, operation or size of the workforce or in the skills required; elimination or diminution of job opportunities, promotion opportunities or job tenure; the alteration of hours of work; and the need for retraining or transfer of employees to other work or locations or the restructuring of jobs.

Several of the CAs outlined in Appendix G maintain the P&E Award clause. However, several agreements have established other types of consultative mechanisms, aimed principally at ensuring regular communication between the parties but which do not have a definition of 'significant effects'.

In its recent award simplification decision (CN 40113 of 1998), the AIRC noted that following discussions between the parties and the conciliation conferences, agreement had been reached that employer-union consultative processes regarding the introduction of change would not form an allowable matter in the P&E Award.

Comparisons with Australian metalliferous and United States black coal mines

Wooden et al (1996) showed that there is no difference (on a statistical basis) between the Australian metalliferous and the black coal sectors in relation to provisions covering consultative arrangements (presumably covering aspects associated with change in the workplace). Indeed, the awards and agreements documented in Appendix H are supportive of Wooden et al's detection of a tendency towards a broader range of work-related matters for discussion in metalliferous than in black coal awards and agreements.

The main unionised agreement in the United States (Appendix I) provides for the establishment of a Labor Management Positive Change Process (LMPCP) "designed to discard old ways of negotiating in an atmosphere of mistrust and to foster a new environment of mutual trust and facilitate new and creative

approaches to labor-management relations through increasing the involvement of employees in the success of the mine" (Article II(G)). The LMPCP is an industry-based process for unionised mines and establishes committees within nominated facilities, which receive a grant (funded by employers to a central fund). By its nature, the LMPCP is broad (it does not stipulate topics of change) and it explicitly recognises the need for the parties to change the atmosphere in which discussions occur.

The only legislated minimum which affects non-union mines in negotiating change with their employees, is under the *Worker Adjustment and Retraining Act*. The Act requires an employer to provide 60 calendar days' notification of plant closings and mass lay-offs in order to provide workers and their families with some time to adjust to the loss of employment and search for alternative employment (Appendix I). As for other types of change, the 'union threat' effect (see Chapter 4) acts as an incentive for management to keep its workforce informed about important developments and to negotiate major changes with its workforce in a positive environment.

Difficulties in negotiating change

Rio Tinto and the DWR&SB each provided evidence which indicates that negotiating change in black coal mining workplaces has been a major factor underlying the high level of industrial disputation in the industry:

> Principally due to the variability over time of disputes data, there are risks in relying too heavily on it. However, the data ... provide a quite strong basis for several conclusions:
>
> - the settlement of major employment conditions is not the principle cause of industrial conflict in coal
> - on the other hand, attempts by management to make changes in work practices appear to generate considerable resistance from unions in the coal industry.
>
> In short, there appears to have been active resistance to change in workplace arrangements at the same time as enterprise bargaining delivered better employment conditions. Rio Tinto estimates that as much as 70 per cent of management time is consumed in negotiating employee relations changes other workplaces have taken for granted. (sub. 22, p. 53)
>
> A comparison of dispute figures provides clear evidence of the relatively poor industrial record of the coal mining sector, particularly over the past eighteen months. As mentioned earlier in the submission, in the Department's view, the majority of the disputes in this period reflect the coal producers' reaction to the impact of competitive pressures; most of the disputes relate to union resistance to changes in work practices and concerns about merit based retrenchment processes. (sub. 40, p. 8)

Many other participants also commented on the difficulties associated with changing work arrangements in the black coal industry, although none pointed to the previous P&E Award provision regarding the negotiation of change as a specific impediment.

The IC (1991b) noted that, at the time of that inquiry, relations between management and production and engineering workers at an industry level were characterised by an adversarial style:

> ... relations between employers and unions are generally poor, stemming largely from the many bitter industrial battles fought in the past. This has fostered an 'us and them' philosophy which at times blinds either party to the other's point of view. (IC 1991b, p. 544)

The Commission welcomes the agreement reached between parties to the P&E Award that provisions relating to the process of negotiating change will not form an allowable award matter. It is also encouraging that some black coal agreements had already moved away from this specific provision, with discussions and negotiations taking place in a less adversarial environment. However, in many cases the attitude and abilities of the parties still appear to inhibit workplace adaptability and flexibility.

5.6.2 Dispute settlement

Dispute settling procedures are commonly found in awards and agreements and, indeed, form one of the twenty allowable matters in the award simplification process. The dispute settlement process in the P&E Award outlines five main steps or levels to dispute settlement — discussions proceed to the next level if a settlement is not reached in the previous level. By agreement, parties can bypass levels (2) to (4) for speedy resolution (Appendix F). Changes to the process of dispute resolution were made in the first stage of the award simplification process. These changes mean that the various levels of union representation no longer have an automatic role in this process but do so if invited. The parties to the P&E Award agreed to delete provisions requiring the use of the (former) process in disputes over unfair dismissals (in conjunction with another clause related to unfair dismissals more generally).

Surprisingly, the ACSA Award does not appear to contain a dispute resolution procedure within the workplace. Instead disputes are heard by Boards of Reference. Nonetheless, all CAs must contain dispute resolution or grievance procedures.

The small number of black coal agreements documented in Appendix G generally contain similar dispute resolution procedures as the P&E Award, with

steps proceeding ultimately to the AIRC if the grievance remains unresolved. Recent notable examples in the black coal mining industry have resulted in the AIRC being unable to arbitrate on a dispute because of jurisdictional/legal issues. Accordingly, MIM's Oaky Creek Agreement provides a number of additional steps which ensure that any dispute is resolved ultimately by a third party if necessary. However, subsequent to the certification of MIM's Oaky Creek agreement, the Full Bench of the AIRC confirmed (in the case of Rio Tinto's Hunter Valley No. 1 mine) that under the WR Act the role of the AIRC in resolving disputes is limited — effectively handing back resolution of the dispute at that mine to the parties themselves.

Nonetheless, the most important elements of MIM's Oaky Creek Agreement in relation to dispute resolution relate to its stand-alone nature, removal of the traditional custom and practice provision and the ability to undertake continuous improvement. This means effectively that there is no general requirement to observe the status quo of either formal or informal work arrangements while a dispute is being resolved, hence reducing the costs of change. The MIM agreement also reduces the scope of matters potentially under dispute and therefore subject to compulsory third party conciliation or arbitration.

Comparisons with Australian metalliferous and United States black coal mines

The dispute resolution procedures in the small number of metalliferous awards and agreements contained in Appendix H tend to have three to five steps, with union involvement in the process tending to be an entitlement of the employee if he/she requests such involvement. Since custom and practice do not appear to be formalised in the work arrangements in awards or agreements in metalliferous mines, a number of the dispute resolution procedures in these awards or agreements (which include the maintenance of the existing work arrangement while the dispute is being resolved) may only apply to formal work arrangements.

Detailed dispute settlement arrangements and grievance procedures are found in the main US unionised mine agreement (Appendix I). However, since custom and practice is formalised also in the main non-unionised agreement, it would appear that dispute resolution procedures relate to disputes about changing both custom and practice and formal work arrangements. It is not clear whether the status quo is maintained while the dispute is being resolved.

While non-union mines in the United States are likely to have their own established policies for the handling of grievances and disputes, there are no formal legislated minimums in this area. Moreover, whether or not the status

quo is maintained while a grievance is resolved is also not subject to formal legislation.

Difficulties in resolving disputes

While dispute resolution procedures are necessary, Rio Tinto was the only producer to raise the link between their use and the approach of third parties to resolve matters of dispute:

> ... coal unions continued to use dispute notification as a means of bringing grievances and similar disputes before the [AIRC] for recommendations or orders or voluntary arbitration, often in protest against action taken in accordance with management rights under awards or agreements. Rio Tinto's experience was that the [AIRC] continued to make recommendations which compromised those rights.
>
> Under the *Industrial Relations Act*, the absence of a clear distinction between industrial disputes over the making of employment conditions, and over reacting to management initiated change, probably contributed to the confusion in the role the [AIRC] played.
>
> To some extent, this lack of clarity has been addressed by the *Workplace Relations Act*.
>
> The distinction between 'protected' and 'unprotected' industrial action, and the availability of orders under Section 127, are steps forward in clarifying the [AIRC]'s role.
>
> There continues to be, however, insufficient clarity over the role of conciliation in disputes over the making of awards and the negotiation of agreements, and the role of conciliation in resolving grievance disputes.
>
> In other words, the distinction between agreement making processes and the application of award or agreement provisions governing the settlement of grievances arising from management action is not clear. (sub. 22, p. 58)

In contrast, comments by BHP suggest that it was more up to mine management and the unions to resolve grievance issues at an earlier stage than that involving the AIRC:

> As far as the AIRC is concerned, I guess if you go back to the early 80s we found ourselves through various dispute resolution procedures spending a fair bit of time in the [AIRC]. We spend very little time in the [AIRC] now. ... We don't avoid it but we don't find ourselves in the [AIRC]. We have tended to not rely upon the legal fraternity, if you like, to resolve issues for us on the job. We haven't found that necessary in general terms. I think most of our experience in the [AIRC] now would be in fact an experience that sees us taking agreements along for certification. (trans., p. 189)

This was based on the premise that all parties recognised the need for change in the approach to dispute resolution:

> It seems, in my experience, to take an event, a significant event to, if you like, bring people into reality. To some extent we saw that in the late 80s, and I think even the unions would agree that in the late 80s the significant event was in fact the so-called hours case, and the union movement at that time saw that if they weren't prepared to change it would occur anyway. (trans., p. 188)

This issue of dispute settlement and the role of third parties in resolving disputes is discussed further in Chapter 6.

5.7 Conclusion

Work arrangements matter because of their direct and indirect effects on human relations, productivity and unit costs of production and therefore ultimately on the survival of a business in a highly competitive environment. This chapter has outlined a host of formal work arrangements in Australian black coal workplaces and compared them with those in Australian metalliferous and US black coal mines.

In the AIRC Full Bench decision on award simplification of the Hospitality Award, it was made clear that the Federal award simplification process would not involve a general review of the level of award entitlements (see Chapter 4). Hence, award-based remuneration and other entitlements in the black coal mining industry are unlikely to be changed substantially in the short term. Nevertheless, recent experience would indicate that some mines may negotiate wage freezes and reductions in over-award rates depending on the circumstances they face. Accordingly, the impact of work arrangements (including custom and practice) on productivity is of central concern for this inquiry. Indeed, even without any further increase in product market competition, the relatively high remuneration of black coal mine employees is, by itself, an important imperative for higher productivity.

Although there is a growing number of exceptions, the Commission finds that a multitude of work arrangements (including customs and practices) have restricted and may continue to restrict productivity at black coal mines. These include:

- the lack of merit-based recruitment mechanisms — through the requirement to use 'retrenchment lists' of previous industry employees and selection from the list based on seniority in NSW;
- retrenchment on the basis of seniority;
- restrictions on the use of casual, part-time employment and the use of contractors;

- the allocation of overtime on the basis of seniority and restrictions on the amount of overtime worked;
- informal restrictions on changing shift and roster arrangements;
- the use of seniority in allocating personnel to shifts;
- practices which contribute to relatively high levels of idle time, such as 'early knock off' and restrictions on staggering 'crib breaks';
- seniority-based allocation of personnel to annual leave;
- seniority-based promotion;
- strict enforcement of demarcations between production work and engineering work, and between the work of production and engineering employees and supervisory staff;
- rigid job demarcations through State coal industry legislation which specifies 'statutory positions' and their associated functions and qualifications;
- the possible inefficient allocation and inappropriate type of supervisory training from a workplace perspective as a result of its determination in coal-specific legislation;
- basing pay on skill accumulation rather than the application of skills (as specified in the work models);
- the allocation of training (and therefore tasks) based on seniority;
- the limited focus of communication and consultative arrangements; and
- the negative approach to dispute resolution at some mine sites.

The prominence of seniority in determining many human resource management decisions in the workplace is particularly notable in the above list.

The AIRC's recent award simplification decision (CN 40113 of 1998) that the use of retrenchment lists in recruitment and LOFO in relation to redundancy are neither allowable award matters nor incidental to or necessary for the effective operation of the P&E Award is a step in the right direction.

It is apparent that some companies have managed to change quite a number of such productivity-restricting work arrangements, at least at some mines. The following chapter examines the issues associated with changing work arrangements.

Recommendation:

The following should not be included as part of the allowable award matters in the black coal industry:

- retrenchment lists and seniority-based recruitment;
- provisions which require retrenchment based on seniority alone;
- restrictions on the use of part-time, casual or temporary employment or on the use of contractors;
- bonuses;
- specific demarcation provisions;
- prescriptive training provisions; and
- provisions relating to the process of negotiating change.

6 WORK ARRANGEMENTS: ENABLING CHANGE

Until the mid-1980s, there was little competition in the market for black coal. The main goal of management was to maintain supply, and this was reinforced by legislative and institutional structures in the industry. Management and its workforce faced little or no pressure to change and improve productivity. The main industry unions gained (on behalf of their members) high wages and work arrangements which hampered productivity.

Some legislative and institutional impediments have been removed, but State legislation on the black coal industry remains a key barrier to reform. By establishing flexible labour market structures and facilitative legislative frameworks, governments can provide an environment more conducive to change.

Increasing competition in the market for black coal has been the key stimulus for productivity growth in the industry. Hence, a major role for governments is to ensure the existence of competitive product markets, both domestically and internationally.

Unions — as bargaining agents for employees — and managers are also important within the context of change in the industry. If a constructive bargaining approach is adopted, the capacity to cope with essential change is enhanced.

It is understandable that employees are wary of pressures to change work arrangements. Yet change is occurring, with employees agreeing to new work arrangements at some mines, for the sake of the competitiveness and continuing viability of those mines.

There is likely to be some job loss in aggregate in the black coal industry in the years ahead. The size of that job loss will be reduced by changing work arrangements which restrict productivity growth.

6.1 Introduction

This chapter examines issues associated with changes to work arrangements in Australia's black coal industry. The pressure to change, and adopt continuous

change strategies, stems from the increasingly competitive nature of the market for black coal.

While a growing number of mines are introducing change, it is apparent that many mine sites continue to find it difficult to achieve changes to the productivity-restricting work arrangements documented in Chapter 5. Consequently, a key question facing those with a stake in the industry — investors, managers, unions and employees — and the relevant institutions, is whether there are any unjustifiable impediments which inhibit the pace of change.

The chapter opens by discussing workplace culture. It then examines the role of the following three players in changing work arrangements and their various approaches to change: managers, unions and employees. The role of government is also discussed in each section. Issues associated with adjustments to change are discussed at the end of this chapter.

6.1.1 Workplace culture and change

Underlying the issue of change in the industry is the role of workplace culture.

> While those who seek reform might see a departure from the culture as an important objective, their strategies, and the proposals of the Commission, should be cognisant of the cultural context. (DWR&SB, sub. 40, p. 13)

Workplace culture is a reflection of the complex inter-relationship between the roles that criticism, conflict and hierarchy play in an organisation (Trompenaars 1993). Consequently, it is a difficult concept to measure. Moreover, a distinguishing feature of any culture — whether national, corporate or at the workplace — is its slowly changing nature (Hofstede 1980).

Previous studies have identified the attitudes of industry participants and the culture pervading the industry as a barrier to changing work arrangements. Attributed to the industry's confrontational background, product market characteristics and the historically hazardous and difficult nature of underground work, the prevailing 'attitude and culture' contributed to, and in turn was shaped by, an industry that, according to Taylor (1994), was characterised by:

> ... aggressive/adversarial industrial relations; centralisation of authority of unions and management and little devolution of authority; poor management/employee relations at the workplace; hierarchical management style with limited consultation with the workforce and reliance on high levels of supervision; and undue reliance by the union on custom and practice rather than best practice. (p. 115)

Many participants in this inquiry also pointed to the 'industry culture' as a barrier to change, suggesting that little change had occurred over time. For example, the NSW Minerals Council stated:

> One of the major impediments to change in the coal industry is the 'culture' of the industry or the set of attitudes which pervade the industry as a result of its history and the institutional and other arrangements which have existed.
>
> This culture, certainly as it applies to many employees in the industry, tends to be characterised by attitudes such as the following:
>
> - coal is unique, special, different — therefore requiring special legislative, regulatory and other arrangements (typically on an industry wide basis).
> - the employee sees himself/herself as working for the 'industry' (rather than the particular company or mine) and identifies very strongly with the union.
> - many of the problems in the industry are due to incompetent management, lack of controls on the industry's production and marketing and damaging investment and purchasing practices by importing countries — these tend to form the rationale for resistance to change.
>
> ... In recent years there has been some change in attitudes within the industry, with some employers more successful than others in achieving change and in breaking down some of the resistance to change. ... Nevertheless the old industry culture as outlined above is still strong and presents a major challenge for management if it is to continue and speed up the process of lifting minesite performance... a number of other institutional barriers and other barriers still exist which are continuing to inhibit change in the industry and which need to be addressed by management and governments. (sub. 25, p. 30)

The interrelationship between the institutional environment of the industry, its history and resistance to change by management can be illustrated with three specific examples. First, it has been argued that managers in some cases have been reluctant to institute change because of conflicting loyalties arising out their union affiliations. The DWR&SB commented:

> The coal unions and their members (especially the CFMEU), which have been able to exercise considerable influence not only in the operation of mines but also in the social fabric of mining communities, have been key players in developing and maintaining the culture of the industry, but managers have also played a part. Coal producers have advised the Department that, historically, companies often selected former members of the union for appointment to first level management positions. As these managers progressed through higher management levels, the industry culture with which they had been imbued expressed itself in the management approaches which were adopted at their workplaces, further contributing to the maintenance of existing industry arrangements.
>
> ... Such managers' loyalties were, at times, with their former peers. The unions meanwhile promoted the now strongly held view that the union looked after employees, developed and pursued the training agenda and maintained an active

> interest in OHS matters. Some industry representatives now argue, with hindsight, that management all but vacated these fields and employees saw the union as the provider of all things good. (sub. 40, p. 12)

Second, in black coal mining, management (until very recently) had few examples of successful implementation of productivity improvements to draw on and may have 'learned' that attempts to introduce change were futile. Their experience was of a prescriptive legislative and industrial relations environment, as the NSW Minerals Council suggested:

> ... the difficulty is ... many of the managers have been brought up in an environment which is prescripted. 'Thou shalt recruit in this way, thou shalt allocate work in this way.' And that is what they've learnt over their many years of working in the coal industry. (trans., p. 89)

Third, since the pay and conditions of staff (including certain managers) is linked to that of production and engineering workers, this provides a disincentive to managers at mine site level to constrain growth in labour costs. This is because a successful argument by one union for improvements in wages and conditions generally results in flow-ons to other awards. Hence, once improvements in wages and working conditions were won by the CFMEU for production and engineering workers in the parent P&E Award, the ACSA would find it easier to argue for and obtain similar conditions for staff. According to Menzies (1998) this point largely explains the wide margin between management salaries in coal and metalliferous mines.

While acknowledging that the existing 'attitude and culture' of the various players in the industry may represent an important barrier to changing work arrangements, the Commission's view is that governments' role with regard to bringing about a permanent positive change in the culture of the black coal industry is best limited to ensuring that *appropriate incentives* are in place to *enable* change to occur over time. Accordingly, this chapter focuses largely on those incentives that are within the purview of government. This does not mean that managers, employees and unions do not need to take greater responsibility for the prosperity of the industry.

6.2 Managers and workplace change

A primary role in introducing flexible and productivity-enhancing work arrangements within the workplace lies with management. Accordingly, this section examines the role of managers in driving change in work arrangements. In doing so, it highlights a number of institutional arrangements which have inhibited or which continue to inhibit managers in driving reform.

6.2.1 Management performance

Managers play a primary role in fostering continuous improvement at the workplace including by instituting flexible and productivity-enhancing work arrangements. While it is difficult to measure management performance without some benchmark, the indicators of mine performance detailed in Chapter 3 together with the persistence of restrictive work arrangements at many mines raise questions about management performance in the black coal industry.

A number of industry participants suggested that management's performance in black coal mining has been inadequate. For example, some contended that responsibility for both the existence and the persistence of restrictive work arrangements rests for the most part with management. Callide Coalfields commented:

> ... there is another side that we need to look at, and that's the effectiveness of management. I dare say that a lot of the restrictions that we're now faced with were probably the results of decisions that were taken more in the interests of expediency rather than the long term view, and we certainly have to address that if we are going to take the industry into the future and succeed. (trans., p. 223)

Thiess Contractors suggested more broadly that effective systems to track and minimise costs have not been established in black coal mining, adversely affecting mine performance. Thiess attributed this to poor management:

> It needs also to be noted that most of the poor work practices in the ABCI [Australian black coal industry] were not mandated by the relevant industrial awards and partly arose out of poor management on site. It is inappropriate to lay the blame for such practices solely on unions and employees when they were simply pursuing what was available from management that was suffering from cash flow priorities, poor cost control, a siege mentality and a herd mindset within the ABCI. (sub. 15, p. 8)

The CFMEU has also laid the blame for poor mine performance with management:

> That [mines operated by contractors] are producing results which may be the envy of others in the industry says more about the ideological problems and management competency of those others. Thiess and Henry Walker are getting on with the business of making money through managing effectively. And for them that means being pragmatic and working with unions. They are not engaged in an ideological war like the management of Rio Tinto, MIM and ARCO. (Maitland 1997, p. 4)

The Commission's view is that the performance of management in black coal mining reflects a set of market-based, legislative and institutional forces. In other words, the previous low level of competition in the market for black coal (discussed in Chapter 2), the industrial relations regime, and the prescriptive

industry-specific legislation together created a relatively perverse incentive structure for managers. This is discussed in Sections 6.2.2 to 6.2.4 below. In addition, some of the characteristics of mining created an environment which tended to favour the union in bargaining over work arrangements. This is discussed in Section 6.3.

6.2.2 Product market influence on management performance

Until about the mid-1980s, the coal industry was insulated from strong competition in both the domestic and international markets. This lack of strong competition impeded productivity improvement by allowing the focus of management to shift away from cost minimisation as well as by discouraging and insulating the workforce (including management) from change. Higher mine costs could simply be passed on to customers in the form of higher prices, as MIM noted:

> Until approximately 1980, the coal industry as a whole operated as price setters rather than price takers, effectively operating both in domestic and export markets on a cost plus basis. Accordingly no real management skills were required. There was no driver to become efficient, and insufficient experience in the industry of using resources — capital or labour — properly. (Menzies 1998, p. 3)

Lack of strong competition in the market for black coal had three significant effects. First, it created inertia, because there was no need to change. Second, it reduced the cognisance of the consequences of not changing — that is, industry participants in the past did not experience the costs (including job loss) of failing to change in response to adverse changes in market circumstances. And third, there was no credible threat of job loss for management to use as leverage in the event that it did wish to introduce change.

More recently, however, product market incentives facing managers have changed. Shifts in the basis on which coal is sold, the emergence of low-cost suppliers of energy (including gas), and increasing substitutability between types and sources of coal have contributed to greater competition in the market for black coal. While demand for black coal is growing, supply is increasing more rapidly, placing downward pressure on prices. The market is now more dynamic. This has created a compelling need for higher productivity in black coal mining, with implications for management and workplace practices.

Changes in work arrangements in black coal mining have been occurring in response to these changes in the product market. The Taylor report attributed the 1988 workplace reforms to the increasing exposure of the black coal industry to the world market (Taylor 1994, p. 113). The DWR&SB also

contended that work reform in black coal had its origins in the increasingly competitive product market:

> In the light of the developments mentioned earlier in the submission — international competition, price pressures and other economic factors — some firms now consider that they must regain lost ground with their employees in ways which, in other industries, are taken for granted. Coal companies are putting more effort into training their mine managers to manage effectively. Moreover, several firms are adopting strategies, based in part on the use of the Workplace Relations Act, to improve their competitive position. (sub. 40, p. 13)

However, while increased competition in the market for black coal has been driving change at many mines, the nature of that change has been constrained in some cases. In particular, it appears that while some mines have been able to achieve once-off improvements, continuous improvement has been more difficult to introduce, particularly at brownfield sites. For example, Camberwell Coal stated:

> ... we still find it very difficult to get ongoing progress and ongoing change and we are a long way ahead of most of the industry. (trans., p. 48)

Once-off changes vs continuous improvement

Several factors appear to have inhibited continuous change. Lack of management experience in seeking and instigating productivity improvements on a continuous basis has acted as one constraint. Institutional factors also have influenced the nature of change — the industrial relations framework existing prior to the introduction of the WR Act and the NSW and Queensland coal industry legislation creating an institutional framework that encouraged management inertia, significantly increasing the costs to managers of instigating change. (See Section 6.2.3 below.) 'Economic' factors also played a role in inhibiting change on a continuous basis. In particular, the capital-intensive nature of mining and the specific nature of some investments made by companies in individual mine-sites created a barrier to management-driven improvements in productivity by reinforcing union bargaining power. (See Section 6.3.1.)

Increasingly, employment arrangements in black coal mining are offering sufficient flexibility to allow for continuous improvement. This is in part due to improvements in management performance at some mines (for example, by bringing in new managers with a new approach) and demonstrated management commitment to change. Recent examples of very flexible arrangements include Shell's Moranbah North (underground) enterprise award and MIM's Oaky Creek (open cut) agreement.

Given the linkages between increasing competition in the market for black coal and the need for stronger productivity growth, a major role for governments is to ensure the existence of competitive product markets, both domestically and internationally.

6.2.3 Facilitating change: the role of regulation

While increased competition in the market for black coal has provided a significant incentive for managers to bring about productivity improvements through negotiating more flexible work arrangements, it is only recently that changes to the industrial relations framework in black coal mining have facilitated the task of raising productivity at black coal mines. In particular, legislative changes to the role of industrial tribunals and to the scope for industrial action appear to have been important. In other areas of government regulation of black coal mining, less progress has been made.

The industrial relations framework

Until relatively recently, industrial tribunals were involved extensively in matters relating to the management of mines at the workplace level. This is because of both the high incidence of disputes in the black coal industry and the relative ease of referral of disputes to a tribunal under the former IR Act. The unlimited scope for inclusion of matters in awards under the former IR Act also played a role in extending the range of matters in which tribunals were involved — particularly in black coal mining where significant numbers of work arrangements have been considered 'custom and practice'.[1] The extensive involvement of industrial tribunals in black coal industry disputes tied up management resources and tended to favour the status quo rather than facilitating change. Further, specific characteristics of the Coal Industry Tribunal (CIT) also appear to have impeded workplace reform in the industry.

The abolition of the CIT and the introduction under the WR Act of both limitations on the extent of involvement of industrial tribunals in disputes at the workplace as well as restrictions on the matters that can be included in awards have supported reform. These recent changes to the industrial relations framework and the way in which the previous industrial relations framework tended to hinder change (including change on a continuous basis) are discussed under the four subheadings below.

[1] Longstanding work arrangements considered by tribunals to be 'custom and practice' become implied terms in employment agreements at common law and prior to award simplification were included automatically in black coal mining awards (by virtue of the general custom and practice provision as discussed in Chapter 4).

The Coal Industry Tribunal

The CIT governed the resolution of disputes in black coal mining until 1995. Employers argued that the existence of an industry-specific industrial tribunal — separate from the conciliation and arbitration framework applying to the majority of Australian industry — impeded productivity improvement in black coal mining by encouraging a perception that black coal mining was unique and sheltered from the adjustments experienced in other industries. It also tended to insulate black coal mining from workplace reform occurring elsewhere.

Further, specific features of the CIT — that is, its legislated objective to maintain the supply of coal and lack of appeal to a Full Bench — gave it a narrower focus than other industrial tribunals (which had broader legislated objectives) and reinforced its isolation. Bach Consulting suggested that achievement of the legislated objective to maintain the supply of coal was at the expense of profitability and minimisation of costs (trans., p. 119).

Employers generally applauded the abolition of the CIT.

Industry-wide application of arbitration decisions

Under the previous IR Act, tribunal decisions had wide application across work sites in an industry — implemented in industry awards of unlimited scope. In black coal mining, this promoted uniformity in work arrangements across the industry and diminished the ability of managers at each mine to seek a solution best suited to the site's individual circumstances. The WR Act, on the other hand, increases the focus on workplace-specific solutions by restricting the matters that can be included in awards and limiting the role of arbitration.

The approach of industrial tribunals

The approach of industrial tribunals in resolution of disputes tends to favour the status quo, placing the onus on those advocating change. Because of this approach, together with particular characteristics of the CIT, the extensive involvement of industrial tribunals in decisions relating to the management of individual black coal mines contributed to resistance to change in the industry.

Three aspects of the approach of tribunals in resolving industrial disputes tend to favour the status quo.

First, tribunals order that the status quo remain until a dispute is resolved.

Second, one factor often considered by tribunals is the likelihood that the parties to a dispute will accept any decision made (Creighton, Ford and Mitchell, 1993, p. 702) — entrenching the historical balance of power at the workplace and sometimes requiring extensive industrial strife (at high cost to

both parties) in order to demonstrate to the tribunal a change in the commitment of one party to reform. Thiess stated:

> Although the industrial authorities may from time to time have resisted employer moves to clean up some of these issues, ... such resistance arose largely from the perceived power relationships within the industry, whereby the employers would generally not stand up to any determined resistance from the mining unions. (sub. 15, p. 8)

Third, tribunals adopt a legal approach, basing decisions on precedent. This can entrench a focus on past circumstances rather than on a continuously changing environment.

Where tribunals are extensively involved in issues at the workplace, their tendency to favour the status quo can militate against the adoption of strategies for continuous improvement, requiring significant management resources in advocating change. In the black coal industry, the inadequate skills, resources or commitment to change of managers in the past resulted in the creation of precedents and insertion of provisions into agreements and awards that were not necessarily conducive to high productivity performance. In concert with the application of tribunal decisions industry-wide, managers were constrained in their ability to adapt work arrangements to suit the circumstances at their particular mine. Exxon illustrated how these factors created a self-reinforcing system that constituted a significant barrier to change:

> Management resources are consumed in the day-to-day industrial relations demands of the worksite. Instituting even the simplest of initiatives requires extensive time and effort directed toward convincing/cajoling/negotiating/ arbitrating with the workforce as to the benefits or reasons for the initiative. This demand on management resources takes away from their ability to focus time and attention to improving the business.
>
> Middle management must share the responsibility for the lack of change. Because attempts at change bring on confrontation, the mindset of management has evolved over time to one of acceptance. The prevailing philosophy is that there is more to lose through jeopardising the relationship with the entire workforce, than through attempting to achieve 'wins' on individual issues geared to improve the business. (sub. 3, p. 7)

Legislative changes under the WR Act have removed some of these constraints on managers seeking to introduce change. The WR Act:

- restricts the extent to which the AIRC can intervene to settle a dispute;
- limits the matters subject to arbitration and the application of an arbitrated outcome;
- allows parties to an agreement to nominate arbitrators other than the AIRC in any dispute settlement procedure; and

- restricts the matters that can be included in awards.

According to MIM:

> Limitation generally of the arbitral role of the AIRC to 19 allowable matters has been extremely important to the whole industry shackled as it was in mechanisms to entrench custom, practice, and the status quo. It has enabled ... employers ... to avoid a lot of history and has forced employers to resolve their problems directly with workforces. (Menzies 1998, p. 10)

Industrial action

Another feature of the new industrial relations environment that appears to have facilitated management in driving reform in black coal is changes in the scope for industrial action. The Commission found some examples of employers who had used the following provisions in the WR Act (and the *Trade Practices Act* (Cth)) to assist in introducing change:

- limits on the ability of employers and employees to engage in industrial action not subject to court action to a period outside the operation of an agreement;
- the ability of the AIRC to grant injunctions against unprotected industrial action (including against proposed future action or sympathy action); and
- prohibition of sympathy actions and secondary boycotts.

These provisions effectively confine the costs that can be imposed on one party by another engaging in industrial action — thereby limiting bargaining power.

State coal industry legislation

Legislation specific to the black coal industry in NSW and Queensland has constrained the introduction of more innovative management and work arrangements in black coal mining. In these States, industry-specific Acts and regulations prescribe a rigid mine site management structure, specifying a range of compulsory and non-compulsory management and other statutory positions. These positions are outlined in Appendix J. Prerequisite qualifications, training and experience are specified for most positions, as well as the functions to be undertaken by the person filling each position.

There are four points to note about the legislation.

First, it is very prescriptive — especially in underground mines. This diminishes the flexibility available to mine management in responding to different situations, reducing the scope for differentiation between mines in approaches to management, human resources and industrial relations and lessening competition. The Queensland Mining Council stated:

> ... [The Act] prescribes a rigid management structure for the mines which is increasingly unsuited to modern operational arrangements. (sub. 24, p. 5)

Second, the primary function designated for many of the positions is to enforce compliance with the legislation. This focus on compliance is reinforced by prerequisite qualifications that require applicants to show knowledge of the legislation and an ability to apply it.

Third, applicants for certificates are obliged to show a high level of technical knowledge only — no study of management, industrial relations, or other human resource subjects (such as supervision, conflict resolution etc) is required. The DWR&SB commented:

> Managers traditionally received very little management training and were often technical specialists rather than proponents of change. (sub. 40, p. 13)

Fourth, the legislation makes it difficult for people who have not worked in the coal industry to obtain employment in management positions by requiring:

- specific black coal industry experience as a prerequisite for obtaining a statutory management position; and
- in-depth knowledge of the coal industry legislation in order to obtain a certificate.

Creating barriers to entry for managers from other industries into black coal mining may result in significant costs in terms of lost productivity by restricting access to new and perhaps more productive approaches to management and human resources. This is especially so given that management per se could be considered a general skill — highly transferable between industries. Camberwell Coal commented:

> The regulatory environment ... just helps to continue to preserve the status quo because you can't introduce mining supervisors from outside, introduce a bit of new blood. You can't even use modern management techniques based on a team based approach without a supervisor in the mining environment. (trans., p. 60)

MIM concurred:

> ... as a result of the requirement that to obtain the necessary statutory qualifications in coal, long periods of coal specific experience is required of all officials in management positions particularly in undergrounds, an effective closed shop in management ranks is preserved. These existing hurdles apply not only to mine managers, but to all professionals and officials, down to the level of even mine surveyors. This severely limits the extent to which new blood can be introduced, and the extent to which legislated management structures can be altered.
>
> Less prescriptive rules in open cuts have assisted operators like Thiess who in our experience have not been able to duplicate their credible open cut performance in

> underground operations. They simply cannot import industry outsiders into key positions in underground mines. (Menzies 1998, p. 3)

The NSW Minerals Council noted how the legislation constrains the introduction of new approaches to supervision in the industry:

> The legislative requirement for the role of Deputies inhibits the development of a role within the range of supervisory skills evidenced in other industries. A review of this aspect of the legislation would be welcome during the review of Coal Industry Safety Legislation. (sub. DR60, p. 9)

From a broader perspective, through its impact on the composition of management skills and by engendering a focus by managers on compliance, the legislation appears to have contributed to a passive management style. This reinforced other incentives for managers to maintain the status quo such as the long period of weak competition in the product market and allowed union representatives to drive the industrial relations and human resources agenda. Rio Tinto stated:

> ... I think that one of the effects of having an industry which has ranked production ahead of productivity has been about the skills of managers. In particular, the skills of managers in relation to people have been more developed in terms of managing relations with unions and managing the interface between the site and the industrial relations system, and less focused on the improvement in the quality of managerial leadership and ... the development of what most of industry would regard as pretty conventional human resource practices. (trans., p.105)

Prescriptive black coal industry State legislation undermines good management practices by:

- **stifling innovation in management by fostering a compliance mentality, and prescribing a specific workforce and mine-site management structure;**
- **encouraging a focus on technical aspects of mine operation without a concurrent emphasis on management/human resources skills; and**
- **making it difficult for mine owners to bring in new ideas, skills and knowledge from outside the industry.**

Recommendation:

Governments should facilitate improvement in management by increasing the choices available to owners and managers in managing mines. They should not prescribe:

- the management hierarchy at the mine site;
- the bundle of skills held by mine managers (including management experience); and
- the functions of mine managers.

The Commission notes that the proposed new Queensland legislation for the coal industry (currently in draft form) — the *Coal Mining Safety and Health Bill 1998* (Qld) — appears less prescriptive functionally than the *Coal Mining Act 1925* (Qld), and allows more freedom for the mine manager ('site senior executive') to determine the supervisory and management structure appropriate to the individual mine.

6.2.4 Conclusion

The way in which these institutional and market-based factors combined to encourage inertia in the management of human resources and industrial relations in black coal mining has been described by Ken Foots, CEO of Ensham:

> "Middle managers who tried to remove union blocks to productivity improvements were often left out to dry by owners who pulled the rug from under them in the name of keeping the coal flowing in the short term without regard to the long-term consequences" said Foots. "Consequently, middle managers often became gun shy and ineffective, handing over their management rights to [union] delegates in return for a quiet life." (Muil 1998, p. 67)

In other words, the preferred approach for many managers and mine owners has been to accommodate the demands of employee (union) representatives in order to maintain production and limit disputes. This has allowed the mine workers' union in large part to drive the human resources and industrial relations agenda, creating an alternative leadership structure in the process. While managers focused on technical problems and compliance with the legislation, the workforce looked to the union for leadership in human resources and industrial relations issues, contributing to employee commitment to the union rather than their company. Overall, this created a self-reinforcing system that impeded management-driven change.

6.3 Unions and workplace change

The CFMEU and the ACSA historically have played an important role as bargaining agents for both non-managerial and managerial employees. Accordingly, this section examines the role of unions in the context of changing work arrangements in the industry. The role of government in this context is also examined and discussed.

6.3.1 Bargaining power

Bargaining over work arrangements in black coal mining has been influenced by a number of features of the industry which contributed to an environment tending to favour employees and their representative unions in the balance of power at the workplace. The role of these industry features in creating the potential for employees to capture a substantial portion of the returns from investment in the industry — as long as competition in the supply of labour could be controlled — is outlined below. It is also noted that the way in which employees capture returns is important.

Maximising bargaining power

Generally speaking, unions are associated with positive and negative economic effects. Positive effects derive mainly from union 'collective voice'. The collective voice enables employees to express their complaints through unions in an environment of protection and without fear of victimisation by the employer. The collective voice also potentially improves communication channels between employees and employers, thereby reducing transactions costs. These positive economic consequences include the enhancement of productivity and reductions in labour costs. Negative effects typically result from a union's monopoly over the supply of labour. This monopoly results in higher than competitive wages, productivity-restricting arrangements (known as 'featherbedding' in the US) and arrangements which inhibit competition in the labour market. Thus, except where unions face monopsony power[2] on the other side of the labour market, the union 'monopoly' effect results in a reduction of productivity and output in the economy (Bosworth et al 1996).

These negative consequences are enunciated typically within the context of competitive product markets. But where firms operate in uncompetitive product markets, a rational strategy for unions (whose members are employed in such firms) is to form a monopoly over the supply of labour (via a closed shop and/or amalgamating with other unions). By maximising their bargaining power in this

[2] That is, a monopoly purchaser of labour.

way, the union(s) may elicit the greatest possible share of super-normal profits for their members. Hence, the greater the bargaining power, the greater the share of super-normal profit for their members.

Historically, the main sources of union bargaining power derived from the characteristics of black coal (that is, its relative importance in the supply of energy both industrially and domestically) and the lack of competition in the market for black coal. These two sources of bargaining power were complemented by the legislative and industrial relations arrangements (discussed in Section 6.2.3) which tended to encourage management inertia and hinder the introduction by managers of change. Increased competition in the market for black coal has dissipated these main sources of union bargaining power.

At least two other characteristics of the black coal mining industry reinforced the bargaining power of unions and employees.

First, employee (or union) bargaining power is enhanced in black coal mining because the industry uses capital relatively intensively. The cost to employers of strike action in capital-intensive industries is greater than in industries that are relatively labour-intensive. While strikes eliminate the need to pay wages, the fixed costs associated with capital equipment such as interest or lease payments continue. The ongoing (fixed) costs of mine maintenance in black coal mining — for example, monitoring gas and controlling water levels — also contribute to the relatively high cost of employee industrial action to employers. Unions, such as the CFMEU, that are successful in controlling the supply of labour are able to exploit the relatively high cost to employers of strikes in these circumstances.

Second, employee (or union) bargaining power is enhanced by the high level of fixed investments specific to individual mines. These types of investments — for example, mine construction and development — are not transferable to other mines and therefore do not have alternative uses. Once capital has been committed, the value of these investments is determined by the profitability of the mine. As employers cannot threaten to redeploy this capital, unions can inflate wages and erode the return to the company of these investments. This contrasts with industries with fewer specific investments where the threat that capital will be deployed elsewhere and workers made redundant acts as a check on the wage claims of unions. At brownfield sites in particular, the unions — by withholding labour — have been able to drive up the wage to a level which effectively transfers much of the return on this investment from the company to employees. At greenfield sites (which include expansions to new and separate mine sites within a large existing deposit) on the other hand, where companies have not yet invested, employers and unions are more evenly matched in terms

of bargaining power. As soon as the specific investment is made, however, the balance of power tips in favour of the union. The experience of MIM — where reforms to work arrangements were relatively easier at a new and separate underground site within the existing Newlands deposit — can be used to illustrate this effect:

> With our Newlands Underground Mine we took the decision neither to employ people nor commit capital until we had satisfactory industrial conditions fixed. ... (Menzies 1998, p.12)
>
> ... While it was relatively straight forward to obtain agreement to these conditions at Newlands Underground, negotiation of similar arrangements at our brownfield operations was more difficult. (Menzies 1998, p.14)

The key to union success in this instance has been its control over the supply of labour (both by creating a closed shop and gaining a monopoly over employee representation). However, once alternative sources of labour become available (for example, through Thiess employing workers utilising non-traditional work arrangements) the incumbent employees lose their advantage.

The unions' ability to control the supply of labour has allowed employees to capture a relatively high share of the super-normal profits arising from the lack of competition in the market for black coal. The union monopoly has also allowed the unions to exploit features of the industry that tend to enhance employee bargaining power. This is particularly the case for brownfield sites. The unions' success in bargaining is reflected in a number of benefits for union members and areas of strong influence for the unions, as documented in this chapter and Chapters 4 and 5.

How returns are captured matters

The means by which a union(s) seeks to appropriate a share of super-normal profits matters. If the means is only through achieving higher than competitive wages, then monopoly labour supply arrangements enable a *transfer* of these profits (from owners to labour) — in other words, there is simply a redistribution of the 'economic pie'. If, however, the means by which the super-normal profit is shared is through the introduction of productivity-restricting work arrangements (which, in turn, reduce the utilisation of capital or raise the amount of labour required), output is reduced from what it would have been and there is a reduction in the size of the economic pie. Accordingly, in situations where profits are reduced substantially, the ease with which reductions in super-normal profit sharing arrangements occur also depends on the manner in which the super-normal profits have been shared — the hidden nature of productivity-restricting work arrangements as a super-normal profit sharing activity makes it more difficult to change such arrangements. Hence as a general principle,

because of these effects (on the size of Australia's economic pie and the difficulties in changing them in different economic circumstances) work arrangements which unnecessarily restrict productivity should not be included in awards.

6.3.2 Union-related impediments to change

This section discusses three impediments to change — the unions' approach to bargaining, provisions of the State coal industry legislation giving responsibility for employee workplace safety inspections to union nominees, and legislative restrictions preventing the development of a market for union services.

Bargaining approach

Under the coal industry's basically collective approach to employee relations matters, the conduct and approach of the parties (both management and unions) have generally been adversarial — as witnessed by the relatively high rate of industrial disputation (see Chapter 4) and perceptions of participants, including the NSW Minerals Council:

> The view held by the CFMEU officials and strongly supported through their formal and informal communications is that all employers are callous and uncaring, and that anything the employer seeks is to be resisted and fought. This adversarial win-lose philosophy is deeply ingrained and provides explicit and implicit barriers to the development of constructive and supportive relationships at many mine sites. (sub. 25, p. 29)

As mentioned in Section 6.2, this relationship has probably been determined partly by poor management practice. Nonetheless, the adversarial approach and philosophy has been successful in achieving significant bargaining power and gains for union members, at least in coal market circumstances that were able to accommodate them. Despite current competitive pressures, this approach is now taking the form generally of an apparent 'resistance to change' in bargaining (Exxon, sub. 3). General President, Mining and Energy Division, CFMEU, Mr John Maitland (1997), has argued that since labour costs represent only about 30 per cent of the fob price of coal, the focus on increasing productivity or reducing the cost of labour was unwarranted. However, the size of this figure has very little to do with the rationale for improving productivity and reducing labour costs. In an increasingly competitive black coal market, the point is whether there is efficient and productive use of all resources (labour and capital) not the size of the labour (or capital) costs as a proportion of total costs.

Enterprise bargaining in the black coal industry is characterised by a 'give up' approach by the unions, resulting in unnecessary increases in costs. Some

participants suggested that this has been facilitated by the relatively centralised nature of union bargaining in the industry. For example, Exxon stated:

> Even at the enterprise level, the CFMEU effectively engages in a system of centralised pattern bargaining. Union district officials coordinate the bargaining process at each site, utilising a 'blueprint' model enterprise agreement as the basis for negotiations. Individual changes which may be beneficial at a given site are resisted if they are deemed to have potential detrimental effects at other Union sites. 'Sacred cows' are unilaterally protected across CFMEU represented sites. (sub. 3, p. 8)

Other submissions pointed to the decentralised nature of bargaining. Powercoal in the public hearings drew on a quote from the CFMEU General President pointing to the power of the mine site lodges and districts:

> ... Mr Maitland has developed a keen understanding of the power of the lodges, (that's the local mine site union lodge), and the districts, (that's the areas):
>
> > "They have enormous power, in essence, we are still a Federation, it's how we operate. They, the districts, have their own autonomy, their own history, their own traditions. You could say the union is still a bit tribal. I ... often refer to our union as a group of Scottish clans that fight each other all the time and only unite when they are told the English are coming."
>
> And I think that says a lot, and for my 32 years in the industry, I think Mr Maitland has certainly said it as it really is. (trans., p. 28)

The power of the mine site lodges within the CFMEU structure would appear to be consistent with the enterprise bargaining approach of the WR Act. As indicated in Section 6.4.1 below, the credible threat of contractors at MIM's Newlands mine recently saw the employees at that mine agree to significant changes from the union's 'blueprint' enterprise agreement (see Section 6.3.1). Similar changes also occurred at the then greenfield site of Ensham in 1995 as well as among many of the (greenfield) sites operated by contractors.

An adversarial bargaining approach, particularly at brownfield sites, may impede the speed of change. The 'give up' approach also requires an improved management capability in convincing its workforce of the need for change. The advantages of a co-operative industrial relations climate are discussed further in Section 6.4.1 below.

State coal industry legislation

The NSW and Queensland coal industry legislation gives employee responsibility for workplace safety inspections to union nominees. It does so by

allocating control of elections for workplace safety inspectors[3] to the relevant union. Rio Tinto stated:

> Part of the prescriptive regime in both states involves the appointment of union elected "Check Inspectors" and "District Check Inspectors" who have statutory powers under the various legislation. The employees in those roles face a tremendous conflict of interest between their union allegiance and appropriate safety performance.
>
> A recent example of this conflict occurred in August 1996 at the Blair Athol Mine in central Queensland when the CFMEU disrupted the commencement of manufacturer-provided equipment training by use of the Check Inspector's statutory powers. Training was stopped by the Check Inspector making an entry concerning the safety of the training process in the mine's Record Book. The Department of Minerals Inspectorate has confirmed that this was an improper use of these powers. (sub. 22, p. 42)

Employee representatives play a valid role in maintaining workplace safety — in particular, through site inspections. However, allocating this role specifically to union nominees creates a nexus between safety at the enterprise level and other industrial relations issues at the industry level. It also fosters a perception that the union (together with the employer) — rather than each individual worker — is responsible for maintaining vigilance over safety. While the Queensland Government suggested that the union had played a very important role in the coal mining industry from a health and safety perspective (sub. 32, p. 37), the Commission sees advantage in an approach which removes provisions in the legislation that allocate safety inspections specifically to union nominees. This would also be consistent with the WR Act which promotes freedom of association.

Recommendation:

The role of employees in carrying out safety inspections should not be restricted by regulation to union nominees.

A restricted market for union services

Further to the discussion in Section 6.2, the WR Act appears to have facilitated management-driven change by moving the Federal industrial relations system in a *direction* which:

[3] District Check Inspectors, Check Inspectors, District Workers Representatives and District Union Inspectors.

- makes agreements at the workplace the centrepiece for the determination of wages and conditions;
- turns the role of awards into a basis for agreement-making by providing a minimum 'safety net'; and
- limits the intervention of third parties while ensuring that agreements have been negotiated in an environment free from coercion and collusion (on the part of both managers and unions or other bargaining agents).

This approach to labour market regulation (and its accompanying institutions) is broadly consistent with the increasingly competitive nature of Australia's product markets. However, the degree to which the WR Act facilitates the last of the three elements described above may be questioned.

In particular, although the WR Act limits the scope for unions to continue with explicit monopoly arrangements (closed shops, union preference clauses etc), the 'more conveniently belong to' rule (s.189) in combination with the provisions relating to the representational rights of existing unions (s.118A) still ensures the maintenance of existing monopoly of union representation in union CAs (see Box 6.1). Hence, given the historically high rate of unionisation in this industry, it is likely that the CFMEU and the ACSA will be able to continue to act as (monopoly) agents for non-managerial and managerial employees.

Abolition of the 'more conveniently belong to' rule together with changes to provisions relating to the representational rights of existing unions, might assist in the establishment of a more contestable or competitive market for union services. This type of development in the labour market would parallel developments in product markets. More importantly, it would enable the pattern and size of unions or bargaining agents to be determined largely by the pattern of demand of the purchasers of union services. There are, however, a number of arguments for and against the establishment of such a market.

One of the arguments against such changes is that employers might be faced with a multitude of unions with which to bargain on an enterprise basis. This, in turn, could increase the transactions costs associated with workplace bargaining. The consumers of union/bargaining agent services (that is, employees) also might face additional costs (through possible delays in reaching an enterprise agreement and the loss of benefits associated with a collective voice) where there are multiple bargaining agents within the workplace.

Box 6.1: **The role of unions in Federal agreement-making**

Union CAs

Under the WR Act provisions, when negotiating union CAs, the only type of bargaining agent that can represent employees is a registered union (provided it obtains the genuine consent of employees in reaching such an agreement).

While modifications to the 'conveniently belong' rule were made under the WR Act and the ability to register enterprise-based unions introduced, the new 'more conveniently belong to' provision (s.189) appears unlikely to increase the level of competition between unions over the representation of employees (Corrs, Chambers and Westgarth 1997b, p. 20). In particular, the 'more conveniently belong to' provision means that an application to register a new union will not be granted if, in the AIRC's judgement, the applicant's members could more conveniently belong to and would be effectively represented by another union(s). (However, the criteria for registration of enterprise unions do not include such factors.)

Moreover, s.118A provisions can help entrench the representational rights of existing unions. Under this section, in considering whether to make an order, the AIRC must give primacy to the views of employees involved, and consider the effect of any order it may make on the operations of the business and any prior understandings about representation rights or previous demarcation orders involving the organisation to which an order would relate.

Hence, with the exception of new enterprise unions, the CFMEU and the ACSA are likely to continue representing most black coal mine employees, at least in the short term.

Non-union CAs and AWAs

In contrast, provisions relating to the making of non-union CAs provide for greater competition between bargaining agents in representing the interests of employees — in this environment unions (or any other agent) may play a role in representing employees, if so appointed by employees. However, these unions or agents do not become a direct party to any agreement that is reached. A similar story applies to AWAs.

Sources: WR Act 1996, Corrs, Chambers and Westgarth 1997b, Department of Workplace Relations and Small Business.

On the other hand, others would argue that it is the employees' interests — not the employers' — that are paramount in developing the market for union services. In these circumstances, there is likely to be a range of different patterns and structures of unions and bargaining agents depending on the different circumstances facing employees, both individually and collectively. It would be still possible that the most efficient outcome could be the emergence

of a monopoly supply of union services in some industries. However, where such a monopoly arrangement became slack and did not act in the interests of its members, the contestability features of the market should ensure that either the threat of (or actual takeover by) other unions or bargaining agents should act as an appropriate point of leverage on its behaviour. Moreover, government intervention in this market (like any other market) should be based on establishing a case of market failure — say, through cases where inadvertent and costly negative consequences arise in the operation of the market which can be corrected efficiently by intervention. If a contestable market for union services were to be developed, consideration therefore would need to be given to the approach taken in ss.189 and 118A of the WR Act and the coverage of the *Trade Practices Act* (for example, in relation to collusive behaviour, mergers etc, in the market for union services). Consideration of the issue would benefit from investigating the legislative arrangements governing unions and/or bargaining arrangements in other developed economies. The NSW Minerals Council (sub. DR60) concurs with this call for further research, suggesting that a broadening of the 'more conveniently belong to' provisions may have different effects on existing and new mine sites.

Although the Workplace Relations Act has diluted the ability of unions to continue explicit monopoly arrangements (such as closed shops, union preference clauses and the like), the 'more conveniently belong to' provision and existing representational right provisions appear to inhibit contestability in the market for union services in union certified agreements. Although the issue is broader than the scope of this particular inquiry, the Commission suggests that further consideration of aspects associated with the development of a contestable market for union services (including the mechanisms whereby such a market would be achieved) would be worthwhile.

6.4 Employees and workplace change

This section examines the role of employees in the context of change in the industry. This is important because ultimately it is the employees themselves (both non-managerial and managerial) who must recognise the need to change and participate in undertaking the necessary changes — though, depending on the circumstances facing each mine, the bundles of changes may differ between mine sites. An important element of the enterprise bargaining framework is the genuine agreement of employees to change. The role of government within the context of employees and workplace change is also discussed.

6.4.1 Employee-related impediments to change

This section discusses three potential impediments to change. They are the employees' attitude to change, their commitment to the enterprise and their perceptions of the benefits and costs of change.

Attitudes to change

The dominant traditions of collectivism and the relative strength of union commitment form a major contextual backdrop to employees' attitudes to change in the black coal industry. Previous management behaviour (such as talking directly to the relevant unions but not to their employees) is likely to have reinforced this collective tradition among employees. However, it would appear that this 'traditional' management approach is changing, providing a counterpoint to the union in employee relations approaches. As a consequence, some employees have agreed to move away from some industry-based customs and practices.

A potential impediment to increased flexibility is the view apparently held by employees that change is not a continuous process. Camberwell Coal stated in the public hearings:

> ... the difficulty is getting people to accept the ongoing need for change and certainly in a way that allows us to reduce our cost structure. (trans., p. 48)

This lack of appreciation of the need for continuous change, especially at brownfield sites, may be explained by the emphasis previously placed on the maintenance of supply and the concomitant lack of emphasis on productivity performance as a key to long-term job security and the survival of the enterprise:

> Change is resisted as workers in the Australian coal industry do not connect their livelihood with that of the financial performance of the company. Workers feel they have a career within the industry and are protected within the Union umbrella; consequently they see no need to change to improve the profitability of the enterprise. (Exxon, sub. 3, p. 7)

As such, the current expectations of employees have been shaped by past behaviour — in particular, previous attempts by management to introduce change usually were forsaken at the outbreak of industrial unrest.

Yet there is evidence of a breakdown in the 'resistance to change' attitude among employees at some mines. For example, at MIM's planned underground development at Newlands, employees apparently considered union concerns over giving up industry-based custom and practice but chose instead to give preference to keeping their jobs. In particular, these employees agreed to accept fundamental changes to working arrangements, such as the abolition of site-

based customs and practices and the end of the LOFO principle in redundancy. Similar changes were accepted by employees at the then greenfield site of Ensham in 1995 and at Centennial Coal's mines. The major factor underlying such attitudinal change appears to have been the changing product market circumstances facing mines and the concomitant threat to either the viability of the mine or the jobs held by incumbents if workplace change did not occur (the credible threat referred to in Section 6.2.2).

Enterprise commitment

As already discussed, historically the workforce has displayed high levels of union commitment but low levels of commitment to mining companies. This view was characterised by Powercoal at the public hearings:

> This culture that we are an industry and therefore as an employee, we ... don't believe the employer is relevant. We believe the industry is relevant, because by the nature of the process of union membership, seniority, long service leave, and Joint Coal Board workers' compensation insurance, the employees see themselves employed by the industry. If one mine fails, so what? There'll be another one opened, and therefore, there's no allegiance to the business enterprise. (trans., p. 28)

Enterprise commitment, however, is considered to be integral to any management change strategy (Iverson 1996). It could be argued, therefore, that the low levels of such commitment by employees may be inimical to achieving change in the industry.

Nonetheless, it is likely that the increasingly competitive nature of the coal market, together with the removal of the use of the retrenched members list as an allowable award matter (CN 40113 of 1998), will assist in developing increased commitment by employees to the enterprise and its goals (which include a focus on productivity performance as a major key to survival and job security). In particular, with the abolition of retrenched members lists, individuals with poor work records will not be guaranteed employment in the industry, introducing a positive incentive to employees to increase their commitment to their current organisation.

This may not necessarily imply a switching of commitment from the union to the enterprise, since 'dual' commitments to the goals and values of both the union and their employer are not necessarily mutually exclusive. United States research has found that a co-operative industrial relations climate is conducive to the existence of higher levels of commitment to an employees' union and their employer (Gordon and Ladd 1990). Similarly, Australian research suggests that a favourable industrial relations climate may reduce conflict and hence may

mean that employees are spared the choice between commitment to the union or their employer (Iverson and Maguire 1997).

Increased coal market competition and the associated breakdown of industry-wide arrangements (such as the retrenched members list) are likely to bring about an increased identification with the goals of the enterprise among employees and an understanding of change within the context of continuous improvement strategies

Benefits and costs of changes to work arrangements

Each employee's decision (individually as well as collectively) about whether or not to agree to accept changes to existing work arrangements will involve a weighing up of the benefits and the costs of reforming work arrangements or resisting change.

Part of this 'weighing up' will include a consideration of the likelihood of retrenchments in the industry — in particular, whether miners are likely to face unemployment in either scenario. The general view of participants in this inquiry (and, it seems, of the CFMEU) is that retrenchments are likely in both scenarios. That is, some job losses are likely whether miners agree to change work arrangements or not. However, where miners resist change, the extent of job loss is likely to be greater. In the absence of a marked improvement in the demand for coal relative to supply — which seems unlikely — an acceleration in productivity growth is the key to more investment in the industry and more satisfactory employment prospects.

The introduction of reforms in work arrangements that allow increased flexibility in the workplace will improve the ability of companies and their mines to adapt to change, facilitating adjustments necessary in future.

The economic modelling undertaken for the Commission by the Centre of Policy Studies at Monash University indicates that an acceleration in black coal mining productivity could result in there being around 2500 more jobs in the industry by 2009–10 than would be the case if the recent (slow) trend in productivity growth continued. The modelling also points to some inter-State differences in the expected pattern of job loss in black coal mining. In particular, if productivity growth continues at its current trend level, the modelling suggests that job loss would be greater in NSW than in Queensland. However, if productivity growth strengthens, the relative extent of job loss in NSW would fall. This is based on the view that there is more room for improvement in productivity growth through work arrangement reform in NSW than in Queensland. Table 6.1 sets out information on the significance of black

coal mining within selected regions and the unemployment rates in these regions.

Table 6.1: **Coal mining employment and unemployment rates for selected labour force regions, NSW and Queensland, November 1997**

Statistical region	*Employed in coal mining*	*Coal mining employment as a per cent of total employment in the region*	*Unemployment rate*
	'000	*%*	*%*
NSW			
Hunter	6.9[a]	2.9	10.2
Newcastle	5.7	2.9	10.4
Illawarra	3.2[a]	2.0[a]	9.5
Wollongong	2.8	2.5	8.0
Northern, Far West-North Western and Central West	0.4[a]	0.2	5.9
Queensland			
North and West BSD Balance	0.7[a]	0.4[a]	10.5
North and West Moreton (Ipswich)	0.3[a]	0.3[a]	11.2
Northern-North West	1.4[a]	1.3[a]	10.0
Mackay-Fitzroy-Central West	10.3	6.0	8.0

a Relative standard error greater than 25 per cent.
Source: ABS (Cat. No. 6101.0 and unpublished data).

In the Commission's judgment, there is likely to be some job loss in aggregate in the black coal industry over the next decade. The size of the job loss would be reduced by changing productivity-restricting work arrangements documented in Chapter 5. The extent to which unnecessary job loss and associated adjustment costs are avoided appears to be largely in the hands of employees themselves.

6.5 Adjusting to change

Around the world, coal mining is characterised by the demise of some mines and the emergence of others over time. The rate of mine closures and

expansions can reflect — and has reflected — a range of different factors. Some of these factors have been outlined in this report:

- technological change in steel production — for example, the development of pulverised coal injection resulting in changes in demand for different types or qualities of coal;
- changes in the structure of markets — for example, deregulation of the Australian and Japanese electricity markets and an increase in the number of suppliers due to investments in countries such as Indonesia and Columbia;
- changes in the price of substitutes for coal;
- the quality of management;
- the geology and the age of mines — for example, as seams deepen, open cut mines may become underground mines, requiring different mining techniques and skills;
- changes in general economic conditions; or
- changes in consumer tastes resulting in greater concern for the environment.

Moreover, investors will take an increasingly global view of opportunities to expand or establish coal mines because of the progressive liberalisation of investment and other regulations in various countries. Hence, the market for black coal is likely to become more competitive rather than less.

These factors and market trends reflect the ongoing nature of change, and the continuous need for adjustment to shifts in a variety of economic and social forces. Reform in this environment is not a once-off event, but will need to enable constant accommodation to change. While some of these changes can create jobs, other changes can lead to difficulties and costs. In particular, some people will lose their jobs.

The major issues faced by miners and their communities in adapting to the changes brought about by the economic and social forces outlined above are discussed in Section 6.5.1. Some of the assistance available to help people adjust to change is outlined in Section 6.5.2.

6.5.1 What does adjustment involve?

The costs and difficulties associated with adjustment depend on the ease with which individuals can relocate to alternative employment, either within the same region or other regions (including metropolitan and non-metropolitan areas). The ability to relocate is influenced by:

- the availability of suitable alternative employment;
- the transferability of skills where individuals seek employment in alternative occupations and the ability to undertake re-training, where necessary (the latter being partly dependent on demographic features, such as age);
- the costs of moving — substantial costs are involved, particularly for families;
- government impediments to mobility — some government taxes (for example, stamp duty on the purchase of residential property), charges and regulations discourage labour mobility; and
- emotional attachment to a particular location — people dislike moving away from friends, family and the familiar environment (schools, etc).

Particular difficulties that may be faced by coal miners in finding alternative employment could arise because:

- coal miners often work in non-metropolitan areas where job opportunities are fewer and the costs of relocating can be relatively high (compared with workers in metropolitan areas);
- on average, coal miners are older than those working in other industries. Research suggests that mature age workers face a greater chance of longer periods of unemployment, in part because retraining is a less attractive option to older workers with a relatively short period in which to reap the returns from training; and
- in some cases, coal miners' skills may not be easily transferable to other industries. Table 6.2 outlines the major occupations in mining, showing that most miners work as tradespersons or production and transport workers. Metalliferous mining and quarrying may be an obvious source of alternative employment for some coal miners. Others with trades or engineering qualifications that are highly transferable between industries may find it relatively easy to find alternative work or establish their own businesses.

In addition, when mines close, falling property prices in shrinking regions can result in significant losses for those who are forced to relocate. The Emerald Shire Council suggested that, in some cases, governments may have exacerbated this problem by restricting private non-mining investment and development in various communities through the types of land-leases made available (sub. DR62, p. 1). However, the Queensland Department of Natural Resources noted the costs to State governments and local authorities that can be associated with converting leases to freehold — particularly in smaller communities likely

to shrink in the event of mine closure.[4] Fly-in, fly-out (or drive-in, drive-out) arrangements in some mines can significantly reduce these problems for governments and individuals.

Table 6.2: **Employment by occupation, mining and all industries, August 1997**

	Mining		*All industries*	
Occupation	*Number employed ('000)*	*% of total employed*	*Number employed ('000)*	*% of total employed*
Managers and administrators	3.3	4.0	628.7	7.6
Professionals	11.3	13.9	1465.2	17.6
Associate professionals	7.1	8.7	889.0	10.7
Tradespersons and related workers[a]	15.7	19.3	1126.5	13.6
Advanced clerical and service workers	0.9	1.1	383.0	4.6
Intermediate clerical sales and service workers	4.5	5.5	1364.5	16.4
Intermediate production and transport workers[b]	34.4	42.2	763.9	9.2
Elementary clerical sales and services	0.7	0.9	832.8	10.0
Labourers and related workers	3.6	4.4	861.8	10.4
Total	**81.5**	**100.0**	**8315.5**	**100.0**

a Includes mechanical and fabrication engineering tradespersons, automotive tradespersons, electrical and electronic tradespersons, construction tradespersons, food tradespersons, skilled agricultural and horticultural tradespersons, other tradespersons and related workers.

b Includes intermediate plant operators (for example, bulldozer, loader, grader operator), intermediate machine operators, road and rail transport drivers, other intermediate production and transport workers.

Source: ABS (Cat. No. 6203.0).

The Association of Mine Related Councils Inc outlined the difficulties that can be faced by remote communities when mines close:

> The conclusion of mining typically results in a substantial number of people having no prospect of local employment and a significant number of local

[4] Two major costs of conversion to freehold include: first, increased transaction costs for governments and local authorities that are forced to deal with large numbers of individual freehold owners rather than one leaseholder (such as a mining company); and second, where freehold leases are not able to be sold and are left vacant, owners may fail to pay rates and local authorities must wait a number of years before foreclosing and using the land for other purposes.

> businesses having little prospects of alternate customers. The usual outcome is a rapid exodus from the area, reducing the rating base a council has from which it can raise revenue to pay for the community facilities and services.
>
> The council is then faced with the problem of keeping up the infrastructure and services the remaining community continues to demand with fewer funds. Costs cannot always be scaled down to the new circumstances because the infrastructure cannot be appropriately reduced. A proverbial example is that of a community swimming pool. It is not possible to fill in a few lanes of the pool to reduce the running costs. ...
>
> The Council with a reduced rating base could then be in the position of having to reduce the services provided to the remaining community (and would probably need to lay off some staff, exacerbating the unemployment situation); and/or may have to let infrastructure run down; or increase individual rates to maintain revenue and the level of infrastructure and services, increasing the burden on the remaining community. (sub. DR57, p. 2)

The Association included further examples of specific difficulties that can arise when coal mines close:

> If major retailers leave, shopping patterns could change, with people shopping at larger neighbouring centres. This would further shrink the local economy.
>
> An excess of accommodation can depress the local real estate market. Those who choose to leave and sell their properties will not be able to purchase the same level of housing in the cities or larger regional centres.
>
> Those unemployed who choose to stay may now need to rely on the social security system and local community assistance programs. (sub. DR57, p. 2)

Given these community adjustment problems, both the Association of Mine Related Councils Inc. and the Emerald Shire Council requested State and Federal Government assistance for redeveloping their communities.

It is worth noting in this context that, in most regions, total mining employment and total employment increased between 1986 and 1996. In those regions where total mining employment declined, the fall was outweighed by rises in employment in other industries (see Table 6.3.) It is also worth reiterating that the extent of job losses in black coal mining is likely to be smaller if productivity-enhancing changes in work arrangements are put in place. Nonetheless, there will no doubt be particular areas in which job losses will require adjustment assistance for the people concerned.

Table 6.3: **Employment in coal mining regions, 1986 to 1996**

Region	*Employment*	*1986*	*1991*	*1996*
NSW				
Hunter	Total	181,768	200,483	210,244
	Mining	11,856	10,012	9,242
Illawarra	Total	114,998	127,626	135,966
	Mining	4,193	3,465	2,739
Northern	Total	69,371	71,914	69,454
	Mining	720	626	465
North Western	Total	42,520	45,015	45,719
	Mining	1,219	1,151	1,623
Central West	Total	63,921	65,702	69,018
	Mining	1,751	1,453	2,095
Queensland				
Mackay	Total	42,351	47,591	55,418
	Mining	4,462	4,495	4,919
Northern	Total	69,760	77,735	83,969
	Mining	1,097	1,772	1,674
Fitzroy	Total	64,649	69,815	75,703
	Mining	4,515	4,292	4,810
Moreton	Total	133,765	191,729	246,316
	Mining	639	691	961

Source: ABS Integrated Regional Data Base, census data.

6.5.2 Adjustment assistance

Government assistance

In light of the economy-wide nature of change and the associated adjustment difficulties experienced by individuals, Commonwealth Government policy more recently has tended towards the provision of general assistance to those adversely affected. This is in contrast to assistance packages offered previously which were aimed at specific industries such as the Labour Adjustment Packages (LAP) for textiles, clothing and footwear, passenger motor vehicles, forestry and, at one time, coal. The LAP scheme has been replaced by more general assistance such as the Regional Assistance Program targeted to regions

with relatively high unemployment.[5] In equity terms, this means that all those experiencing difficulties related to adjustment are more likely to be treated in a similar manner. Specific adjustment assistance advantages its recipients compared with others who are experiencing adjustment pressures elsewhere in the economy.

Generally available welfare assistance (such as the Commonwealth Newstart Allowance), and provision of information by the Commonwealth Government about job vacancies, careers and assistance with job search (now provided through the employment services market established in May 1998 incorporating the Flexible Labour Exchange [FLEX] system) improve labour mobility. Developments in education and training policy at the Commonwealth and State level are also likely to facilitate adjustment by improving labour mobility. The introduction of competence-based training in a framework involving recognition of skills nationally, in particular, is likely to improve the ability of coal miners (for example) to transfer to employment elsewhere. (Competence-based training is discussed in Chapter 5.)

Assistance provided by companies

Some companies provide outplacement services, in addition to retrenchment payouts which employees are entitled to receive under agreements and/or awards (see Box 6.2).

The Commission considers that the difficulties and costs associated with change faced by workers in black coal mining are being driven by factors also causing change elsewhere in the economy. Thus, while these difficulties and costs can be significant for some individuals, they are not confined to black coal miners. General assistance available economy-wide — rather than industry-specific assistance — is therefore preferable in equity terms, as all those experiencing difficulties relating to adjustment are more likely to be treated in a similar manner.

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[5] The Regional Assistance Program (RAP) administered by the Department of Employment, Education, Training and Youth Affairs (DEETYA) provides general assistance to regions to promote employment opportunities by encouraging industries to locate in certain areas. Funding is allocated on the basis of State unemployment per head of population and then allocated to regions with particularly high unemployment. The assistance provided is of a general nature and might include surveys identifying barriers to employment, feasibility studies for the establishment of industries or businesses, or facilitation of networking between businesses. The particular assistance is adapted to best suit the region concerned by area consultative committees set up by DEETYA.

Box 6.2: **Restructuring at Drayton Coal**

Restructuring at Drayton Coal resulted in a decision to reduce the size of the workforce at the mine. To assist employees in coping with retrenchment, the company initiated outplacement services which operated from 10 December 1997 to 6 April 1998. Employees were able to have access to services (including during work time) that consisted of:

- personal counselling on a 24 hour basis;
- career counselling; and
- financial counselling.

Training and information sessions were also provided on topics such as:

- coping with change;
- job search;
- resumé writing;
- interview and interpersonal skills;
- financial advice; and
- starting up your own business.

Drayton Coal has indicated that it is continuing to support exiting staff leaving after 6 April 1998.

Sources: Drayton Coal Pty Ltd and NSW Minerals Council, DR60, Appendix A.

7 COAL RAIL TRANSPORT

Available evidence suggests that after adjusting for differences in the operational environment, the productivity of coal rail freight services in Australia is somewhat lower (by around 20 per cent) than that of better operations overseas. The prospect of competition in freight-carrying services has led to some improvements in performance. The introduction of third party access to rail infrastructure, if pursued vigorously by the NSW and Queensland Governments and if supported by fair and transparent access regimes, offers significant opportunities to remove much of the remaining performance gap. By introducing competition into rail freight services, access arrangements are likely to stimulate improved productivity and efficiency in pricing.

The approach to and progress of the proposed access arrangements in NSW and Queensland have differed. Although both States have now indicated that they will waive the Trade Practices Act exemption on coal-carrying services, there have been significant delays in the introduction of effective competition. This has raised concerns about the commitment of governments to seeking the full benefits offered by competition in rail freight.

Issues in the pricing of rail access, such as asset valuation, rates of return on assets and price discrimination are important. The adoption of transparent and economically sound pricing systems developed by existing independent State pricing tribunals (IPART and QCA) is recommended, together with a right of appeal to these tribunals regarding particular access pricing decisions on a case-by-case basis. In addition, the structure of State rail enterprises should give a clear signal of arm's length relationships between State-owned infrastructure operators and State-owned freight providers.

7.1 Introduction

Black coal is carried by rail in NSW, Queensland, South Australia, Western Australia and Tasmania. This chapter concentrates on the coal rail freight task in NSW and Queensland which account for the vast majority of black coal carried.

Approximately 75 per cent (around 140 million tonnes (Mt)) of black coal is transported by rail. The rest is transported by road and barge — less than 4 per cent in Queensland but around 40 per cent in NSW (although only 20 per cent of export coal is not transported by rail). Over the last twenty years, the rail system (infrastructure and rolling stock) has had to expand significantly to transport the large increases in mostly export coal.

At present, State rail authorities provide all coal rail freight services in NSW and Queensland, with the exception of a small line to BHP's steel works at Port Kembla. However, the organisational structures of the two rail authorities have moved in quite different directions in recent years. NSW has established separate businesses for different services and functions while Queensland has retained an integrated organisation providing all rail services. All have independent boards which are accountable to shareholding Ministers for their performance.

NSW operates a standard gauge rail system which has two corridors connecting 29 inland rail terminals with three coal export terminals at two ports (see Appendix C). In 1996–97, 58.7 Mt of black coal was carried, of which 57.4 Mt was exported. This represents a 44 per cent increase in coal freight since 1990–91.

Queensland Rail (QR) operates a narrow gauge rail system which connects more than 30 coal mines with six coal export terminals at four ports (see Appendix C). The coal rail network involves five rail corridors outlined in Table C.11. In 1996–97, QR hauled 91 Mt of black coal, 33 per cent more than in 1990–91.

Rail freight is a significant cost for exported black coal, averaging around 15 per cent of the free on board (fob) cost of production (excluding royalties) in 1997 (Barlow Jonker 1997). However, for some mines freight is up to twice this share due to implicit royalties included in rail charges. An efficiently operated and priced rail system is therefore important to the competitiveness of the Australian black coal industry. The Commonwealth Department of Primary Industries and Energy observed:

> Improvements in work practices in the Australian coal industry on their own will not ensure competitiveness — the most efficient mine possible will be disadvantaged if the quality of its transport infrastructure to the port and at the port is poor. (sub. 43, p. 7)

Coal and railways in Australia have a particularly strong mutual dependence. Coal is the single largest commodity transported by rail and the export coal industry is heavily reliant on rail to provide transport to ports. Around 81 per cent of freight by weight carried by FreightCorp and 86 per cent of

freight by weight carried by QR was coal in 1996–97. In NSW, coal contributes 49 per cent of freight revenue while in Queensland it makes up 70 per cent of freight revenue. This compares with around 37 per cent of freight by weight and 33 per cent of freight revenue for CSX Transportation (a major US rail company) in 1996.

Australia has an advantage in the international supply of black coal because mines are much closer to ports than is the case for many of its overseas competitors. Average coal hauls in NSW are 135 km and in Queensland 250 km, compared with about 1000 km for Class 1 US railways and 600 km for South African railways (Spoornet) (BIE 1995a). However, historically some of this advantage has been eroded by very high cents per net tonne kilometre (cntk) freight rates. While relatively short rail hauls have an influence on these high freight rates, the two key contributing factors have been:

- State governments using rail charges as a means of taxing the coal industry; and
- productivity performance of State rail authorities being somewhat below best practice levels.

Australian railways have undergone gradual reform of their organisational structures, financial arrangements and competitive environment. Essentially, these reforms have involved changing the structure and objectives of public monopolies to encourage better performance, winding back monopoly pricing in certain freight services and commencing the process of providing for third party access to rail infrastructure. They are gradually reducing freight rates towards more competitive levels and leading to improved productivity. These changes have formed the foundation which, if built upon, can provide an efficient coal freight transport system. This chapter considers the pace and nature of current and future change which could further improve pricing and performance of coal rail freight.

7.2 Efficiency and prices of coal rail freight services

There have been several studies in recent years examining the efficiency of Australian coal freight services (BIE 1992, 1993 and 1995a; JAG 1994) and the prices charged for them (BIE 1992, 1993 and 1995a; Easton 1996 and sub. 7). QR has undertaken several more recent productivity benchmarking studies but has not been willing to make these available to the Commission. In addition, participants in this inquiry have provided information and comments on rail pricing and performance. This section notes the limitations of international comparisons of charges and efficiency and briefly summarises the more recent

studies. Sections 7.3, 7.4 and 7.5 consider recent and future policy changes designed to improve the performance and pricing of coal rail freight.

As observed by several participants (NSW Government (sub. DR68), FreightCorp (sub. DR67) and Queensland Government (sub. DR61)), these studies are several years old. Given the important and ongoing changes to pricing, organisational structure and competitive environment that have occurred in coal rail freight in recent years, the performance shortcomings observed in past benchmarking studies will have been moderated. Indeed, many participants have observed recent improvements in pricing and productivity of coal rail freight. However, most participants (including governments and their rail authorities) have conceded that significant further improvements are available.

It is important to recognise that particular caution is required when comparing rail freight charges and productivity between rail systems. Ideally, comparisons should be between producers with similar operating environments. However, Australian coal rail freight systems differ significantly from those overseas. In discussing rail freight rate comparisons and operating efficiency performance measures, the BIE observed:

> Variables like traffic density, traffic mix, terrain, climate, average haul length and differences in the prices of key inputs are factors largely beyond the control of railroad management. Accordingly, they need to be formally taken into account to enable meaningful comparisons of performance. (BIE1995a, p. 68)

When comparing rail systems it is important to consider:

- the length of the haul. The longer the haul the larger the total cost of rail transport but the lower the cost per net tonne kilometre (ntk);
- traffic density. The larger the volume of coal and the greater the traffic density, the cheaper the cost per ntk to haul coal;
- that volume more than weight drives costs. For example, coal is a bulkier commodity than iron ore — it takes up more space for a given weight — and therefore requires more wagons and more locomotives to pull the wagons; and
- the gauge of the railway. For a given height, a wagon on a wider gauge railway will have a greater volume. Also, the narrower the railway gauge the lower the maximum axle load and the shorter the train length.

Productivity measures and rail freight charges need to be adjusted for these differences before being used to compare performance. Such adjustments are inevitably imperfect for a service with such variable operating conditions as coal rail freight. Hence, performance comparisons need to be treated as broadly indicative rather than as precise indicators of relative performance. When all

rail freight systems differ significantly, the concept of system-wide world best practice is a somewhat artificial construct.

In addition to significant differences in rail operating environments, exchange rate variations add a significant arbitrary element to international comparison of freight rates. From June 1997 to June 1998, the Australian dollar devalued by close to 20 per cent against the US dollar. This causes Australian coal rail freights to compare much more favourably with those of US railways, without any change in relative efficiency or performance of the rail systems. Such currency swings had a limited impact on price comparisons when large implicit royalties made Australian freight rates much higher than freight rates overseas. However, as royalties and monopoly rent are removed from freight charges, there will be a much lower gap between Australian and overseas rates. Hence, comparisons will be much more sensitive to exchange rate changes.

Comparisons of domestic rail charges with raw freight rates from overseas are not an appropriate means to establish best practice performance. Australian railways should not have the objective of matching other countries' rail freight rates, as many factors outside the control of rail operators, such as operating environment, input prices and exchange rates will impinge on such comparisons. Rather, rail providers should be aiming to provide the most efficiently operated and priced service within Australian conditions, and governments should seek to provide the competitive, legislative and organisational frameworks to make this possible.

7.2.1 Coal freight rates

Inquiry participants indicated that rail freight rates per ntk for coal in Australia are very high relative to those paid by mines overseas, particularly in the United States. MIM stated:

> Rail and port charges for export coal in Queensland are internationally uncompetitive. (sub.18, p. 1)

Similarly, Exxon argued:

> The high cost of transport of black coal in NSW is well known and documented as being significantly out of step with world's best practice. (sub3, p. 10)

However, in its report on rail freight performance for the BIE, Symonds Travers Morgan (1996) cautioned against focusing on charges when assessing rail authority efficiency:

> This report focuses on railway input costs (eg cost per hour for train crew, cost per kilometre for track maintenance) rather than costs per unit of output (eg cost per train kilometre or cost per gross tonne kilometre). The latter are generally

> inappropriate indicators of relative performance as incompatibilities between them can grossly distort any comparisons. As an example, a gross tonne kilometre across the Blue Mountains clearly represents a greater use of resources than a gross tonne kilometre performed across the Nullarbor. (Symonds Travers Morgan 1996, pp. 1–2)

Also, as noted above, converting rail charges to a common currency provides only an indication of their current impact on the coal industry's international competitiveness, and does not represent a precise measure of the relative efficiency of rail systems.

Freight rates of NSW and Queensland railways have been significantly higher than overseas rates, largely because of governments' use of rail freights to collect implicit royalties from the coal industry. Both the NSW and Queensland Governments have begun to remove royalties and identified monopoly rent from coal freight rates. The impact of these reductions will continue to be reflected in declining prices to 2000 (see Section 7.4).

Furthermore, difficult operating environments and shorter hauls have added to costs and prices per ntk compared with some overseas railways. The broad indication from available studies is that even after adjusting for different operating environments, operating costs of Australian coal rail freight appear to be in the region of 20 to 30 per cent higher than major North American railways. This gap has been closing slowly as reform in Australian railways improves productivity.

The BIE (1995a) found that for 1993–94 average coal revenue per ntk in NSW (5.7 cents) was over three times the average for US Class 1 railways (1.8 cents), while Queensland revenue (4.8 cents) was 2.6 times the US equivalent.

As well as the royalty component, the BIE observed that a good deal of the difference between Australian and US revenues per ntk could be attributed to shorter hauls and different operational conditions and input costs faced by Australian railways. One of the major differences is the much longer average hauls of US coal railways. Easton Business Consultants commented:

> Comparisons on a cents per tonne basis therefore tend to be misleading. For example, crewing and rolling stock utilisation costs incurred whilst loading and discharging coal may account for 40 to 50 per cent of such costs on a 90 km haul but only 10 per cent on a 900 km operation. (sub. 7, p. 6)

Comparisons of freight rates for similar length hauls for a sample of railings indicated that QR rates (including royalty) were around twice those of various US railways while NSW rates were only 25 per cent above (BIE 1995a). This is the opposite of the raw per ntk revenue data reported above, where average

revenue in NSW was much higher than in Queensland. This disparity partly reflects the much shorter average haul distance in NSW (Table 7.1).

Table 7.1: **Average distance from the mine to the port** (km)

Country/region	*Average distance from the mine to the port (km)*
NSW	135
Queensland	250
US	600 to 1300
South Africa	580
Canada	1100

Sources: IEA Coal Research 1993, FreightCorp and QR.

Dr Easton (1996) compared prices for hauls of coal over comparable distances in the United States, Queensland and NSW. These data suggest that in 1993, the cost per net tonne kilometre was significantly higher in NSW and Queensland than in the United States. Dr Easton also estimated the difference between revenue and costs for NSW and Queensland coal freight at $535.7 million in 1993. This was equivalent to 47 per cent of the freight rates charged (Easton 1996).[1]

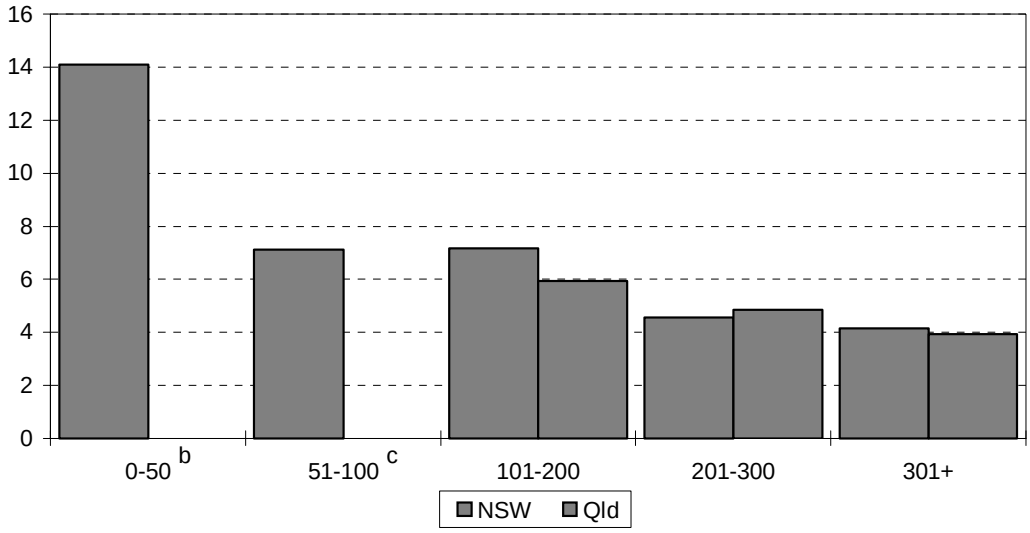
Current freight rates

Data on 85 mines from Barlow Jonker (1997) indicate that average freight rates per ntk are higher in NSW (6.3 cents) than Queensland (4.8 cents), largely reflecting the much shorter average haul (Table 7.2).[2] For hauls between 100 and 200 km, NSW rates are around 20 per cent higher than Queensland, due to the shorter average haul length in NSW in this range. The average rates for each State for distances over 200 kilometres are very similar (see Figure 7.1). However, there are some wide variations in charges between mines within each range, partly reflecting rail authorities' discriminatory pricing policies.

[1] In estimating costs, Dr Easton assumed that a rate of return on assets of 12.5 per cent was a justified cost. An increase of 1 per cent in that assumed return would reduce the excess profit by around $12 million.

[2] The estimated freight rates of Barlow Jonker (1997) and BIE (1995a) differ. This is because the BIE surveyed Australian public service rail providers and standardised input costs whereas the Barlow Jonker estimates are derived from a sample of 85 mines in 1996. The Barlow Jonker estimates therefore reflect actual costs to the mine.

Figure 7.1: **Weighted average freight rates for NSW and Queensland, 1996[a]** (cntk)



a Based on rail charges for 85 mines. Weighted average distance for each category similar except for 101–200 km category.
b There are no rail freight hauls between 0–50 km in Queensland.
c For confidentiality reasons, NSW and Queensland have been combined in the 51–100 km category.
Source: Commission estimates derived from Barlow Jonker (1997).

Table 7.2: **Weighted average coal rail charges and average distance carried, 1996[a]**

	cntk	*Distance (km)*	*$/t*
NSW	6.28	112	7.03
Queensland	4.83	248	11.98
Combined[b]	**5.05**	**174**	**8.79**

a Weighted averages based on tonnes per mine and calculated using 85 mines.
b Weighted average of NSW and Queensland.
Source: Commission estimates derived from Barlow Jonker (1997).

For 1996, Rio Tinto estimated that NSW freight costs per ntk (unadjusted for different average haul lengths) were 40 per cent higher than in Queensland and 2.2 to 2.8 times US better performance. When the monopoly rent is removed, Rio Tinto estimated that the NSW freight rate would be 4.6 cents per ntk, which is still higher than Queensland freight costs of 4 cents per ntk (sub. 22, p. 29). As noted above, different average haulage distances and operating environments mean that such unadjusted price comparisons are not valid measures of relative performance.

Data provided to the Commission by FreightCorp indicated that average coal freight rates per tonne had fallen by around 15 per cent since their peak in 1986–87 and by over 10 per cent since 1992–93. These rates are not adjusted for average haul length, but they indicate improvements in pricing from their monopoly rent inflated levels, particularly in view of the rise in input prices over this period.

Iron ore is the main metalliferous commodity transported by rail in Australia. BHP submitted:

> For the year ended 31 May 1997, [coal] rail freight costs accounted for approximately 30 per cent of total production and delivery costs, at rates as high as 7.5 cntk, compared to world's better performance rates of around 2.4. Performance at this level or better is achieved at BHP's Western Australian Iron Ore operations. (sub. 30, p. 19)

However, there are special circumstances surrounding rail freight of iron ore which make direct comparisons of ntk costs misleading. Long hauls over dedicated tracks with favourable terrain, together with low administrative overheads of a single commodity line, generate particularly low freight costs. In addition, iron ore is a more dense mineral than coal and requires fewer wagons to haul a given weight.

7.2.2 Operating costs and productivity

Comparisons of operating efficiency are more reliable guides to performance and the potential to lower prices than are direct price comparisons. This is particularly so in coal freight where the systems being compared have diverse operating environments and prices are distorted by large de facto royalty collections.

There have been two major studies in recent years which provide information on the productivity of Australian coal rail freight compared with that of overseas rail services. The study which focused most on coal was undertaken for Queensland's Joint Advisory Group (JAG) on World's Best Coal Haulage Practice (JAG 1994). The JAG consists of representatives from various government departments, QR and the Queensland coal industry. It undertook a detailed comparison of QR's *coal service operating costs* with those of Burlington Northern (BN), a recognised highly productive US railroad operating in a competitive market. QR reported the findings of the study for 1992–93:

> The results of the initial benchmarking review showed that QR's 1992–93 coal operating costs per ntk were approximately 25 per cent higher than the estimated Burlington Northern coal haul operating cost per ntk for the 1992 year. However, of the 25 per cent gap, 7 per cent was considered to be due solely to structural

> factors which were out of QR's control (that is fuel/energy prices, length of haul and material equipment costs) and an estimated 8 per cent required QR to incur major capital expenditure (which could not reasonably be expected within the short-medium term). This left a 10 per cent gap capable of being closed by the year 2000. (sub. 12, p. 13)

However, BHP observed the limitations of the JAG benchmarking exercise:

> Whilst that was very useful, it gets to the stage where I think a lot of these exercises do, you fall back on structural differences between QR and the benchmark partner that you're looking at, and if you're not very careful you can explain that whole difference away due to structural differences. (trans.p. 196)

Since the original study there have three follow-up studies. These studies were not made available to the Commission. QR is considering a different approach to benchmarking which is based more on comparing particular activities — for example, maintenance — rather than making whole of system comparisons.

The BIE (1995a) compared operating costs of Australian freight railroads with world's best practice costs, after standardising for differences in operating environment and adjusting for different input prices. These comparisons were not with any single railway but rather with estimates of best productivity and cost performance in a range of operating costs. This analysis provided an estimate of the reduction in controllable operating costs to reach achievable world's best practice (WBP). Although these comparisons include non-coal freight, they provide a useful indication of the performance of coal freight divisions. Coal makes up the majority of freight in NSW and Queensland, although it is not as important for most overseas railways.

Standardised operating costs of both the NSW and Queensland rail freight systems were estimated to be about 37 per cent above WBP in 1993–94. This represented additional operating costs of around $200 million for each system. However, the Australian coal freight businesses are recognised as being more efficient than general freight and hence the gap to WBP would be somewhat less. The gap between the freight operating costs of all the Australian systems examined and WBP had been falling steadily from 52 per cent in 1989–90 to 43 per cent in 1991–92 and 24 per cent in 1993–94 (Symonds Travers and Morgan 1996).

The results of the JAG and BIE studies indicate that provision of coal rail freight in Australia has been somewhat less productive than best practice overseas railways. Together with comments from inquiry participants, they suggest a need for ongoing reform and a performance gap which, while not insignificant, can be reduced substantially.

Participants' views

Participants' comments on the performance of the State rail authorities were limited and tended to support the above view. In general, while participants suggested that rail charges had been grossly excessive, they usually did not differentiate between monopoly profits and poor productivity as causes of these high charges. Those who did comment on productive efficiency suggested that performance was reasonable although important improvements could still be made. In commenting on the JAG analysis of QR's operating costs, BHP stated:

> ... not surprisingly to us, QR performed reasonably well performance-wise. We've never had a major complaint with their performance, our complaints have been what they have charged for it. (trans., p. 196)

ARCO also commented on the efficiency of QR:

> ... we know that as a railway it is a fairly efficient railway. It's a modern railway. The haul distance is a good one, on average 250 kilometres from the coast, but unfortunately the way the coal companies see it the operating efficiency doesn't translate into low rail freights. (trans., pp. 229–30)

However, many coal producers have observed that the lack of competition in rail services has been a barrier to making the 20 per cent efficiency jump to better practice levels. Comments on the introduction of rail access in NSW support this view that competition is needed to generate better performance.

FreightCorp indicated the significant reductions that could be achieved in operating costs. For example, it outlined large planned reductions in its workforce from the 4000 it commenced with in 1996:

> We've laid out for our workforce, a plan that shows that two years out from now we'll be down to 2500 or less, and the workforce accepted that if we're going to be competitive, it's necessary. (trans., p. 17)

It also indicated that corporatisation and the threat of future competition had already stimulated significant improvements in its productivity and service since the BIE benchmarking studies (sub. DR67).

The Rail Access Corporation (RAC) (sub. 23, p. 6) estimated that up to 30 per cent savings will be achieved in its infrastructure maintenance and upgrading costs as a result of competitive tendering. In 1997–98, rail maintenance costs have fallen by around $50 million. For the future the RAC had indicated that:

> The major coal carrying infrastructure in the Hunter Valley will be competitively tendered in July 1998. Tendering of components of the western coal system (eg. Waterfall to Bomaderry) are currently underway with tendering of all of the coal related network expected to be completed by the end of 1998. Benefits from savings in maintenance and works expenses will flow through to access prices

> almost immediately for most mines in the Hunter Valley (Category 1 mines). (sub. 23, p. 6)

However, in February 1998, the NSW Government announced a moratorium on competitive tendering for RAC maintenance work until mid-1999, in order to provide job security for existing government rail maintenance workers. It has since submitted that:

> Benchmarking supervised by the Independent Pricing and Regulatory Tribunal will be introduced to ensure that maintenance costs are, at most, equal to levels which would be achieved by competitive tendering. (sub. DR68, p. 11)

If successful, this approach would mean that coal industry freight rates would fall as originally anticipated by the RAC. However, it is not clear why delays in competitive tendering are needed if maintenance costs can be reduced to competitive levels. Alternatively, if State government subsidies or lower returns from the RAC are to fund continuing inefficiencies in maintenance expenditure, the costs will have been simply transferred from the coal industry to NSW taxpayers.

The performance improvements already reported suggest that delaying the impact of competitive forces by restricting competitive tendering and contracting, and by failing to develop acceptable rail access regimes (see Section 7.5), will be expensive for rail freight users.

7.3 Structure of rail authorities

Through the 1980s and 1990s Commonwealth and State governments have reformed and restructured their business enterprises. Rail services have lagged behind more significant business inputs such as telecommunications, electricity and gas. However, some restructuring of Australia's railways has occurred, generating benefits to pricing and performance of coal rail freight. The pace of change has been gradual and the speed and nature of reforms has varied between States.

Early reforms were concerned primarily with removing government department responsibility for operating railways and establishing independent rail authorities or government corporations. These developments led to establishing separate business units for different services and setting clearer objectives for performance, pricing and community service obligations. The ongoing structural reforms created a more business-oriented focus for rail authorities, led to some improvements in productivity and performance, and established the environment for the introduction of more competition into rail freight. These structural

reforms were necessary for the introduction of greater competition (discussed in Section 7.5).

The NSW and Queensland Governments have taken different approaches to reform of their rail services. While both have corporatised State rail businesses, only NSW has created separate organisations for providing the 'below track' rail infrastructure and the 'above track' freight-carrying service.

7.3.1 Current structures

New South Wales

In 1996, the government-owned NSW State Rail Authority was separated into four separate businesses. These businesses cover track and related rail infrastructure (Rail Access Corporation, RAC), track and rolling stock maintenance (Railway Services Authority, RSA), provision of freight services (FreightCorp) and provision of passenger services (SRA).

The RAC and FreightCorp are both State-owned corporations with independent boards of directors. Both have the Treasurer as one shareholder, with the Premier being the other shareholder for the RAC and the Minister for Sports filling that role for FreightCorp. The RSA is currently a government business enterprise but corporatisation is planned in the near future. The share holding ministers will be the Treasurer and one other minister (sub. DR68).

The creation of different organisations for the provision and maintenance of rail infrastructure (the RAC) and the carriage of freight (FreightCorp) was of particular significance as it separated the natural monopoly provision of rail track from the potentially contestable freight and passenger services. The separation of the largely business-oriented freight services from the essentially loss-making passenger services was also important as it enabled the senior management and the board of FreightCorp to adopt a strong business focus. In addition, while leaving responsibility for maintenance of rail infrastructure with the RAC, the NSW Government has transferred the existing resources (workforce and equipment) for undertaking maintenance activities into a separate organisation (the RSA). This structure creates the appropriate environment for transparent competitive tendering for maintenance contracts.

Queensland

In Queensland, QR was corporatised on 1 July 1995. QR has four business groups: coal and minerals, freight, city train, and travel train. A separate unit was established within QR to deal with third party access to rail infrastructure. The Queensland Treasurer and the Minister for Transport are the shareholding

Ministers. Although each business is a separate profit centre, they are all answerable to the same board of directors. The Government sets key financial and non-financial performance targets and community service obligations.

Rio Tinto (sub. 22) commented that the corporatisation of QR had brought about some slow change, but much remained to be done. ARCO argued that there are some difficulties with QR's structure due to the lack of independence of the freight division:

> At the micro economic level, progress has certainly been made and there is a strong working co-operative relationship between the coal industry and QR's Coal and Minerals Division. From the coal industry's perspective however the Coal and Minerals Division seems to be hamstrung by the current integrated Queensland Railways structure as well as unrealistic financial objectives placed on Coal and Minerals Division from Government. (sub.21, p. 3)

A review of the corporatisation of QR (conducted by the Queensland Government and QR) has recommended that the integrated structure remain but that a separate business unit be established to operate QR's rail infrastructure (including maintenance) and negotiate conditions of access with users. This new group will subsume the functions of the existing access unit. The Queensland Government has decided to implement these changes from July 1998 (Sheldon and Johnson 1997) (see Section 7.3.2).

7.3.2 Structure appropriate for a competitive environment

The evolution of a more commercial focus for State rail authorities and the introduction of competition into rail freight services raise questions of the appropriate structure of rail authorities. In particular, the actual and perceived relationship between the government-owned provider of the monopoly infrastructure service and the government-owned freight operator will be crucial to the emergence of effective competition in rail freight. The Queensland Mining Council (QMC) argued:

> The industry structure within which an access regime operates may be a crucial factor influencing the regime's effectiveness. The standard approach is physical separation of the monopoly and contestable elements of a service in the interests of ensuring non-discriminatory treatment by the access provider of all established and prospective access seekers.
>
> This reflects one of the basic presumptions of competition policy — that vertical integration is inherently anti-competitive and in attempting to establish genuine contestability the burden of proof should rest with those who would retain integrated structures.
>
> The coal industry strongly supports a review of rail industry structure in Queensland. The present configuration — a ring-fenced network access unit within

> a fully integrated QR — needs to be examined in respect of its implications for effective third party access. (sub. 24, pp. 34–35)

As noted above, NSW has separated infrastructure and rail freight and has also created an independent infrastructure maintenance unit. Structural separation improves the transparency of the cost of each element of rail services and hence increases the pressures to improve the efficiency of the rail system. The QMC commented:

> Monopoly encourages complacency, inattention to costs and resistance to innovation. To the extent that competition is impeded for want of a structure which better facilitates the entry of third parties, then integration is unequivocally bad for overall costs. (sub. 24, p. 35)

The Queensland Commission of Audit recommended a break-up of QR:

> In order to drive efficiency through competition, Queensland Rail's track operations should be separated from rail service operations, which would then be provided by separate commercial providers. (Queensland Commission of Audit 1996, p. 165)

King and Maddock (1996) have argued:

> If there are economies of scope then integration may be preferred. However, if an integrated access provider has a significant opportunity to stall access negotiations, separation may offer considerable benefits. (King and Maddock 1996, p.133).

However, there are also potential one-off costs of structural separation, particularly in the initial phase of moving from a fully integrated monopoly rail service. Estimates provided to QR suggest that:

> The costs of separation are considerable and have been estimated by a Mercer/Booz-Allen study for Queensland Rail to be in the order of $30 to $50 million, not inclusive of major costs associated with disaggregation of information systems. (sub. DR61, p. 2)

In addition, there may be ongoing costs if there are important advantages in combining infrastructure provision and operation with freight operations. For example, a single rail operator may be able to provide a given level of rail services of each product line (for example, freight, urban passenger and country passenger services) more cheaply than a combination of separate rail operators, each producing a single product at the given level of output (economies of scope). Some industry participants commented that the degree of coordination involved in scheduling transport is a source of economies of scope and needs to be considered before implementing structural separation. ARCO indicated that the integrated QR structure worked well operationally and cited possible operational problems in separation:

> ... the degree of cooperation between the railways on an operational level is very good. ... Certainly we don't need a new structure that creates barriers to cooperation which we presently have. Because railways require a high degree of logistics there needs to be cooperation from the mine site to the port and in between, and the last thing we need is bureaucracy created whose pure function is just to exist. It must have the purpose of ensuring efficiency and the efficient use of infrastructure. (trans., p. 230)

Based on an unpublished report by Mercer Management Consulting and Booz-Allen and Hamilton, the Queensland Government concurred:

> The advantage of a vertically integrated structure is that it permits decisions on infrastructure investment and operations to be both technologically and managerially integrated. This has the potential to maximise the efficiency of the railway system as a whole. The major disadvantage of structural separation is the additional contracting and the potential litigation costs associated with the formal contractual arrangements which would need to be in put in place between a separate track owner and operator(s). (sub. DR61, p. 7)

In addition, QR submitted that structural separation was not necessary because competition can be achieved through mechanisms other than structural separation and that overseas experience does not support the view that structural separation leads to competition. It claimed that there would be other costs such as a reduction in market responsiveness of infrastructure investment and safety concerns (sub. DR66). QR concluded:

> Since the costs of separation are significant, the benefits of separation should be established as significant and unequivocal before a policy of mandated separation of ownership can be justified. (sub.DR66, p. 2)

The approach taken by the Queensland Government in maintaining an integrated structure whilst creating arm's-length businesses is referred to as 'ring-fencing'. In discussing structural separation in telecommunications, the Commission argued that ring-fencing would provide only limited benefits (IC 1997c). It considered that structural separation was needed to increase the benefits obtained from competition.

In fact, under a 'pure' ring-fencing approach, the cost of establishing contractual arrangements will be incurred regardless of whether vertical separation is undertaken. This is because contractual arrangements will be required between the two arms of the integrated operator. In addition, contractual arrangements will be required for any new rail operators.

In recognition of the uncertain costs and benefits of structural separation, King and Maddock have argued for a case-by-case assessment:

> We clearly disagree with the conclusion of the Hilmer Report that there should be a presumption in favour of vertical separation. While such restructuring may often

> be desirable, it can only be evaluated on a case-by-case basis. In particular, separation must be considered within the entire context of the access regime that is being established. From this perspective we have serious concerns about the moves of some state governments in Australia to break up vertically integrated access providers in rail, electricity and gas before considering more fully the access regimes that will apply to those sectors. (King and Maddock 1996, p.134).

Shell Coal Pty Ltd (SCPL) considered that the balance of benefits favours separation in the case of QR:

> SCPL is concerned that the benefits envisaged by Hilmer and enshrined in the Competition Principles Act will not be possible while QR itself determines the protocols and access charges for potential competitors in coal haulage. The disaggregation of the NSW State Rail Authority resulted in some inefficiencies but in the case of coal rail freights, such costs have been more than offset by the benefits. (SCPL 1998, p. 3)

The Commission considers that the gains in transparency and eventual effectiveness of introducing competition in rail freight flowing from separating infrastructure and freight provision are likely to outweigh any initial costs and difficulties in managing operational relations with a freight provider now in a separate organisation. The latter problems will arise in any event as new entrants gain a greater share of the freight market. Rio Tinto observed:

> With the introduction of competing rail freight companies, there is a need for a comprehensive coordination protocol to ensure the smooth running of the rail system. Issues such as access for loading and unloading facilities, incentives for rail freight companies to maintain up-to-date rolling stock, and use of common facilities need to be addressed. (sub.22, p. 29)

It would not be surprising if there were some initial costs and operational problems in introducing vertical separation. These problems are likely to be largely transitional and, given experience, coordination should be well handled at low cost with modern computing and communications equipment. Many of these costs will exist for the infrastructure provider if there are any new entrants to the freight or passenger services sector. Only if no new entrants emerge would an integrated structure produce the maximum cost savings envisaged by the Queensland Government.

The recently announced QR restructuring loses some of the co-ordination advantages of having infrastructure and freight services in the one organisation, while providing little in the way of greater independence and transparency in the provision of rail infrastructure.

The issue of formal separation of below and above track services should be considered in a public review of the progress in rail reform.

7.4 Removing implicit royalties and monopoly rent

Coal freight has been subject also to specific reform in the pricing area. This reform has addressed the use of coal freight rates as an implicit royalty collection mechanism or as a means of financing losses in other rail freight and passenger services.

The level of coal royalties is determined by State governments. However, the means of collecting royalties may have unintended and undesirable impacts on the efficiency of both rail services and the level of royalty collections. The coal industry has been particularly critical of both the past use of rail freights as a taxation mechanism and of the rate of phasing out of this practice. The QMC observed the deleterious impact of royalty-inflated rail charges in Queensland in the 1980s:

> Rail reform has been and will continue to be a critical determinant of coal industry development in Queensland. Rail freight concessions introduced from 1984 provided a crucial measure of relief for the industry when the eighties 'coal boom' failed to materialise. Although freight rates stayed very high, without the concessions that were given, many of the mines commissioned in the late seventies and eighties would have become economically unsustainable.
>
> That said, no new coal mines were then commissioned until after 1989 when significantly lower freight rates were offered to new projects. Investment in Queensland coal assets was simply untenable until rail charges were reduced to something approaching commercial levels. (sub24, p. 3)

State governments charge royalties on the extraction of coal (and other minerals) in order to provide benefits for their communities for the exploitation of their resources. Because of the high prices for black coal in the 1970s and early 1980s the NSW and Queensland Governments used the rail freight system to obtain revenue from coal producers additional to that raised from explicit royalties. These monopoly rents and de facto royalties as they have been referred to in NSW and Queensland, respectively, significantly distorted rail freight pricing and distracted governments from the focus of providing efficient rail freight services. The revenue from these high charges was appropriated by governments into general revenue or was used to allow rail authorities to at least partially fund loss-making services.

The push to improve performance of GBEs over the last decade, together with the declining fortunes of the coal industry, resulted in governments recognising that the collection of royalties through the rail freight system was inefficient, arbitrary and inequitable. The QMC commented on the impact of de facto royalties based on perceived ability to pay:

> The effects of this approach were mainly three. First, there was no predicability in the system and no relationship between freight rates and the cost related factors

> like distance, volume and efficiency which would normally determine a rail charge. Planning prospective projects was difficult and negotiations with Treasury were protracted and one-sided. (sub.24, p. 24)

The switch to a more commercially oriented approach to rail freight pricing allows the performance of railways to be monitored more closely. The previous lack of transparency was detrimental to assessing performance because it was impossible to untangle inefficiencies in rail provision from high freight prices due to royalties. The absence of a link between charges and underlying cost also stifled development of cost-saving practices. BHP observed the beneficial impact on efficiency of a greater focus on cost-based pricing:

> ... the Government agreed to identify and separate out the de facto royalty and rail freight components of the rail freight rates, thereby allowing clearer negotiation of the true rail freight component. Based on the achievement of performance linked incentives and a co-operative approach between QR and BHP Coal to improving both current and future practices, potential for improved efficiencies and potential flow on benefits was also agreed. (sub.30, p. 19)

In addition, the removal of royalties from rail freights takes away a potential barrier to efficient freight choices by coal producers. In many cases, even with freight rates including royalties, rail would be the chosen transport mode. In others, government regulations restrict coal to using rail. However, there will be some situations in which the transport choice has been distorted by the implicit royalty and monopoly rent-inflated freight rates. In these cases the removal of royalties from rail will enable mines to choose the most economical form of transport, unaffected by royalty considerations.

Further, competition among coal producers on the domestic market will be enhanced by more efficient operation and pricing of coal rail freight, with ensuing benefits extending far beyond the coal industry. In arguing for removal of monopoly rents and greater rail competition, Pacific Power observed:

> In an increasingly competitive national electricity market, all three NSW generators may seek to maximise coal supply contestability through the delivery of coal by rail to increase competition with mines closer to the power stations.
>
> The potential for increased rail delivery will continue to be constrained unless the commercial attractiveness of utilising rail is increased. (subDR55, p. 3)

7.4.1 New South Wales

In addition to explicit coal royalties discussed in Chapter 10, the NSW Government obtains monopoly rent through the rail system in the form of excess access charges for coal freight from selected mines or groups of mines. However, there are also some rail lines where coal freights have not covered the

avoidable costs of the freight service. The NSW Government observed the impact of this policy on pricing:

> The ability of mines to pay monopoly rent depends on a number of factors including the quality of the coal, extraction costs, customer contracts and taxation and charging regimes. Within any region, there may be significant differences among the mines on these factors, and therefore in freight rates, haulage costs and thus monopoly rent. Indeed, not all freight hauls contribute to monopoly rent. (sub. 26, p. 17)

These monopoly rents remained within the SRA to help fund other loss-making services, thereby lessening the contribution required from the State budget to finance SRA losses. Hence, the SRA did not need to identify separately the size of monopoly rents.

With the creation of the RAC and FreightCorp, and in preparation for the introduction of competition in rail freight, the monopoly rent component and the losses on hauls not covering avoidable costs have been estimated and incorporated in the RAC's access prices. This leaves FreightCorp free to price on a commercial basis. The monopoly rents, as estimated by the NSW Government, are being phased out over four years to July 2000.

In the interim, the NSW Government will still receive monopoly profits in the form of payments made by the RAC in lieu of company tax and the RAC dividend. However, the Government needs to make greater contributions to the RAC and the SRA now for any loss-making services previously partly financed by monopoly profits on coal freight which had been fully retained in the former SRA.

Apart from identified monopoly rent, FreightCorp has indicated two other possible sources of excessive coal freight charges.

> Reduction in the below rail component of freight rates is a factor which FreightCorp sees as being constrained by Rail Access Corporation's (RAC) intention to pursue a significant rate of return on its assets in the Hunter Valley and the absence of urgency in attaining efficient infrastructure maintenance. (sub. DR27, p. 2)

The coal industry has expressed concern that the rate of return used to estimate the maximum commercial price payable for access to rail infrastructure is excessive. A 14 per cent post-tax return on revalued assets is used in the NSW access regime to determine *ceiling access prices* to be charged (within a discriminatory pricing framework). This ceiling rate was set by the NSW Minister for Transport as the Minister responsible for the rail access regime. Any *excess* of *actual* prices for a mine or group of mines in 1996 above this ceiling cost of servicing their operations (incorporating the maximum

14 per cent return), was identified as monopoly rent. This rent is being phased out by 2000. These issues are considered in Section 7.6.

While the 14 per cent *ceiling* return is not an average rate earned on all RAC assets, the scope for price discrimination allowed by such a high ceiling rate gives some cause for concern. To the extent that the ceiling rate is considered excessive, monopoly rents would still be earned even after 2000 on those contracts paying ceiling or close to ceiling prices. Price discrimination is considered further in Section 7.6.

In addition, there are likely to be ongoing inefficiencies created and maintained by the long period of absence of competition in providing rail services. The benchmarking studies cited in Section 7.2 suggest that such implicit monopoly costs have been in the region of 20 per cent or more. Moreover, the delay in competitive tendering of maintenance has delayed the RAC's predicted savings of up to 30 per cent in maintenance and works expenses (sub. 23). In order to realise further savings, FreightCorp argued that access prices should be based on efficient costs, and that they must reflect efficiency both in maintenance practices and in the procurement of network management services (sub. DR67). The NSW Government has announced its intention to benchmark rail maintenance costs in the absence of competitive tendering and contracting out.

7.4.2 Queensland

The Queensland Government also has altered the method of determining coal rail freight rates in recent years. Prior to 1992, rail charges were not based on costs but rather reflected Queensland Treasury's assessment of individual mines' ability to pay additional revenue (in effect, an implicit royalty). Because these assessments varied over time with the coal market environment, mines with similar costs and profitability could be paying very different amounts of implicit royalty depending on when their rail freight contract was established. The QMC indicated the ongoing problems caused by this approach to setting rail prices:

> Since 1993, this situation has not been adequately addressed by the corporatisation of QR. Rail freight pricing remains opaque; coal rail costs and profits are concealed; the setting of CSOs is obscure, and there is no mechanism in place for achieving best practice freight rates. (sub.24, p. 24)

In 1992 the negotiation of new or expiring rail freight contracts was passed to QR. Prices were to be set on a commercial basis related to costs of providing the freight service. QR (sub. 34) indicated that all of the pre-1992 contracts are expected to be renegotiated by mid-1998. Some of these have involved early termination of contracts, requiring negotiated payments to the Queensland

Treasury to reflect the early cessation of implicit royalties contained in their rail freight rates. (Further details of the changed royalty arrangements are provided in Chapter 10.)

Because of the absence of a structured reduction of royalty-inflated prices, Queensland does not have the same issues of identifying excess charges as does NSW. Implicit royalties are removed only when rail contracts expire, at which stage they can be viewed as totally disappearing if the freight rates offered by QR are considered commercial. However, this approach results in considerable inequity between mines, with the size of their total royalty payments depending on the expiry date of their freight contracts. BHP observed:

> ... while agreement has been reached with the Queensland Government to end defacto royalties in the year 2000, the company is at a major competitive disadvantage in the meantime compared to other coal companies in Queensland and overseas companies by paying almost $1 billion in royalty payments on its Queensland operations. (sub.30, p. 2)

However, with the imminent scheduled expiration or early renegotiation of all pre-1992 rail contracts, the issue of de facto royalties in Queensland has become a largely historical one. In particular, as discussed in Section 7.5, it now provides no basis on which to delay the introduction of third party access to rail infrastructure.

The policies of the NSW and Queensland Governments for ongoing removal of monopoly rents and de facto royalties from rail freights have improved the efficiency of rail pricing and encouraged improved performance by rail authorities. However, the pace of change has been slow, delaying the benefits from more efficient pricing of coal freight.

7.5 Introducing competition into rail freight

The use of rail freight charges to collect revenue is one reason why rail costs for export coal have been excessive. The other key reason for high rail charges is the existence of some degree of inefficiency in State rail authorities. Section 7.3 noted some changes in the organisational structure of rail authorities which have helped to improve performance. This section considers the NSW and Queensland Governments' response to the introduction of a more competitive external environment for rail authorities in order to stimulate further efficiency gains.

As with most economic infrastructure in Australia, rail services have been provided traditionally by governments, because provision by a single enterprise was seen as the most cost-effective and in order to meet social objectives for

these services (for example, uniform provision and subsidised pricing). The competition policy agreement reached by the Commonwealth and State governments in 1995 recognised that only the network infrastructure portion of rail services required monopoly provision and that freight carrying services could be opened up to competition by allowing freight carriers access to rail infrastructure. However, while the network provider was a monopolist, the potential existed for it to appropriate most of the benefits of competition. Hence safeguards were included providing applicants for access to rail infrastructure with certain rights of appeal to the National Competition Council (NCC).

As with the restructuring of their rail authorities, the NSW and Queensland Governments initially adopted different approaches to allowing access to rail infrastructure for coal carriers. NSW developed an access regime which potentially provided access to rail infrastructure for freighting coal while Queensland relied on the *Competition Policy Reform Act*, (s.78) (which does not bring 'government coal-carrying services' under the access arrangements of the Act until November 2000) to delay access to rail infrastructure for third parties wishing to transport coal. However, in April 1998, the Queensland Government indicated that it will no longer rely on the s.78 exemption and will allow competition in coal freight once an acceptable access regime has been developed.

7.5.1 New South Wales

Despite some uncertainty surrounding the right of businesses to seek access to coal rail infrastructure up to November 2000, the NSW Government, in its rail access regime, has not excluded third parties from carrying coal.[3] The NSW Government indicated:

> Although the intention of the National Competition Policy was to allow for the exclusion of Government coal traffic until November 2000 through establishing a 'moratorium', the NSW Government took the policy decision to use the moratorium period:
>
> - only in respect of coal access prices and not access per se; and then
> - to implement a program of phased reductions in coal access prices rather than maintain prices throughout the period. (sub.26, p. 17)

[3] The definition of the term 'government coal-carrying service' in s.78 has been subject to dispute. The NCC has accepted arguments that the term should be interpreted narrowly to exclude only access to coal haulage services such as that undertaken by FreightCorp (NCC1997c). This interpretation would allow an independent operator to apply for access to rail track for the purposes of carrying coal. The issue is currently before the Federal Court.

However, the NSW Minerals Council submitted that the NSW Government had consistently used the s.78 exemption to attempt to impose an unsatisfactory rail access regime:

> The NSW Government has at all stages of the application to the NCC for declarations and certification sought to use s.78 to impose on the NSW coal industry terms for access that are inconsistent with the Competition Principles Agreement. (sub. DR60, p. 19)

The NSW Minerals Council's argument is given additional credence in view of the need to test the meaning of the s.78 exemption in current Federal Court proceedings relating to its declaration application.

While the coal industry applauded the early introduction of rail access in NSW, it was also concerned about deficiencies with the proposed access regime. Hence, in April 1997 the NSW Minerals Council applied to the NCC to have the Hunter Valley coal service determined as an essential facility and 'declared' for access by third parties. If successful, this application would circumvent the current NSW rail access regime and open the way for direct negotiation of access conditions between freight providers and the RAC, which were not bound by the NSW rail access regime. There would also be recourse to legally binding arbitration by a private arbitrator or the Australian Competition and Consumer Commission (ACCC) if these direct negotiations were not successful. Under the current NSW access regime, the Independent Pricing and Regulatory Tribunal (IPART) is available to applicants (freight carriers) who cannot reach an agreed access price with the RAC (see Box 7.1). However, freight customers such as coal companies do not have any rights of appeal. At present, only rail operators — such as National Rail and FreightCorp — or potential rail operators can appeal to IPART regarding disagreements with the RAC on access conditions. No such appeals have yet been made regarding carriage of coal.

In parallel with the Minerals Council application for declaration, the NSW Government submitted its rail access regime to the NCC for certification in June 1997. This regime sets out the rights and obligations of parties providing or seeking access including coverage, the operation and content of access agreements, dispute resolution, information requirement parameters and pricing principles.

In September 1997, the NCC accepted the Minerals Council's application and recommended to the NSW Premier that the Hunter Valley rail line be declared for access as it met all of the criterion under s.44 of the *Trade Practices Act (1974)*. In particular, the NCC found that the existing NSW rail access regime was not an effective regime, largely because of the uncertainty and lack of transparency in its pricing arrangements.

Box 7.1: **Independent Pricing and Regulatory Tribunal (IPART)**

The NSW Government Pricing Tribunal was established in July 1992 to regulate the prices of government monopoly services. In 1996, the *Government Pricing Tribunal Act, 1992* was amended and the role of the Tribunal expanded. The Tribunal was renamed IPART. IPART has responsibility for price regulation of government monopolies declared by the NSW Government. It has specific powers to:

- set maximum prices for government monopoly services;
- investigate and report on any matter, with respect to pricing, industry or competition;
- regulate gas pricing and third party access to gas networks;
- register agreements for access to public sector infrastructure assets; and
- arbitrate disputes covering the negotiations of such agreements.

IPART currently regulates electricity, water supply and related services, urban passenger transport services, rural bulk water, waste services and local water authorities. The regulatory activities undertaken by IPART include:

- determining maximum prices, which must be charged by the agencies concerned unless they have the Treasurer's approval to charge lower prices; and
- reviewing and recommending pricing policies for monopoly services.

In addition, schedule 1 of the Act lists a number of government agencies for which IPART has a standing reference. Among these are the State Rail Authority and the Port Corporations. IPART does not have the power to set prices or undertake a review until monopoly services provided by an agency have been declared. Ports Corporations are yet to be declared.

Sources: www.ipart.nsw.gov.au/ and *Independent Pricing and Regulatory Tribunal Act, 1992* formerly *Government Pricing Tribunal Act 1992.*

In November 1997, the NSW Premier rejected the NCC recommendation. The Minerals Council appealed against this decision to the Australian Competition Tribunal. The appeal was heard in April 1998 and adjourned to the Federal Court where the interpretation of s.78 will be determined.[4]

[4] A Directions Hearing in the Federal Court in early June 1998 decided that a full bench of the Federal Court would hear the case. The case is expected to be heard in late August/early September. It will then be referred back to the Australian Competition Tribunal.

In April 1998, the NCC published its draft recommendation on the application for certification of the NSW rail access regime. The Council found that:

> While some issues regarding the phasing out of coal pricing need further clarification, the Council considers that the Regime will meet the CPA [Competition Principles Agreement] after including the proposed changes by the NSW Government subsequent to lodgement. (NCC 1998, p.ii)

The National Rail Corporation (NRC) has also expressed dissatisfaction with long delays in obtaining authorisation from the NSW Government to carry intra-state freight (NRC 1997, p. 6). Conditional authorisation was granted in February 1998, but with the caveats that the NRC's core business would be intermodal capital-to-capital freight and that the Minister for Transport would be informed prior to the finalisation of any contractual arrangements regarding intrastate enterprises.

Hence, despite an initial positive response by the NSW Government to seeking the benefits of competition in coal rail freight, the details of the proposed access arrangements raise questions concerning the extent of the Government's commitment to seeking the full benefits offered by competition in rail freight. Eighteen months after the NSW access regime was introduced, there is still no competition in coal rail freight. The desire to protect revenue and the interests of government rail providers may have limited the extent to which reform initiatives have been translated into action. In the meantime, FreightCorp's competitive position is being strengthened as it necessarily expands capacity to meet growing demand in a currently captive market. FreightCorp has indicated that by the end of 1998 it will have a Hunter Valley fleet capacity of over 90 million tonnes per annum, nearly 40 per cent above the current annualised rate of deliveries.

FreightCorp observed the difficulties faced by potential new entrants:

> Basically, FreightCorp believes that competition has been delayed by the continuing uncertainty over the access environment within NSW and that changes are required in the current approach taken to the pricing of access to infrastructure. (sub. DR67, p. 4)

The current NCC application and certification processes might deliver an improved and transparent access framework on which prospective carriers can have confidence to make considerable investment needed to enter the coal freight market. However, it is of some concern that such a long and expensive process is needed for governments to apply competition policies adequately to their own enterprises, especially when such policies offer clear State and national benefits.

The introduction of access to rail infrastructure for coal freight services in NSW has been hampered by the lack of an effective access regime against which new freight carriers can confidently invest and by the protracted negotiations for declaration. This has unnecessarily slowed the achievement of the significant price and productivity benefits from competition in coal rail freight.

Introduction of effective competition in rail freight can be expected to improve the performance and pricing of the government owned freight carrier significantly. FreightCorp (sub. DR67) has pointed to important performance improvements already achieved in its operations as a result of the potential for competition. However, additional pressure on the monopoly provider of rail infrastructure will be indirect. With regard to the cost of NSW coal rail services, Exxon stated:

> The recent break-up of the old SRA and the opportunity for the introduction of 3rd party competition on the rail networks in NSW is leading to some improvement in this area. Nevertheless, the coal industry has been disappointed with the Government's corporatised owner of the track infrastructure, the Rail Access Corporation. This organisation still exhibits monopolistic traits which will inhibit cost efficient transport of NSW black coal. ... In contrast, Exxon has been pleased to date with the performance of FreightCorp, the government's corporatised freight haulage operator, as this organisation appears to recognise that with the advent of 3rd party competition, its success is tied to its ability to provide efficient and effective low cost service. (sub.3, p. 10)

It is important that governments set appropriate charters and performance objectives for rail infrastructure providers and monitor their achievement carefully.

Furthermore, the NSW Minerals Council submitted (sub. 25) that a lack of operations protocols was a barrier to entry into rail haulage and delayed the introduction of competition.

> It is also difficult for new operators to challenge the monopoly of FreightCorp... because of a lack of Operations Protocols and other information from RAC which they need to compete effectively with FreightCorp. (sub25, p. 36)

Operations protocols are the detailed rules for assigning priorities on the rail network to various rail operators, traffics and trains. These protocols are often informal practices. The Commission considers that it is important that infrastructure providers formalise and publish operational protocols to enable effective competition in rail.

7.5.2 Queensland

Initially the Queensland Government indicated that it would delay the introduction of third party access for coal haulage until November 2000. In the Draft Report the Commission argued for the early introduction of competition in coal rail freight, because implicit royalty revenue was being largely removed as most coal rail contracts were renegotiated. Since the Draft Report, several developments have signalled a somewhat faster introduction of more competition in Queensland coal rail freight.

First, from March 1998, a regulation under the *Queensland Competition Authority Act 1997* (QCA Act) provides for third party access to below track rail services in Queensland. This permits the use of all transport infrastructure owned by QR for the purpose of providing transportation by rail (except for interstate services). QR observed:

> The Queensland Government is of the view that the Queensland third party access regime constitutes an effective access regime in accordance with the Competition Principles Agreement. As such, the Queensland Government will soon be submitting the access regime with respect to rail services to the National Competition Council for certification. (sub.DR66, p. 2)

Second, the Queensland Government announced:

> ... on the 25 April 1998 the removal of the exemption in relation to access to Government coal carrying services on the Queensland rail network. (sub. DR61, p. 6)

An application for certification of the Queensland access regime has been made to the NCC. In view of the NSW experience, this process may involve significant delays unless the Queensland Government is fully committed to achieving the benefits of competition in coal rail freight.

Finally, in April 1998, the Queensland Government signed an agreement with SUDAW Developments Ltd to develop a feasibility study for a privately owned merchant railway from the Surat Basin coal field to a Queensland export coal port.

The combined impact of these reforms will potentially introduce competition within the existing rail network and possibly provide yardstick competition with a new railway.

If the benefits from the lifting of the moratorium on access to coal rail freight are to be realised by new entrants, there needs to be an effective mechanism for operators, other than QR, to gain access to the below track infrastructure. The Queensland Government has established a legislative framework for access in

rail and other industries under the QCA Act (see Box 7.2). However, an access regime for rail is not yet in place.

Box 7.2: **Queensland Competition Authority (QCA)**

In mid-1997, the Queensland Government passed the *Queensland Competition Authority Act 1997*. Its purpose is to create the QCA as an independent regulatory authority with powers and functions to:

- administer a third party access regime;
- provide a prices oversight regime to ensure that government monopoly businesses do not abuse market power through monopoly pricing; and
- administer a competitive neutrality complaints mechanism.

The areas of responsibility of the QCA of most interest to this inquiry include access to essential infrastructure and prices oversight.

Access to essential infrastructure

The regime set out in the Act is similar to the Commonwealth access regime. The regime provides for:

- a declaration process to determine whether services should be subject to access claims;
- access codes, which provide a means of tailoring the generic regime to specific classes of infrastructure;
- the QCA to require owners of infrastructure-providing services that are declared under the regime to submit to the QCA undertakings for the declared services; and
- a compulsory dispute resolution procedure where the QCA assumes the role of an independent arbitrator.

The Act enables the Minister(s) responsible to establish access codes or undertakings for rail transport infrastructure and port infrastructure. These have yet to be developed.

Prices oversight

The QCA investigates pricing policies where directed to do so by the State Premier and Treasurer. The QCA's recommendations may or may not be accepted by the Premier and Treasurer.

Sources: Sub. 12, sub. 24, sub. 32 and sub. DR61 and *Queensland Competition Authority Act 1997.*

To take full advantage of its changed approach to introducing competition into coal rail freight, the Queensland Government will need to develop an effective access regime rapidly. Any undue delay will make the eventual opening of the

market more difficult. While there remain no competitors for QR's coal freight division, it will have to expand its wagon fleet to service the entire expanding market. Often this involves signing additional tonnages on long-term contracts, as short-term contracts are likely to be particularly expensive in the current monopoly market. Early introduction of access, while the total market is still expanding, would allow a window of opportunity for new competitors to establish themselves.

The approach and progress of the Queensland Government is critical to the early achievement of the efficiency benefits of coal freight reform. The QMC observed:

> Whether the opportunities arising from the concept of third party access are realised in regard to coal rail will depend on the level of commitment of the Queensland Government to developing an effective access regime and a supporting rail industry structure. (sub. 24, p. 22)

Queensland has not established a separate access authority like the RAC in NSW, but rather has set up an independent access unit within QR. This unit is responsible for all dealings (operational and pricing) with third party operators seeking to gain access to the rail network in Queensland. It will now be subsumed in the new infrastructure division to be created within QR. This arrangement raises concerns about transparency and fairness as the coal and minerals division of QR will be a competitor for third parties seeking to provide coal freight services. BHP observed:

> Despite there being arguments on both sides, there is reason for concern that the retention of an access body within the control of the current service operator, without specific and transparent controls, will not result in an unbiased outcome. (sub. 30, p. 20)

This view was supported by the Queensland Commission of Audit:

> Given the incentive that exists for Queensland Rail to discourage competitors from operating on its network, the effectiveness of the regime will be limited unless it is enforced by an independent authority. (Queensland Commission of Audit 1996, p. 162)

As shown by the NSW experience, an access regime will need to be comprehensive, transparent, clearly equitable to all parties and have appropriate appeal mechanisms if it is to generate confidence for potential entrants and end users. The Queensland Commission of Audit argued:

> To introduce competitive pressures the very minimum required is a comprehensive third party access regime implemented across the entirety of the Queensland Rail's network. (Queensland Commission of Audit 1996, p. 162)

Early development of an access regime which is detailed and transparent in dealing with pricing and operational matters and has appeal mechanisms easily accessible to freight users is necessary to generate the maximum benefits from the planned introduction of competition into rail freight. This is particularly so in Queensland where the integrated structure of Queensland Rail has created industry concerns about the fair treatment of new entrants into the coal freight market.

Recommendation:

The NSW and Queensland Governments should facilitate the early establishment of comprehensive rail access regimes that can be certified by the National Competition Council as effective.

The introduction of access to rail infrastructure will be of benefit initially only to new mines or expanded tonnages from existing mines. Those mines on current long-term contracts negotiated under the expectation that third party access would not commence until November 2000 may be disadvantaged if the early introduction of competition generates reductions in freight rates for new contracts. While any unforseen results of contractual negotiations in a commercial environment have to be borne by the parties, the negotiation of coal freight rates in Queensland in recent years have been conducted in the expectation of delayed introduction of competition. Indeed, several participants indicated a belief that the eventual introduction of competition may not occur until well beyond 2000. BHP speculated:

> While the National Competition Principles set a framework for the introduction of such competition in other sectors from 1996, coal in Queensland suffers from a moratorium on the introduction of third party operations until 2000, a restriction that will effectively and practically prohibit their introduction, without immediate steps to facilitate that access until well beyond this time. (sub.30, p. 20)

These expectations have now been overtaken by a change in Government policy. However, the inherent delays in developing an acceptable access regime and the time required to establish a new freight operation suggest that there would be little new competition before 2000. In that event, the change in the policy framework will have had little adverse impact on holders of existing contracts.

7.6 Price setting for rail access

This section considers the efficient pricing of the use of rail infrastructure by third parties. Because it would not be economic to duplicate the rail network,

this infrastructure is subject to monopoly provision. Hence, pricing rules and procedures need to be developed that generate efficient performance, pricing and investment by rail infrastructure providers.

Through third party access to rail infrastructure, the freight haulage component of coal rail transport is likely to be opened up to competition over the next five years. If supported by appropriate access regimes and pricing this should generate efficient market-driven prices for the freight haulage portion of coal freight costs.

A number of important issues for access pricing are examined below. These matters, which are often quite technical and complex, are relevant to rail services beyond coal freight. The detailed resolution of these issues is beyond the scope of this inquiry. However, a number of salient points can be made regarding pricing in the context of coal freight services.

It is important to recognise that, in examining charges for access to rail infrastructure, the Commission is not considering the appropriate level of State taxation that the coal industry or particular coal mines should pay. The main point to be drawn from the analysis in this chapter and Chapter 10 is that such matters should be decided in the context of royalty policy, not rail pricing policy. The use of excess profits from rail freights to obtain revenue from the coal industry distorts both the pricing and performance of rail services and is often a blunt and arbitrary instrument for collecting implicit royalties. Although such policies are officially ending, there remains concern in the coal industry that access pricing decisions still provide excessive returns from coal freight.

The Commission has not made any recommendations regarding the appropriate method to price rail access and notes that many alternative approaches have been put forward for other infrastructure industries. Some possible pricing approaches include; rate of return regulation, CPI minus X and the United States Interstate Commerce Commission method (sub. 7, sub. DR54 and Easton 1996).

7.6.1 Asset valuation

Asset valuation and rate of return on assets are the building blocks for rate of return pricing. Together they establish the profit component of the total cost that the rail infrastructure provider will aim to recover in prices. Asset values will also directly affect depreciation expense. Setting appropriate asset values and rates of return is part of the process of determining prices which generate efficient use of below track infrastructure and investment in that infrastructure.

The method of valuing assets for pricing access to rail infrastructure has raised considerable participant comment. The main concern of the coal industry is that the use of replacement cost asset values is a means for governments to continue to make excessive returns from coal freight despite their professed policy of competitive pricing. The Queensland Manufacturing Industry Forum argued:

> User charges will be overstated if the asset base on which target revenue is calculated is not appropriate. (sub. 2, p. 12)

The QMC concurred:

> ... QR has adopted a method of asset valuation which is guaranteed to lead to overpricing. (sub. 24, p. 7)

For rail access pricing, NSW currently uses replacement cost and Queensland uses deprival value as the methods of valuing assets. Replacement cost is the cost to an entity if it were to replace the asset with an item providing a similar or equivalent service. Deprival value is the cost to an entity of providing goods and services by using an asset, if it were deprived of that asset. The value to the entity in most cases will be measured by the replacement costs of the service or benefits currently embodied in the asset. Hence, deprival value normally will represent the cost avoided as a result of controlling the asset and the replacement cost represents the amount of cash necessary to obtain an equivalent or identical asset (Steering Committee on National Performance Monitoring of Government Trading Enterprises 1994). Because of the impact of inflation, replacement cost and deprival value approaches usually will generate higher asset values than historical cost, particularly for assets with long lives.

Many participants argued that historical cost was the most appropriate form of asset valuation. The QMC stated:

> Replacement cost is said to be (i) preferable to historical cost in accounting for the opportunity costs of capital — which it is not, and (ii) necessary to sustain assets — which it is not. Replacement cost valuation causes an over-recovery of capital costs. (sub. 24, p. 27)

Dr Easton commented:

> Replacement cost valuation is not used by the private sector — which government corporations are supposed to emulate — or by the Class 1 North American railroads which QR is supposed to emulate in pursuit of world's best practice. The American Railroad Accounting Principles Board and the Interstate Commerce Commission explicitly rejected replacement cost valuation for use in the regulation of US railroad pricing. (Easton 1996)

And, as Easton Business Consultants, he added:

> A prime reason for this preference is that historical costs are valid, accurate and verifiable, and are thus objective and transparent. Values are not dependent on

> assessments of relative service potential, which may be highly subjective. (sub. 47, p. 5)

The ACCC, however, has argued in its draft guide to access undertakings:

> Before accepting the historical cost approach to asset valuation as part of pricing principles included in an undertaking, the Commission will need to be satisfied that gold plating and over investment is not likely to occur. (ACCC 1996, p. 41)

It stated that it prefers replacement cost when:

> ... adverse incentives are difficult to address within the historical cost framework or if significant cost reducing technological developments are likely. (ACCC 1996, p. 42)

The Queensland Government has similar concerns:

> The method of asset valuation chosen needs to result in an access price which allows for ongoing maintenance and renewal of the asset over time. The use of historical cost may not achieve these ends. (sub. DR61, p. 11)

King (1996) suggested that no one method of asset valuation is to be unambiguously preferred. On balance, however, he argued that historical cost is the most appropriate method of asset valuation for access pricing because it is easy to administer, transparent, less subjective than replacement cost, and provides adequate incentives for operation and investment. Moreover, King and Maddock (1996) have argued that replacement value may create artificially high and inefficient access prices because below track infrastructure is more likely to be upgraded and maintained rather than totally rebuilt.

Whichever asset valuation method is chosen, the most important requirement to avoid systematic over- or under-pricing is to implement the matching rate of return concept. King observed:

> The choice of rate-of-return will depend in part on the chosen asset valuation technique. For example, if the valuation technique is based on depreciated historic value then the owner of the asset will need to be compensated for the rate of inflation through a nominal rate of return. If the asset base includes an adjustment for inflation, for example by using replacement cost or inflation adjusted historic cost, then a real rate of return can be used. (King1996, p. 103)

Participants also criticised the lack of transparency in determining and publishing asset values. The QMC stated:

> The mines have no means of verifying that freight rates are genuinely commercial. They are not entitled to know the value of rail assets attributed to their use, the rate of return applied to those assets or the operating cost component charged to them. (sub. 24, p. 26)

The Commission concurs and addresses this issue in the Recommendation in Section 7.6.3 below.

7.6.2 Rate of return

As noted above, for rail access pricing NSW and Queensland use replacement cost and deprival value, respectively, as their asset valuation methodologies for setting prices for access to rail infrastructure. Both of these methods make allowance for inflation and hence a real rate of return is appropriate when determining the amount of profit that should be aimed for in the long run.

QR is subject to a nominal rate of return target on revalued assets. This raised concerns in the industry of over-recovery for inflation in both the rate of return and the value of assets (sub. 24, p. 39). QR has indicated that the capital gain on rail assets is included as earnings in assessing the nominal return earned by QR (sub. DR66, p. 3). If the rate of appreciation of QR assets is equal to general inflation, then the resultant earnings target for railway operations will be the same under a real return objective.

The NSW access regime uses nominal rates of return in setting *ceiling prices* which the RAC can apply for access to rail infrastructure. The ceiling rate of return is 14 per cent nominal post-tax on the replacement value of assets. Many participants commented that this was too high. Rio Tinto argued:

> ... the 14 per cent (nominal, post tax) defined by the NSW government is a very high rate of return for such a low-risk enterprise with high barriers to entry, and should be considered un-commercial. (sub22, p. 28)

As observed by Easton Business Consultants:

> ... generation of an overall after-tax return of 14 per cent requires a pre-tax return of 22 per cent. (sub. 7, p. 13)

The application of nominal rates of return to current valued assets in setting prices for access to rail infrastructure will lead to excessive prices.

These returns led to industry concerns that monopoly profits were still being earned by the RAC, because the monopoly rent component of pre-1996 prices, as identified by the NSW Government, was based on excessive rates of return. Easton Business Consultants stated:

> ... if RAC overvalued infrastructure assets and/or set its target rate of return at too high a level, RAC would be in a position to embody monopoly rent in its charges for access over and above the acknowledged levels. (sub7, p. 13)

Similarly, Camberwell Coal argued:

> We think there's potential to include another form of monopoly profit because the rail access regime that has been introduced in NSW has very high rates of return and it's also the replacement value of the capital... (trans.,pp. 62–63)

> ... I believe there will be an ongoing monopoly profit component still contained in that charge even after the phase out of the identified monopoly profit over the next five years. (trans., p. 63)

FreightCorp expressed the view that:

> The NSW Rail Access regime currently sets RAC a target rate of achieving 14 per cent after tax rate of return. This rate of return is substantially above a return commensurate with the inherent risks within RAC's business and informed analyses from a number of independent sources are in agreement that an appropriate return should be less than 10 per cent. Even a return at this level is contingent upon the sharing of volume risk between operators and RAC. In the absence of such risk sharing, the rate of return should be significantly lower still. (sub. DR67, p. 10)

Much of this concern relates to the 14 per cent (post-tax) *ceiling* rate of return limiting the RAC's use of discriminatory pricing for individual mines or groups of mines. This is not the average rate of return that the RAC aims to earn on its whole operation or on coal freight in particular. These rates will be a good deal lower. However, the absence of a publicised average rate of return target on which prices are based creates uncertainty in the minds of coal producers that excessive rates of return are still being earned on coal freight.

In addition, FreightCorp argued:

> Operators and their customers require a reasonably accurate assessment of future freight charges to input into the development of business and investment plans. FreightCorp offers its customers price certainty with multiple year price/service packages for the haulage component. The below rail component once received from RAC is then added to the haulage component. Uncertainty over long term access charges could serve as a deterrent to new entrants initially faced with large start-up investments. (sub. DR67, p. 6)

Furthermore, the *average* rates of return applied in other major infrastructure industries such as gas and electricity are prescribed and published. The NSW Minerals Council submitted:

> ... rates of return used in the gas and electricity regimes (also natural monopolies) are 7.5 and 9.5 per cent (real, before tax) respectively.(sub. 22, p. 28)

The NSW Government indicated that it will allow:

> ... an independent third party to examine the evidence in relation to the issue of rate of return and provide a view on the appropriate maximum rate of return to business such as that of Rail Access Corporation. (sub. DR68, p. 1)

The transparency of access pricing is discussed further in the next section.

7.6.3 Differential pricing and cross-subsidisation

Many mining companies have complained strongly about the practice adopted by both NSW and Queensland rail authorities of discriminating between mines in setting prices based on the perceived ability to pay. NSW participants were particularly concerned that the maximum rate of return incorporated in the rules for differential pricing of rail access was a mechanism used by the RAC to achieve monopoly profits by stealth on parts of the Hunter Valley system.

The RAC and QR indicated that differential pricing is followed in order to optimise use of the rail network. Hence, it is potentially beneficial to the coal mining industry as a whole.

The extent of price discrimination practised in coal rail freight is difficult to assess because freight rates per ntk can vary for cost-related reasons such as distance of haul, traffic density and special timing requirements.

The RAC recognised some possible problems of differential pricing and argued that it was not in its interests to see these occur:

> Operators competing in the same end-markets are naturally concerned that they are treated equally to their competitors and if they have the same requirements (ie. impose the same costs) they should face the same access charges. RAC supports this principle. It is not in RAC's commercial interest to support cannibalisation of traffics, ie. allowing a new entrant to achieve a lower access charge to secure traffic from incumbent operators currently paying higher access charges. This will only dilute RAC's revenues for no material gain. Similarly, it is not in RAC's interests to give incumbent operators an advantage and so frustrate competition and prevent new entrants and potentially new traffic coming to rail. (sub23, p. 9)

In the case of services with high fixed costs such as rail infrastructure, the effective use of price discrimination can produce economically beneficial outcomes. This is achieved by discriminating between users so that those marginally profitable producers (or output) which would be lost if charged higher prices pay less than other users but still make some contribution over the long run avoidable costs attributable to them. Theoretically, efficiency of pricing would be maximised if there was discrimination between all users based on the size of their marginal responsiveness to price changes (demand elasticity). Those with high responsiveness would be charged lower prices while those whose demand for the service is not very responsive to price change would face higher prices.

Both the RAC and QR propose to continue the practice of price discrimination for rail access charges. Some industry participants have also recognised the efficacy of some price discrimination. However, in general the industry is concerned about the use of price discrimination as a means of continuing to

make excessive profits from rail freight and the impact on competition between coal producers.

Both the RAC and QR are aware of these concerns. QR stated:

> Whilst flexibility in pricing is required to allow the achievement of commercial outcomes, this needs to be balanced against the need to ensure that such flexibility is not exercised in a manner that inappropriately disadvantages any one end user relative to its competitors. (sub.12, p. 24)

Establishment of pricing principles by independent pricing authorities would provide users with more confidence in the application of discriminatory pricing.

Price discrimination is observed in other capital-intensive industries and occurs in privately-owned overseas railways. If appropriately applied on the basis of relative demand elasticities, price discrimination by rail infrastructure providers could be an efficient practice which would be likely to benefit the coal industry as a whole. However, the information requirements for such an approach are high. In particular, demand elasticity will not be related directly to average profitability. In some cases it may be possible to identify mines that are likely to close if not given favourable (but above avoidable cost) access charges. However, price discrimination between viable mines will be largely arbitrary because those setting access prices will not be able to assess accurately efficient price discrimination.

As with asset valuation and rates of return, the complex issues surrounding price discrimination make transparency and genuinely independent regulation in price setting particularly desirable for a monopoly service. After many years of arbitrarily imposed excessive rail prices, the coal industry is understandably suspicious of the motives of governments in setting access prices. These concerns are given more credence when governments do not appear to be wholeheartedly facilitating the introduction of access to rail infrastructure.

Transparency in price setting is somewhat more complicated in the case of price discrimination because, where charges for individual companies are involved, there may be arguments for somewhat less disclosure than in the more aggregative issues of asset valuation and rates of return. Transparency in pricing and rights of appeal have been requested almost universally by the coal industry. The Commonwealth Department of Primary Industries and Energy commented:

> The mechanisms for calculating rail freight rates need to be publicly transparent, fair and equitable. This has not been the case in the past. Transparency is an important factor in assisting companies to determine their cost structure and identify areas where their competitiveness can be improved. Transparency is also

> an aid to investors since it creates certainty and separates out the costs of supplying and operating the network. The lack of transparency in pricing reduces user confidence in the service provider and provides the opportunity for excessive charging. To overcome this problem, the price setting process should be independent of government. (sub.43, p. 7)

Although the NSW access regime offers recourse to IPART (see Box 7.1) in the case of disputes in negotiations with the RAC, this right is available only to the rail operator or potential rail operators. At present, FreightCorp is the only coal carrier in NSW and it has not raised with IPART any pricing disputes it has had with the RAC, despite considerable industry concern with the high ceiling rates of return for some mines and groups of mines on the Hunter Valley line.

The pricing of coal rail freight by government enterprises in NSW and Queensland is not transparent. A set of principles and practices should be developed in each State which will generate efficient prices and provide the private rail freight and coal industries with confidence in the fairness of pricing.

The Commission considers that industry requests for greater transparency in access pricing are soundly based. More information would be likely to improve the efficiency of the price setting process and give more confidence to potential freight carriers that fair treatment would be provided. This would have flow-on benefits to the efficiency of the provision of rail freight. Independent pricing tribunals which could serve this purpose already exist in both NSW (IPART) and Queensland (QCA). It is crucial that details of the recommendations and decisions of these tribunals regarding access pricing for coal (and other freight) be publicly available.

The NSW Minerals Council voiced concern regarding a potential conflict of interest between the role of an arbitrator and the role of a regulator. It commented:

> There was a question there which arose in submissions to the NCC about possible conflict of interest between IPART's regulation and the arbitration role ... although IPART finished up having both roles but there was some distinction made between those two roles and some steps made to help resolve possible conflict of interest problems. (DRtrans., p. 29)

It contended that:

- there should be a regulator, such as suggested here but that the regulator should be independent of the arbitrator
- the parties to a dispute should be able to appoint an arbitrator of their own choosing in accordance with the CPA and not have a predetermined arbitrator imposed on them by the access regime. (sub.DR60, p. 9)

The Commission considers that while the possibility of conflict of interest exists, the potential conflict can be overcome by clearly defining the functions of arbitration and regulation. Indeed, IPART already separates its arbitration and regulation functions. Moreover, the independence and transparency of the procedures and practices undertaken by IPART and QCA should ensure that such a conflict does not arise. The issues involved in establishing efficient prices for rail access are quite complex. The requisite skills for appropriately arbitrating disputes on access prices are much more likely to reside in government pricing agencies than with commercial arbitrators. However, if both parties agree to an alternative arbitrator, this option should be open to them.

Recommendation:

In New South Wales and Queensland, pricing principles and asset valuations used to determine prices for access to rail infrastructure should be made public. So too should any related recommendations prepared by the NSW Independent Pricing and Regulatory Tribunal and the Queensland Competition Authority.

Freight customers should have a right of appeal to these bodies regarding the application of the principles on a case-by-case basis.

The role of the regulation and arbitration units of IPART and QCA should be clearly defined and delineated.

Parties should be able to use an independent arbitrator of their choice for dispute resolution.

One clearly undesirable form of price discrimination is the cross-subsidising of services which do not cover the costs directly attributable to them. In Australia, many rail passenger charges fail to cover the costs of providing the services. In the past, excessive profits from coal rail freight have financed some of these losses and disguised their size. Governments have recognised that cross-subsidisation is an inappropriate method of financing loss-making services and have instituted reforms for their direct funding.

With the existence of price discrimination in setting access prices, potential exists for low access charges to be granted to passenger services with a commensurately higher proportion of infrastructure costs being allocated to freight haulage. Demand elasticities on which to base price discrimination for a service with significant government financing are problematic, leaving room for discretion in setting access charges. However, granting passenger services

preference over freight services in use of track implies that the passenger services access charge should be higher in such instances.

A number of participants complained of cross-subsidies from coal freight to other freight and passenger services. In its submission, Rio Tinto argued:

> The broad rate of return is used to permit profitable parts of the network to cross-subsidise other, less profitable parts of the network. (sub.22, p. 28)

In an integrated rail authority like QR, potential exists for cross-subsidy through allocation of overhead costs of the 'above track' operating units between passenger and freight services. While the exact allocation of such costs may be essentially arbitrary, industry suspicions can be alleviated by introducing transparency and regulatory control as recommended in this report.

7.6.4 Contributed assets

In addition to setting freight rates well in excess of costs, in the past the Queensland Government has often required mining companies to pay for the capital required to provide a rail service. QR indicated:

> ... under the former Treasury pricing policy, mining companies in most instances were also required to fund all of the locomotives, wagons and infrastructure required to provide the capacity for their respective hauls. The funding was usually by way of an up-front contribution which was non-refundable. (sub.12, p. 10)

With the advent of more commercial pricing for rail freight since 1992, the coal industry has argued that depreciation and rate of return on contributed assets should not be included in access prices. Rio Tinto argued:

> In many cases, customers of QR have been required to make capital contributions to rolling stock and other infrastructure. This has not been fairly and adequately acknowledged by the government when determining the capital value of their asset. (sub. 22, p. 32)

Ownership of these contributed assets is not relevant to assessing an appropriate price for rail services. Rather the issue is who should receive the return — the rail authority (government) or the contributing company. If the Government holds the view that the contributed assets were simply part of the implicit royalty charged at the time for extraction of the community's coal assets, then ownership should be seen as residing in the rail authority. If these charges are now considered to have been too high then some form of restitution for those assets still in use would be appropriate. QR has taken the second approach:

> QR, although not under any legal obligation, provides recognition to the present owners of mines for which rail asset funding contributions have previously been made by the mining industry. (sub.12, p. 11)

If the contributing company receives a return, this may be achieved through lower freight rates (based on exclusion of those assets from the asset base for calculating costs) or some form of capital rebate. The situation is complicated when the contributed assets are used also to service other customers. Prices charged to these customers should include allowance for the use of contributed assets, but any subsequent restitution to the original asset providers would be complex.

To the extent that lower prices are charged to firms that have contributed assets, it is important to make some adjustment to the value of these assets in determining the State rail authorities' asset base for calculating profits needed to achieve government rate of return objectives. If this is not done, prices for other users will be higher in order to make up for the rebates to firms that contributed assets. If the assets are used totally for the contributing firm's freight, and prices charged fully reflect this contribution, then the assets should be excluded totally from the asset base for aggregate rate of return purposes. If they are used partly to service other freight which is charged fully for their use, then only a partial adjustment to the asset base is appropriate.

While in the past contributed assets appear to have been largely part of Queensland Treasury's revenue-raising objectives in relation to coal rail freight, this approach could also be used by QR in the future as a form of risk management. If coal tonnages were to fall in the future then specialist capital could become redundant or underutilised. User capital contributions (with appropriate removal of capital costs from freight charges) would transfer these risks to users, who may be better placed to assess and manage the risks involved, resulting in lower total freight costs.[5] In the more competitive coal freight market which is likely to develop after the introduction of access to rail infrastructure, users may have a greater range of pricing options from which to choose.

[5] At present QR rail contracts are based on take or pay principles with customers continuing to compensate QR for non–discretionary costs in providing required capacity if the contracted tonnage is not railed. This approach transfers a significant amount of risk to users while retaining responsibility for capital spending with QR. This approach to risk management may be more appropriate when individual assets are not dedicated to single users.

8 THE COAL WATERFRONT

Coal ports and associated receival, storage, blending and loading facilities are critical elements in the coal chain. The efficient operation of the coal waterfront is a significant determinant of the international competitiveness of the Australian black coal industry. Waterfront charges account for about 6 per cent of the free on board price of coal.

In general, Australian coal ports and terminals perform well by international standards in terms of physical throughput and pricing. However, there remains scope for improvement. In particular, concerns have been raised about possibly excessive rates of return earned by some government port authorities on coal port assets. The calculation of such charges should be transparent and independent of the assets' capacity to provide monopoly revenue. Making the ports corporations in New South Wales and Queensland subject to prices oversight would impose discipline on governments not to use them to generate excessive returns.

8.1 Introduction

The performance of the waterfront has important implications for the overall competitiveness of the Australian black coal industry. On average, waterfront charges represent about 6 per cent of total free on board (fob) costs for export coal.

Ports and terminals not only have direct cost effects. They are linked to rail infrastructure and mines in what is termed a coal chain and the performance of ports and terminals affects the other components in the chain. The Queensland Government submitted:

> ... the scheduling and loading of ships tends to drive other activities in the [coal] transport chain. (sub. 32, p. 38)

Work by the Bureau of Industry Economics (BIE 1995b), together with information from participants, suggests that charges and performance at most Australian coal ports are broadly competitive with overseas ports. However, comparative international port charges have moved independently of relative productivity levels due to significant variations in exchange rates in recent years.

The highly negative sentiments expressed by participants about the pricing of coal rail freight services have been largely absent in their discussion of ports. However, several submissions identified potential for more effective pricing and removal of perceived excess returns to governments at certain facilities. On the performance front, the recent long queues and high demurrage costs at the port of Newcastle attracted significant comment from participants. As many as 40 vessels queued off Newcastle during a period of unforeseen demand in 1997 (ICR 1998b, p. 10). The queue still stood at 20 vessels in February 1998 but has now been reduced further to more normal levels. The need for further improvement in the coordination of mine-rail-port linkages was also raised.

After a brief outline of Australian coal ports, this chapter presents evidence on the charges and performance of ports. It also suggests changes that might further enhance the performance of those ports.

8.2 Australian coal ports

The coal industry in Australia is serviced by six ports and nine terminals. NSW is serviced by two ports containing three terminals and Queensland by four ports containing six terminals. The coal port at Newcastle has two terminals, as do the ports at Gladstone and Hay Point in Queensland. Newcastle Port Authority has indicated that a further terminal with a capacity of 28 million tonnes a year (mtpa) may be established within that port by an independent operator (sub. 16, p. 2).

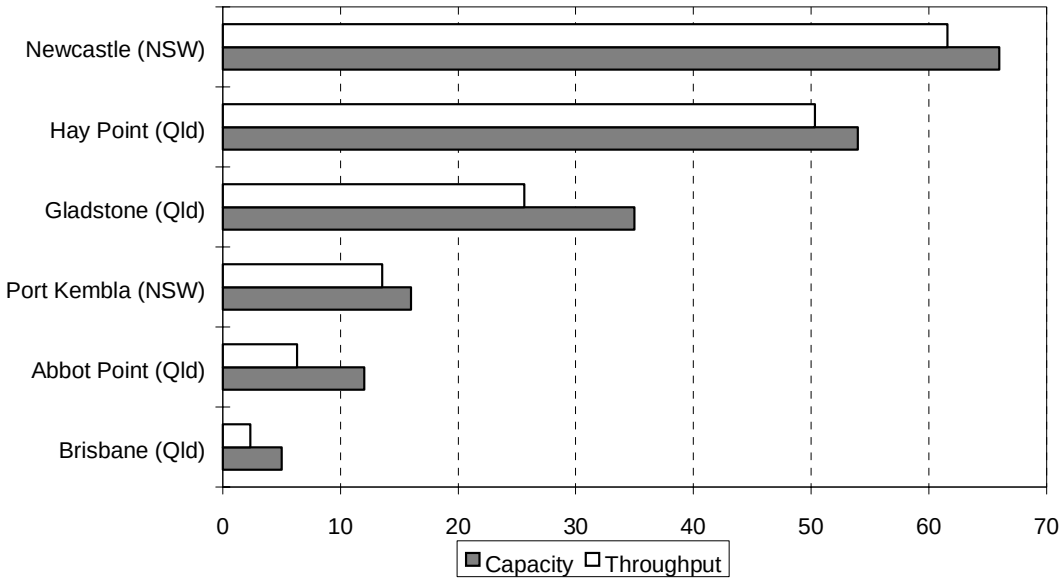
All coal ports in Australia are government-owned. However, as indicated in Table 8.1, the ownership and operators of the coal loading terminals vary considerably.

Australian coal terminals are not unique in having various ownership and management structures. For example, the newly constructed Los Angeles Export Terminal (LAXT) has 37 shareholder companies, from widely varying backgrounds, in a closely held private corporation (LAXT, p. 2). The coal terminal at Richards Bay in South Africa is also privately owned (the shareholders having interests in mining or energy) as is the Kaltim Prima facility in Indonesia. By contrast, Westshore Terminals at Roberts Bank in British Columbia is owned by holders of units in a publicly tradeable income fund.

8.2.1 Capacity

As Australia is the world's largest exporter of coal, its coal loading facilities are some of the largest in the world, although not all are large by international standards. Figure 8.1 presents the nameplate capacity and throughput of each of Australia's six coal ports for 1997, when more than 80 per cent of export throughput was handled by Newcastle, Hay Point and Gladstone.

Figure 8.1: **Coal port capacity and throughput, 1997[a]** (Mt)



a Hay Point includes the Dalrymple Bay Coal Terminal and the CQCA Coal Terminal at Hay Point, Gladstone includes the R.G. Tanna and Barney Point loaders and Newcastle includes the Kooragang and Carrington terminals.

Sources: Australian Coal Report (1997, pp. 145–51), sub. 32, p. 46 and ICR (1998a, p. 20).

The throughput of coal terminals does not always correspond with their capacity. This is not surprising given somewhat large and unpredictable changes in the level of coal shipments — both in the short and long term — and the lumpy nature of new investment. For example, the coal terminals at Abbot Point and Port Kembla have considerable excess capacity. The former reflects a significant initial over-estimate of long-term throughput while the latter reflects stagnant output in Port Kembla's feeder coalfields. By comparison, in its 1997 operating mode, the coal terminal in the Port of Newcastle was not able to meet foreign demand for Hunter Valley coal.

Given the export nature of the Australian black coal industry, the location and development of coal loading ports mirrors the development of coal mining regions in Australia. The longest established mining regions have the longest

established coal ports and terminals. Furthermore, incremental changes in ports correspond with developments in mining. For example, the terminals at Hay Point, Dalrymple Bay and Gladstone have emerged as large terminals as the Bowen Basin has risen to prominence.

Large physical distances influence the number of ports in Queensland relative to NSW. In Queensland's Bowen Basin, mining occurs over a distance of about 500 km, from Collinsville in the north to Moura in the south. By comparison, while much of the coal mining in NSW occurs a significant distance inland from its ports, it is not dispersed over such a distance north and south. In addition, the industry in NSW, while continuing to develop as an export industry, first went through a phase of being tied closely to contiguous domestic electricity generation plants.

8.2.2 Competition among Australian coal ports

The Commission discussed competition between Australian ports in *Port Authority Services and Activities* (IC 1993, p. 67). Some of that discussion centred on competition between bulk cargo ports.

In general, there is very limited opportunity for competition between coal ports (although there are some ports at which two coal terminals are potential competitors). There is no viable choice of ports unless the total cost of shipping through alternate coal chains is roughly the same. Where transport distances to alternative ports are not similar, there would usually be a significant difference in the cost of using one coal chain as distinct from another. The expense of transporting coal to an alternative port is generally prohibitive and this cost differential will tend to determine shipment through a particular port.

In some cases there is competition between certain ports at the mine development stage, when mines have a choice of linking up with alternative coal chains. For example, in the Central Bowen Basin a new mine or an existing mine expanding production has a choice between the ports of Gladstone, Hay Point or Dalrymple Bay. It also may choose to ship its product partly through one coal port and the balance through another. Having made this initial decision, the mine effectively will be locked into that arrangement for the term of the contract.

In addition, there is potential indirect competition among ports. Each port is a critical link in the mine to customer transport chain. The coal chains of countries and regions are competing with each other to improve their industry's competitiveness, with consequential implications for market share and new investment. This form of competition has become more important as coal prices have fallen and profit margins tightened or evaporated for many marginal

mines. The Queensland Ports Corporation observed the need for ports to help keep their customer mines competitive:

> So it becomes quite competitive at that point and we're competing against developments in other coal ports in Queensland, in coal ports in New South Wales, in coal ports in other parts of the world. (DRtrans., p. 3)

If a coal port fails to perform efficiently, it reduces the efficiency of the coal chain overall, in turn lessening the ability of the industry to compete in international markets. For example, inefficiency within a coal terminal might cause higher congestion costs relative to competing coal chains. As a consequence, coal demand might be diverted to another source.

The Ports Corporation of Queensland also raised the prospect of benchmark competition between ports:

> ... there exists competition between infrastructure business managers to improve the performance of the assets they manage. This could perhaps be best demonstrated in the case of bulk port operators if all terminals throughout Australia stated the total cost per tonne of using the port. (sub.DR64, p. 2)

8.3 Coal waterfront cost comparisons

There have been a number of recent studies comparing coal waterfront charges, both between Australian ports and between Australian and international ports. The BIE published a study of waterfront charges and productivity in 1995, which showed that the Australian coal waterfront generally performed on a par with world standards. Price information provided by participants in this inquiry indicated that this competitiveness has been largely maintained. Large recent movements in the value of the $A will have had a significant influence on international price comparisons.

The following sections report the results of available studies of waterfront charges and comments on limitations in using such comparisons.

8.3.1 Difficulties with productivity and price comparisons

Chapter 7 (Sections 7.2.1 and 7.2.2) noted some caveats to the interpretation of international comparisons of productivity and prices of rail services. Similar arguments apply for ports. Any significant differences in operating environments between ports will cause differences in productivity and charges, which are not related to performance. Hence, appropriate adjustments need to be made to allow for varying operating conditions before making such comparisons for performance assessment purposes.

For example, the Australian port of Abbot Point is relatively small and requires two tugs to berth coal carriers. Hence, it will have towage costs relatively higher than a port that only requires a single tug. Scale is also important. The port of Richards Bay in South Africa is far larger than most international coal ports. As it can accommodate larger vessels, it can spread the costs of towage over a larger tonnage, thereby reducing average cost. However, such differences are not as serious for benchmarking ports as they are for rail because the operating environments of different coal ports are generally not as diverse as those of coal rail systems.

The need to convert prices to a common currency adds a further complication when making international comparisons of coal port charges. Comparisons of prices demonstrate the impact of ports on the competitive position of the coal industries of different regions or countries. But international comparisons require conversion of port charges to a single currency and exchange rates are unlikely to capture adequately all of the differences in the relative input prices for the waterfront in each country. Hence, although in recent years coal handling charges at many Australian ports have been similar to those at ports in Canada, South Africa and the United States, this in itself does not demonstrate their relative productivity or management performance.

Fluctuations in the exchange rate between Australia and other countries can alter the competitive position of our ports on the basis of a simple charges comparison. For example, from June 1997 to June 1998 the Australian dollar depreciated by close to 20 per cent against the US dollar and by a similar amount against the Canadian dollar. Such a depreciation reduces Australian port charges relative to those in the United States and Canada without any change in productivity. Conversely, the comparative position of Australian ports has deteriorated significantly against Indonesian ports due to the effect of the more than 60 per cent depreciation of the Indonesian rupiah against the Australian dollar in the past twelve months.

Charging policies also affect comparisons. The Ports Corporation of Queensland pointed out:

> The difficulty in comparing the performance and charges at each terminal is that these are often determined differently at each terminal. In some cases only particular users are aware of the price they pay. Therefore, it is difficult to obtain a straight comparison. (sub. 9, p. 4)

The components included in charges also may vary between ports. For example, the port of Hampton Roads in the United States does not charge users for dredging (BIE 1995b, p. 99).

8.3.2 Coal waterfront productivity and charges

This section reports information from the BIE, Barlow Jonker and from inquiry participants.

The Bureau of Industry Economics

In its 1995 report *International Benchmarking — Waterfront*, the BIE compared estimates of charges, as well as discussing the timeliness of services and the level of productivity on the coal waterfront. The BIE research reported individual charges for all the coal ports in Australia except the Port of Brisbane.

Total coal waterfront charges were aggregated into three groups: terminal charges, ancillary charges and port authority and government charges. The composition of each group is shown in Table 8.2.

Table 8.2: **Coal port pricing categories**

Terminal charges	*Ancillary charges*	*Port Authority and government charges*
Stevedoring	Pilotage	Conservancy[a]
Up-front capital contributions	Towage	Tonnage
	Mooring	Berth hire
		Wharfage

a A charge to cover the cost of providing navigational aids in and about a port.
Source: BIE (1995b, p. 97).

Total waterfront charges at the Australian coal ports were found to be competitive by international standards. The average across all the Australian ports was $A4.31 per tonne. The average for the three international ports in the comparison was a little more than $A5.00 per tonne. Figure 8.2 presents total waterfront charges for all the ports in the BIE study.

As noted above, the BIE report also discussed waterfront productivity for coal (BIE 1995b, pp. 101–109). This research showed that Australia not only had relatively low charges for waterfront services, but partial productivity measures also indicated that Australia's coal waterfront was performing competitively. The BIE stated:

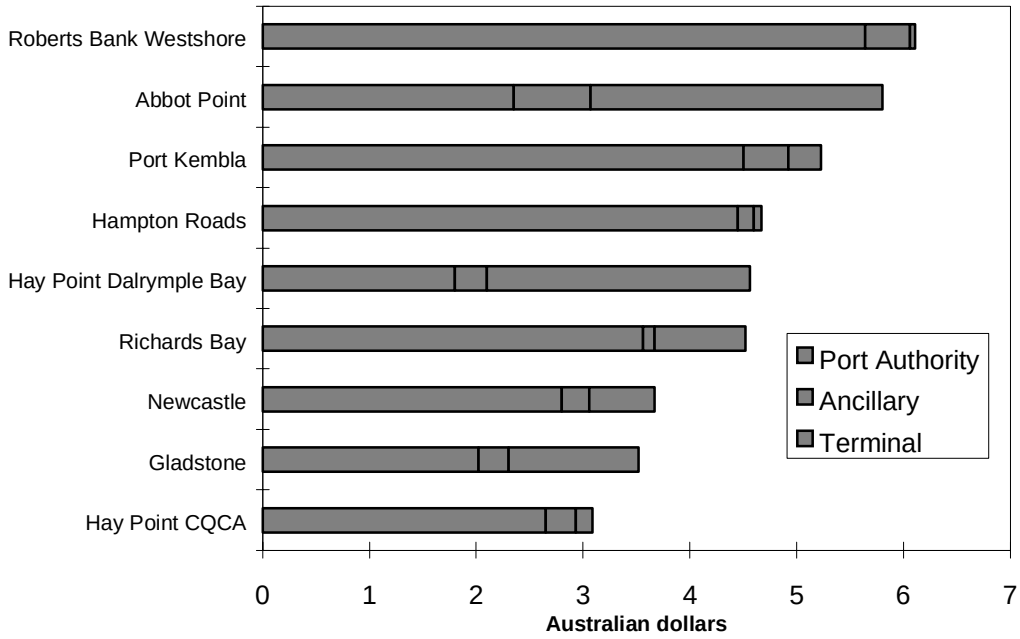
> ... the lower terminal charges are supported by high labour productivity and capital utilisation in the coal terminals. (BIE 1995b, p. 109)

The BIE reported that labour productivity in Australia was particularly high when compared with coal terminals in South Africa and North America. This observation appears to be in accord with the general experience at Australia's

bulk handling terminals, although it contrasts with labour productivity at container terminals (BIE 1995b, p. 109). Box 8.1 discusses some of the factors influencing the performance of the coal waterfront labour force.

The physical performance of Australia's coal waterfront is broadly competitive with coal loading facilities in other countries.

Figure 8.2: **Waterfront charges, by category of charge and port,[a] 1994**



a Reproduced from BIE 1995b, p. 176. Based on a 120 000 tonnes vessel with a cargo exchange of 114 000 tonnes.

Source: BIE (1995b, p. 176).

While the BIE report indicated that Australian coal ports were competitive on the basis of price, and had relatively high labour productivity and capital utilisation, it was less positive regarding timeliness and reliability of waterfront services. The BIE commented that the limited information available raised questions regarding the timeliness and reliability of services, noting that:

> Of the scant information collected, Richards Bay significantly outperformed Australian ports in terms of timeliness with smaller average delays. (BIE 1995b, p. 101)

Some of the implications of waterfront timeliness and reliability are discussed in greater detail in Section 8.5.1.

Box 8.1: **The coal waterfront labour force**

The BIE observed relatively poor performance of container handling on the Australian waterfront (1995b, p. xiii). The same research observed that the performance of the coal waterfront appeared to provide an exception to this overwhelmingly negative story (BIE 1995b, p. 102). A number of factors seem to be driving the superior performance of the coal waterfront, including:

- different union coverage from that in Australia's container terminals;
- different work arrangements than those in Australia's container terminals; and
- a closer relationship between bulk terminals and their customers.

The Australian container terminal industry is characterised by total coverage of a single union, the Maritime Union of Australia (MUA). In contrast, information provided to the Commission by BHP shows that union coverage varies on the coal waterfront. For example, union coverage at the ports of Hay Point and Abbot Point in Queensland is provided predominantly by the Construction, Forestry and Mining Employees Union (CFMEU). At the port of Gladstone, both the Australian Workers Union and the CFMEU are the dominant unions, although five unions have coverage. The Port Kembla coal terminal has exclusive CFMEU coverage under an enterprise agreement. The coal terminal at Kooragang has MUA coverage and the Carrington terminal has Transport Workers Union coverage.

It appears that coal terminal operators have been able to develop workplace arrangements tailored more closely to their own, and their workforce's needs. For example, although the Port of Gladstone operates its workforce under the coverage of a number of unions, it enjoys considerable flexibility in how they are utilised. It submitted:

> ... during a particularly busy coal shiploading period, additional labour can be supplied from our Quarry/Land reclamation operations to guarantee continuity of shiploading operations. (sub. 10, p. 8)

In contrast, Port Kembla coal terminal adopts a slightly different approach, utilising teams in the work environment as the core of its business strategy (sub. 45, p. 4).

The third distinguishing characteristic between bulk ports and container ports appears to be the close relationship between customers and the facility. In all coal terminals the terminal operators know their customers first hand. This leads to a close understanding of the customers' needs by the terminal operators, unlike in the container business where the extensive use of shipping agents and stevedoring firms means that the customer may be several times removed from contact with the service provider.

Barlow Jonker

In 1997, Barlow Jonker reported costs of coal production for Australian mines. From this information the Commission estimated average port charges. The Barlow Jonker cost data include:

> ... the costs of coal handling and ship loading, harbour dues and wharfage, and an allowance for superintendence. (Barlow Jonker1997, p. 81)

The costs reported by Barlow Jonker were prepared from information supplied by individual ports. However, it is not clear whether each port's figure is based on the same cost elements. As such, the average may be biased up or down depending on whether individual port authorities have included the full cost of waterfront services. Estimates calculated from Barlow Jonker data should not be compared with the estimates calculated by the BIE.

On the basis of the data reported by Barlow Jonker, in 1996, the average total cost for Australian mines was $51 per tonne of coal fob, of which around $3 or just under six per cent represented port charges. Compared with the share of transport costs attributable to rail freight, this share is small. These estimates are averages only. For example, at 1997 coal prices the share of port charges would have averaged a little under five per cent for coking coal and around six per cent for thermal coal.

Information from participants

Limited information on waterfront charges was submitted by participants, and much of it was confidential.

On balance, the information confirmed the conclusion of the BIE report, that Australian coal waterfront charges were broadly competitive with major international coal ports, although certain individual ports were significantly more expensive and there remained scope for improvement.

Information supplied by Queensland Ports Corporation indicated that, at the ports for which data were provided, between 15 and 20 per cent of total charges per tonne of coal were not user-based charges (sub. 9, p. 5). Such charges include Commonwealth and State government charges, towage, pilotage and tonnage charges. As well as this impost, among user-based charges, both the Abbot Point and Dalrymple Bay coal terminals levy *special harbour dues* of more than $2.00 per tonne. In contrast, the R.G. Tanna terminal at Gladstone levies a special harbour due of $0.23 per tonne.

Rio Tinto indicated that charges at some Australian coal ports were on a par with those of international ports but that, on average, Australian port charges were slightly higher. Rio Tinto submitted:

> In terms of cost per tonne PWCS is one of the least cost coal ports in the country at $3.65 per tonne. The average price in Australia is $4.13 per tonne. The PWCS price also compares favourably with indicative port costs from international competitors: for example: Indonesia $3.98, USA $3.90, South Africa $3.85. (sub. 22, p. 30)

However, Rio Tinto did not include demurrage in the figure reported for Port Waratah Coal Services (PWCS). In the presence of a queue at PWCS, the Rio Tinto figure understates the total cost of waterfront services there.

While it considered that coal handling charges at Australian facilities are generally high, BHP observed that at certain ports they are particularly high — notably at Port Kembla. It submitted:

> Charges at Port Kembla of approximately $4.70 per tonne ($4.10 with recent relief) are high, when compared with what are already high coal handling costs at comparable Australian ports. Loading charges at Newcastle are approximately $2.90 per tonne and around $3.20 per tonne (plus a capital component of around $0.85 a tonne) [users have an option of a per tonne payment or up front capital contribution] at the state Government-owned Dalrymple Bay terminal in Queensland. Costs at the adjacent BHP Coal operated Hay Point terminal are significantly lower. (sub. 30, p. 25)

As the bases for the various estimates of coal waterfront charges are not explained in submissions, the Commission is not able to comment on differences between various reported figures. Nonetheless, while participants' information varies, it raises a number of potential issues in public policy. These are examined next.

8.4 Pricing issues

Although comparisons of charges are of interest in assessing Australia's competitive position, examining the method of price determination — setting the level and the structure of prices — is of more relevance to assessing the performance of Australia's coal ports.

8.4.1 Rate of return on assets and special harbour dues

An important issue for participants is the appropriateness of the rate of return that governments earn on their ports infrastructure used for exporting coal. Rio Tinto argued that the return to the Queensland Government from certain coal ports is excessive:

> With the charges levied by PCQ [Ports Corporation of Queensland] on the users of DBCT [Dalrymple Bay Coal Terminal], the government has made a return on its

> investment of 46 per cent per annum. This covers all its investments at the port and includes the expenditure on the stage 3 expansion. Given an asset base of around $500 million and with 32 million tonnes per year throughput, the capital charge should be around $1.70 per tonne. The current Special Harbour Due is [$2.43] per tonne. ...
>
> There have also been significant capital contributions by some of the users which currently attract a reduced rate on some of their tonnage. For the allocated tonnage of these users, the capital charge should be around $1.20 per tonne. (sub. 22, p. 34)

The Queensland Government argued that the return it generates on government owned ports was justified. It stated:

> As part of the corporatisation process, [Government owned port corporation] assets were valued in accordance with the Queensland Government's Asset Valuation Guidelines, which are based on the 'deprival value' methodology. In addition, port GOCs [Government Owned Corporations] strive to achieve long run rates of return on these assets consistent with the weighted average cost of capital for the port. Short term targets are agreed between shareholding Ministers and boards as part of the annual SCI [statement of corporate intent] negotiation process and port performance is monitored against these targets. Consequently, underlying assumptions relating to asset values and rate of return targets will have an impact on port charges negotiated as part of User Agreements. (sub. 32. pp. 47–48)

The target rates of return for Queensland's port GOCs are not published. However, as port assets are revalued to current prices, such rates of return should be real rates and not nominal. The application of nominal rates of return to revalued assets would provide governments with benefits from inflation unless capital gains are included in port authority income (as is done by Queensland Rail — see Section 7.6.2).

The target rates of return for such government assets should be published in the interests of transparency to demonstrate that economically sound pricing principles are being applied. This would not undermine the relationship between the Queensland Government and the port GOCs.

The Ports Corporation of Queensland expressed concern about publishing target rates of return:

> This is a matter for decision by our shareholders the State Government. From the perspective of commercial negotiation, it is not normal to place this type of information in the hands of the other party to the negotiations. (subDR58, p. 3)

However, the Commission considers that because of their high degree of market power, government-owned ports corporations and rail infrastructure providers face circumstances very different from those found in markets where competition is strong. In this situation, it is appropriate that governments

publish the target rates of return underlying their pricing policy. This would not disadvantage ports in negotiations as they have no non-government competitors who could take advantage of this information.

Recommendation:

The Queensland Government should publish the target rates of return for its port corporations' assets.

The existence of special harbour dues at certain ports in Queensland was also questioned by participants. The facilities at Abbot Point and Dalrymple Bay in Queensland were funded partly by private users and partly by the Government. Users of these ports are levied a special harbour due of $2.71 and $2.43 per tonne, respectively. Ports Corporation of Queensland indicated that the majority of the special harbour dues collected at DBCT are paid to Queensland Treasury Corporation as a return on the Government's investment (sub. 9).

This special harbour due represents 46 per cent of the charges at Abbot Point Terminal and nearly 48 per cent at Dalrymple Bay. BHP suggested that the levying of special harbour dues makes it difficult for users to have confidence in the calculation of the overall level of charges (sub. 30, p. 22). Rio Tinto (sub. 22) went further, suggesting that these charges have been used by the Queensland Government essentially for raising revenue through excessive profits from a natural monopoly:

> In commercial terms the port [the common user coal port at Hay Point, including Dalrymple Bay Coal Terminal] is a natural monopoly for while other ports do exist, they are further away and would cause higher freight charges to make use of them. The State government has been using the port monopoly to raise revenue far above the cost of supplying the service. (sub. 22, p. 34)

The Ports Corporation of Queensland observed the very different outcome of the Government's investments at Dalrymple Bay and Abbot Point:

> It turned out that the Dalrymple Bay Coal Terminal was ... unusually profitable. But the Abbot Point investment ... has probably only broken even(DRtrans., p. 5)

The Ports Corporation of Queensland indicated that the special harbour dues issue was now one of only historical interest and that future pricing arrangements would be substantially different (sub. DR58). The agreements for DBCT and Abbot Point expire during 1998–99. The Ports Corporation envisages that renegotiation will not require Government involvement and it expects that special harbour dues will cease. In their attitudes to both rail and port charges for coal, governments have recognised the far more competitive market and lower returns now faced by Australian coal producers. In this

environment, attempts to extract significant monopoly rent from government-owned infrastructure would lead to significant falls in throughput and lower returns to infrastructure providers.

With the creation of the Queensland Competition Authority (QCA) as an independent regulatory body in July 1997, the Queensland Government has put in place a mechanism designed to address port authority pricing issues. The QCA could consider the details of port GOC asset valuations, in addition to target and actual rates of return.

The QCA can recommend to the Queensland Government changes in the pricing practices of government corporations where they have been declared (see Box 7.2). Port pricing arrangements would be within the price surveillance ambit of the QCA should they be declared by the Queensland Government. Declaration of port GOCs by the Queensland Government would place more discipline on port authority pricing decisions.

The Ports Corporation of Queensland has expressed concern that the involvement of the QCA in port pricing may mitigate against fruitful negotiations:

> We believe that the negotiating process has value in that as we work through the various issues with our clients, we're looking at where benefit can be obtained and, in fact, we come to a low cost situation.
>
> ...We talked with the people we're negotiating with, along the line that we didn't want to go through the process of negotiation, simply to get to the stage where having agreed that what was a fair and reasonable thing, that the proponents then went off to QCA and said, "Well this is the start point, we now want it better". We felt that that was not a reasonable position to be in. (DRtrans.,p. 15)

The Commission sees the main role of independent pricing tribunals in port pricing to be the recommending of appropriate pricing principles (including rates of return and asset valuations) and where necessary reviewing their application to particular circumstances. Accordingly, if port authorities apply the agreed principles appropriately, there should be no benefit to clients making frivolous appeals to the QCA. In this environment, the negotiation process between port authorities and their clients can still produce important efficiency benefits.

In addition to the issues concerning Queensland ports, it was suggested by BHP (sub. 30, pp. 22–26) that the operating lease for the site, plant and equipment at the Port Kembla Coal Terminal — payable to the Port Kembla Port Corporation — generates an excessively high return to the NSW Government. Reflecting the difficult competitive position of many coal mines using Port Kembla, the NSW Government has reduced the per tonne charges for the use of

port facilities from $2 to $1.30, effectively reducing its rate of return by one third. These reductions (backdated to December 1997) are to be passed on completely to the mining industry. In addition, IPART will hold an inquiry into the lease arrangements and examine productivity changes in the coal industry in July 1999.

Although the NSW Government publishes rates of return for Port Corporations, the arguments regarding calculation of the appropriate rate of return on government assets apply equally to ports in NSW as they do to Queensland port GOCs.

While the NSW ports corporations are standing reference agencies under the provisions of the *Independent Pricing and Regulatory Tribunal Act 1992* (NSW) (see Box 7.1), they have not been declared as monopolies, and, hence do not fall within the prices surveillance ambit of the NSW Independent Pricing and Regulation Tribunal (IPART). Thus, IPART does not have the authority to conduct a review of, or set maximum prices for, the services of NSW ports corporations. The Commission considers that NSW ports corporations would have stronger incentives to adopt appropriate and transparent pricing strategies if they were subject to review by IPART.

Recommendation:

The New South Wales and Queensland Governments should bring their port corporations within the prices oversight jurisdiction of the Independent Pricing and Regulatory Tribunal and the Queensland Competition Authority, respectively.

8.4.2 Pricing practices

As well as issues associated with rates of return and special harbour dues, this inquiry raises issues about the use of price to create the correct signals for the efficient use of coal loading facilities.

There are a number of reasons why prices for coal waterfront services at particular ports should vary, including to:

- allocate scarce capacity (for example during peak periods);
- improve efficiency in the coal chain; and
- reflect different levels of costs imposed by user requirements.

The difficulties of the PWCS pricing system during the period of long queues in 1997 is a striking example of where price could be used to help allocate

capacity more efficiently. Because of the common user conditions of its operating lease, PWCS does not use price signals to allocate capacity, operating rather on the basis of loading ships in the order that they join the queue. Particularly when there is an ongoing capacity shortage, this system encourages vessels to hurry to the port in order to obtain an earlier place in the queue. Furthermore, the increase in transactions on the spot market may serve to exacerbate the queuing problem. As miners sell marginal tonnages on the spot market, in addition to their contracted tonnages, greater numbers of vessels are required.

In 1997 this system contributed to significant delays and costs. Physical queuing gave rise to high demurrage (ship detainment) charges on coal producers, effectively increasing total charges for mining companies from an apparently competitive $2.80 per tonne to around $5 per tonne.

Rationing demand by using prices could have changed the incentives to race vessels to the port. For example, vessels wishing to obtain expeditious turnaround, by reserving a date for loading, should be able to pay to achieve that goal. An alternative approach is that adopted by LAXT. Rather than using prices to allocate capacity, LAXT requires users to nominate arrival details and reserve a window of time for a given vessel significantly in advance of its arrival (LAXT, p. 23). This system avoids the ship queuing problem, while putting in place strong incentives for vessels to meet their allocated window. However, this approach will involve some (usually unknown) cost in terms of loss of flexibility.

As another matter of principle, waterfront charges should reflect the underlying cost of providing a given level of service. Where the cost of providing waterfront services varies, the charge levied also should vary where the cost differences are important and can be readily identified and charged for. For example, under the present system of pricing at the port of Gladstone, no distinction is made between producers that require coal blending services and those that do not. Unless the coal handling facilities incur no further cost in providing blending services, the levying of the same charge on all users is effectively a cross-subsidy from those which do not blend (or blend at the mine) to those which do.

However, the incremental cost of blending will vary according to the design of the facility. For example, at the R.G. Tanna facility in Gladstone, each mine has a dedicated stockpile area and reclaiming is achieved by underground feeders. The cost of blending may be relatively small as all it requires is another bulldozer and operator. Nonetheless, in facilities where the cost is significant, there should be a method of charging which takes into account the cost of providing the service.

PWCS also does not charge for standard blending services — non-standard blending services are quoted case by case. Blending is not the only cause of cost differences between users of coal loading facilities. The cost of loading vessels of various types and loads will differ and should be reflected in the charges. Neither PWCS nor Queensland Port Authorities applies discounts for volume, although the latter has indicated that these are likely to be introduced at Abbot Point where there is significant excess capacity (DRtrans., p. 15). Such increased flexibility in pricing demonstrates the benefits of the commercialisation of government business enterprises over the last decade.

Finally, efficient prices provide correct signals throughout the entire operation — from allocating capacity, to decisions on when to expand. In its submission, with reference to its own experience, PWCS described the merits of user pays charging regimes:

> PWCS believes there is merit in investigating a user pays regime for PWCS services for the following reasons:
>
> ... the possibility of a competitive terminal being established to export Hunter Valley coal would mean in all likelihood that a common charge could not be sustained;
>
> ... the impost of cost reflective charges for the different services provided may serve as a driver for more efficient behaviour by PWCS and customers alike;
>
> ... will serve to eliminate the current cross-subsidisation that is a characteristic of a common charge approach;
>
> ... differential charges (possibly consisting of an access charge and variable operating charge) could support the adoption of an economically sensible capacity allocation scheme (discussed above);
>
> ... differential pricing has the potential to better inform future investment decisions to be made by PWCS. (sub. 42, p. 4)

Rio Tinto also observed the deleterious effect of the common charge at PWCS:

> There is a single charge for each tonne of coal shipped through the terminals, regardless of the level of service provided. Differential charges reflecting the level of service would almost certainly lead to changes which would improve the efficiency of the terminals. (sub.DR65, p. 6)

While the common user lease requirements are directed at preventing the coal industry owners of PWCT from using their market power in coal handling against new coal mines, they have the undesirable effect of apparently restricting legitimate and desirable pricing practices from being used.

There is potential for terminal operators to make greater use of variable pricing to generate improved performance and, where appropriate, ration demand.

8.5 Other issues

As well as the obvious concerns about productivity and pricing levels and practices, there are two other reasons why coal waterfront performance is important. First, it was noted by a number of participants that the long queues of vessels waiting off the coal terminals at Newcastle during 1997 had a negative spillover to the rest of the coal industry. This was seen as taking the form of damage to Australia's reputation as a reliable coal supplier or of reduced competitive discipline on other Australian port facilities. Second, coal waterfront facilities are but one element in the coal chain from mine to port. As such, any underperformance of the waterfront may drive underperformance of the coal chain overall.

8.5.1 The effect of sub-optimal performance at PWCS

As a result of faster than expected growth in demand and inefficiencies in using existing capacity, long queues of coal vessels formed of the port of Newcastle in 1997. Demurrage payments of well over $100 million in 1997 are the visible manifestation of this sub-optimal performance. In addition, the inability of suppliers to meet demand for coal represents income forgone by the industry. Powercoal (trans., p. 29) noted that the inability to get its product to the international market can cause mining companies to reassess their expansion plans. In addition, buyers could change their short and long-run supply plans, reducing the growth of the coal industry that otherwise might have occurred.

A number of participants (for example, Exxon, sub. 3 and DPIE, sub. 43) also observed the adverse impact on the reputation of the Australian coal industry of the large numbers of vessels laying off the port of Newcastle during 1997 and early 1998. Another more subtle spillover may have been generated by the bottleneck at the port of Newcastle. Assuming that there is some indirect competition between ports, as discussed in Section 8.2.2, if a major port in Australia performs at world's best practice it disciplines other competing ports to improve their performance. Conversely, when there are problems with the performance of a significant port, the discipline imposed by this competition is relaxed. Although each port may view itself as competing only with the next closest port — or perhaps all Australian ports — the industry, overall, is competing in an international market.

The queue of coal ships at Newcastle, although fluctuating, has now returned to more normal levels at which little demurrage is payable. This largely reflects greater efficiency by PWCS in the use of its existing capacity, together with some improvement in the coordination in the coal chain. Although throughput continues to grow, there may have been some potential coal shipments which

did not occur because sellers and/or buyers changed their plans as a result of the long queues and high demurrage costs at PWCS. The very long queues of ships at Newcastle turned out to be a relatively short-term – albeit very expensive – phenomenon.

The capacity shortages at PWCS in 1997 had a negative impact on the Australian coal industry, particularly in the Hunter Valley. A number of matters relating to these shortages have implications for improved operation of Australian coal ports.

The need to weigh the costs of excess capacity against the problems of capacity shortage observed recently at PWCS implies a delicate balance in planning capacity expansion. The NSW Minerals Council commented:

> ... the board of PWCS agonised long and hard seven years ago and they do it all the time, about when to add capacity, because they've always been conscious of the problem of too much investment, getting too far ahead of the throughput of a loader. It can only come back and add to costs, and in a fine margin business of course that's not desirable. (trans., p. 81)

Such investment decisions are an ongoing part of all capital-intensive industries. The decision to add capacity at the wrong time would impose significant costs on the industry. For this reason, some level of queuing can be efficient. The terminal operator has to balance the potential costs of queuing against the inefficiency cost of excess capacity. In addition, many coal terminal assets have long lives and hence, before investing, operators will need to be confident that observed demand growth will be maintained for a considerable period.

Unless significant excess capacity is maintained constantly, unforseen expansion in demand growth would usually be expected to cause short-term queuing problems depending on the time taken to expand capacity. In addition, at Newcastle vessel arrivals vary significantly during the year, so there will be queues at certain times unless excess capacity is created to cope with short-term peak throughputs. As capacity expansion can generally only be made in discrete lumps, there are also likely to be medium-term variations in queue length as capacity is excessive immediately after new investment has been bedded down, but becomes tighter as throughput increases.

Hence some degree of queuing can be seen as desirable, varying in both the short and medium terms. The Ports Corporation of Queensland argued that:

> ... the cost of demurrage is an integral part of measuring the efficiency of the port. This does not mean that no demurrage is the aim. Having regard to the capital costs of the port and the desire for increased throughput of tonnage over the asset base, a $0.20 to $0.30 demurrage charge per tonne may deliver the best overall costs to port users. (sub. DR58, p. 4)

The capacity problems at PWCS were exacerbated by significant delays due to appeals by objectors under the planning approval process imposed by the NSW Government. Without these delays the new berth and extended conveyor (which will increase nameplate capacity to 75 million tonnes) may have been in place before the end of 1997 and hence cut short the excessive queues.

Rio Tinto commented on the general role of the government in infrastructure planning:

> The role of State Governments, port authorities and rail authorities is, in the case of private industry investment to:
>
> ... ensure that the legislative framework for statutory approvals and appeals is conducive to allowing properly planned projects to proceed in a timely manner; especially by ensuring that the guidelines for Environmental Impact Studies and other pre-construction approvals are sufficiently specific to allow all of the issues to be resolved during, not after the planning phase, and provide input and advice to the planning process where government services interface with the proposed expansion. (sub. 22, p. 35)

Although the right of appeal to courts by an objector to the PWCS expansion represents the workings of a democratic society, the process seems to have been unduly long in this instance. In order to bring about a resolution of the problem, a new Act of the NSW Parliament (*Kooragang Coal Terminal (Special Provisions) Act 1997* (NSW)) was passed, validating the Minister's development consent. The third berth at Kooragang will not be in place until September 1998 and commissioning will add further time before the facility is fully productive.

The Commission considers it important that those who believe themselves adversely affected by infrastructure developments have adequate opportunities to appeal or seek compensation. However, the interests of appellants need to be considered within a general framework of the costs and benefits of such projects.

Despite long queues during 1997, reported throughput was somewhat less than the facility's nameplate capacity (66 mtpa). For example, Powercoal observed:

> We see the Port of Newcastle with a nameplate capacity of 66 million tonnes, achieving throughputs less than that, somewhere between 60 and 62 million tonnes per annum. (trans., p. 22)

This outcome in the face of significant excess demand, suggests that there was room for improvement in the management and operation of the facility. This would partly reflect the bedding down of earlier capacity expansions completed in August 1996. The NSW Minerals Council (sub. DR60) has indicated that PWCS operated well below its capacity for the first half of 1997, but has since

improved performance significantly to consistently achieve its nameplate throughput over the last year.

However, a report by the Port Capacity Utilisation Group expressed the view that the Port of Newcastle in its present form has the capacity to ship even greater tonnages. The Group suggested that:

> ... combined receivals capacity at PWCS is no less than 88 Mt/yr and the ship loading capacity a yet unidentified figure in excess of this number. So, theoretically, with better systems and presumably a minimal capital expenditure, Newcastle can load out an additional 30 Mt/yr. (ICR 1997b, p. 12)

If correct, this view indicates that ongoing improvements in port management and coal chain coordination are available to users of PWCS.

The absence of any mechanism to allocate scarce capacity once it became obvious that underlying throughput demand was well in excess of achieved capacity also accentuated the queuing problem. The common user lease conditions applying to PWCS requiring a common charge to all users are seen by management as preventing variable pricing to allocate demand. By providing the scarce capacity to those firms willing to pay the most for it, pricing mechanisms would have allocated available throughput more efficiently and reduced the need for wasteful queuing. There would have been a significant profit transfer from coal producers to PWCS, but this would have been preferable to the transfer and wasted resources involved in the large demurrage bill associated with long queues of vessels.

Finally it has been argued that the present ownership and management structure of PWCS may inhibit timely decision-making and response to changing circumstances. Powercoal commented:

> ... sometimes if you sit back and look from outside in, you could be drawn to the conclusion that the whole coal chain, PWCS scenario, is somewhat like an old co-operative. Plenty of shareholders, but no real leadership, and I think we're currently seeing the need for the coal chain to be brought under the control of one management system. There are plenty of consultative bodies around and everybody's making their best endeavours. But nobody has authority to make a decision. You can only go forward once you can make a decision, and we Australians are not known for consensus, so therefore, I fail to see how we're really going to get the port up to where it should be, while ever we have this current structure. (trans., p. 30)

While it is generally not the role of governments to consider appropriate ownership structures of private sector organisations, PWCS does have long-term access to scarce berths at the Port of Newcastle on which it has now made significant capital investment. Furthermore, poor performance by one port operator can have spillover impacts on the rest of the Australian industry.

However, the Commission received no response from participants to its Draft Report request for comments on this issue. Different ownership models for terminal operators are outlined in Section 8.5.2.

8.5.2 The port in the coal chain

It is recognised that an efficient coal chain — the combination of mining practices, rail and port facilities — is important to optimising the efficiency of the coal industry. This is particularly relevant to the Australian experience, as by international standards the majority of Australia's high quality coal resources are relatively close to export facilities. Given efficient mining practices, rail links and waterfront facilities, the Australian export coal industry has a potentially large competitive advantage over rival producers such as those in western Canada and much of the United States. If the Australian industry does not maximise the efficiency of its coal chains, it may lose some of this advantage.

Although the available evidence about the performance of the waterfront component of the Australian coal chain is quite positive, there remains scope to improve the performance of at least some of Australia's coal waterfront facilities, specifically their relationship with other elements in the coal chain.

One question is whether the current ownership models of terminal operators is the most appropriate for achieving optimal performance. For example, although Australia has a number of coal terminals owned and operated by private consortia of coal mining companies, it has no facility that is operated as a discrete profit centre such as a publicly listed company. By contrast, the Westshore coal terminal at Roberts Bank in British Columbia is owned by a publicly tradeable income fund. Its imperative is to generate a competitive return on investors' funds, and this makes for an approach to its operation radically different from that of any facility in Australia. As its customers operate in a highly competitive market, there are unlikely to be significant rents available for appropriation by Westshore. The background and some of the unique characteristics of Westshore terminal are presented in Box 8.2.

A second model that offers a useful method of thinking about optimising the performance of waterfront facilities is the 'line balance' model. This model shares a lot in common with the 'just in time' production methods used in other industries such as the automotive industry.

Box 8.2: **Westshore Terminals' approach to the coal chain**

Westshore Terminals began operations as part of Kaiser Resources' coal mining interests in Canada. It originally serviced one mine, supplying six to seven million metric tonnes per annum (mtpa) to the Japanese market for metallurgical coal. After a number of changes in ownership, coinciding with the mixed fortunes of Canada's coal industry, Westshore Terminals is a profit-making operation, independent of coal miners and rail transport providers.

In order to maximise its profits, Westshore Terminals needs to know that each other element in the chain from mine to port has the incentive to operate efficiently. For example, an inefficient mine that takes overly long to load out trains delays the loading of the coal at the terminal. Similarly, a rail system that operates inefficiently imposes a cost on the terminal.

In the Westshore Terminal coal chain, where one element creates an inefficient burden on another element, the system is designed to direct the incidence of that cost to the cause of the inefficiency. For example, demurrage charges are shared with the mines according to agreed guidelines.

This was not always the case. As in the case of PWCS, demurrage used to be borne 100 per cent by the mine until the issue was addressed in negotiations aimed at improving overall coal chain performance. With the demurrage charge being shared, each individual element has a strong incentive not to bring about demurrage.

The existence of rail detainment charges reinforces these incentives. The three elements in the coal chain have negotiated agreed cycle times for completion of each step in the chain. Where any element in the coal chain exceeds its cycle time, a detainment fee is charged. For example, in a round trip of approximately 100 hours from mine to port, there may be an allowance of four hours to load, five hours to unload and the balance to haul from mine to port. Should the mine, rail or port fail to meet the cycle time, they are required to make payments to the other elements in the chain.

Westshore Terminals describes its place in a competitive coal chain in the following terms:

> Above all, however, Westshore remains committed to play a key role in the competitive success of the coal chain on the West Coast of North America by providing efficient unload and load operations, special blending requirements and constant dialogue with our customers on improvements in all aspects of the coal chain.

The underlying basis for such a model is that systems operate more cost efficiently when the peaks and troughs are removed and the system produces only as demand requires, with a minimum of inventory. The Queensland Government observed the relevance of such an approach to the coal chain:

> Infrastructure utilisation can be improved by smoothing out the peaks and troughs of demand. In this regard, balancing of the infrastructure requirements and costs of links in the transport chain ie mine stockpile costs, rail costs, terminal stockpile costs, terminal and port costs, requires ongoing fine tuning. (sub. 32, p. 42)

An example of where such a line balance model is applied is the Cyprus Amax Cumberland mine in Pennsylvania. The history and approach of this mine is described in Box 8.3.

The approaches taken by Westshore Terminals and Cumberland mine represent only two methods whereby the performance of individual elements is enhanced by focussing on the close relationship between a port and the other elements in a coal chain.

The coal terminals at the ports of Newcastle and Gladstone are involved with well established coal chains terminating at those facilities. The Hunter Valley Coal Chain (HVCC) has evolved over time, with the input of mines, FreightCorp, PWCS and the Newcastle Ports Corporation (sub. 27, p. 15). The potential for such co-operation to generate better performance is demonstrated by the recent improved capacity utilisation at PWCS. The coal loading facilities at the port of Gladstone also seem to have a well established coal chain, as do most of Australia's other facilities.

However, the success of the approaches at Westshore Terminals and Cumberland mine does not seem to have been replicated in Australia. There remains scope for improvement. For example, the Rail Access Corporation acknowledged that there was room to further improve the HVCC:

> The RAC recognises that its investment strategy must be aligned with those of the other stakeholders to ensure that capital is spent on projects that provide the best overall economic benefit to the coal chain and the lowest life cycle cost, irrespective of whether the investment is made in rail infrastructure, rolling stock or port facilities. Historically, industry participants have tended to optimise only their own parts of the coal chain, many times to the cost of other participants and overall efficiency. (sub. 23, p. 14)

The NSW Minerals Council (sub. DR 60) indicated that greater co-ordination between various parts of the coal chain played a major role in the improved throughput from existing PWCS facilities observed in 1998. This improved cooperative effort was stimulated by the pressures created by the long delays faced by coal ships in 1997. Similarly, there may be scope for improving the efficiency of Queensland coal chains. The pressure created by falling coal prices is likely to generate renewed efforts by all members of the coal chain to obtain these co-ordination benefits.

Box 8.3: **Cumberland mine's *line balance* approach**

Cumberland mine commenced operations in August 1977. It was owned by United States Steel and operated on the basis of a cost plus contract, supplying thermal coal to Ontario Hydro. Its employees were, and remain, members of the United Mine Workers of America. In what Cumberland describes as "a significant emotional event", the mine was forced on to the spot thermal coal market in 1990, when the cost plus contract was lost. The mine reduced operations to 3 or 4 days a week and its future was unsure.

In June 1993, the mine was purchased by Cyprus Amax with a view to improving its performance substantially. A new and updated longwall mining unit was purchased late in 1994. Another major change occurred in the way management thought about the overall operation from the coal face, 17 miles to the load out facility at Cumberland harbour. This led to the development of the *line balance* model central to the present approach of mine management.

Under the *line balance* model, every stage in the coal chain from the coal face to the port is balanced as an integrated single system. For example, it does not increase the efficiency of the coal chain, overall, to add rail capacity if the mine capacity is not adequate to match it. Similarly, there is no advantage from installing larger slope belts in the mine if the preparation plant cannot cope with that much coal.

Under the *line balance* approach, the overriding consideration is the total cost of the system, not the cost of elements within the system. As the operation evolves over time, the capacity of each element is augmented in such a way that the overall efficiency is achieved at the least total cost.

Cumberland mine reports that this approach has been central to the improved performance of the mine. Total cost has been reduced and output has doubled from 3.2 mtpa in 1993 to 6.3 mtpa in 1997.

In the cases of Westshore Terminals and Cumberland mine, the respective coal chains have experienced external shocks; through changes of ownership and market pressures. In each case the individual components in the coal chain have been required to take into account the efficiency of the system overall. Had each individual element not been able to meet its respective challenge, the entire coal chain would not function efficiently.

It is important to realise that the coordination of the coal chain is largely in the industry's hands. However, governments must also ensure that their rail and port authorities are responsive to industry needs. In particular, these authorities need to price flexibly so as to encourage improved coal chain performance.

9 GOVERNMENT REGULATION AND SAFETY

Underground coal mining is hazardous. The sector's fatality rate is about six times the Australian industry average. However, the low injury record of some mines indicates that accidents are preventable if hazards are managed effectively. The rate of fatal injury in the open cut coal mining sector is slightly higher than the Australian average.

The coal industry is one of the few industries subject to industry-specific occupational health and safety (OHS) legislation. In contrast to the OHS legislation applying to other industries, the coal legislation specifies how particular hazards are to be controlled, rather than placing general duties of care on workplace parties.

Participants raised a number of problems with the current legislative approach. These included that it contributed to apathy, diminished workplace parties' responsibility for safety and imposed significant costs on companies and regulators.

To improve safety outcomes in the coal industry, workplace parties need to bear more responsibility for safety. This could be achieved by incorporating duty of care principles in coal mining legislation, requiring employers to develop mine safety management plans and vigorously enforcing workplace parties' responsibilities. While there is a role for regulation of serious hazards, existing regulations should be redrafted along performance lines, and specific procedures for controlling hazards should be incorporated in mine safety management plans. Given the lesser hazards in the open cut sector, it would be appropriate to regulate it under OHS legislation applying to other industries or metalliferous mining.

The Joint Coal Board should be abolished and its functions taken over by the NSW Department of Mineral Resources, the NSW WorkCover Authority and other public and private providers as appropriate.

It may be appropriate for local government rates levied on coal mines to be higher than those for other businesses. However, rates should be not be inflated to include a quasi-royalty component.

9.1 Introduction

Government regulation of the coal industry is principally concerned with safety. This chapter begins by outlining the Australian coal industry's safety record (Section 9.2). It then identifies the legislation governing safety and the government agencies which administer that legislation (Section 9.3). The next section contrasts the approach to regulating safety in the coal industry with the approach applied to the rest of Australian industry (Section 9.4).

Participants in this inquiry raised a number of problems with the regulation of safety in the coal industry, and these concerns are outlined in Section 9.5. The Commission then outlines a number of principles to guide the reform of safety legislation to address these concerns (Section 9.6).

The remainder of the chapter is concerned with other aspects of regulation of the coal industry, namely the Joint Coal Board in NSW (Section 9.7), and charges levied by local governments (Section 9.8).

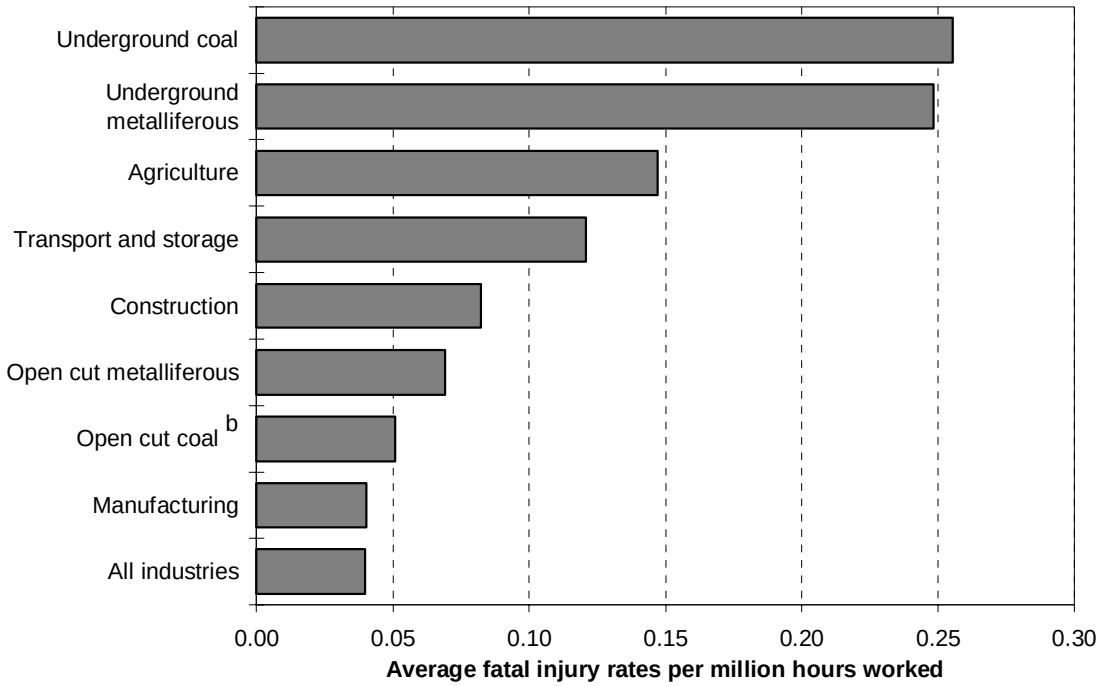
9.2 The Australian black coal industry's safety record

Underground coal mining is a hazardous industry, and the industry's fatality rate indicates serious deficiencies in the management of these hazards. The average rate of fatal injury in the underground coal industry is about six times the average rate applying across all Australian industries in recent years (see Figure 9.1).

In contrast, the rate of fatal injury in the open cut coal mining sector is only slightly above the all industry average. Coal mining has a fatality rate similar to that of metalliferous mining, but a higher lost time injury rate. However, the comparison is sensitive to the specific years chosen (see Figures 9.1 and 9.2).[1]

[1] Minerals Council of Australia (1998) data show that over the period 1987–88 to 1996–97, the average fatality rate of metalliferous mining was higher than for coal mining, both in the open cut and underground coal sectors. However, this estimate was based on a simple average of fatal injury frequency rates in each year, when a weighted average taking into account changes in the number of hours worked would be more statistically accurate. The average fatality rates reported in Figure 9.1 were calculated using a weighted average and were limited to those years for which data on the number of fatalities and number of hours worked were available (namely, 1992–93 to 1996–97).

Figure 9.1: **Average fatal injury frequency rates, selected Australian industries**[a]



a Average fatal injury frequency rates for coal and metalliferous mining are for the years 1992–93 to 1996–97. Fatality rates for the other industries were for the years 1991–92, 1993–94 and 1994–95. These were the only years for which complete published data were available.

b Open cut coal figures include Victorian brown coal.

Sources: Minerals Council of Australia (various), Worksafe Australia (various) and IC (1995b).

Table 9.1: **Lost time in Queensland coal mines, 1996–97**

	Source of lost time as a percentage of total time worked					
	Sickness	*Disputes*	*Injuries*	*Absenteeism*	*Other*	*Total lost time*
Open cut mines[a]						
Best Practice	0.13	0	0	0.08	0	1.52
Worst Practice	6.55	9.01	0.92	10.63	2.53	14.92
Industry Average	2.05	1.66	0.28	0.84	0.13	4.97
Underground mines[b]						
Best Practice	0.54	0.60	0.06	0.11	0	2.05
Worst Practice	4.68	5.57	2.27	8.94	2.76	15.96
Industry Average	2.86	2.62	1.02	1.64	0.41	8.67

a Open cut mines include only those with over 100 employees.

b Underground mines include only those with over 50 employees.

Source: QCB and reproduced by the Queensland Government in sub. 32.

There is substantial variation in safety performance within the coal industry (see Table 9.1). Given that, in general, coal mines face similar risks, this diversity in performance indicates that some mines have been much more successful than others in controlling the hazards they face. The low injury record of some mines indicates that accidents are preventable if hazards are managed effectively.

The coal industry's progress in improving safety is mixed. On the positive side, the industry has reduced significantly the rate of lost time due to injury over the period 1987–88 to 1996–97 (see Figure 9.2). On the negative side, the industry's fatality rate has remained high (see Figure 9.3). On all indicators, underground coal mining has a worse safety record than open cut coal mining.

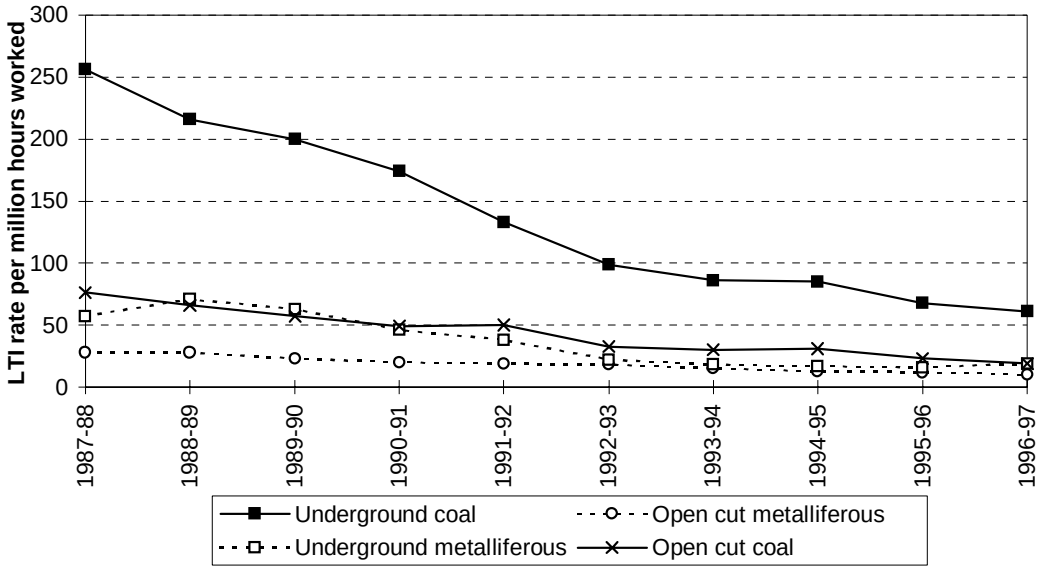
International data, although not strictly comparable, provide a broad indication of the performance of Australian mines relative to their overseas counterparts. In terms of fatalities, Australian underground coal mines have a similar fatality rate to those in the United States, and Australian open cut coal mines have a lower fatality rate than those in the United States (Minerals Council of Australia 1998).[2] However, coal mines in the United States have significantly lower lost time injury rates than Australian coal mines, although the performance gap has narrowed over the period 1991–1997. BHP provided evidence that its Australian coal mines had a worse injury rate than its metalliferous and overseas coal mines, including those in Indonesia (see Table 9.2).

Workplace accidents impose costs on companies. Table 9.1 indicates that injuries account for about 6 per cent (0.28/4.97) of lost time in the open cut sector, and around 12 per cent (1.02/8.67) of lost time in the underground sector. If the worst-performing mines reduced their lost time due to injuries to the average level there would be significant improvements in productivity.

BHP provided evidence that workers' compensation for its Queensland coal operations cost the company $4.6 million in 1996–97. In addition, BHP estimated that the overtime cost of replacing workers on compensation across the whole BHP Coal Division was $4.7 million in 1996–97.

[2] This comparison is based on the period 1987–88 to 1996–97 for Australian coal mines, and the period 1991 to 1997 for US coal mines.

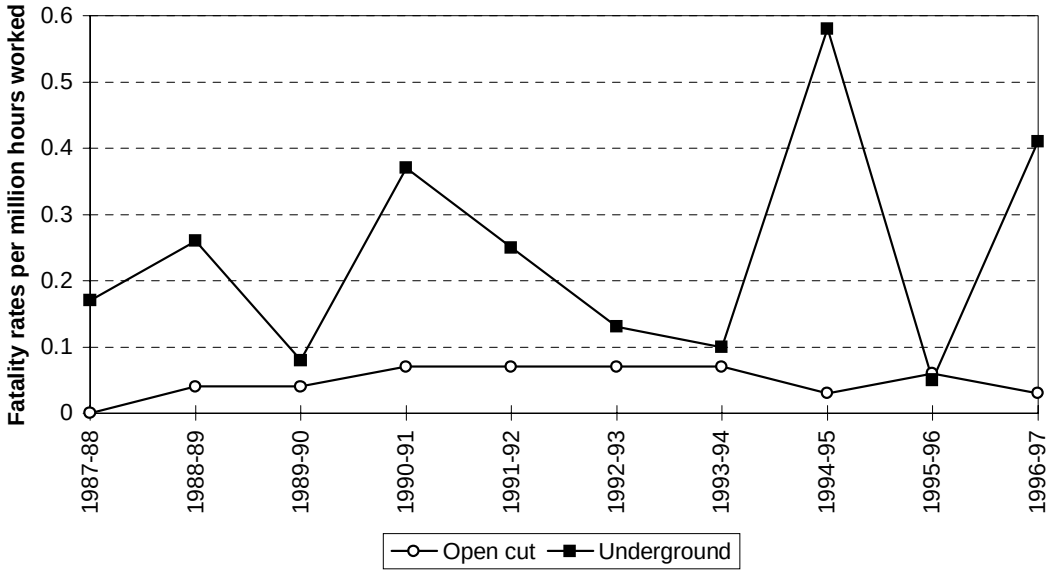
Figure 9.2: **Lost time injury frequency rates for coal and metalliferous mining[a], 1987–88 to 1996–97**



a Lost time injury frequency rate is the number of lost time occupational injuries per million hours worked.

Source: Minerals Council of Australia (1998).

Figure 9.3: **Fatal injury frequency rate, underground and open cut coal mining[a]**



a Fatality rate is the number of fatalities per million hours worked.

Source: Minerals Council of Australia (1998).

Table 9.2: **Comparative safety performance at BHP operations**[a]

Operation	*12 month lost time injury frequency rate*[b]	*12 month lost time injury severity rate*[c]
BHP Coal Collieries NSW (Aust.)	36.0	1053
BHP Coal Qld Operations (Aust.)	12.7	300
BHP Iron Ore — Mt Newman (Aust.)	11.2	271
BHP Iron Ore — Yarrie (Aust.)[d]	7.6	73
BHP World Minerals San Juan (US)	6.8	58
BHP Steel (global)	5.8	189
BHP Iron Ore — Yandie (Aust.)[d]	3.9	370
BHP World Minerals Navajo (US)	3.7	26
BHP Copper (global)	3.5	136
BHP World Minerals La Plata (US)	2.6	38
BHP Coal Indonesia	0.6	7

a Injury rates are for the twelve months to August 1997.
b Lost time injury frequency rate is the number of lost time injuries per million hours worked.
c Lost time injury severity rate is the days lost per million employee hours worked. This measure takes into account the severity or number of days lost per injury.
d Contract operations.
Source: BHP, sub. 30.

9.3 The regulation of safety in the coal industry

The coal industry is one of the few industries in Australia subject to industry-specific occupational health and safety (OHS) legislation, and then only in some States. The only other industries with specific OHS legislation are the mining industry, the offshore petroleum industry and the Commonwealth public sector.

In South Australia and Tasmania, the coal industry is covered by the OHS legislation applying to all other industries and mining legislation. In Western Australia, the coal industry is subject to the OHS legislation applying to the mining industry. In Victoria, open cut coal mining is subject to the general OHS legislation. Only in NSW and Queensland is coal subject to coal specific OHS legislation.

The main piece of legislation governing OHS in NSW coal mines is the *Coal Mines Regulation Act 1982* (NSW) (see Box 9.1). NSW coal mines are also subject to the *Occupational Health and Safety Act 1983* (NSW) which governs

OHS in most NSW businesses. Open cut and underground metalliferous mines in NSW are regulated by the *Mines Inspection Act 1901*.

Box 9.1: **The NSW Coal Mines Regulation Act 1982**

Matters covered by the *Coal Mines Regulation Act 1982* (NSW) include the following:

- the operation of mines — ranging from notification of operations, methods or systems of working mines, to the closure of mines;
- the administration governing the industry such as the appointment, qualifications and functions of departmental inspectors and the functions of the Coal Mining Qualifications Board;
- hours of work for mine employees;
- the role of managers (and under-managers, deputies and examiners) and duties of owners;
- rules under which employees should conduct themselves;
- safety inspections and reports;
- mine safety precautions and requirements;
- the operational conditions under which equipment such as boilers and pressure vessels are to be used;
- necessary qualifications, appointment prerequisites and duties of a range of mine personnel (for example, certificates of competence, mine mechanical engineers, colliery fitters and mine surveyors);
- election and necessary qualifications of district check and electrical inspectors (including how these elections are to be conducted);
- the first aid requirements, sanitary conveniences, bath and change house accommodation and protective equipment;
- coal mine vehicle and transport requirements and the operation of belt conveyors;
- the declaration of coal preparation plants; and
- the care of horses, appointment of horsekeepers and veterinary inspections of horses in underground mines.

Sources: *Coal Mines Regulation Act 1982* (NSW) and amendments.

Coal mines in Queensland are regulated under the *Coal Mining Act 1925* (Qld). In contrast to NSW, Queensland coal mines are exempt from the principal OHS statute for all other industries in Queensland, the *Workplace Health and Safety Act 1995* (Qld). Open cut and underground metalliferous mines in Queensland are regulated by the *Mines Regulation Act 1964*.

The coal legislation in Queensland and NSW covers open cut and underground coal mines. There are separate regulations for some hazards, although there is a tendency for similar regulations to be developed for both types of mines. Examples of this in NSW include:

- the *Coal Mines Regulation (CMR) (Fire Control — Underground Mines) Regulation 1984* and the *CMR (Fire Control — Open Cut Mines) Regulation 1984*;
- the *CMR (Electrical — Underground Mines) Regulation 1984* and the *CMR (Electrical — Open Cut Mines) Regulation 1984*; and
- the *CMR (Airborne Dust — Underground Mines) Regulation 1984*, the *CMR (Flammable Dust — Underground Mines) Regulation 1984* and the *CMR (Airborne Dust — Open Cut Mines) Regulation 1984*.

The coal industry is also one of the few Australian industries with a specialist OHS inspectorate. In NSW, there is a coal inspectorate located in the Department of Mineral Resources. The OHS inspectorate for virtually all industries other than mining is the NSW WorkCover Authority. The coal inspectorate is responsible for securing compliance with both the *Coal Mines Regulation Act 1982* (NSW) and also the *Occupational Health and Safety Act 1983* (NSW) (as regards the coal industry). In Queensland, the coal inspectorate is located in the Department of Minerals and Resources, whereas the inspectorate for almost all other industries (except mining) is located in the Department of Training and Industrial Relations.

9.4 How coal mining OHS legislation compares with other OHS legislation

The OHS legislation applying to the coal industry is very different from the general OHS legislation that applies to other Australian industries. The general OHS legislation was overhauled in the 1980s to replace provisions that specified how particular hazards should be controlled with duties of care on workplace parties. The new legislative approach made workplace parties responsible for safety according to their degree of control over hazards and activities in the workplace.[3]

This approach reflected the view that there were severe practical limits on the extent to which safety could be improved by rules set by external agencies. Ultimately, the best results would be achieved by workplace parties working

[3] For a more detailed description of OHS legislation applying to other industries, see IC (1995b).

together to identify the hazards in their jobs, and the measures that could be implemented to make work safe. While many prescriptive regulations remain, governments are recasting these in terms of the *performance* standards to be met, rather than prescribing the specific ways of controlling hazards. Other regulations are being recast in terms of the *processes* which companies should adopt to assess and control hazards, rather than the specific content of those controls.

In contrast, the coal mining legislation specifies how particular hazards are to be controlled (see Box 9.2) and contains detailed requirements for other aspects of mine operations, such as showering facilities (see Box 9.3). The Queensland Government described the *Coal Mining Act 1925* (Qld) as "highly prescriptive and complex" (sub. 32, p. 35).

While generally prescriptive, the coal mining legislation also contains some self regulation provisions. For example, the NSW Act does not prescribe how the rooves of underground roadways are to be supported. Instead it requires managers of underground mines to make rules for the support of the roof and sides of workplaces and roadways (s.102).

To keep up with new hazards that are revealed through disasters or created by new technology, the legislation must be amended regularly. For example, the *Coal Mines Regulations Act 1982* (NSW) has been subject to at least 43 amendments. Following the 1994 Moura explosion, in which eleven miners died, the Queensland legislation was amended to require mines to prepare safety management plans, to appoint ventilation officers, and to specify procedures for the sealing of mines. Nevertheless, prescriptive legislation inevitably cannot specify procedures to cover all hazards in all mines.

In contrast to the general OHS legislation applying to other industries, the coal mining legislation specifies management arrangements to apply at mines. The Acts set out management and safety positions (such as examiner of an open cut mine, first aid officer), the duties and the training and experience requirements of people in these positions. In NSW, there are fifteen compulsory statutory positions for underground mines, and nine such positions for open cut mines. In Queensland, there are seven compulsory statutory positions for underground mines, and four such positions for open cut mines. The Acts state that some activities can be performed only by people in these statutory positions. Further information about the duties, training and experience requirements of statutory officers is provided in Appendix J.

Box 9.2: Examples of prescriptive requirements in NSW coal mining legislation: explosives

The following examples contrast the approach to regulating hazards in open cut mining in the NSW coal and metalliferous industries, without seeking to assess the suitability of each approach. The comparison illustrates how the coal legislation prescribes specific procedures, whereas the metalliferous legislation specifies outcomes or more general requirements, leaving the detail of procedures to be developed at individual mines.

Explosives

The Coal Mines Regulation *(Explosives and Shotfiring — Open cut Mines)* has 61 provisions governing explosives, compared with six such provisions in the *Mines Inspection General Rule 1994* governing open cut metalliferous mining. Examples of these provisions include:

Open cut metalliferous mining:

> A person carrying out blasting operations at a mine must take such precautions as are necessary to prevent any person or structure being adversely affected by the blasting. (s.28(1))
>
> The manager must ensure that adequate written records of receipts and issues of explosives are maintained at the mine. (s.26(4))

Open cut coal mining:

> Where a round of shots is to be fired, the detonators shall be connected in series (except where approved by an inspector) and, as far as possible, additional wire shall not be used for connecting detonator lead wires to each other. (s.43(1))
>
> No person shall fire any shot unless the person has posted sentries or taken adequate precautions against the inadvertent entry of persons into the danger zone by the erection of fences conspicuously marked with the words “danger” and “shotfiring” together with the date and the shotfirer’s initials. (s.44(a))
>
> No person shall fire a shot or round of shots unless the person has sounded for a minimum of two minutes’ duration, the siren provided pursuant to clause 36, and the person fires the shot or round of shots at the end of that time. (s.45)
>
> Every shotfirer shall at the end of the shotfirer’s shift, enter in a book kept at the mine for the purpose the following particulars: (a) the amount of explosives, detonating cord, detonators and relays issued to the shotfirer; (b) if free flowing explosives were used, the total quantity and type of free flowing explosive used in every round; (c) the amount of explosives, detonating cord, detonators and relays returned by the shotfirer to the explosive store; (d) the result of all examinations made by the shotfirer. (s. 42)

The coal legislation also involves the inspectorate in the management of safety at individual mines. For example, the Queensland legislation requires managers to notify the inspectorate about how they intend to seal part of a mine, and states that the sealing must not go ahead unless the inspectorate has notified the manager in writing that he or she is satisfied that the arrangements comply with appropriate standards and good mining practice (*Coal Mining Legislation Amendment Regulation 1996*, Part 2, s.3.1C). In addition, the inspectorate also must be notified of certain events, such as the installation of pressure vessels, alterations to showering facilities (see Box 9.3), and the absence of a Manager from the mine and the arrangements as to who will be assuming the Manager's responsibilities.

The legislation also states that certain equipment must be certified by the inspectorate before it can be used in mines. For example, s.27 of the *Coal Mines Regulation (Electrical — Underground Mines) Regulation 1984* (NSW) states that certain electrical apparatus must be approved before it can be used in underground mines. Similarly, s.20 of the *Coal Mines Regulation (Electrical — Open Cut Mines) Regulation 1984* (NSW) states that certain electrical apparatus cannot be used unless it is approved. No such requirement applies to NSW open cut metalliferous mines. Instead, managers are required to "ensure that all equipment and machinery at the mine is designed, used, maintained, repaired and replaced so as to protect the health and safety of persons at the mine" (*Mines Inspection General Rule 1994*, s.45).

Penalties for breaches of the coal mining legislation are low compared with penalties applying to other industries. Maximum penalties are $10 000 under the NSW coal legislation, $1000 under the current Queensland legislation and $375 000 under the draft Queensland Bill (see Box 9.6). This compares with maximum penalties under the general OHS legislation in NSW and Queensland of $825 000 and $300 000, respectively.

It is also understood that the Queensland and NSW Minerals Departments rarely prosecute companies that do not meet their safety responsibilities. However, it is difficult to verify this as neither State publicly releases its enforcement record. The annual reports of inspectorates indicate that inspectorates adopt an advisory approach to dealing with serious safety breaches. For example, the Annual Report of the NSW Department of Minerals and Resources lists the actions taken by the Department in relation to mining fatalities that occurred in 1996–97. These actions included requiring the mine where the fatality occurred to review safety systems, distributing information about the fatal occurrence throughout the industry to avoid similar occurrences at other mines, and establishing judicial inquiries and coronial inquests. While mines were required to improve processes, in no case were they prosecuted. This contrasts with the

enforcement record of the NSW WorkCover Authority which conducted 473 prosecutions in 1996–97.

Box 9.3: Examples of prescriptive requirements in Queensland coal mining legislation: showering facilities

The regulation of showering facilities and change rooms illustrates the complexity of coal mining regulations, even for relatively minor hazards such as sanitation. Excerpts from the *General Rules for Underground Coal Mines (Qld), Part 52 — Health and Sanitation,* are given below:

> Plans and specifications of all bath houses and change houses shall be submitted to the Chief Inspector before the commencement of construction. No extensions of or structural addition to an existing bath house or change house shall be made unless the plans and specifications thereof have been approved by the Chief Inspector. (s.52.3)
>
> The bath house building shall be constructed of suitable material and shall have a floor of impervious material that is graded and drained to allow water to be carried away from the building. (s.52.5)
>
> The floor space in every change room, exclusive of any floor space in the portion thereof in which showers are installed, shall not be less than 1 square metre for each person employed underground in the largest shift at the mine. (s.52.6)
>
> Showers and washing basins shall be provided at the rate of not less than one shower for every five persons and one basin for every 20 persons in the largest shift employed underground at the mine. (s.52.8)
>
> The floors of the bath houses and change houses, the cabinets, and the inside walls up to a height of 2 metres shall be thoroughly cleansed at least once in every period of 10 days or more often if necessary to ensure that it is maintained in a clean and sanitary condition. (s.52.11)
>
> A responsible adult person or persons appointed by the manager shall once at least in every day on which workmen are employed at the mine inspect all the bath houses and change houses. The person or persons so appointed shall without delay make a full and accurate report in a book kept at the mine stating the result of such inspection and specifying the measures taken to remedy any defect disclosed during the inspection. (s.52.13)

In summary, the coal legislation reflects a very different approach to the regulation of safety than that applying to other Australian industries. The coal legislation prescribes how particular hazards are to be controlled and how mines are to be managed to ensure safety. It also involves the inspectorates in the management of mine safety. In contrast, the OHS legislation applying to other Australian industries specifies responsibilities, leaving individual enterprises to

work out the management structure and detailed operating procedures necessary to ensure safety, subject to meeting the requirements of specific regulations.

9.5 Problems with the current approach

In the Second Reading Speech of the *Coal Mines Regulation Bill* (NSW), the Minister for Industrial Relations said the purpose of the Bill was to

> ... provide all the elements necessary to achieve a safe working environment, and for an inspectorate with sufficient powers to enforce safe mining methods and practices. Provisions are being made for a competent management responsible for its actions and the members of the work force to have responsibilities to care for their own safety. (11 March 1982)

However, companies highlighted a number of problems with the current approach to regulating OHS in the coal mining industry. They argued that the current approach is not always conducive to good safety outcomes, and can impose high compliance costs on companies, reducing international competitiveness, without commensurate improvements in safety. The poor safety record of the industry, outlined in Section 9.2, gives credence to the companies' view.

Adverse effects of the current approach to safety

The first reason why the current approach may not be conducive to good safety is because inevitably it is not possible to develop prescriptive requirements to cover hazards at all mines, in all circumstances. The Queensland Mining Council observed that prescriptive legislation led workplace parties to assume mistakenly that "all risk will be adequately covered by general prescriptive legislative requirements" (sub. 24, p. 14).

Second, prescriptive legislative requirements may contribute to apathy on the part of miners and mine managers. The Queensland Mining Council said:

> The present highly prescriptive regime is an impediment to improvement. The Queensland *Coal Mining Act 1925* is outdated and inflexible and helps to perpetuate dangerous attitudes to safety on the part of managers (compliance with the Act is all that is needed) and employees (safety is a management issue). (sub. 24, p. 9)

A number of studies have found an apathetic approach to safety in the coal mining industry:

- the Warden's Inquiry (1996) into the Moura accident found that there was a "singular lack of concern from those in positions of authority" to update their knowledge about spontaneous combustion; and

- the NSW Review of Mine Safety (see Box 9.5) found that it was common for mineworkers to indicate that they had never experienced a mock evacuation of their site (ACIL 1997a). A stakeholder surveyed for the Review stated that "for most, the last time they had self-rescuer training was at their induction 15 years ago. There is little refresher training" (p. 37).

Hopkins (1988) has argued that rather than reflecting apathy, breaches of safety rules by coal miners reflect:

> ... attempts to assert an alternative code of safety, a code arising out of the miners' own experience. They are an attempt to assert the primacy of the miners' own skills and to resist the implicit process of deskilling which detailed governmental regulation of safety involves. (p.333)

The overhaul of OHS legislation applying to other Australian industries sought to counter apathy and a failure to work safely by involving workplace parties in the control of hazards at work. This reflected the view that workers would not 'own' and implement safe operating procedures unless they were involved in their design. The prescriptiveness of coal industry legislation limits the scope for workers and managers to design procedures suited to their circumstances, and in this way may contribute to apathy and the violation of safety rules.

The third reason why prescriptive legislation may not be conducive to safety relates to the ability of mining companies to import successful safety practices from other parts of their operations. As mentioned in Chapter 1, the largest coal mining companies have interests in other industries, such as metalliferous mining and construction. While hazards vary between industries, the approaches to managing safety can be common (ie delineating responsibilities, involving workplace parties, and integrating safety into the way work is done). Reflecting this, companies are implementing safety programs across all of their operations, and moving managers between operations in different industries. Thiess Contractors, which has received highly commended awards in the annual Minerals Council of Australia MINEX safety awards for the last three years, commented:

> A primary reason that Thiess has been successful in managing health and safety in the mining industry is directly related to our ability to cross pollinate management practices within our broad range of disciplines. It is recognised that the industry's isolationist approach to health and safety management supported by Government's separate mining legislation, has had a negative effect for ongoing improvement. Although it is appreciated that the industry has some unique hazards, so too have many other industries. It is also appreciated that regulation and codes of practice differ from industry to industry, however management practices largely remain the same...

> ... Thiess manages occupational health and safety throughout all of its disciplines using a singular occupation health and safety system. All supervisory staff receive the same occupational health and safety management training. It is suggested that a unilateral approach to planning, implementation and training has brought many benefits to Thiess which could produce the same benefits to all industry stakeholders. (sub. 15, p. 13)

The legislation contributes to the coal mining industry's isolationist approach to health and safety management (identified by Thiess) by erecting barriers to mobility of management personnel and impeding cross-industry initiatives. For example, legislative requirements that site managers of underground coal mines have at least two years' experience in underground coal mining, and site managers of open cut coal mines have at least one year of experience at open cut coal mines, can prevent managers from other industries moving into the coal industry, bringing with them the insights from successful safety practices in other industries (see Chapter 6 and Appendix J). Camberwell Coal said:

> Statutory qualifications limit a company's ability to hire into supervisory positions persons from outside the coal industry, as to qualify for a statutory qualification you need to have a minimum of two years experience in the industry.
>
> This system entrenches a coal industry culture and restricts companies' ability to hire the most appropriate person for the job. Organisational structures are also restricted by the need to employ persons in statutory roles. (sub.13, p. 12)

Statutory positions also perpetuate the view that safety is the responsibility of particular individuals, rather than developing a culture in which safety is everyone's responsibility.

The involvement of the inspectorate in mine safety decisions may diminish workplace parties' responsibility for safety. While the inspectorate's involvement is beneficial if it leads to an extra level of scrutiny, it is not conducive to safety if workplace parties come to rely on the assessment of the inspectorate, rather than rigorously assessing hazards themselves. This is because it is unrealistic to expect an inspector to be familiar with all of the aspects of a mine that bear on how work should be performed safely at that mine, such as the skills of the workforce and the way work is done at that mine.

Approvals by the inspectorate may also perpetuate a static approach to safety management, by ensuring that arrangements are safe when they are scrutinised by the inspectorate, rather than a dynamic approach, whereby arrangements are reviewed regularly to take account of factors that are changing at mines.

Effects of the current approach on costs and competitiveness

The current approach to regulating safety also imposes significant costs on companies and regulators without commensurate improvements in safety. The

compliance costs of a prescriptive regulatory approach were illustrated to the Commission during a visit to BHP's Elouera mine in Wollongong (see Box 9.4).

Box 9.4: **Compliance costs at BHP's Elouera mine**

The Elouera mine is an old mine, where mining is confined to a relatively small section of the mine. There are large areas of the mine which were worked decades ago and which no longer need to be used. BHP keeps these areas open to improve ventilation in the worked areas of the mine.

Under the requirements of the *Coal Mines Regulation Act 1982* (NSW) all roadways must be inspected every week [*Coal Mines Regulation (Managers and Officials — Underground Mines) Regulation 1984*, s.63 (1) (d)]. This is to guard against unstable roofs, rock falls etc, which could prove fatal to miners walking along these roads. However, this hazard is not relevant in the old sections of the Elouera mine, as miners do not use these walkways.

In the absence of this legislative requirement, BHP estimated that it would check the roadways about every four weeks to ensure that there was no deterioration of the roadways which could affect ventilation and other services if roadways were to collapse. Given that there are around 52 kilometres of roadways in the old section of the mine, the legislative requirement to check all roadways weekly is costing BHP an extra $165 000 annually.

Source: BHP.

Legislative provisions prescribing staffing, training and experience requirements (ie statutory positions) inflate costs by inhibiting the introduction of modern human resource management practices, thereby reducing the international competitiveness of the Australian coal industry. Companies said that statutory position requirements:

- inhibited the introduction of team work, perpetuating traditional hierarchical models of work;
- impeded the flexible deployment of labour; and
- perpetuated the unproductive demarcation of work.

These effects are discussed more fully in Chapters 5 and 6.

A number of coal companies, including Camberwell Coal, Exxon and Rio Tinto argued that legislative requirements developed for the hazards of the underground coal industry were being imposed inappropriately on the open cut coal mining sector. For example, Exxon said:

> The Coal Mines Regulation Act has been largely based on the early history of the underground coal industry in Australia. Open Cut operations are consequently burdened with some overly prescriptive regulations relative to the inherent risks.
>
> For example, personnel criteria involving minimum qualifications, experience levels, number of required management personnel, etc. are much more restrictive than those for open cut operations in the metalliferous industry. The qualifications for statutory positions in the coal industry (both underground and open cut) and the onerous process for obtaining a certificate of competency create barriers to hiring capable and qualified persons from metal mining or other general industries for equivalent employment opportunities in the coal industry.
>
> As a second example, standard mining equipment (haul trucks for example) must undergo expensive electrical and mechanical upgrades from the factory model versions to meet required coal industry-specifications. This same equipment is purchased "off the shelf" by the metalliferous mining and other general industries where the inherent risks are essentially similar. (sub 3, p. 11)

Rio Tinto said:

> There is no statistical or other evidentiary support for the view that open cut coal mining is inherently more dangerous than any other open cut mining activity. This suggests that open cut coal safety requires no legislative treatment beyond that applying to other open cut mining activity. The specific hazards of underground coal mining mean it cannot be regarded in the same way. ... It follows from those distinctions that:
>
> - regulation of open cut coal mine occupational health and safety should be brought into the mainstream of mining occupational health and safety regulation as soon as practicable;
> - the regulatory arrangements should distinguish clearly between the needs and circumstances of open cut and underground mining. (sub DR65, p. 5)

Prescriptive requirements and approval mechanisms also can lift capital costs. Companies such as Powercoal and Exxon said that the machinery they used was manufactured now mostly in the United States. Yet, for historical reasons, the Australian inspectorates have adopted United Kingdom standards as the basis for approving equipment. As a result, equipment often requires costly modification before it can be used in Australia, even though it has been approved and is used safely in the United States. Companies also said that equipment approved for use in Queensland was not approved for use in NSW, and that approval criteria were revised, preventing the commissioning of equipment. Powercoal said:

> The underground coal industry has to use machines which are approved by the inspector of the Department. Sadly, I have witnessed in the last 3 months, something like $3 million worth of new machines, five in number, sitting idle either at the manufacturing plant or at our mine sites because the Department have changed their standards, changed their rules or changed their opinion from the time

> the machine was ordered to the time the machine was manufactured. And we have been struggling ever since to get those machines approved. (trans.p. 26)

In response to the Draft Report, the Queensland Government advised that its Coal Inspectorate recognises Australian Standards, and if none are available, then British standards are generally used. In relation to recognition of equipment approvals between States, the Queensland Government advised that both States use the same scheme to certify electrical equipment used in explosion risk zones. However:

> ... requirements of different State mining legislation sometimes prevents equipment being used interchangeably in both States. This situation will probably improve with the introduction of the new coal legislation in Queensland. (sub. DR 61, pp. 13–14)

9.6 Alternative regulatory approaches

An alternative to the current regulatory approach would be to make the coal industry subject to the OHS legislation applying to other industries, and to abolish the existing coal mining Acts. This alternative approach would have two main advantages. The first is that it would ensure that the coal industry would gain from advances in OHS legislation. In this regard it is significant that in relation to other industries, NSW moved from a prescriptive legislative approach to one based on duty of care over 15 years ago. Queensland introduced duty of care legislation three years ago. These principles have still not been incorporated in coal mining legislation.

The second benefit would be that it would ensure that common national standards applied across all Australian industries, providing equity in treatment to workers and simplicity in compliance to companies. Many of the hazards in the coal industry (for example noise, manual handling, hazardous substances) are common to other industries.

Thiess Contractors supported the mainstreaming of coal mining safety legislation:

> A preferable position would be to amalgamate the mining legislation with the occupational health and safety legislation. The question must be raised as to why 90 per cent of Australia's industries can be successfully managed with occupational health and safety legislation, why not mining? (sub15, p. 13)

However, the Queensland Minerals Council saw such an approach as only a long-term goal:

> The Mining Council supports the incorporation of coal within mainstream health and safety legislation as a long term goal. In the short to medium term the industry needs to keep its own separate legislation and inspectorate in order to:
>
> - sensibly stage the process of major change for all participants — regulators, managers and employees;
> - provide for a level of continuing prescription in regard to catastrophic accident risks unique to underground coal mining;
> - build and preserve a skilled coal mining inspectorate. (sub24, p. 9)

The Commission considers that there would be significant resistance among workplace parties to regulating underground coal mining under the general OHS Acts applying to other industries. This reflects the industry's catastrophic hazards, poor safety record, and history and familiarity with operating under a prescriptive legislative environment. While the Commission supports mainstreaming as a longer-term goal, and notes that other hazardous industries are regulated under general OHS legislation (for example the petrochemical industry), it supports a process of phased change for the underground coal sector.

However, these considerations are less compelling for the open cut coal sector. While open cut coal mining involves the management of serious hazards (for example, large mobile plant and blasting), it does not face the unique catastrophic hazards of underground coal mining (such as methane build-up). The open cut coal sector also has a substantially better safety record than the underground sector. There is less resistance among industry parties to the option of mainstreaming open cut coal mining, as indicated by comments made by participants in this inquiry and consideration of this option by tripartite working groups (Mine Safety Review 1998). In addition, there is evidence that regulating open cut coal mining under the same legislation as underground coal mining has led to the imposition of inappropriate regulatory requirements (see Section 9.5).

The Commission considers that the process of regulatory reform in open cut coal mining would be assisted by legislating for the open cut sector separately from the underground sector. Separate consideration of the two sectors would reduce the likelihood of requirements developed for the underground sector being imposed inappropriately on the open cut sector. It is also likely to enable a faster rate of change in the open cut sector than may be possible if the underground and open cut sectors were considered together.

The open cut coal sector could be regulated under the legislation governing OHS for most other industries or the legislation applying to metalliferous mining. However, determining which would be the more appropriate legislation is beyond the scope of this inquiry.

In the following section the Commission outlines principles to guide the reform process in underground and open cut coal mining.

Mine safety management plans

The Commission considers the first principle that should guide the reform process, in both underground and open cut coal mining, is that workplace parties should bear more responsibility for safety. This is a key to improving safety. The current regulatory approach undermines this principle by:

- over-prescribing how hazards should be controlled, shifting responsibility from the mine level to the industry/government level; and
- over-involvement of the inspectorate in the control of hazards, leading to a diminishing of responsibility by workplace parties.

Incorporating duty of care principles in the legislation governing the coal industry would be a first step in encouraging workplace parties to assume more responsibility for safety. The duty of care of employers should be drafted broadly to recognise organisational responsibility as well as the responsibility of individual managers. In practice, most serious accidents involve systemic failure, and it is inappropriate to put responsibility on one individual, even the mine manager, who operates within constraints and incentives set by owners and Boards. The focus on individuals and the limited liability of owners are significant weaknesses of current legislation (Hopkins forthcoming).

The Commission also considers that there should be a legislative requirement for black coal mining companies to develop mine safety management plans, in consultation with their employees. This would encourage companies to assume more responsibility for safety, and is an intrinsic part of companies meeting their duty of care.

A requirement to develop mine safety management plans would mean that managers and workers at mines would need to identify the hazards of their jobs, and develop operating procedures to control them. These procedures would include how particular work is to be done, and workers would need to be trained in these procedures. The safety management plan also would address the broader training that workers need to assess and respond to non-routine events.

For some hazards, management probably would need to call on outside expertise to assist in the hazard identification and control process. While workers would be well placed to assess day-to-day safety issues, they may not have the knowledge and expertise to identify potentially catastrophic risks, such as the geological conditions that might lead to gas outbursts.

Appropriate supervision and training is a key part of working safely. Safety management plans and site operating procedures would need to specify supervisory and staffing arrangements, and the training or competence of people whose actions affect safety.

Obviously a key part of a safety management plan approach is implementation of the control measures determined. Mines would need to audit processes to ensure that safety procedures were being implemented.

One of the aims of a safety management plan approach would be to integrate safety considerations into everything that occurred at a mine. For example, when new equipment was commissioned, workers would be trained in the safe use of that equipment, and safe operating procedures would be reassessed to see if they needed to be modified in light of the new equipment.

Safety management plans would need to be amended as circumstances changed or knowledge evolved. For example, mines would re-examine their plans and procedures in the light of findings from government investigations of fatal and serious accidents, or 'near misses' that occurred at their own or other mines. Continual improvement should be a feature of plans and mines would need to develop ways of updating safe operating procedures in the light of insights from others, including their workforce.

Employee involvement in the development of safety management plans is important to ensure that the plan is informed by workers' knowledge of hazards and the way in which work is done, and to increase the likelihood that procedures, once developed, are implemented. The provision of information about safety is also a basic right of workers. Rio Tinto emphasised:

> ... the need to establish mechanisms which enable non-managerial employees to be consulted about mine-based safety issues and to have concerns about aspects of safety management dealt with through those procedures. (subDR65, p. 7)

The Commission endorses this view. In addition, it considers that site health and safety representatives should be elected by workers at the mine, rather than nominated through the union, to avoid potential conflict between safety and industrial objectives (see Chapter 6).

There has been some debate as to whether mine safety management plans should be approved by the inspectorate, and whether mines should be required to submit a safety plan before being granted approval to commence mining (Mine Safety Review 1998). In the offshore petroleum industry, companies are required to have their 'safety case' or plan approved by government.

The Commission considers the dangers of this approach are that it:

- may diminish companies' responsibility for safety, as approval of plans would inevitably mean that inspectorates would have to share in the responsibility for assessing hazards;
- may encourage firms to consider safety at a point of time (when their plan was being assessed by the inspectorate), rather than constantly reviewing safety procedures in the face of changing circumstances; and
- would impose a large burden on the inspectorate.

It is also doubtful whether it would be feasible for inspectorates to assess plans. The NSW Minerals Council said:

> It comes to a level of detail. For an inspector to approve one of these things [safety management plan], they would have to be as immersed in the plan and know as much about how the mine operates as the mine operator. Now it's physically impossible for them to do that. I mean, there is a real distinction in the amount of information, knowledge and expertise that an inspector has, to be able to give that stamp of approval. (DRtrans., p. 38)

Nevertheless, it is understandable that mines may want to draw on the expertise of the inspectorate in developing their plans. For example, mines way want advice on the processes used for plan development and hazard identification, and the general approaches being applied in the industry to hazard control. The Commission considers that inspectorates could offer this advice, while being careful that their advice is not seen as providing approval of plans or diminishing workplace parties' responsibility for safety.

In summary, the advantages of a safety management plan approach would be that:

- it would encourage workplace parties to assume more responsibility for safety;
- procedures would be tailored to site hazards, such as those created by the particular geology of that mine, encouraging a more active approach to safety and minimising compliance costs;
- workers would be involved in the development of safe operating procedures, ensuring that the procedures are workable, and maximising the likelihood that they are implemented;
- safety would be integrated into all processes at the mine; and
- site operating procedures could be changed as circumstances changed or as experience revealed better ways of working.

The Commission recognises that progress along these lines is occurring, but notes the finding of the NSW Review of Mine Safety that only a few NSW sites had adopted comprehensive risk management approaches in 1996 (see Box 9.5).

Box 9.5: **NSW Review of Mine Safety**

The NSW Government called for a Review of Mine Safety in 1996 following concern about the unacceptable number of fatalities in the NSW metalliferous and coal mining industries. The Review made 44 recommendations, mainly concerning what the industry should do to improve its safety record, either at an industry or enterprise level.

The Review recommended that there be an immediate tripartite re-examination of legislative options. It supported the introduction of mine safety management plans:

> The Review believes that the mine safety management plan approach has much to recommend it, particularly as it is aimed at the full identification and management of all core risks. A Mine Safety Management Plan approach could provide the structure for currently disparate risk assessment and management activities. (p. 75)

The Review commented on the extent to which these plans were being adopted by the industry:

> There are a range of proprietal safety management systems in the industry at present. In essence, they all appear to involve the core elements of identification of hazards and assessment of risk; devising of plans and procedures to manage the risks; and auditing/examination of how effectively the safety management system has been put into effect. The Review sought to test how, and to what degree these systems were actually being put into place in NSW, and whether or not real safety gains had been observed.
>
> Larger operators in both the coal and metalliferous sectors in NSW appear to have invested considerable effort over the past few years to introduce risk assessments and to develop and implement risk management plans at their mine sites. In the coal sector the Inspectorate, and in particular the Chief Inspector of Coal Mines, was seen as having been a driving force in encouraging companies to take on a risk management approach. (pp. 32–33)
>
> However, very few sites have adopted the comprehensive major risk management approach envisaged in the Warden's Court Report [on the Moura accident]. (p. 75)

The Review made a number of findings and recommendations on the NSW coal inspectorate. These included:

- inspectorate policies and procedures on investigation and enforcement be developed and published;
- the Department introduce a more systematic approach to the setting of priorities among Inspectorate activities; and
- all inspectors conduct both announced and unannounced mine site visits, and that there be a requirement for sufficient unannounced visits to create a perception of a significant likelihood of an unannounced visit at any time.

Source: ACIL Economics and Policy (1997a), Secretariat to the Review.

Support for mines in developing safety management plans

In developing mine safety management plans, mines could draw on advice and information from a range of sources. This could include codes of practice and guidance notes developed by the mining industry and the inspectorates, and incident reports prepared by inspectorates. In relation to some hazards, firms may choose to adopt completely the procedures in the industry's code of practice. The Commission notes that the coal industry has developed a training program and a competence standard for staff responsible for developing mine safety management plans.

As discussed above, inspectorates could provide advice to individual mines, although it would be important that this role did not compromise their enforcement role, or diminish a company's responsibility for safety. To ensure this, the provision or acceptance of advice should not provide immunity from prosecution.

In the past, there has been some debate about whether small mines would be capable of implementing a safety management approach. The Commission notes that small mines must grapple with other complex issues such as optimal mine design, geological and engineering problems, financial structuring, and marketing and legal issues. In these areas, when mines lack adequate in-house expertise, they purchase expert advice from contractors. The Commission can see no reason why mines could not adopt a similar approach to safety, or make use of codes of practice or guidance notes developed by the industry and the inspectorate.

Prescriptive requirements in legislation and regulation

The Commission considers there is still a role for regulation of serious hazards under a duty of care regime. However, existing regulatory prescription should be reformed. In this regard, the Commission supports the findings of the NSW Review of Mine Safety that:

- the current regulations provide little incentive for companies to take greater responsibility for determining and implementing mine safety management plans;
- the present level of prescription as regards minor hazards is excessive and may result in considerable unnecessary and misdirected effort; and
- given the hazards of underground mining, certain minimum outcomes in relation to the management of serious risks should continue to be prescribed.

As a first step, regulations should be reviewed and rationalised by:

- removing detailed provisions prescribing the management of minor hazards, such as the health and sanitation regulations (see Box 9.3); and
- removing obsolete regulations, such as the *Coal Mines Regulation (Pit Horses — Underground Mines) Regulation 1984*.

Second, the regulation of major hazards should be redrafted along performance or management process lines, as is occurring with regulations applying to general industry. Rather than prescribing the detailed procedures for managing major hazards in legislation and regulation, such procedures should be incorporated in mine safety management plans, where they can be tailored to the circumstances of particular mines, and workplace parties can participate in their development. As stated by the NSW Minerals Council:

> If you follow the type of mine safety management plan that is outlined in that Systec document, in effect it would contain a lot of the prescription that currently occurs in underground mining. It would include things like management structure, it would include specific rules and requirements relating to the control of risk, it would form the basis for the inspectorate's inspection process. I think if you use that model at the end of the day there wouldn't be an enormous amount left to prescribe in regulation. (DRtrans., p. 36)

Codes of practice and guidance notes would provide workers and the inspectorate with a benchmark for assessing the adequacy of procedures being implemented at individual mines. Companies would have to show that their procedures were at least as safe as those in codes or guidance notes. Much existing regulatory prescription of serious hazards could be recategorised as codes of practice, providing companies with one possible model for managing hazards. However, the changes proposed by the Commission would provide companies with the flexibility to adopt alternative procedures, if these could be demonstrated to provide an equivalent level of protection.

Third, prescriptive requirements in legislation and regulation relating to management positions (for example, deputy) should be abolished, and the need for other statutory positions (for example, cap/oil lamp officer) reassessed. While supervision, staffing and training are key components of safe operating systems, these arrangements are more appropriately determined at a site level, in the context of the overall safety management plan, than through centrally prescribed regulation.

Commenting on the draft Queensland Coal Mining Bill (see Box 9.6) which reduces the number of statutory positions to one for open cut coal mining and three for underground coal mining, the Queensland Mining Council remarked:

> The coal industry disagrees with some aspects of the draft Act, principally in respect of its requirement for continuing with a number of defined management positions for which statutory certification will be required. ... Conversely, the

> Mining Council argues that the requirement to retain certain traditional 'management' positions will limit the scope for mines to determine safety management arrangements which best suit their particular operations and in this way negate some aspects of the new legislative regime. (sub24, p. 10)

The Commission notes that the coal mining industry has developed industry-wide competences for many positions and tasks at coal mines (see Chapter 6). Like codes of practice, these competences could guide decisions at the site level, while providing a benchmark for gauging the adequacy of training and staffing arrangements at sites. However, sites would have the flexibility to implement alternative training arrangements provided that these met their safety responsibilities. The abolition of statutory positions would mean that all the legislative provisions designed to support these, such as the Coal Mining Qualifications Board, certificates of competence and requirements to notify the inspectorate of changes in management arrangements, could be abolished.

Box 9.6: **Review of the Queensland Coal Mining Act, 1925**

The review of the *Coal Mining Act 1925* (Qld) commenced in 1991, but was suspended during the inquiry into the Moura explosion. The Queensland Government had advised that it expected the draft Coal Mining Bill to be released by June 1998 (sub. 32, p. 35). However, this timing has been affected by the Queensland election. The key features of the draft Bill are:

- the incorporation of duty of care principles;
- the adoption of workplace consultative arrangements similar to those provided in the Workplace Health and Safety Act 1995;
- provision for mines to prepare safety management plans that implement controls appropriate to the conditions at the particular location; and
- the incorporation of existing State and national standards on hazards common across all industries such as noise and hazardous substances (sub.32, pp. 34–35).

Sources: Queensland Government, sub. 32 and Queensland Mining Council, sub. 24.

Fourth, governments, the coal industry and certifying agencies should review the certification of equipment, drawing on approaches used in other industries for ensuring that equipment is appropriately scrutinised prior to being deployed in hazardous situations. There is no doubt that equipment should be evaluated comprehensively before it is used in mines. The Queensland Government advised that the four coal industry fatalities that occurred in 1996–97 involved some aspect of equipment design or operation. However, participants' views raise questions whether the current approach is the most cost effective. One option that should be considered is whether more responsibility could be

assumed by companies in assessing equipment, as part of companies' overall duty of care. As a minimum, Australian inspectorates should recognise the standards set by another State in relation to coal mining equipment. The review should also consider the process of developing Australian standards rather than adopting overseas standards, weighing up the benefits to safety against the costs of modifying equipment that has been manufactured to meet overseas standards.

Fifth, regulations should be subject to regular review, with workplace parties involved, to ensure that they remain appropriate to modern mining practice.

Enforcement

The key principle guiding the Commission's approach is that better safety outcomes depend on workplace parties assuming more responsibility for safety. This underlies the Commission's proposal that there should be less reliance on legislative prescription, and greater emphasis on the development of safety procedures at site level, through mine safety management plans.

However, the benefits of this approach will be realised only if workplace parties do, in fact, take greater responsibility for safety and comprehensively assess and control the hazards of their work. In this regard, there is a role for government in providing companies with the *incentive* to manage safety. Governments can provide this incentive by enforcing vigorously workplace parties' legal responsibilities and by imposing large penalties on parties (principally employers) who fail to meet their responsibilities.

This approach would require a change in the role of the inspectorate. To provide a strong incentive for workplace parties to meet their responsibilities, and to provide adequate assurances to workers that less legislative prescription did not mean less safety, the inspectorate would need to give a higher priority to *deterrence* in enforcement.

This should involve random audits of mines to determine that:

- mine safety management plans have been developed;
- the procedures in plans represent an appropriate response to the hazards of the mine; and
- the procedures are being implemented on the ground.

Inspectorates would need to adopt a range of enforcement responses depending on the severity of any dereliction of responsibility. This would range from issuing notices requiring certain things to be rectified in a given period, in the case of minor breaches, to stopping production and/or prosecuting employers, in the case of major breaches. Inspectorates should take action against employers

who fail to control serious hazards — irrespective of whether this has already caused an accident.

The Commission considers that the inspectorate's enforcement activities should focus on those hazards that have the potential to cause serious injury or fatality. This reflects the fact that the industry has made less progress in reducing fatal injuries, and that companies may lack sufficient incentives to address low probability, but catastrophic accidents in the absence of government requirements to do so (see Box 9.7).

As part of creating a credible deterrence, the inspectorate should issue an enforcement policy and publish in its annual report details about actions taken against companies in respect of significant dereliction of the duty of care, including the names of offending companies. The Commission also considers that the maximum penalties applying to the coal industry should be brought into line with those applying to other industries under general OHS legislation. The greater emphasis on deterrence proposed by the Commission contrasts with the advisory approach currently adopted by the inspectorate. Inspectorates may need to review their structure to avoid any perception of conflict between their advisory and enforcement roles.

Box 9.7: **Incentives for companies to invest in safety**

The IC (1995b) found that companies may lack the financial incentives to invest in safety in the absence of government requirements to do so.

The IC estimated the cost of workplace injuries of different severity and the distribution of these costs between employers, injured workers and the community. The IC found that employers bear a large share of the costs of minor workplace injuries, but a small share of the costs of serious injuries such as fatalities and permanent disabilities. This research indicated that employers had strong incentives to reduce the incidence of minor injuries, but lacked the incentive to make the larger investments necessary to curb serious injuries.

While this finding was based on costs across all industries, it may explain why the coal industry has made more progress in curbing minor injuries than in reducing the incidence of fatal injuries. The research highlights why there is a need for government regulation to ensure good safety outcomes.

The process of reform

Recent reviews and reforms by governments have lent support for a legislative approach based around the duty of care and the development of mine safety management plans. In 1996, the Queensland Government introduced

amendments requiring mines to develop safety management plans, as recommended by the Moura inquiry. The Government has also reviewed its legislation and prepared a draft bill which includes duty of care principles (see Box 9.6).

The Review of Mine Safety in NSW recommended that coal operators be required to prepare mine safety management plans to identify and manage all serious risks (see Box 9.5). The NSW Government has said that it is moving towards "duty of care regulation supported by enforcement" (sub. 26, p. 14). It is currently reviewing coal mining legislation, and plans to circulate a draft bill in the year 2000 (Mine Safety Review 1998). Tripartite discussions are also being held to consolidate the regulations under the *Coal Mines Regulation Act 1982*. At present there are 35 regulations. These will be consolidated into three — a general regulation covering all coal mines, a specific regulation for open cut coal mines, and a specific regulation for underground coal mines. This process is due for completion around the end of 1998.

The reform principles that the Commission has outlined above reflect those underlying general OHS legislation, and are consistent with a longer-term goal of mainstreaming the regulation of OHS in the coal industry. The Commission considers that this goal would be advanced by involving those with expertise in the development and implementation of duty of care legislation in other industries, in the process of reforming coal mining legislation. This would help to ensure, for example, that the employer's duty of care was appropriately framed to reflect organisational responsibility, and that legislative defences did not diminish this responsibility inappropriately.

Recommendation:

Workplace parties (principally employers) should be legally responsible for mine safety through their duty of care.

Underground coal mines should be regulated separately from the open cut coal sector, which should be covered by OHS legislation governing metalliferous mining or the general legislation governing OHS in other industries.

Under the regulatory approach proposed by the Commission:

- companies would be required to develop and periodically review mine safety management plans in consultation with their employees. These plans would identify all safety risks at a mine and contain procedures for the management of these risks;

- mines would be guided in developing safety management plans by codes of practice, guidance notes and advice from safety consultants and coal inspectorates;
- existing regulatory requirements would be reviewed and rationalised to remove obsolete regulations and detailed provisions prescribing the management of minor hazards;
- regulations prescribing the management of serious hazards would be redrafted along performance or management system lines, and existing regulatory prescription would be recategorised as codes of practice;
- regulations prescribing management positions would be abolished and the need for regulations prescribing other safety positions would be reassessed;
- there would be vigorous enforcement with an emphasis on deterrence, so that workplace parties had the incentive to comprehensively assess and control the hazards of their work;
- inspectorates would conduct random audits of mines to ensure that mine safety management plans addressed mining hazards and had been implemented;
- coal inspectorates would issue an enforcement policy and publish details in their annual reports about actions taken against companies in respect of significant derelictions of their duty of care; and
- maximum penalties applying to the coal industry would be brought into line with those applying to other industries.

9.7 The Joint Coal Board

The Joint Coal Board (JCB) was established under legislation enacted by both the Commonwealth and NSW Governments in 1946. Its main function was to regulate the industry and ensure the maintenance of coal supplies in NSW. The JCB has been subject to several reviews over the last decade. Its four core businesses are:

- to manage an occupational health service that delivers health assessments, injury management, work environment monitoring (including dust monitoring) and health education to the NSW coal industry;
- to maintain a fully funded workers' compensation insurance scheme for people working in the NSW coal mining industry;
- to provide an information service on production, employment and accident data; and

- (until July 1998) to conduct an international coal technology training program, funded by the United Nations and AUSAID, on the utilisation of coal in an environmentally sustainable manner (JCB 1997).

The NSW Government stated:

> The Commonwealth has advised that it will be withdrawing from the Joint Coal Board. The NSW Government is currently considering how the functions of the Joint Coal Board will be performed after this takes place. (sub.DR68, p. 2)

Many participants considered it was time to review further the functions of the JCB, with some calling for its abolition.

9.7.1 Assessment of JCB functions

Dust monitoring

The JCB has a statutory power to monitor dust in coal mines. The JCB stated that its monitoring role is "independent of individual coal companies, and allows the industry access to data from consistent testing across the entire NSW coalfield" (sub. DR59, p. 1). In addition, mine managers have a duty to sample the dust levels in their mine in accordance with the *Coal Mine Regulations Act 1982*.

The JCB warned against coal companies having sole responsibility both to sample and monitor dust levels:

> [The JCB's first submission] was intended to highlight the problems that the US industry is experiencing as a result of operators having responsibility for both sampling and monitoring. There is an obvious potential for conflict of interest. ...
>
> Along with the apparent fraudulent sampling that occurs in the US is a persisting level of pneumoconiosis. Current "black lung" prevalence in NSW is approaching zero. Appendix B shows the decrease in prevalence of pneumoconiosis in NSW over the past 25 years, along with figures for the US industry over a corresponding period. The Board still asserts that where dust sampling and monitoring responsibility are separate (for example, NSW) the potential for conflict of interest is reduced, and the danger of a distant future externality such as chest disease appearing is minimised. The Board is an unbiased monitor of dust levels across the entire NSW industry, and the Board strongly believes that this role is fundamental to maintaining a disease-free workforce. (sub. DR59, p. 2)

However, Mr Rod Ruston, a member of the JCB, disagreed that the coal industry would engage in fraudulent sampling:

> When talking about dust sampling, the [JCB's first] submission virtually makes an accusation that Australian mine operators will cheat or be biased if they are given the opportunity to undertake the sampling themselves.

> The health and safety of our workforce is a critical issue for all mine operators and the accusations made in the submission are totally unacceptable. As operators, the coal mining companies would ensure the sampling undertaken was properly representative of the working conditions of the employees.
>
> ... Consequently, there are ample alternatives to the Joint Coal Board monopoly on the dust sampling which will at least maintain the current standard and probably enhance it. (sub. 36, pp. 1–2)

The Commission considers that a similar approach should be adopted to the management of dust as to other occupational health and safety hazards (see Section 9.6). Employers should be legally responsible for managing the risk posed by dust and complying with any regulatory requirements, and they should detail how this risk will be managed in their mine safety management plans. Coal inspectorates should audit mines randomly to ensure that they are managing all risks, including dust. Inspectorates may wish to consider whether the long latency of dust-related illnesses warrants additional enforcement strategies such as regular monitoring of dust levels. The Commission considers that this function could be assumed by coal inspectorates.

Workers' compensation insurance

The JCB has a legislated monopoly over the provision of workers' compensation insurance in the NSW coal mining industry. Its insurance arm operates as Coal Mines Insurance (CMI). Even though it is a monopoly provider, many participants considered that it provides competitive insurance rates.

The JCB stated that its premiums were lower than coal companies would be able to obtain under the NSW WorkCover scheme:

> The premium rates set by CMI compare well with those likely for coal enterprises under WorkCover in NSW (the alternative insurer, unless an enterprise self insures). Two reviews of CMI have been commissioned by the NSW Minerals Council over the past two and a half years. Both reports concluded that there would be no financial advantage in mines transferring their insurance cover from CMI to WorkCover or becoming self-insurers. Despite charging rates which are approximately half the rate Work Cover would charge the scheme administered by CMI is fully funded — that is, the premiums collected are sufficient to cover the cost of claims incurred. (sub. 44, p. 1)

The JCB's monopoly over workers' compensation insurance prevents coal mining companies in NSW from selecting their workers' compensation insurer.

The NSW Minerals Council argued that Coal Mines Insurance should be separated from the JCB and compete in the open market:

> The NSW Minerals Council believes that Coal Mines Insurance should be separated from the JCB (that is, corporatised). Coal Mines Insurance is regarded as a competitive insurer which offers an efficient service to clients. It should, therefore, be well equipped to offer workers' compensation insurance to non-coal employers. However, the Council also believes that it is also appropriate to end the Coal Mines Insurance monopoly on New South Wales coal industry workers' compensation by providing coal companies with the option to self insure or to insure through another insurer. (sub. 25, p. 40)

There is merit in this view.

Other functions

As well as the pre-employment medical checks provided for those about to enter the industry, the JCB is contracted to provide a more rigorous assessment for members of the NSW Mines Rescue Service. The average waiting time for a standard assessment at a JCB office was about two days in 1995–96 (JCB 1997).

The JCB provides occupational health and rehabilitation services in competition with a wide range of public and private providers. The need for the JCB to do so is not clear.

The JCB said that the purpose of its free health assessments is "to collect epidemiological data on the health of mineworkers" (sub. DR59, p. 3). The Commission considers that responsibility for this function could be assumed by the coal mining inspectorate, with assessments contracted out to appropriate providers. That way the results of such assessments could inform the other functions of inspectorates such as the provision of advice, enforcement and code of practice development. The inspectorate could also balance the priority and resources of this function against its other health and safety initiatives.

The JCB's responsibility for collating coal-related statistics also could be transferred to the Department.

In the draft report, the Commission suggested that the international coal training program could be coordinated by the NSW Department of Mineral Resources. However, the JCB said:

> Australia is a donor country to the United Nations. Unfortunately, no donor country's government can be the recipient of funding from the United Nations. This of course includes State governments. Any appointed subcontractors for the program have to be independent statutory entities or private sector companies. The Board, unlike the NSW Department of Mineral Resources, is an independent statutory entity, and as such is able to coordinate the program. (sub.DR59, p. 3)

AUSAID, which provided funding for the program, advised that the program ended on 30 June 1998. The United Nations is designing a new program.

However, it has not been decided whether the program will include a coal training element. Providers of the new program will be selected by international public tender. Therefore, international training is no longer a function of the JCB, and there are considerable uncertainties as to whether the JCB would be funded to deliver such a program in the future.

9.7.2 The future of the JCB

Against this background, the Commission sees no need for continuation of the JCB. Its existence tends to reinforce the perception that the coal industry is 'special'. In the interests of creating a more efficient industry, this perception must change. Abolition of the JCB, with its functions transferred to the NSW Department of Mineral Resources, WorkCover and other public and private providers as appropriate, would help to facilitate the mainstreaming of the coal industry.

Recommendation:

The Joint Coal Board should be abolished and its functions taken over by the NSW Department of Mineral Resources, WorkCover and other public and private providers as appropriate.

If it were decided to retain the workers' compensation role of the JCB, Coal Mines Insurance should be corporatised and required to compete for business against other insurance options.

9.8 Local governments

Local governments affect the coal industry in a variety of ways —including planning and land use regulations and the levy of rates.

In terms of planning, in many cases local government faces conflicting objectives of coal companies and local residents. Local governments must balance the desires of coal companies to use their resources most effectively with the possible environmental concerns of local residents (such as increased dust and noise associated with the mining and transport of coal). Typically, problems arise when coal mining encroaches on developed areas, or in areas where there is little history of coal mining. In Wollongong, for example, problems have arisen due to the trucking of coal in suburban areas and the need to find space for coal waste.

In terms of local government charges, several coal companies in the Hunter Valley noted that local governments levy relatively high rates on coal mines, while the companies perceived that they received little in return. Camberwell Coal noted the following points:

- council rates are very high, particularly in the Singleton Shire;
- Camberwell expected to pay about $74 000 in rates in 1997 to Singleton Shire (4 cents per tonne) but received little in return; and
- the coal mining rate in Singleton is 5.23 times the average of all other rates in the shire. (sub. 13, p. 4)

However in response to the draft report, the Association of Mine Related Councils argued that while mine rates may appear to be high, the rates rarely cover the commitments arising from coal developments:

> The Association argues that there is a massive imbalance in the distribution of costs borne by councils and the benefits derived by State and Federal Governments which needs to be redressed to counter the high net cost of coal development at the local level.
>
> What the [Camberwell] mine does not appear to appreciate is that its very existence creates infrastructure maintenance and social service costs for the council. Roads and amenities need to be maintained, usually at a much increased rate because of the extraordinary additional damage and use by the mining companies, community services which would not have been required if there were not an influx of miners into the community need to provided. (subDR57, pp. 1–2)

The Commission acknowledges that it may well be appropriate for coal mining rates to be higher than those for other businesses, if the coal industry imposes disproportionate costs on local government services. At the same time, local governments need to be aware of the indirect benefits to their revenue which may stem from coal mining activity. For example, other businesses attracted to shires to provide services to coal mining companies and their employees may be a source of additional local government revenue.

It would be inappropriate for local council rates to be inflated to include a quasi-royalty component. This is because the ad hoc levying of royalties by different layers of government or infrastructure providers (ie rail authorities) could undermine industry competitiveness and reduce investment in the coal industry. Royalties are discussed in the next chapter.

10 ROYALTY ARRANGEMENTS

Mining companies pay State governments for the use of black coal resources through royalties. In NSW, royalties are levied as a dollar amount per tonne of production (specific royalties), and in Queensland as a percentage of the value of production (ad valorem royalties). State governments are phasing out the collection of royalties through rail freight rates.

Current royalty systems have the advantage of being easy to administer. Ad valorem royalties have the additional advantage of varying with price and therefore partly responding to changes in the value of coal resources. In principle, a resource rent royalty would be superior on efficiency grounds, as a company's royalty liability would depend on the value of its resource, and would vary with changes in mining costs and coal prices. A key issue is the complexity and cost of administering and complying with a resource rent royalty.

A number of participants elaborated on the difficulties of administering a resource rent royalty in the black coal industry. Nevertheless there are strong arguments for making royalties more responsive to market conditions. In NSW, the replacement of specific royalties with ad valorem royalties would allow royalty levels to move with world prices, better reflect the value of coal resources, and encourage the exploitation of low grade coals.

10.1 Current royalty arrangements in NSW and Queensland

In Australia, most minerals are owned by State and Territory governments. Miners pay State governments for the use of black coal resources through royalties. In NSW, royalties are levied as a dollar amount per tonne of production (called a *specific* royalty), and in Queensland royalties are levied as a percentage of the value of production (called an *ad valorem* royalty).

The term royalty is used to describe both royalties paid direct to State Treasuries and royalties collected through rail authorities and remitted to State governments.

The Commission estimates that in 1996–97 the NSW and Queensland Governments collected a total of $636 million in royalties, equivalent to

2.8 per cent of their own revenue or 1.8 per cent of their total revenue — a relatively small share of State budgets (see Table 10.1).

Table 10.1: **Black coal royalties in NSW and Queensland, 1996–97**[a]

		NSW	*Queensland*	*Total*[b]
Royalties	($m)	233.5	402.0	635.5
Royalties as a percentage of States' own revenue	(%)	1.6	4.7	2.8
Royalties as a percentage of States' total revenue[c]	(%)	1.0	2.9	1.8

a Royalties includes royalties paid direct to State Treasuries and royalties collected through rail authorities and remitted to governments. This estimate excludes monopoly rents collected by the NSW RAC.

b Comprises NSW and Queensland.

c States' total revenue comprises States' own revenue plus Commonwealth contributions.

Source: Commission estimates.

10.1.1 Royalty arrangements in Queensland

Since 1994, the Queensland Government has been phasing out the collection of royalties through the rail system and phasing in a new, higher royalty rate of 7 per cent, levied on the mine gate value of production. The new royalty rate applies to mines that have renegotiated their rail contracts, and to new mines and mine expansions.

Mines on old rail contracts pay a lower royalty rate (4–5 per cent), but are subject also to royalties built into their rail charges. By 2000, the new arrangements will be fully implemented and all mines will be subject to a 7 per cent royalty and commercially negotiated rail freight rates. Further information about the phasing in of the new royalty arrangements is provided in Box 10.1.

10.1.2 Royalty arrangements in New South Wales

In NSW, royalties are levied at the rate of $1.70 per tonne on all coal production, plus an additional $0.50 per tonne super royalty on open cut mines.

The NSW Government is phasing out the collection of monopoly rents in rail charges, but has not announced any offsetting increases in the specific royalty rate. The monopoly rent component in NSW rail access charges is collected by the Rail Access Corporation (RAC). This monopoly rent amounted to $1.20 per tonne in 1996–97 and is to be phased out over four years. It will be eliminated totally by 1 July 2000. Further discussion of monopoly rents in access charges in NSW is provided in Chapter 7.

Box 10.1: **Phasing in of new royalty arrangements in Queensland**

Prior to 1992, rail freight rates were determined by direct negotiation between Queensland Treasury and coal companies and included an implicit royalty component. Queensland Rail (QR) said: "The level of the freight rate set by Treasury was usually based on the mine's ability to pay. In many instances this resulted in freight rates being significantly in excess of the costs of haulage" (sub.12, p. 10).

Following the commercialisation of QR in 1991, QR adopted a policy of setting freight rates in new rail contracts solely on the basis of the cost of providing rail transport services to coal mines. This meant that *new* rail contracts no longer included a royalty component. To partially offset this loss of revenue, the Queensland Government announced a new royalty regime in 1993, which was phased in from 1 January 1994.

Under the new royalty regime, new mines and mine expansions are subject to a royalty of 7 per cent levied on the value of mine production, and existing mines become subject to this royalty rate when their present rail contracts expire. Mines with rail contracts expiring after the year 2000 are given the opportunity to renegotiate these contracts in 2000, at which time they become subject to the new royalty arrangements. An exception was provided for cases where premature termination gave rise to mutual benefit. This is the year in which the exemption for 'government coal-carrying services' under s.78 of the *Competition Policy Reform Act* expires (see Chapter 7). Until rail contracts expire or are renegotiated, mines are subject to the lower export coal royalty regime in existence before 1994, which was 5 per cent for open cut mines and 4 per cent for underground mines, and freight rates that include a royalty component.

In 1995–96, the amount of royalty revenue collected through old Treasury-negotiated rail contracts and remitted by QR to Government was $235 million, or $3.05 per tonne of coal railed (QR 1996). The Queensland Government has recently given these mines an opportunity to renegotiate their rail contracts along commercial lines. Mines that take up this offer are subject to a special royalty until 2000.

In addition, there are a small number of mines that negotiated lower commercial freight rates with QR in 1992 and 1993 prior to the introduction of the new, higher royalty rate. These mines are subject to a Resource Utilisation Charge until 2000.

The new royalty regime also includes arrangements to tax coal for the domestic and export markets equally. The royalty on domestic coal is being increased from 5 cents per tonne in 1994 to 7 per cent by 2000.

Sources: QR, sub. 12 and Queensland Government, sub. 32.

In March 1997, the NSW Government introduced new arrangements for levying royalties on coal reject. The royalty rate is no more than 50 per cent of that applying to other coal, with each case being assessed individually. The other change in NSW that has affected royalty collections has been the compulsory purchase by the Government of some private coal titles (see Box 10.2).

Box 10.2: **Purchase of private coal titles by the NSW Government**

In most cases, coal is owned by State governments regardless of who owns the land on the surface. However, in NSW some land granted prior to 1884 included rights over coal. Royalties for coal mined from this land accrued to private landholders rather than the State. By the end of the 1970s, about 30 per cent of coal production involved the mining of private coal and in some areas, such as the Upper Hunter, private ownership approached 100 per cent.

In 1981, the NSW Government introduced the *Coal Acquisition Act*, to revoke private landowners' title over coal and to pay compensation. This policy was reversed in 1990, when the Government introduced the *Coal Ownership (Restitution) Act* which provided former private coal owners the opportunity to have their title restored.

In a report to the NSW Government in 1996, the Coal Restitution Taskforce estimated that the Government would lose more than $300 million in coal royalty if private owners' titles were restored. Based on the recommendations of the Taskforce, the Government introduced the *Coal Acquisition Amendment Act 1997* to enable the re-acquisition of a small number of private coal titles and to clarify the Minister's power to refuse applications for the restoration of former private coal titles.

Currently companies with open cut operations mining privately-owned coal are not liable to pay the $0.50 per tonne super royalty. The acquisition of private coal titles will remove this anomaly.

Source: NSW Government, sub. 26.

10.2 Criteria for assessing royalty systems

A number of criteria can be used to assess royalty systems. A desirable royalty system is one which:

- *promotes economic efficiency* — by not distorting companies' production decisions;
- ensures an *equitable distribution* of the rents from exploiting mineral resources between the community and the miner;

- is *stable* — maximising the information available for companies when making investment decisions, increasing the likelihood that investments will be soundly based, and avoiding the costs associated with sovereign risk;
- *varies with the value of the resource* — the value of a resource may vary over time as prices and costs change. A royalty system that reflects this ensures an equitable distribution of rents over time and distributes risk between miners and the community; and
- is *easy to administer* — reducing administrative costs for governments and compliance costs for companies.

Governments often value a royalty system that provides a predictable stream of government revenue to fund recurrent expenditure. However, as royalties are payments for depleting Australia's mineral capital, they should be used to retire public debt or for purposes for which governments would otherwise be prepared to borrow (for example to add to the nation's infrastructure), rather than being used to finance government current consumption expenditure. Therefore, the predictability or 'smoothness' of revenue flows should not be a criterion in assessing royalty systems.

10.3 Alternative royalty collection methods

This section considers three different methods of collecting royalties.

The first method relates the royalty to the economic rent of an activity, where economic rent is defined as any profit in excess of the profit which would induce a company to undertake the activity (ie super-normal profit).[1] Thus economic rent is the difference between the revenue obtained from the sale of coal and the costs (for example, labour and capital) incurred in earning that revenue — where costs are defined as opportunity costs (ie minimum expenditures necessary to attract inputs such as labour and capital into coal mining).

When an economic rent-based royalty is levied periodically as a fixed proportion of economic rent it is referred to as a resource rent tax. Alternatively, in principle, a royalty based on economic rent could be collected by auctioning the right to exploit the coal deposit, or by some combination of auction and periodic assessment.

[1] See IC (1991b) for a more comprehensive discussion of rent-based royalties.

The Commonwealth Government introduced rent-based royalties for new offshore petroleum projects in 1984, and extended them to Bass Strait petroleum production from July 1991.

Economic rent-based royalties differ in many important respects from royalties which are based on accounting profits, although they are often referred to synonymously. In NSW, profit-based royalties apply to certain mining operations at Broken Hill (line of lode mines).[2]

The other two methods of collecting royalties are based on mine output. One relates to the value of production (an ad valorem royalty) and the other to quantity (a specific royalty).

10.4 Evaluation of alternative royalty systems

The previous sections have outlined alternative royalty regimes and criteria for assessing them. This section uses those criteria to evaluate the alternative approaches to levying royalties.

10.4.1 Periodically calculated rent-based royalties

A periodically (for example, annually) calculated rent-based royalty system would have the advantage of being:

- efficient;
- equitable;
- sensitive to the changing value of the resource; and
- stable.

Rent-based royalties would not reduce the level of coal production, and would not distort the combination of inputs used, the timing of resource extraction, or the decision to invest in the coal industry rather than elsewhere (ABARE 1990). In principle, on efficiency grounds, rent-based royalties would be superior to output-based royalties (see Box 10.3). The NSW Government noted:

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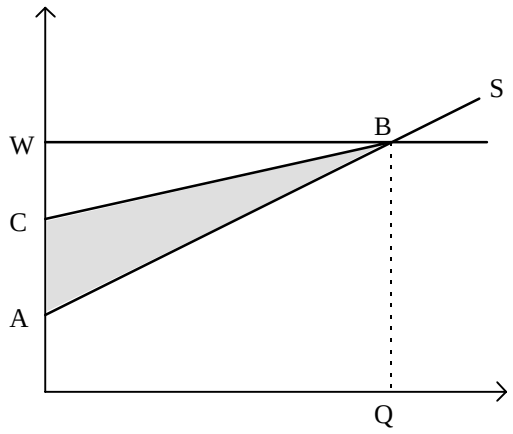
[2] The main difference between a rent-based royalty and a royalty based on profit is the treatment of capital. Under a rent-based royalty, interest payments and capital depreciation would not be allowable deductions. The cost of capital — whether interest payments or equity — is already included in the return on capital which must be met before royalties become payable. Capital items are depreciated at 100 per cent in the year in which they are incurred, and therefore, ongoing deductions for depreciation expenses are not allowed. In contrast, interest payments and depreciation expenses are allowable deductions for calculating profits for accounting or tax purposes.

> The RRR [resource rent royalty] has the considerable advantage that it can have a close to neutral effect on investment in the industry. Properly calculated, it should not prevent new investment, even in marginal mines, and should not close mines prematurely. (sub. 26, p. 23)

Periodically calculated rent-based royalties would enable an equitable distribution between the community and the project owner of the rents from exploiting mineral resources. This is because the amount of royalty paid by miners would vary according to the economic value of their mineral deposit. The economic value of a deposit would vary over time as coal prices and extraction costs changed, and would vary between mines, depending on, among other things, the geological characteristics of mines. Periodically calculated rent-based royalties would reflect these differences in the value of mineral deposits, both over time and between mines.

Box 10.3: **The neutrality of rent-based royalties**



In the above figure, W is the world price and AS is the supply schedule. Consequently, it is viable to mine Q units of ore and the deposit would earn $WAB economic rent. If royalties were levied as a percentage of rent ($CA/WA), the mine would continue to produce Q units and pay royalty of $ACB. The rent-based royalty is neutral because the cut-off grade (Q) is unchanged by the imposition of the royalty. This contrasts with the output royalty in Box 10.4.

Source: IC (1991b).

Sovereign risk associated with royalty charges is usually a factor taken into consideration by mining companies. However, as rent-based royalty systems would be sensitive to the changing value of the mineral resource, they are likely to be less prone to ad hoc change than other royalty systems. Companies' royalty liability would change with movements in prices and costs under a rent-

based royalty system, but the basis on which it was calculated would be stable. This would provide companies with greater certainty in making investment decisions. This advantage is unlikely to apply to royalty systems that are not responsive to changes in capacity to pay (in particular, specific royalties). Such systems are more likely to come under pressure for ad hoc adjustment as world prices and mine profitability fluctuate.

In practice, the main disadvantages of periodically calculated rent-based royalties are the difficulty of regularly calculating economic rent for each mine and the complexity and cost for companies of complying with such a royalty. Issues raised in a Working Party report to the NSW Government (1989) included:

- calculating the threshold rate of return that companies are allowed to achieve before they are liable to pay royalties;
- setting the royalty rate — striking a balance between giving companies the incentive to contain costs, and adequately compensating the community for the use of black coal resources;
- calculating allowable deductions — deductions for resource rent purposes are different from those applicable to company taxation, particularly in terms of the treatment of capital items; and
- identifying the entity paying royalties — the royalty liability applies to the project, not the company owning the mine. Nevertheless, some joint head office expenses are incurred because of the project (for example project finance, accounting and legal costs). Some costs are also shared between projects. For example, two mines may share the same washery. Therefore governments need to set guidelines for the attribution of joint costs.

The Queensland Government said that the disadvantages of a resource rent royalty included:

- high administration and compliance costs;
- revenue instability for governments; and
- sovereign risk created by changes in royalty systems, particularly in the context of Queensland being part way through phasing-in new royalty/freight arrangements.

In relation to the first point, the Queensland Government said:

> For the Queensland coal industry, the information requirements of a resource rent royalty would be substantial. There are currently 44 coal mining projects in operation in Queensland with several more projects in the development stage. To further complicate matters, various consortia of companies own many of these projects with head offices in other States. Supplying and verifying cost data would be a large administrative burden on both industry and government. In particular, it

> would be administratively difficult and costly to determine relevant assessable profit (particularly due to cost allocation issues in many instances) and verify costs for vertically integrated enterprises. In addition, the royalty system may be open to manipulation by producers to reduce the royalty payable through creative accounting and by changing the timing of expenditures. (subDR61, p. 17)

The Queensland Government noted that the administrative costs of implementing a resource rent royalty in the offshore petroleum industry were less as there are currently only eight operators paying royalties. It also noted that the data requirements of the royalty would be seen as "an intrusion into confidential commercial matters of industry" (sub. DR61, p. 17).

On the second point, the revenue instability of a resource rent royalty, the Queensland Government said that the stability of revenue under an ad valorem royalty system enhanced its ability to plan regarding its expenditure and that any changes to this revenue source could "seriously jeopardise the services provided to the people of Queensland" (sub. DR61, p. 18). However, as noted in Section 10.2, royalties should not be used to finance government current consumption.

On the third point, the Commission acknowledges that the introduction of a new royalty system would be an instance of sovereign risk, but considers that a resource rent royalty, once implemented, is likely to be more stable than output-based royalties.

The NSW Minerals Council was concerned with the sovereign risk and competitive neutrality effects of introducing a resource rent royalty (sub. DR60, p. 12).

10.4.2 Rent-based royalties realised through auction

An alternative to levying royalties on periodically calculated rents would be to auction rights to explore and mine, and to realise an expected future stream of rents in a once-off bid at auction. If those who bid at the auction were well informed about current and future production costs and coal prices, such an approach would:

- be easy to administer;
- promote economic efficiency; and
- be equitable.

In these circumstances there would be no need for governments to calculate economic rents annually — companies would estimate this once in assessing how much to bid for a resource. Such an auction would promote economic

efficiency as companies' future production decisions would be unaffected by their initial bid.

However, in practice, the main disadvantage of this approach is that companies would be uncertain about the current and future value of mineral deposits for which they were bidding. This risk and uncertainty would be reflected in lower bids at auction and, therefore, lower royalty revenue.

Uncertainty also has implications for the equity and stability of the royalty system. Incomplete information about the value of deposits would mean that in some cases the community would get a low return on its asset, while in other cases companies would pay far in excess of the value of the deposit. This inequity would generate pressures for changes in the royalty regime after the auction. For example, in cases where the resource proved to be far more valuable than the initial bid, there would be pressure for governments to impose additional royalties during the project's life. If governments succumbed to this pressure, instability in the royalty regime would be another factor increasing project risk.

10.4.3 Ad valorem royalties

Ad valorem royalties have the advantage of being easy to administer as governments need information only about the value of mine output. This information requirement is much less onerous for governments and companies than that required to calculate periodic rent-based royalties.

While ad valorem royalties are inferior to rent-based royalties on efficiency and equity grounds, they are preferable to specific royalties, as the amount of royalty collected adjusts to changes in coal prices over time, and therefore partly reflects changes in economic rents. For example, when prices are high, the level of royalty per unit of output increases under an ad valorem system, but is unchanged under a specific royalty system.

Furthermore, ad valorem royalties vary according to the value of different types of coal at any point in time. For example, the royalty per tonne of low value thermal coal is less than the royalty per tonne of high value coking coal.

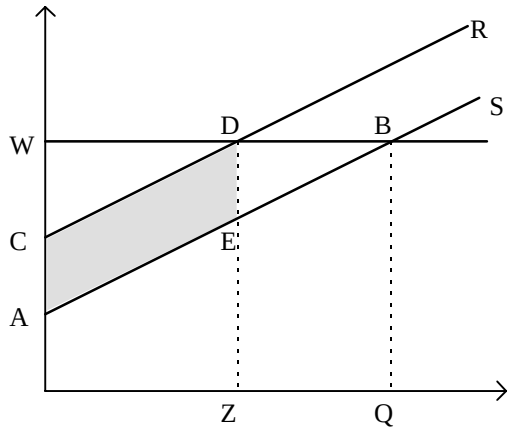
In practice, the main disadvantage of ad valorem royalties is that they take no account of differences between mines in the cost of exploitation. For a given coal price, mines with favourable geology pay the same royalty per unit of output as mines with difficult geology, even though the former are more valuable mineral deposits (given their lower costs of extraction) and, therefore, should yield a higher return to the community. This failure to account for cost

differences between mines can lead to ad hoc arrangements, such as the NSW Government's decision to impose a super royalty on coal from open cut mines.

Ad valorem royalties can also:

- induce companies to produce a lower than optimal level of mine output;
- discourage the development of marginally efficient mines; and
- induce companies to cease mining before the economic benefits of mining a deposit are exhausted (see Box 10.4).

Box 10.4: **The effect of specific and ad valorem royalties on mining output**



In the figure above, W is the world price at which the mineral can be sold and AS is the supply schedule. Consequently, it is viable to mine Q units of ore and the deposit would earn $WAB economic rent. The imposition of a specific or ad valorem royalty ($AC per unit) would increase costs as represented by the schedule CR. It would then be viable to mine only until the Zth unit of ore. The deposit now generates less economic rent ($WAED) of which the government receives $CAED as royalty.

Source: IC (1991b).

10.4.4 Specific royalties

Specific royalties are also easy to administer as the only information requirement is the level of mine output.

In terms of the criteria outlined in Section 10.2, specific royalties are inferior to both rent-based and ad valorem royalties because, in addition to having all of the disadvantages of ad valorem royalties, they take no account of differences in the value of various types of coal (for example thermal versus coking) or of

changes in coal prices over time. This can lead to ad hoc arrangements such as the NSW Government's decision to set royalty rates for coal reject on a case-by-case basis.

10.5 Royalties collected through rail freights

As outlined in Section 10.1, the Queensland and NSW Governments are phasing out the collection of royalties through rail freights. The Commission welcomes this reform.

The past practice of setting different freight rates for mines on the basis of perceived capacity to pay rather than haulage costs was a very imperfect way of implementing a rent-based royalty. This is because freight rates were set at a point in time under long-term contracts and were not adjusted in a predictable way according to changes in the economic value of mines (although ad hoc adjustments did occur).

In addition, while companies' capacity to pay influenced the *level* of freight rates, rates were set on a per tonne basis, and raised costs for every unit of production. In this regard, royalties embodied in freight rates were a form of specific royalty, and had similar adverse effects on the level of mining output.

Finally, incorporating royalties in rail freights reduced the efficiency of the rail transport system and distorted companies' transport choices (see Chapter 7).

While the Commission welcomes the phasing out of royalties in rail freights, it is important not to overstate the significance of this reform. In Queensland, the Government is removing one output royalty (excess rail freights) and increasing the level of another output royalty (the ad valorem royalty). In NSW, the Government is phasing out the collection of monopoly rents in rail charges without increasing other royalties. While this should improve economic efficiency, it is at the cost of a lower return to the community for the exploitation of coal resources.

10.5.1 Effect of phasing arrangements in Queensland

The phasing arrangements in Queensland for removing royalties from freight rates and introducing a higher ad valorem royalty rate were criticised by BHP:

> From 1 June 1997, BHP Coal renegotiated its rail haulage arrangements for five of its North Bowen Basin Mines. As part of this negotiation, which was predicated on the premise of growth in the industry, the Government agreed to identify and separate out the de facto royalty and rail freight components of the rail freight rates, thereby allowing clearer negotiation of the true rail freight component. Based

> on the achievement of performance linked incentives and a co-operative approach between Queensland Rail and BHP Coal to improving both current and future practices, potential for improved efficiencies and potential flow on benefits were also agreed. Payment of the de facto royalty component, directly to Queensland Treasury, will however continue until the year 2000. The continuation of the de facto royalty until that time will see the effective rail freight "rate" remain only marginally lower than it has been in recent years, and will not reduce substantially until 2000. Notwithstanding the advances in the recent agreement, the uneven application of the de facto royalty continues to place BHP Coal at a distinct competitive disadvantage with many other Queensland producers who do not pay this impost. ... between the time of this submission and the cessation of defacto royalties in 2000, BHP Coal will pay to the Government around $1.0 billion in these royalties. (sub. 30, pp. 19–21)

The arrangements implemented in BHP's case are in line with those announced by the Queensland Government in September 1993 (see Box 10.1). That is, mines under rail contracts that expire after 2000 are not subject to the higher rate of royalty until 2000, at which time they can renegotiate their rail contracts in a competitive environment. The exception to this is where renegotiation of rail contracts leads to mutual benefits for the Government and the company. The Queensland Government explained that this exception applied in BHP's case:

> ... in return for the payment of a "special royalty" to offset the loss of State revenue, the State agreed to terminate the arrangements in advance of the respective expiry dates. The State, in agreeing to the premature termination of the pre-commercialisation rail haulage arrangements, released the mines to negotiate new rail haulage contracts incorporating the latest operating and capital efficiency gains. The State has offered similar arrangements to other mines with pre-commercialisation rail haulage contracts still in existence. (sub32, p. 51)

To the extent that BHP will be paying lower royalties after the year 2000, the changes to royalty and freight arrangements announced by the Government in 1993 have benefited BHP.

BHP's concern that it is paying higher charges than other Queensland mines during the transition period could have been addressed by bringing forward the date for aligning the royalties applying to all mines. However, a shorter transition period may have disadvantaged some mines, exacerbating sovereign risk.

In conclusion the Commission notes that:

- the phasing out of royalties collected through rail freights has advantaged BHP overall;
- inevitably some mines may be advantaged and others disadvantaged during the transition period;

- a lengthy transition period is appropriate given the long lead times of investments in this industry;
- in negotiating arrangements with BHP, the Queensland Government has adhered to the phasing principles it announced in 1993; and
- the phasing arrangements have provided for flexibility in pursuing 'mutual advantage' and BHP has taken advantage of this provision to implement more efficient coal loading arrangements, and realise the benefits of lower freight rates.

10.6 Participants' views on royalty arrangements

Some participants observed that the current basis for setting royalties made no allowance for changes in market conditions and companies' capacity to pay. For example, Camberwell Coal said:

> The super royalty applies only to open cut mines and was introduced in the late 1970's when the coal industry was booming, and when open cut mines were seen as being particularly profitable. Circumstances have changed and the super royalty can no longer be justified, particularly to mines like Camberwell with high strip ratios. (sub. 13, p. 4)

Rio Tinto commented:

> State government charges are not generally responsive to competitive forces. They tend to be based on a fee-for-service for use of the various government owned infrastructure monopolies, or royalties calculated on a dollars-per-tonne basis or as a percentage of the $/tonne "mine-gate" selling price.
>
> Accordingly, coal producers are squeezed between price pressures emanating from their markets and governments charges which are not responding to these market developments. (sub.22, p. 27)

In response to these concerns, the Commission sought participants' views about the costs and benefits of replacing existing royalty schemes with a resource rent royalty. The views offered indicated that the costs associated with implementation of a resource rent royalty would exceed its benefits. The Queensland Government and Rio Tinto strongly opposed such a royalty, and the NSW Government and the NSW Minerals Council identified a number of problems with implementing it.

Nevertheless there are strong arguments for making royalties more responsive to market conditions. In NSW, the introduction of an ad valorem royalty system would:

- allow the risk of world price movements to be shared between mining companies and the government;

- ensure that royalties better reflected the value of coal resources; and
- encourage the exploitation of low grade coals.

Pacific Power supported the introduction of ad valorem royalties in NSW:

> Pacific Power has some concerns with the current royalty arrangements in NSW, whereby a fixed royalty (including, in some instances a super royalty) is levied on all coal produced in NSW, regardless of coal quality.
>
> The arrangement results in a situation whereby royalties levied on a low quality coal provided to a NSW generator may be of the order of three times as high (expressed as a percentage of coal price) as that levied on an export coking coal.
>
> A reduction in the royalty amount paid on lower quality coals would enhance the attractiveness of the purchase of such coals by NSW generators. This may in turn contribute to greater coal resource utilisation and operational and marketing flexibility for coal suppliers.
>
> From its perspective, Pacific Power sees some merit in an *ad valorem* system for royalty calculation, which would reflect the lower quality (and value) of domestic thermal coals. (sub. DR55, p. 3)

Like any change in royalty arrangements, a move from a specific to an ad valorem royalty system would involve winners and losers. Producers of thermal coal and lower quality coals would pay a lower royalty per tonne of production, but coking coal producers would pay a higher royalty per tonne. This may create difficulties for coking coal producers with high cost structures. However, in the longer term, producers of all coals would benefit from having a more market-responsive royalty scheme.

Recommendation:

The NSW Government should adopt an ad valorem royalty system.

11 MODELLING THE EFFECTS OF IMPROVED PERFORMANCE

The Centre of Policy Studies (CoPS) at Monash University was commissioned by the Productivity Commission to model the potential industry and economy-wide effects of productivity change in the black coal industry. This chapter summarises the results generated from MONASH-Coal, a customised version of the MONASH computable general equilibrium model of the Australian economy.

Overall, the CoPS results highlight the importance of productivity improvements for this export-oriented industry. Confirming intuition, the results also indicate that the economy and the community at large can benefit substantially from a more efficient black coal industry. Productivity improvements expand the productive capacity of the economy, allowing extra output and income to be generated using the same amount of inputs. As the black coal industry makes a significant contribution to national output, productivity gains in the industry can generate substantial national income gains. Modelling suggests that real GDP could be around 0.4 per cent higher than otherwise by 2009–10, and real private consumption 0.9 per cent higher, as a result of feasible, accelerated productivity change in the industry. In terms of today's dollars, this would represent additional annual national income in the order of $3 billion in 2009–10.

Under the assumptions of the MONASH-Coal model, real income gains generated by productivity growth translate into higher real wages across the economy. This reflects a conservative view that trend growth in economy-wide employment is not affected by productivity gains in the black coal industry. If there were to be a somewhat smaller increase in real wages, aggregate employment could grow more rapidly as a result of productivity changes in the coal sector. This would spread the benefits of productivity growth more widely, and generate additional national output and income.

Under reasonable assumptions about conditions in international coal markets and the response of coal export prices to cost reductions, improvements in both labour and capital productivity would benefit the black coal industry and its employees. To the extent that improved international competitiveness generates more

coal exports and export income, it encourages higher investment in the industry than would otherwise occur. By encouraging relatively higher investment, higher productivity growth has the potential to slow job losses in the industry which have been occurring for many years and which are likely to continue in the absence of improved productivity. On the other hand, the modelling indicates that a failure to improve productivity would lead to lower output and investment growth, and accelerate job losses. Thus higher productivity growth can reduce the need for relocation of black coal industry workers, though productivity improvements could entail some restructuring within mines and the black coal industry.

Not surprisingly, the two major black coal producing States, NSW and Queensland, benefit from expansion of the sector, while other States, particularly those which are export-oriented, are estimated to experience somewhat slower growth than otherwise.

The modelling shows that improved productivity in rail, leading to lower freight rates, can deliver significant benefits to the industry and the economy. With productivity improvements in rail which close the estimated gap between current operating efficiency and best practice, coal exports are estimated to be about 10 per cent higher in 2009–10 than otherwise. The coal industry can also gain from lower freight rates associated with early introduction of competition in rail.

Restructuring of the rest of the economy is an inevitable response to expansion of coal exports and higher national income. Some sectors and States are predicted to experience slightly slower growth than they otherwise would, others moderately higher growth. Any costs incurred in this adjustment process would partly offset the estimated benefit of productivity improvements. Nonetheless, these costs would be transitional, whereas the gains from sustained productivity improvements would accrue permanently.

It should be borne in mind that the modelling results are illustrative. Modelling provides a tool for quantifying in broad terms the potential impact of productivity change in the black coal industry and the economy at large. In practice, productivity changes in the black coal industry will occur in the context of numerous unforeseen changes in the industry itself and in the domestic and international economies.

11.1 Introduction

This chapter summarises the results of economic modelling commissioned for this inquiry. Further details of the modelling results and assumptions are provided in Appendix L and Attachments L1 to L7. Appendix M discusses issues relevant to modelling productivity change in the black coal industry, while a detailed discussion of the MONASH model can be found in the Industry Commission's report on the Textiles, Clothing and Footwear Industries (IC 1997b, Appendix O). Attachment L8 summarises comments on the modelling exercise by two external, independent referees.

Five scenarios incorporating different assumptions about the productivity performance of the industry, coal export prices and rail transport efficiency and coal rail freight rates have been modelled by the Centre of Policy Studies. By modelling a range of possibilities, the Commission considers that better insights can be obtained, and more informed conclusions drawn. The impact of each scenario is assessed over a 12-year period — from 1997–98 to 2009–10.

The major assumptions underlying each scenario are:

- *Scenario 1 (the 'base case')* — 'steady' productivity growth in the black coal industry in line with recent performance of the industry. Projected exports in this scenario reflect ABARE export forecasts;
- *Scenario 2* — no further productivity growth in the industry after 1997–98;
- *Scenario 3* — accelerated productivity growth in the black coal industry;
- *Scenario 4* — accelerated productivity growth (as in Scenario 3). Foreign buyers capture part (Scenario 4a) and all (Scenario 4b) of the cost reduction by reducing the prices they are prepared to pay for Australian black coal; and
- *Scenario 5* — accelerated productivity growth (as in Scenario 3) coupled with rail freight reductions for coal reflecting (i) productivity improvements in rail service provision (Scenario 5a) and (ii) accelerated removal of excess charges for rail (Scenario 5b).

As already noted, all the scenarios and modelling results are illustrative only, designed to focus on the impact of productivity change on the black coal industry and the economy at large. In practice, productivity changes in the black coal industry will occur in the context of numerous unforeseen changes in the industry itself and in the domestic and international economies.

11.2 Scenario 1 (the base case): steady productivity growth

11.2.1 Outlook for the black coal industry: 1997–98 to 2009–10

This scenario, referred to as the base case, sets a 'business as usual' course for the black coal industry. It assumes that the industry achieves export levels forecast by ABARE while continuing to improve total productivity at broadly the same rate achieved since 1990. ABARE forecasts suggest that Australia's international market shares in both thermal and coking coal will change little over the period examined.

ABARE and other forecasters predict very little growth in nominal black coal prices over the period examined (see Attachment L1, Table L1.2) and this will be insufficient to keep pace with expected increases in production costs. Without adequate productivity improvements, the industry is likely to face a cost/price squeeze.

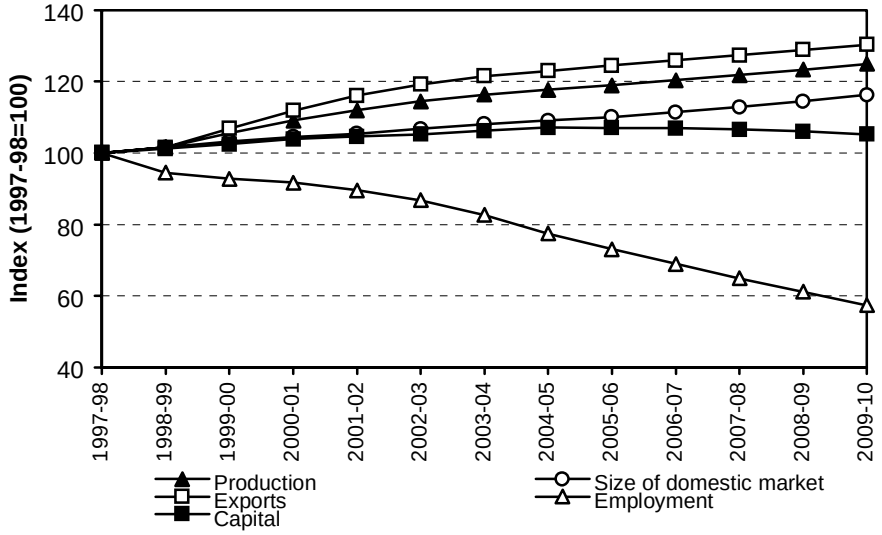
For most of the period it is assumed that some productivity improvements will arise from opening new, more capital-intensive mines and closing less efficient mines, as well as from moderate reforms in existing mines. Attachment L4 explains the basis of this assumption which implies higher capital intensity and lower employment in the industry, continuing a trend which has been evident for some time.

Nonetheless, despite higher capital intensity, annual net real investment in the industry is expected to decline from current levels. In other words, though total capital employed in the industry is expected to continue to rise, the *rate* of expansion is likely to decrease compared with current levels and compared with expansion rates in the rest of the economy. This is the picture which emerges from the base case projections presented in Figures 11.1 and 11.2.

In the base case, thermal coal exports are forecast to be 30 per cent higher in 2009–10 than in 1997–98 and coking coal exports about 20 per cent higher. Output growth is somewhat lower, reflecting slow growth of domestic sales, especially for coking coal.

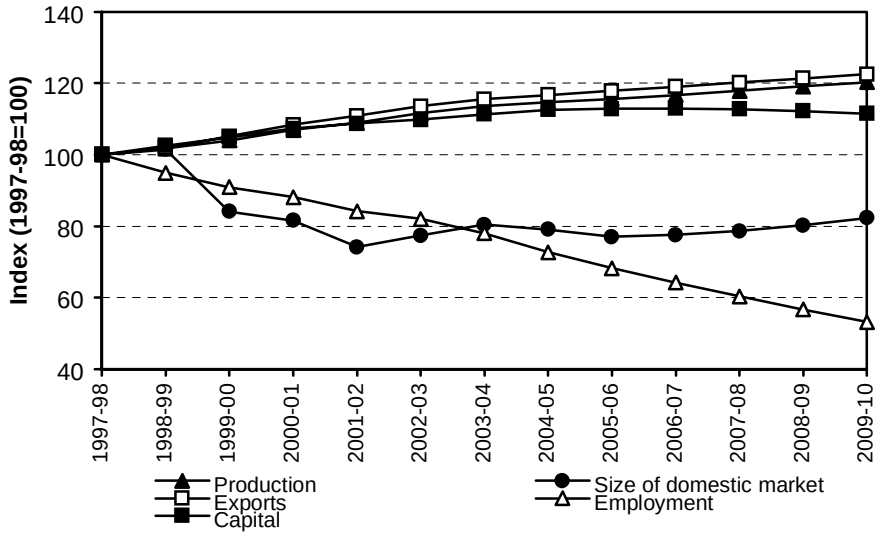
Industry output, investment and employment are projected to grow at rates below the economy-wide average. Thermal coal output is projected to grow by 1.9 per cent per year and coking coal output by 1.6 per cent, compared with real GDP growth of 3.0 per cent per year over the 12-year period examined. Annual investment in the industry declines by an average 2.5 per cent per year, leading to slow growth in capital employed.

Figure 11.1: **Base case: thermal coal indicators, 1997–98 to 2009–10,** (index 1997–98=100)



Source: MONASH-Coal simulations.

Figure 11.2: **Base case: coking coal indicators, 1997–98 to 2009–10,** (index 1997–98=100)



Source: MONASH-Coal simulations.

Black coal industry employment is projected to fall over the period examined, reflecting continuation of the introduction of more capital-intensive techniques and closure of labour-intensive mines in an effort to contain costs. Thus by 2009–10, total industry employment (in terms of hours worked) is projected to be more than 40 per cent below its 1997–98 level. If average hours per worker

do not change, this reduction implies job losses in the order of 10 000 over the next 12 years.

11.2.2 Outlook for the domestic economy: 1997–98 to 2009–10

For the rest of the economy, the base case scenario incorporates information (including from ABARE, Access Economics and CoPS) about likely developments in the international and domestic economies over the projection period.

Table 11.1 summarises the base case projections for the economy as a whole. Real GDP is projected to grow at an average annual rate of 3 per cent. This is quite strong relative to average growth over the past decade, and reflects Access Economics' view that economic developments in several Asian economies will have a significant short-term but less noticeable long-term impact on Australia's growth.

Table 11.1: **Scenario 1 (base case): economy-wide projections**

Macro variables	*Average annual percentage change 1997–98 to 2009–10*
Real GDP	3.0
Real investment	2.5
Real private consumption	2.9
Export volumes	5.5
Import volumes	3.9
Traditional exports	2.8
Employment (hours)	1.8
Real wage (producer)[a]	1.0
Consumer prices	2.3

a The producer real wage is defined as nominal wages relative to the prices received by producers (the GDP deflator), and thus gives an indication of the real cost of labour.

Source: MONASH-Coal simulations.

On the supply side of the economy, GDP is driven by employment and capital growth of around 2 per cent (with capital growth somewhat stronger than employment growth), implying total factor productivity growth of a little over 1 per cent per year. On the demand side, investment and private consumption are projected to maintain their shares of GNE, while the share of public consumption is expected to fall. Real exports and imports are projected to grow at 5.5 per cent and 3.9 per cent, respectively.

Projected developments in the industrial structure of the economy are presented in detail in Appendix L. Sectors projected to grow strongly include communications, electronic equipment, finance and business services, chemicals, transport equipment and transport and storage. This pattern of growth reflects relatively strong national investment and 'non-traditional' export growth as well as the continuing introduction of new communications and computerised technologies. Slow growing sectors include textiles, clothing and footwear and public administration. Growth in mining and agriculture of 2.8 per cent is slightly below projected GDP growth.

Changes in base case projections

The Commission chose to use the MONASH-Coal model so that the impact of productivity change in the black coal industry can be viewed against the background of a dynamic economy. Scenario 1, the base case, provides that background.

The base case provides a reasonable view of likely developments in the black coal industry and the domestic economy over the next 12 years. However, no-one knows the ultimate impact of the economic down-turn in Asia, and there will be many other unforeseen developments over the next decade.

Changes in productivity in the black coal industry (modelled in Scenarios 2 to 5) are assessed *relative* to the base case. The results in these scenarios, expressed as percentage differences from the base case, are unlikely to be very sensitive to variations in the base case assumptions. In other words, estimated *percentage* improvements in performance are not likely to vary greatly in response to variations in the base case.

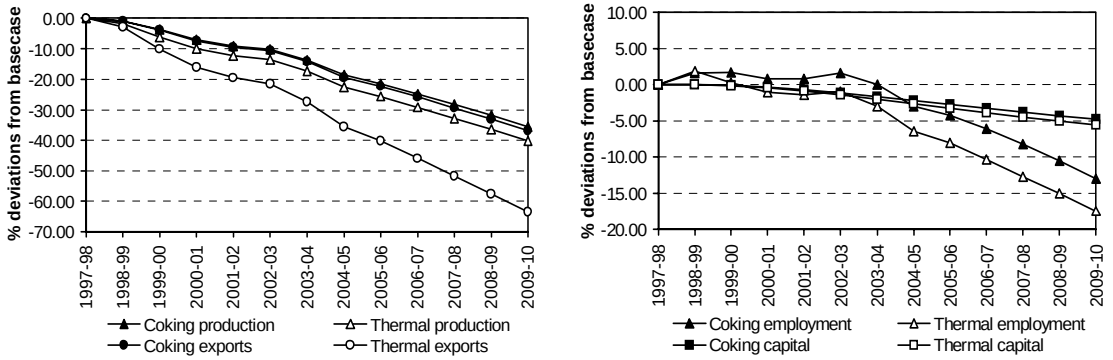
11.3 Scenario 2: no further productivity growth

In Scenario 2, CoPS has modelled a 'worst case' scenario. It assumes that productivity in the black coal industry remains unchanged at its 1997–98 level over the entire period to 2009–10. Relative to Scenario 1, where total factor productivity is assumed to grow at a little over 1 per cent per year, this scenario essentially models the impact of a cumulative *deterioration* in total factor productivity of the order of 15 per cent over the entire period (that is, a deterioration of a little over 1 per cent per year between 1997–98 to 2009–10).

11.3.1 Impact on the black coal industry

Without any further productivity improvements, the competitiveness of Australian coal exports declines and Australian producers lose international market share to more competitive producers. As indicated by Figure 11.3, thermal coal exports are estimated to fall relative to base case projections so that by 2009–10 exports are estimated to be 63 per cent below the base case projection. Coking coal exports are estimated to be around 37 per cent lower in 2009–10 than otherwise.

Figure 11.3: **Scenario 2: impact on coal mining, 1997–98 to 2009–10** (percentage deviations[a] from base case)



a Percentage deviations are calculated as the difference between the value of the relevant variable in the simulation and its value in the base case, expressed as a percentage of the base case value.

Source: MONASH-Coal simulations.

The fall is pronounced in thermal coal exports where Australia confronts intense competition from relatively new exporters, including Indonesia, South Africa and Colombia. The estimated fall in coking coal exports is less severe, reflecting the assumption that foreign demand for coking coal is not as price responsive as demand for thermal coal. The basis for these assumptions about the nature of international coking and thermal coal markets is discussed in detail in Appendix L and Attachment L5.

With productivity growth stalled, and exports lower relative to the base case, employment and investment in the industry are also estimated to be lower than in the base case. Eventually, the negative impact on employment of continuing reductions in exports more than offsets the positive effect on employment of no further labour-saving productivity change in the industry. Moreover, additional job losses in the industry imply additional labour adjustment, the costs of which should be added to the estimated losses flowing from a deterioration in productivity.

The results for this scenario are sensitive to the response of overseas buyers to an increase in the price of Australia's black coal exports. As modelled, with international coal markets assumed to be competitive, a rise in production costs (relative to the base case), by causing a rise in the price of Australian coal exports, generates large falls in exports. If foreign demand for Australian coal were less sensitive to higher coal prices, the estimated fall in exports would be smaller. The sensitivity of the modelling results to changes in export demand elasticities is discussed in Section 11.4.1 below.

11.3.2 Economy-wide effects

As shown in Table 11.2 (row 2), with the substantial decline of a major export industry, real national income and real private consumption are estimated to be lower than projected in the base case. Real GDP in 2009–10 is estimated to be 0.3 per cent lower than in the base case, and real private consumption 0.7 per cent lower. (As explained in Appendix M, in the MONASH-Coal model, real private consumption provides a measure of the net impact of productivity change on the community's economic welfare.)

The impact on real private consumption is estimated to be larger than the fall in GDP for two reasons. First, MONASH-Coal assumes that any change in real income (relative to the base case) affects only real private consumption. Second, as modelled, contraction of the black coal industry leads to expansion of some major commodity exports which causes a deterioration in the terms of trade. This effect reduces the purchasing power of income.

Economy-wide real wages also are estimated to be lower than in the base case. This reflects the modelling assumption that economy-wide employment growth, as projected in the base case, is invariant to productivity change in the black coal industry. If the real wage did not fall relative to its base case level, industries other than coal could not expand employment. Unemployment would be higher than otherwise and the estimated national income loss would be even larger than suggested here.

Some restructuring of the economy is an inevitable response to the large decline in coal exports. In order to restore long-run balance of payments equilibrium, imports must fall and other exports increase to offset the fall in coal export receipts. Overall, exports and imports are smaller in 2009–10 than in the base case. Details of estimated industry restructuring are provided in Appendix L.

Table 11.2: **Economy-wide impact of Scenarios 1 to 5** (percentage deviations from base case 2009–10)

	Real GDP	*Real private consumption*	*Real investment*	*Real wage*
Steady productivity growth (Scenario 1)	0	0	0	0
No further productivity growth (Scenario 2)	-0.3	-0.7	-0.6	-0.3
Accelerated productivity change (Scenario 3)	0.4	0.9	0.7	0.6
Accelerated productivity change and moderately lower coal prices (Scenario 4a)	0.3	0.5	0.4	0.4
Accelerated productivity change and significantly lower coal prices (Scenario 4b)	0.2	0.0	-0.2	0.1
Accelerated productivity change in coal and rail (Scenario 5a)	0.6	1.0	0.9	0.7
Accelerated productivity change in coal and accelerated reduction in excess rail charges (Scenario 5b)	0.4	0.9	0.7	0.6

Source: MONASH-Coal simulations.

11.4 Scenario 3: accelerated productivity improvements

Scenario 3 models feasible improvements in labour and capital productivity additional to those assumed in the base case. Additional productivity improvements are assumed to occur smoothly over five years, beginning in 1998–99. Thereafter, for the period 2003–04 to 2009–10, total factor productivity growth resumes its annual trend (base case) rate of around 1 per cent.

Overall, labour and capital productivity growth in the industry accelerates (relative to base case growth) by more than 5 percentage points per year between 1997–98 and 2002–03. The acceleration is assumed to occur through relatively rapid (relative to historical trends) changes in work and management practices in all aspects of mining operations — that is, in the mines themselves, in coal preparation plants and in mine administration.

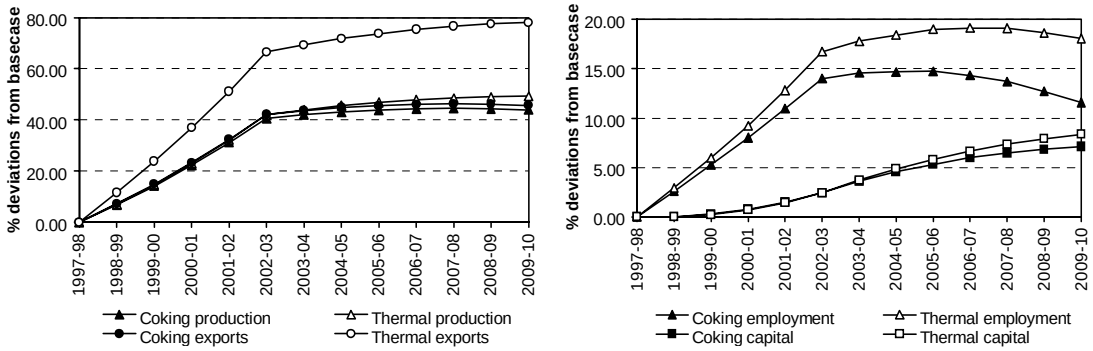
Examples of the changes in management and work arrangements that might contribute to accelerated productivity improvements are discussed in Chapter 5. They include reductions in idle time caused by inefficient shift change-overs and rostering of breaks, 'early knock off', lack of flexibility in roster arrangements and arbitrary union-based demarcation rules. Because reductions in idle time improve the productivity of both capital and labour, a *neutral* productivity improvement — that is, an improvement that equally improves labour and capital productivity — has been modelled.

As well as illustrating the potential impact of feasible productivity acceleration in the industry, Scenario 3 provides a reference point for assessing the impact of productivity gains of varying size. To a reasonable approximation, if the assumed productivity improvement (relative to the base case) were smaller (or larger), the impact on black coal industry performance would be proportionately smaller (larger).

11.4.1 Impact on the black coal industry

Modelling suggests that exports of both coking and thermal coal can increase substantially with improved productivity. For example, thermal coal exports in 2009–10 could be 80 per cent above their base case level, while coking coal exports could increase by around 46 per cent compared with the base case projection (Figure 11.4).

Figure 11.4: **Scenario 3: impact on the black coal industry, 1997–98 to 2009–10** (percentage deviations from base case)



Source: MONASH-Coal simulations.

With higher exports, output of both coking and thermal coal is estimated to increase at a much higher rate than in Scenario 1 — by 4.7 per cent per year for coking coal (compared with 1.6 per cent per year in Scenario 1) and by 5.3 per cent per year for thermal coal (compared with 1.9 per cent in

Scenario 1). Given known Australian coal reserves of around 76 billion tonnes, annual coal output of this magnitude could continue for almost 200 years. Average labour productivity levels implied by the results — of around 25 000 tonnes per man-year by 2009–10 — are also feasible, falling within productivity levels currently achieved in some Australian mines.

Total industry employment (measured in labour hours), as in all the scenarios, is estimated to continue to decline relative to 1997–98 levels. But with rapid productivity change, the rate of decline slows so that by 2009–10, there could be around 2500 more jobs in the industry than in the base case. The demand for labour grows (relative to the base case) because higher output and export growth outweigh the impact of labour-saving productivity changes. As indicated in Figure 11.4, coking coal employment is estimated to be 12 per cent higher in 2009–10 than in the base case, and thermal coal employment 18 per cent higher, reflecting strong growth in exports following the productivity improvement. The modelling thus indicates that productivity improvements in the industry can *reduce* labour market adjustment (and its associated costs), though changes in work arrangements will entail adjustments within the industry.

Qualifications and sensitivity analysis

These results assume that there are no domestic impediments to realising expanded export potential. MONASH-Coal assumes that port and other transport and handling services respond to increased demand. If there were significant impediments in some regions, the estimated expansion could be moderated.

The results also abstract from any transitional adjustment costs incurred. Although, in this high productivity growth scenario, job losses in the industry are estimated to slow down, changes in work arrangements will involve adjustment costs. In the short term, these transitional costs will moderate the extent of gains estimated by the model.

Importantly, for reasons explained in Appendix L, Attachment L5, the results in Scenario 3 assume that world thermal coal prices do not change significantly in response to changes in the level of Australian exports. Put another way, international demand for Australian thermal coal is assumed to be highly responsive to changes in price. (The elasticity of demand is assumed to be -20.) A small decline in Australian thermal coal prices will be sufficient to induce a large expansion in world demand for Australian exports.

Demand for Australian coking coal is assumed to be somewhat less responsive to price changes. This implies that a change in the level of Australia's coking coal exports will influence world coking coal prices to a larger extent than a

similar change in the level of thermal exports will influence thermal coal prices. This is likely to be the case because Australia's share of the coking coal market is larger than its share of the thermal coal market. As explained in Appendix L, Attachment L5, the elasticity of demand for coking coal is assumed to be -10.

Based on these assumptions about world demand for Australian coking and thermal coal, a reduction in costs in Australia broadly translates into increased exports because export prices fall only slightly. If foreign demand were less responsive to changes in Australian coal prices, prices would need to fall by a larger amount in order to encourage increased demand. Lower coal prices would also dampen Australia's export response. In other words, in this situation, an improvement in productivity would increase export *capacity* (for any export price), but the expansion in capacity would not be matched by an expansion in actual exports or export receipts.

In order to gauge the sensitivity of the results to changes in the export demand elasticities, Scenario 3 was run with elasticities of demand of -10 for thermal coal and -5 for coking coal. In other words, the responsiveness of foreign buyers to a change in the price of Australian coal was halved.

The results (presented in detail in Appendix L) indicate that with export elasticities of -10 for thermal coal and -5 for coking coal, the estimated export expansion (relative to the base case in 2009–10) following accelerated productivity change is around one-third lower for coking coal, and about one-quarter lower for thermal coal than with higher demand elasticities.

The impact of lower export demand elasticities also is captured indirectly by Scenario 4a (discussed below). Results for that scenario similarly indicate that export gains are still achievable for the black coal industry from productivity improvements despite lower coal prices.

On the whole, the Commission considers that international demand for Australian black coal (coking and thermal) *is* sensitive to price changes. Thus an expansion of Australian exports is *not* expected to induce large reductions in world coal prices which choke off that expansion. In particular, as discussed in Chapter 2, there is evidence that world market conditions are becoming increasingly competitive due to the emergence of new suppliers and markets, and increasing cost pressures on traditional coal buyers. On this basis, the Commission considers that Scenario 3 provides a reasonable representation of international market conditions.

11.4.2 Economy-wide effects

Productivity improvements and export growth in the coal sector are estimated to translate into long-term gains in real national income and private consumption (Table 11.2, row 3). Modelling suggests that real GDP could be 0.4 per cent higher in 2009–10 than it would be under base case productivity assumptions in the black coal industry. Expressed in terms of today's dollars, this would represent additional income in the order of $3 billion in 2009–10.

Real private consumption (which, in MONASH-Coal, provides a measure of economic welfare) is estimated to be 0.9 per cent higher in this scenario in 2009–10 than in the base case. The estimated increase in private consumption exceeds the estimated national income gain because the model assumes that all additional real income is consumed. The purchasing power of income also is enhanced by an improvement in the terms of trade. This occurs because expansion of the black coal industry leads to contraction of some other major commodity exports, tending to increase their export prices.

The increase in national income accrues to workers throughout the economy. It is estimated that economy-wide real wages could be 0.6 per cent higher in 2009–10 than in Scenario 1.

When modelling the economy-wide impact of productivity changes in the black coal industry, the Centre of Policy Studies has adopted a pessimistic assumption about aggregate employment growth. Thus, in Scenario 3, real wages are forecast to increase, but there are no permanent gains in employment relative to employment levels achieved in Scenario 1. Some short-term employment gains occur while productivity accelerates because real wages are assumed to be sticky. This boosts national income in the early years of the period examined, but these gains gradually are wound back by real wage increases.

If the estimated real wage increase were moderated, *permanent* increases in aggregate employment could be achieved as the direct result of accelerated productivity growth in the black coal industry.

11.5 Scenario 4: accelerated productivity improvements leading to lower coal prices

As explained above, the Commission considers that Scenario 3 provides a reasonable representation of the international market for coal, and thus provides a good indication of the potential effects of accelerated productivity improvements in the Australian black coal industry. However, there are a range of views about the influence of changes in the level of Australian coal exports

on foreign demand and export prices. For example, one participant argued that demand for Australian coal is not at all responsive to price (see Chapter 2).

In Scenario 4, the Centre of Policy Studies has modelled this alternative view of the international market-place. Scenario 4 illustrates the impact of productivity improvements in the black coal industry when foreign buyers of Australian coal capture part (Scenario 4a) and all (Scenario 4b) of the benefit of cost reductions by negotiating lower prices for Australian coal.

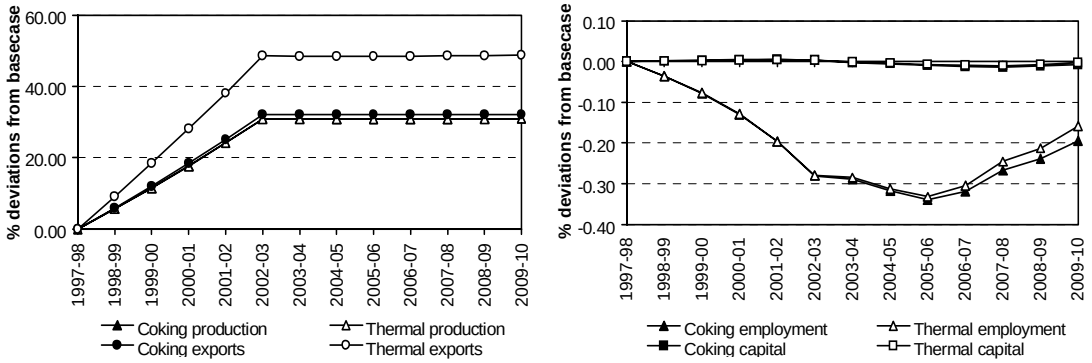
Importantly, the results still show that even if foreign buyers exert extreme pressure on export prices, national output can still expand as a result of productivity improvements in the black coal industry. This is because productivity improvements, which lead to more efficient use of factors of production (labour and capital), increase the *productive capacity* of the economy. That is, productivity improvements allow more output to be produced from given factor inputs. Generally speaking, this increase in capacity is best used in producing more coal, but if coal prices fall, and expansion of coal is discouraged, labour and capital can be expected to shift to other industries over time, boosting output in these industries. This process would involve adjustment costs, moderating estimated gains in the short term.

11.5.1 Scenario 4a: accelerated productivity improvements leading to moderately lower coal prices

In Scenario 4a, the black coal industry is assumed to expand output using its base case labour and capital, but the lower price paid by foreign buyers (thus enabling them to capture part of the productivity gain) discourages additional investment in the industry. Without additional investment (relative to the base case), employment in the industry varies little from the base case projection. (The difference is -0.2 per cent in 2009–10.) The gains in this scenario for the black coal industry (Figure 11.5) and the economy overall (Table 11.2, row 4) are still quite large, though smaller than if prices had not fallen.

As noted above, it is sometimes suggested that the international coal market is uncompetitive. While the Commission disagrees with this view, if it were the case that foreign buyers of coal were in a position to influence Australian coal prices, Scenario 4a provides a reasonable approximation of such behaviour.

Figure 11.5: **Scenario 4a: impact on the black coal industry, 1997–98 to 2009–10**[a] (percentage deviations from base case)



a The impact on both thermal and coking coal production is virtually identical, as is the impact on thermal and coking coal capital.

Source: MONASH-Coal simulations.

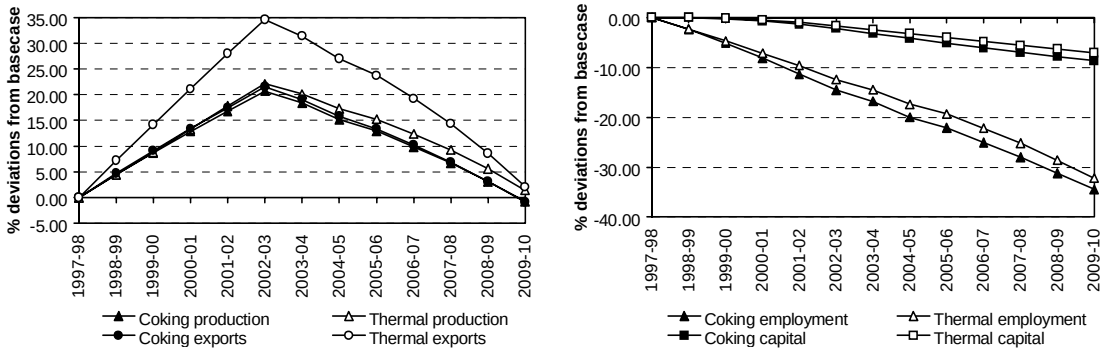
11.5.2 Scenario 4b: accelerated productivity improvements leading to significantly lower coal prices

Scenario 4b presents the extreme situation where foreign buyers of coal capture *all* of the cost reduction via lower coal prices. Coal export and output volumes grow relative to the base case while productivity accelerates in the first few years of the period modelled. However, because of the impact of lower coal prices, this expansion is overturned when productivity growth returns to its base case level.

Both employment and investment in the industry fall relative to the base case because the increase in output volume is too small to compensate for the negative effect of factor-saving productivity change on factor demands (see Figure 11.6).

Real GDP is still estimated to be 0.2 per cent higher than if productivity growth remained at its base case rate. The increase in GDP occurs because fewer resources are required to produce any volume of coal. If coal output does not expand, resources formerly employed in coal are freed up and available, over time, to expand output in other industries. Of course, this adjustment process would involve some transitional adjustment costs which should be offset against any predicted national income benefits.

Figure 11.6: **Scenario 4b: impact on the black coal industry, 1997–98 to 2009–10** (percentage deviations from base case)



Source: MONASH-Coal simulations.

Although GDP increases, consumer welfare, as measured by real private consumption, remains unchanged at its base case level due to the estimated deterioration in the terms of trade caused by lower coal prices. In other words, the rise in national income is offset by a decline in the purchasing power of that income.

The Commission considers this scenario (which implies that, whatever the Australian export price of coal, high or low, the quantity demanded will not change) to be highly unrealistic and pessimistic. It has been modelled to demonstrate that even if the benefits to the black coal industry of productivity improvements are captured entirely by foreign buyers, national output can still increase.

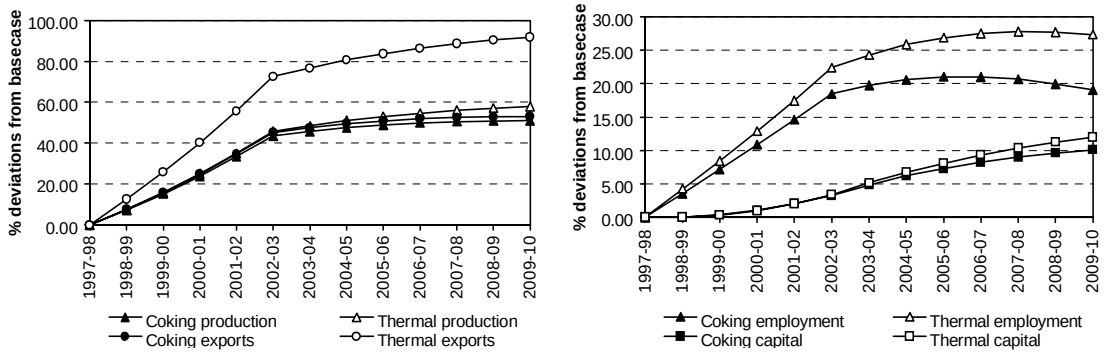
11.6 Scenario 5: accelerated productivity improvements in coal coupled with best practice productivity in rail transport of coal and accelerated removal of excess rail charges

Scenario 5a models the impact of achieving accelerated productivity change in the black coal industry itself, together with productivity improvements in rail transport of coal. Scenario 5b models the impact of achieving accelerated productivity change in the black coal industry together with rail freight reductions for the coal industry associated with expeditious introduction of effective competition in rail provision. While each scenario has been modelled separately, it is likely that increased competition in rail will drive cost and pricing efficiency simultaneously.

Scenario 5a assumes that rail freight costs are reduced by 20 per cent, closing the estimated gap between current levels of rail operating efficiency and best practice (see Chapter 7). The improvement, which when fully implemented reduces rail costs to the black coal industry by around $150 million per year (or around $1 per tonne of coal railed), is assumed to occur in tandem with accelerated labour and capital productivity improvements in the mines, as modelled in Scenario 3.

Under these assumptions, thermal coal exports are estimated to be around 90 per cent higher in 2009–10 than in the base case, and coking coal exports about 50 per cent higher. This implies a *net* addition to coal exports of more than 10 per cent due solely to productivity improvements in rail. Expansion of coal output, as well as flow-on effects of improved rail productivity to other domestic users (agriculture and other mining industries), is estimated to add 0.2 per cent to GDP by 2009–10. This is additional to the 0.4 per cent GDP gain arising from productivity improvements within mines.

Figure 11.7: **Scenario 5a: impact on the black coal industry, 1997–98 to 2009–10** (percentage deviations from base case)



Source: MONASH-Coal simulations.

Scenario 5b assumes that excess or monopoly charges for rail freight of coal — that is, charges (excluding rail royalties) in excess of the cost of providing rail services — are removed by 2001–02. (As with Scenario 5a, it is assumed that lower freight rates are achieved together with productivity improvements in mines.) In the base case it is assumed that these excess charges are removed by 2005–06, reflecting gradual implementation of reforms already announced. However, as discussed in Chapter 7, the Commission considers that there is scope both to hasten and to deepen the reform process in NSW and Queensland.

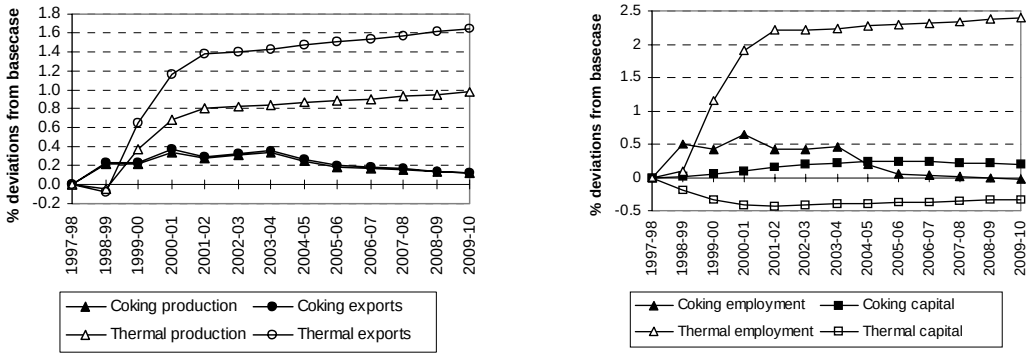
It is difficult to quantify excess freight charges due to difficulties in estimating costs. For reasons explained in Attachment L6, the Commission has assumed

that, on average, excess freight charges currently are around $2 per tonne of coal railed.

In Scenario 5b it is assumed that removal of the $2 per tonne excess charge is achieved by 2001–02, four years earlier than in the base case. Because this represents a one-off benefit for the coal industry compared with the base case, by 2009–10, export volumes are projected to be only slightly above the level estimated in Scenario 3 (see Figures 11.10 and 11.11). Nonetheless, the results (as shown in Figure 11.8, *excluding* the impact of productivity improvements within mines) indicate that, in cumulative terms, additional coal exports of around 10 million tonnes could be achieved between 1999–00 and 2005–06.

There would be scope for further rail freight reductions if excess rail charges were not reduced to the extent assumed in the base case. For example, if it were assumed that monopoly rents did not phase to zero by 2005–06, but remained at around $2 per tonne for the entire period modelled in the base case, the gains to the coal industry from their early removal would be larger. Indeed, the increase in exports would be about double the increase estimated in Scenario 5a (which models a rail freight reduction of around $1 per tonne). In other words, if rail freight rates were assumed to be around $2 per tonne lower than in each year of the base case, coal exports could be around 20 per cent higher in 2009–10 than otherwise.

Figure 11.8: **Scenario 5b: impact on the black coal industry, 1997–98 to 2009–10** (percentage deviations from base case)[a]



a The results in Figure 11.8 *exclude* the impact of productivity change within mines.

Source: Monash-Coal simulations

For the economy as a whole there are virtually no additional gains under this scenario. All macroeconomic variables are estimated to remain as projected in the base case. When combined with productivity gains in coal mines (as modelled in Scenario 3), the economy-wide results are thus the same as for

Scenario 3 (see Table 11.2, Row 3). This occurs because the assumed reduction in rail freight rates (which is not due to productivity improvements) is modelled as a revenue-neutral tax change. This approach is required to reflect the fact that forgone 'monopoly' rail revenue must be made up by the government sector either by increasing taxes or by reducing expenditure. As modelled, monopoly rail revenue forgone is assumed to be balanced by an increase in income tax.

11.7 State and Territory results

Table 11.3 reports the estimated impact of accelerated productivity change in the black coal industry (Scenario 3) and productivity deterioration (Scenario 2) on employment and output in each State and Territory. More detailed discussion of the regional effects of productivity change is provided in Attachment L7.

Not surprisingly, relative to base case forecasts, NSW and Queensland benefit from expansion of the coal sector. States that are export-oriented, Western Australia especially, are estimated to experience somewhat slower growth than in the base case. Conversely, if the coal sector contracts, NSW and Queensland are adversely affected, while other States perform slightly better.

11.8 Summary

Figures 11.9, 11.10 and 11.11 compare the modelling results in each scenario for the whole economy and the coking and thermal coal industries.

Overall, the modelling conducted by CoPS for the Commission suggests that productivity improvements in the black coal industry generally are good for the economy, coal-producing States, and the community overall. This confirms intuition. More efficient use of resources in coal expands the productive and income-generating capacity of the economy. This increase in capacity can be used to produce more coal as well as other goods and services.

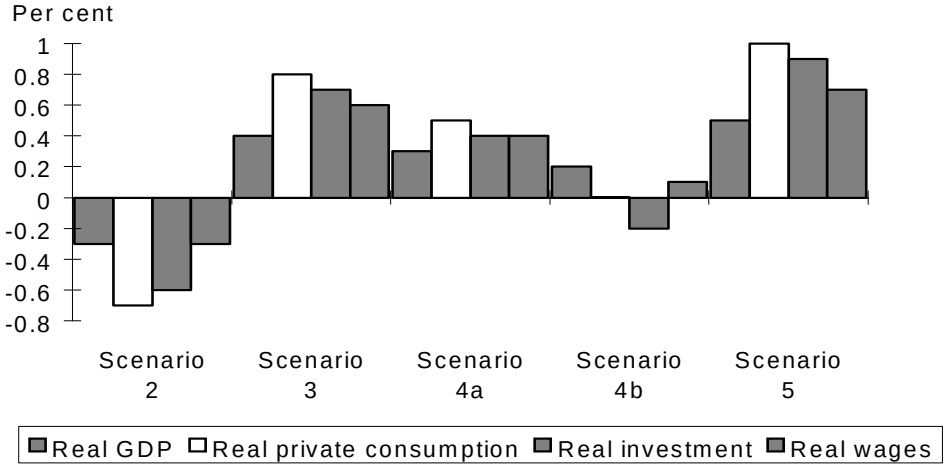
Table 11.3: **Output and employment by State and Territory in the base case, Scenario 2 and Scenario 3**

	Base case	*Scenario 2*	*Scenario 3*
	Average annual percentage change 1997–98 to 2009–10		
Real Gross State Product			
NSW	2.85	2.79	2.92
Vic	2.62	2.64	2.61
Qld	3.56	3.44	3.71
SA	2.64	2.65	2.63
WA	3.59	3.63	3.53
Tas	2.32	2.34	2.30
ACT	3.19	3.17	3.22
NT	3.95	3.99	3.89
Employment (hours)			
NSW	1.63	1.60	1.65
Vic	1.48	1.50	1.47
Qld	2.37	2.33	2.42
SA	1.52	1.54	1.51
WA	2.32	2.35	2.27
Tas	1.23	1.24	1.20
ACT	2.11	2.11	2.12
NT	2.62	2.64	2.59

Source: MONASH-Coal simulations.

Restructuring of the economy is inevitable following expansion of the black coal industry. For reasons explored in Appendix L, some sectors and States and Territories are likely to experience slightly higher growth than otherwise, others slightly slower growth. It should be borne in mind, however, that any acceleration of productivity change in the black coal industry will occur in the context of a variety of unforeseen changes including improved efficiency in other industries. The *net* effect of all these changes will determine the actual structure of the economy.

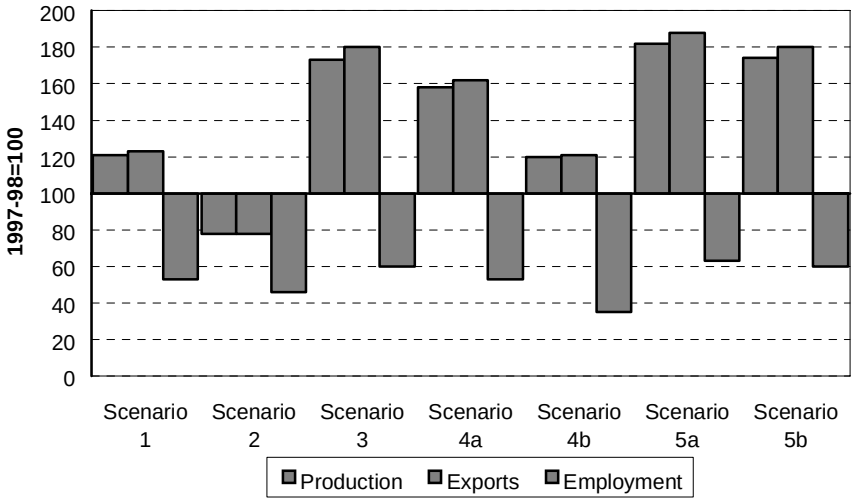
Figure 11.9: **Economy-wide effects of Scenarios 2 to 5a** (percentage deviations from base case in 2009–10)[a]



a Scenario 5 represents Scenario 5a only. Results for Scenario 5b are not shown because they are identical to the results for Scenario 3.

Source: Monash-Coal simulations.

Figure 11.10: **Coking coal production, exports and employment in 2009–10, Scenarios 1 to 5** (index 1997–98=100)



Source: MONASH-Coal simulations.

Figure 11.11: **Thermal coal production, exports and employment in 2009–10, Scenarios 1 to 5** (index 1997–98=100)

Source: MONASH-Coal simulations.

Productivity improvements are also good for the black coal industry and its workers *unless* cost reductions directly induce large export price falls (for example, as in Scenario 4b). The Commission considers that there is strong evidence that world coal markets are highly competitive and becoming increasingly so. In this environment, Australian coal exports should be able to expand as a result of domestic productivity improvements without inducing large price falls.

Importantly, price falls induced by productivity gains and lower costs in the Australian black coal industry must not be confused with falls in export coal prices caused by external factors including, for example, economic downturn in major markets, or increased exports from rival suppliers. Falls in export prices caused by these factors, which are outside Australia's control, lead to contraction of the black coal industry unless productivity accelerates.

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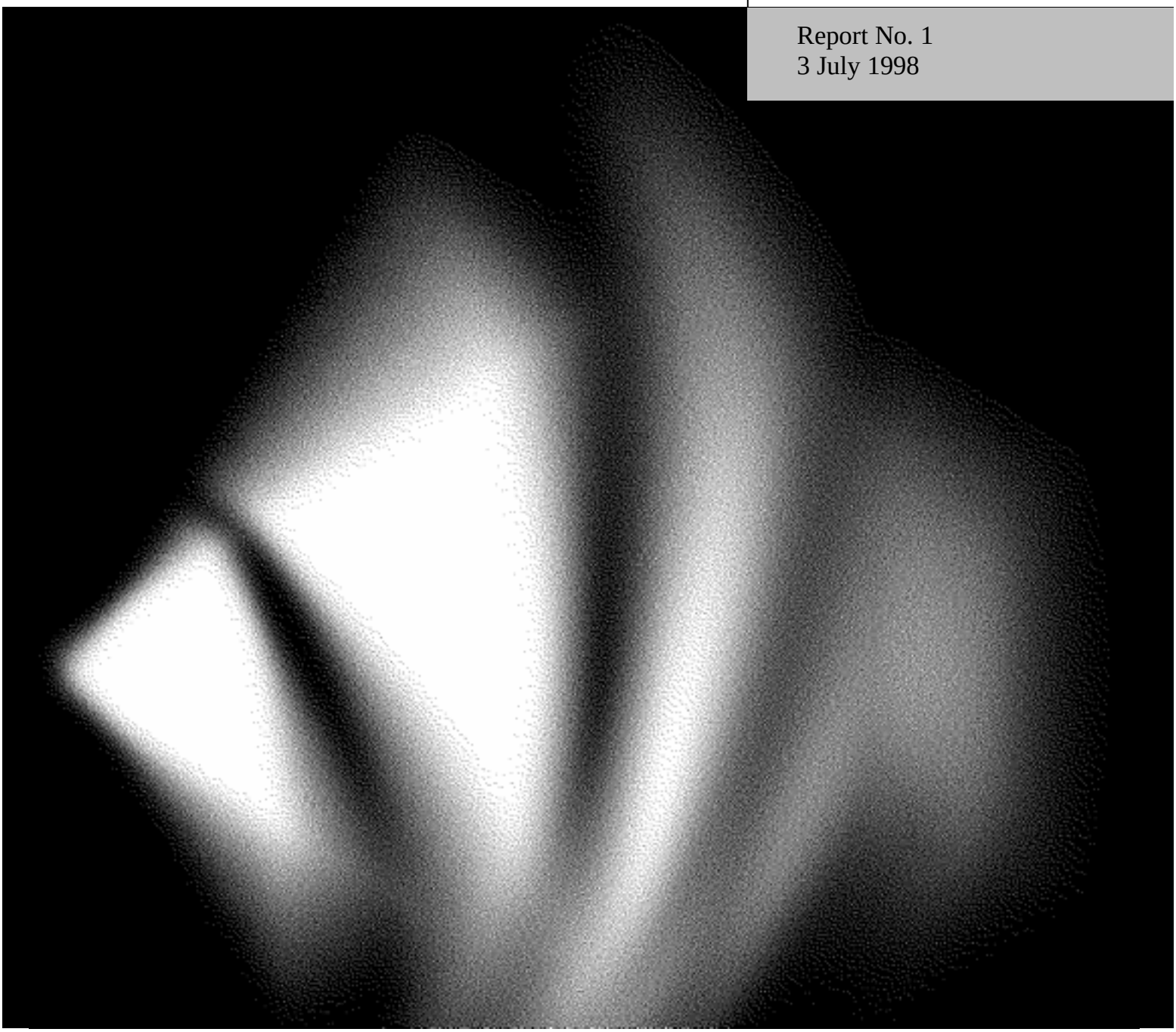
PRODUCTIVITY COMMISSION

The Australian Black Coal Industry

Inquiry Report

Volume 2: Appendices

Report No. 1
3 July 1998



A CONDUCT OF THE INQUIRY

A.1 Introduction

This appendix outlines the inquiry process and the organisations and individuals which have participated in the inquiry.

Following receipt of the terms of reference on 9 July 1997, the Commission placed a notice in the national press inviting public participation in the inquiry and released an issues paper to assist participants in preparing their submissions. A list of those who made submissions is in Section A.2.

The Commission also held informal discussions with organisations, companies and individuals to gain background information and to assist in setting an agenda for the inquiry. Organisations visited by the Commission are listed in Section A.3.

In November 1997, the Commission held public hearings in Sydney and Brisbane. Following release of the draft report, the Commission held a second round of public hearings in May 1998. In total, 16 individuals and organisations gave evidence (see Section A.4). A transcript of the hearings was made publicly available.

Mr Bill Scales, AO was Presiding Commissioner for this inquiry until 27 February 1998, when he resigned from the Commission. He was replaced as Presiding Commissioner by Mr John Cosgrove from that date. Mr Keith Horton-Stephens and Mr Nicholas Gruen were also Commissioners on the inquiry, but left the Commission prior to the completion of the final report.

A.2 Submissions received

Participant	*Submission No.*
ACB Consulting Services Pty Ltd	51
ARCO Coal Australia Inc.	21
Asia Pacific Strategy Pty Ltd	1, 38, 50, DR53
Association of Mine Related Councils	DR57

Australian Coal Association	31
Australian Mines and Metals Association Inc.	14
Bach Consulting Pty Ltd	20
Bagot, T. Mr	17, 37
BHP Coal Pty Ltd	30, DR63
Callide Coalfields Pty Ltd	6
Camberwell Coal Pty Ltd	13
Department of Primary Industries and Energy	43
Department of Primary Industries and Resources South Australia	46
Department of Workplace Relations and Small Business	40
Drayton Coal Pty Ltd	48
Durie, R. Dr	DR56
Easton Business Consultants	7, 47, DR54
Emerald Shire Council	DR62
Exxon Coal and Minerals Australia Ltd	3
FreightCorp	27, DR67
Gladstone Port Authority	10
Joint Coal Board	19, 44, DR59
Leggate, J. Mr	28
Long-Airdox Australia Pty Ltd	5
Michael Minns Human Resources Pty Ltd	8
MIM Holdings Ltd	18
Newcastle Port Corporation	16
NSW Government	26, DR68
NSW Minerals Council	25, 35, 52, DR60
Pacific Power	39, DR55
Port Kembla Coal Terminal	45
Port Waratah Coal Services Ltd	42
Ports Corporation of Queensland	9, DR58, DR64

Queensland Government	32, DR61
Queensland Manufacturing Industry Forum	2
Queensland Mining Council	24
Queensland Rail	12, 34, DR66
Rail Access Corporation	23
Rio Tinto Energy	22, 49, DR65
Roberts, I. Mr	33
Ruston, R. Mr (Member Joint Coal Board)	36
Shell Coal Pty Ltd	29
Smith, G. Dr	11
The Allen Consulting Group Pty Ltd	4
Thiess Contractors Pty Ltd	15
United Mining Support Services	41

* DR indicates that the submission was received after draft report.

A.3 Visits

Australian Capital Territory

ABARE

Department of Primary Industries and Energy

Development Allowance Authority

Minerals Council of Australia

New South Wales

Allied Mining — South Bulli Mine

BHP — Elouera Colliery

BHP Steel Colleries Division

Bloomfield

Bulga Mine

Camberwell Coal Pty Ltd

Centennial Coal Company

CFMEU

Coal Operations Australia

CRC for Black Coal Utilisation

Cummnock Coal

Exxon Coal and Minerals Australia

FreightCorp

Hood, M. Dr

JCD Australia

Liddell Coal

Mt Thorley Coal Loader

Muswellbrook Coal Company Ltd

Nippon Steel

NSW Department of Mineral Resources

NSW Department of Transport

NSW Minerals Council

NSW Treasury

Oakbridge

Peabody Resources

Port Kembla Coal Terminal

Port Waratah Coal Services Ltd

PowerCoal

Rail Access Corporation

South Bulga Mine

United Colleries

Wollongong City Council

Queensland

ARCO Coal Australia Inc.

Australian Coal Association

Australian Mines and Metals Association Inc.

BHP Coal Pty Ltd

Burton Coal Project

CRC for Mining Technology and Equipment

Crinum Mine

Emerald Shire Council

Ensham Mine

Ensham Resources Pty Ltd

Gladstone Port Authority

Hay Point Coal Terminal

MIM Holdings Ltd

Newlands Mine

Oaky Creek No. 1 Mine

Peak Downs Mine

Queensland Department of Mines and Energy

Queensland Department of Transport

Queensland Minerals Council

Queensland Ports Corporation

Queensland Rail

Queensland Treasury

Rio Tinto Energy

Shell Coal Australia

South Blackwater Mine

Thiess Contractors Pty Ltd

Victoria

Australian Mines and Metals Association Inc.

Department of Workplace Relations and Small Business

National Competition Council

Rio Tinto Energy

Western Australia

Wesfarmers Coal

Overseas — United States and Canada

ARCO Coal Company

BHP Minerals New Mexico Operations

British Columbia Ministry of Employment and Investment

Cyprus Amax Minerals Company

Cyprus Cumberland Mine

Foidel Creek Coal Company (Twentymile Mine)

John T. Boyd Company

Kennecott Energy Company

Los Angeles Export Terminal Inc.

United Mine Workers of America

Westshore Terminals Ltd

A.4 Public hearing participants

ARCO

Asia Pacific Strategies

Australian Mines and Metals Association

Bach Consulting

Bagot, T. Mr

BHP Coal

Callide Coalfields Pty Ltd

Camberwell Coal

Easton Business Consultants

FreightCorp

NSW Minerals Council

Ports Corporation of Queensland

PowerCoal

Rail Access Corporation

Rio Tinto Energy

Shell Coal Australia

B COAL AND COAL MINING

This appendix explains the geological and technical terms necessary to understand the black coal mining industry and its place in the Australian economy. It covers geology, exploration, coal mining and describes the physical characteristics of coal which affect its quality, end use and price.

B.1 Geology

The geology of a black coal resource has a significant impact on the costs of extracting the coal. The existence of high quality, or abundant resources is not enough to guarantee that mining a black coal seam will be economically viable. For example, the large high quality black coal resources identified in Australia's Cooper basin will not be mined in the foreseeable future, being too deep to exploit at current prices (sub. 46, pp. 4–5).

Coal is found in layers between other layers of sedimentary rocks. The layers of rock are referred to as strata. Layers of coal are known as seams.

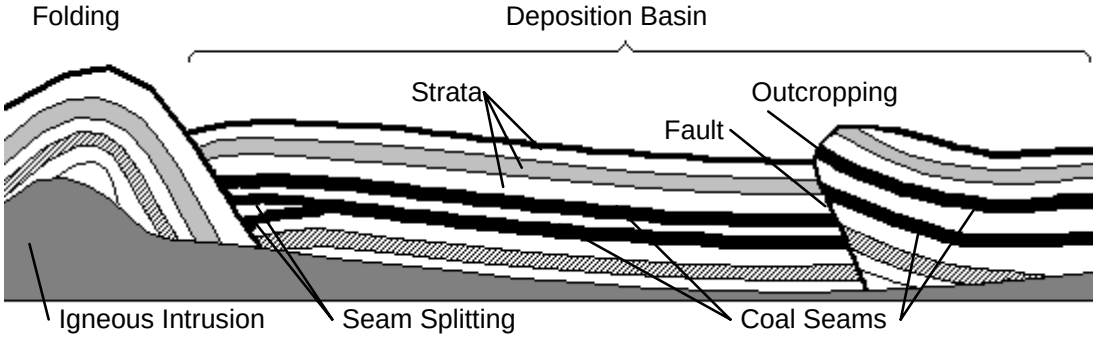
Layers of rock are formed by sediment building up in low lying areas known as deposition basins. Over millions of years these layers of sediment are transformed into sedimentary rocks under pressure from overlying material.

Coal is formed when plant material is covered by a layer of sediment, preventing complete decomposition. The long period of heat and pressure, caused by the weight of the overlying layers, produces chemical changes that force out oxygen and hydrogen, leaving behind a layer of carbon rich coal. Coal seams can be less than a millimetre thick to over 100 metres thick in some locations around the world.

The exact nature of a seam of coal has a major impact on the economics of a potential mine. Generally, for any given quality of coal, the thicker the seam and the nearer the seam is to the surface, the less expensive it is to mine. The type of surrounding rock also will affect mining costs, as will the existence of rock mixed up amongst the coal.

In addition to the location and the purity of the resource, other geological factors have an important impact on the viability of a coal mining operation. Figure B.1 shows common rock strata formations and the geological terms that are applied.

Figure B.1: **Geological formations related to coal mining**



Movements in the earth's crust can create pressure that causes sections of it to concertina. The original horizontal strata become folded and may even become vertical. Where sections of the crust move relative to each other, this pressure can cause faulting. Along a fault, the rock strata will be non-continuous as a result of being lifted, depressed or moved sideways. Mining in the presence of significant faulting poses problems in extracting the coal and in terms of safety as the rock can be unstable. Consequently, the existence of such conditions can impose significant costs on the mining operation.

Volcanic activity can cause molten igneous (volcanic) rock to intrude into the sedimentary strata before it cools. Such a process can cause sedimentary layers of rock, including coal seams, to dip rapidly away from the surface and be altered in composition. It also can cause coal seams to split or become disrupted (non-continuous).

Finally, weathering and erosion can cause an outcropping or exposure of the coal seam on the surface. Many of the early discoveries of coal in Australia were of outcropping seams in the Newcastle and Illawarra regions.

In mining coal, it is common to encounter complications from the above geological processes. In terms of economic viability, complicated mine geology generally means greater costs of extraction and can render even high quality coal resources uneconomic. For example, significant faulting of a coal seam can make longwall mining impossible. Alternatively, favourable geology can be advantageous to a mine, allowing the operation to be highly productive simply through ease of access to a high quality resource.

B.2 Exploration

Interest in mineral resources has a long history in Australia, beginning with the appointment of geological surveyors in various colonies around 1850. It was as

a result of these early surveyors' efforts that many of the coal fields now in production were first identified.

Locating and evaluating a coal deposit is the first step of the mining process. Considering the many geological problems outlined in the previous section, it is clear that comprehensive exploration is vital to avoid developing mines under geological conditions that are fundamentally uneconomic. The exploration process involves moving from a general description of the resource to an accurate assessment of how much coal can be provided to the marketplace.

Identified coal resources are the potentially useable resources in a defined area. Such resources could be mined to give an acceptable quality for commercial use in the foreseeable future. Minor coal occurrences are excluded.

Identification is based on points of geological observation and extrapolations from those points. A geological point of observation is a sample of a coal-bearing strata which provides information on that strata by observation, measurement and testing of surface or underground exposures, core samples, cuttings and/or non-cored boreholes. Geophysical techniques such as seismic surveys can increase confidence regarding the continuity of seams between points of observation. Closer spacing of observation points may be required in the presence of faulting, intrusion and seam splitting.

Various categories of resource exist depending on the level of confidence in the resource assessment.

- *Inferred resources* are where the presence of coal has been unambiguously determined. However, no detailed samples or measurements have been taken.
- *Indicated resources* are where exploration has allowed a reliable estimate of coal thickness, quality, depth and in-situ tonnage.
- *Measured resources* are computed from similar information to that used to calculate indicated resources. However, the degree of assurance is higher than for indicated resources.

Indicated and measured resources are known collectively as *demonstrated resources* or *demonstrated economic resources*. Figure B.2 shows how resources are categorised by increasing levels of exploration. Australia's resources are described in Attachment C1.

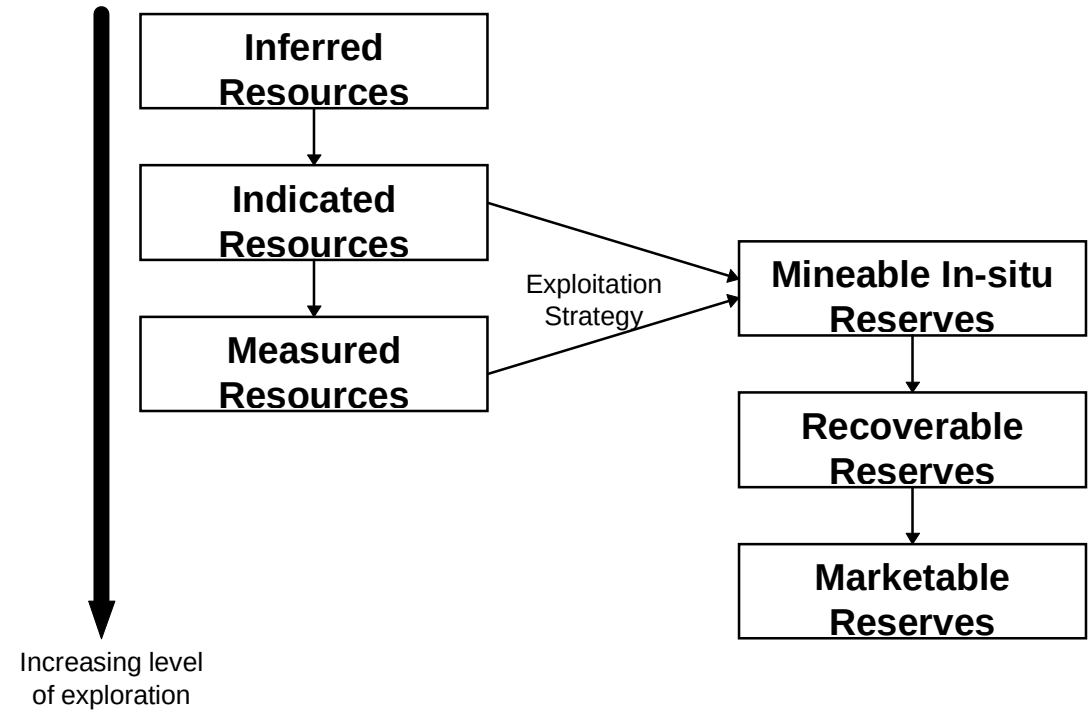
Once the resource has been identified, sufficient information is gathered to enable exploitation including detailed or conceptual mine planning. Coal reserves are those parts of the coal resource for which such planning has been undertaken. Again, various categories of reserves exist depending on the level of assessment.

Mineable in-situ reserves are the tonnages of coal contained in seams or sections of seams for which sufficient information is available for which conceptual mine planning has been undertaken and an outline of the proposed mining method has been provided. Mineable in-situ reserves exclude coal in locations where mining is prohibited — for example, within Australian national parks.

Once mine planning is complete, the proportion of seams to be extracted is calculated. This provides the tonnage of recoverable reserves from the mineable in-situ reserves. This is also known as run-of-mine tonnage. The type of mining to be used will determine what recovery factor is applied to calculate recoverable reserves. For example, an open cut mine may recover 90 per cent of mineable in-situ reserves, while an underground mine may recover 50 per cent of mineable in-situ reserves.

Marketable reserves are the tonnages of coal that will be available for sale. If the coal is to be sold raw then marketable reserves will be the same as recoverable reserves. However, this is generally a lower estimate of reserves than recoverable reserves as the calculation of marketable reserves involves making allowance for removing the impurities in the recoverable reserves. This process of upgrading the coal is known as beneficiation.

Figure B.2: **Categories of coal resources by level of exploration**



Source: QCB (1997).

B.3 Coal mining

Coal is produced from two distinct types of mines; surface (open cut) and underground. Generally, coal more than 70 metres below the surface is mined by underground methods. Coal nearer to the surface is mined by surface mining techniques.

As technology changes, the line between viable surface and underground mines is becoming less well defined. Furthermore, with the advent of new technology, both surface and underground mines are increasingly mechanised. In turn, miners are becoming skilled in the new technologies.

B.3.1 Surface mining techniques

In general, surface mining is the cheapest and most productive method of mining coal. Surface mining techniques can extract up to 95 per cent of the coal in a particular deposit. Surface mines exist in three general situations:

- area mines — where the terrain is flat, or gently undulating, and the coal seam or seams are at a relatively constant depth;
- contour mines — which most often exist where the terrain is undulating and a number of coal seams exist interspersed with other strata; and
- mountain removal — where coal-bearing strata exist near the top of large hills or mountains. In this case the entire mountain may be excavated to obtain the coal.

Open cut strip mining

In Australia, open cut mining accounts for over 70 per cent of production. In the United States, open cut mining accounts for about 60 per cent of production.

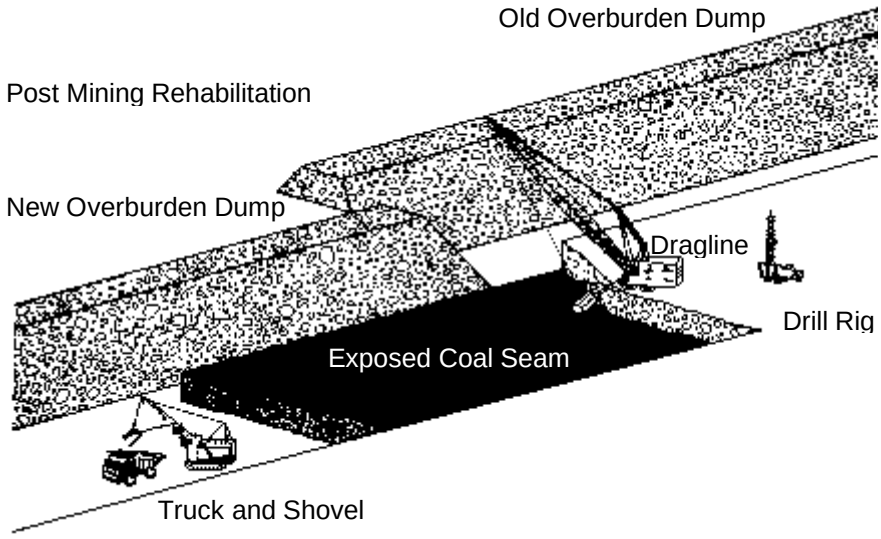
Large open cut strip mines can be a number of kilometres long and up to a kilometre wide. Most open cut mines follow a broadly similar model, although the precise technology applied varies considerably.

The first process is generally referred to as the pre-strip. Bulldozers and scrapers are used to remove the existing vegetation and to roughly level the surface. Top soil is stripped and stockpiled for use in rehabilitation works, after mining is completed. Holes are then drilled in the overburden and explosive charges set and fired. This weakens the overburden for easier removal in the next process.

Overburden removal (stripping) is carried out by a number of methods, including dragline, excavator, shovel, or bucket wheel, depending on overburden depth and the precise characteristics of the mine. Removing the

overburden exposes the coal seam below. When exposed, the coal seam can be mined by wheel loaders and trucks or other combinations of plant. Again, this can involve drilling and blasting to loosen the coal seam for extraction. Figure B.3 shows a profile of a typical open cut strip mining operation.

Figure B.3: **Open cut strip mining, typical cross section**



Source: United Mine Workers of America (1997).

Highwall

This technique may be adopted in the latter stages of area mines or contour mines. It is used to recover additional resources that cannot be extracted economically by further surface mining. A remote-controlled auger or continuous miner is bored into the exposed coal seam in the highwall of an open cut and extracts coal on to a conveyor system. Highwall techniques are used occasionally in Australian open cut mines to extract residual coal reserves. Mines currently using or planning highwall mining include Ulan, Oaky Creek and Liddell.

B.3.2 Underground mining techniques

Bord and Pillar

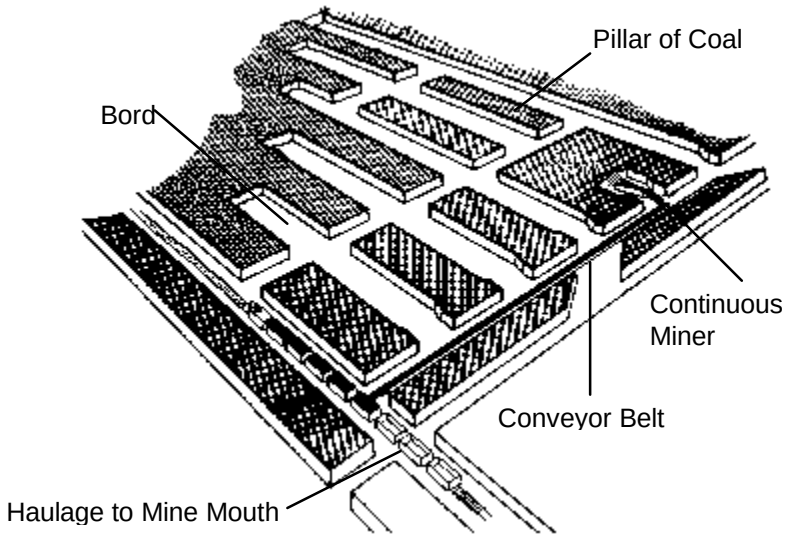
Traditionally, the underground mining of coal used the bord and pillar method (room and pillar in the US). However, this method is viewed by some mine operators as uncompetitive and is becoming obsolete in the face of newer techniques, such as longwalls. It is still used where the geology is unsuitable for

longwall mining and a number of bord and pillar mines operate throughout Australia.

This system involves the excavation of a series of rooms or bords directly into the coal seam. The roofs and ribs (walls) of access tunnels are bolted to increase their strength. In the advance phase, pillars of coal are left to help support the roof of the mine. In the retreat phase, these pillars can be removed to increase the total amount of coal extracted. As the pillars are removed, the roof is allowed to collapse and mined areas are sealed off. In Australia, the extraction of pillars is almost always mechanised.

The technique utilises machines known as continuous miners to cut coal from the working face using a revolving drum covered in hardened teeth or picks. The picks are positioned or laced on the drum concentrically, such that the coal is worked towards the centre of the miner, gathered up by gathering arms and conveyed through the body of the miner to conveyor belts linked to the surface. Alternately, coal is loaded into shuttle cars to be transported to the mine opening. Figure B.4 shows the basic processes involved in bord and pillar mining.

Figure B.4: **Bord and pillar mining**



Source: United Mine Workers of America (1997).

Longwall mining

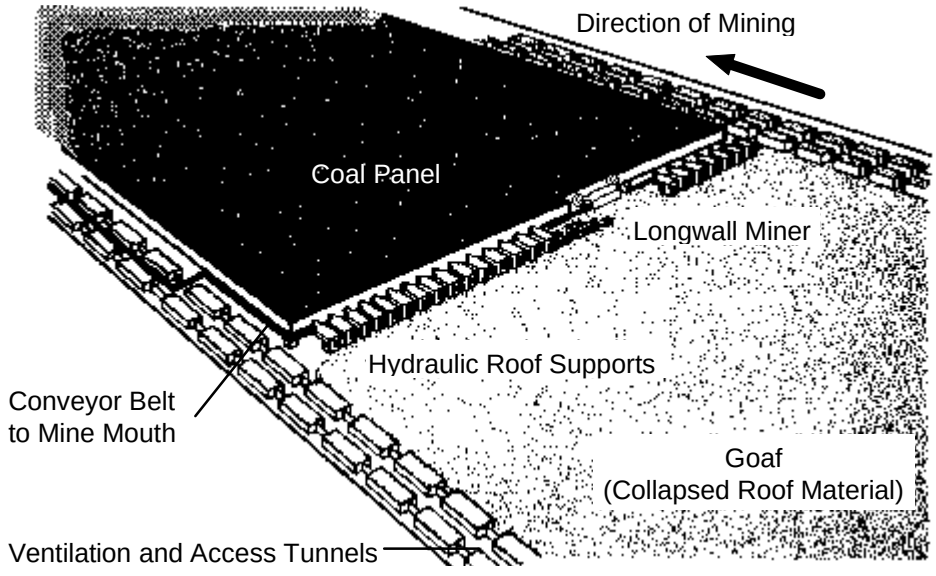
In longwall mines, continuous mining machines are used in development work on roads and ventilation tunnels. A longwall mining unit is employed to extract the bulk of the coal.

Two parallel access roads are developed directly into the coal seam from a central access system using a continuous miner. The two entries, which can be up to 200 metres apart, are then joined by a crosscut tunnel at their far ends. The face that is formed by this crosscut is referred to as the longwall. A longwall mining machine is installed in the crosscut. This machine has a rotating shearer laced with picks, which moves laterally and vertically shearing the coal from the face. The pick lacing works the coal off the face on to a conveyor belt in a single operation and allows the coal to be extracted continuously from the face and transported to the surface by conveyor.

Longwall systems generally have their own self-advancing hydraulic roof supports. As the machine advances and mining proceeds, the roof is allowed to fall behind the advancing machine. This fallen roof material is referred to as goaf and may contain both coal and other material in varying amounts. It can be explosive if not ventilated or sealed.

Longwall mining is the most productive method of underground mining in the absence of major geological complications. It is capital-intensive and the approach of individual mines can vary considerably even although they adopt the same general techniques. Figure B.5 shows views of a longwall machine from the side and from above.

Figure B.5: **Longwall mining**



Source: United Mine Workers of America (1997).

Continuous mining

Although there are a number of mines operating in Australia using the continuous mining method, most continuous miners are only one element in the total underground mining approach. Typically, continuous mining machines are used in development work on roads and ventilation tunnels, prior to the use of a different technique for extracting the coal.

Shortwall or miniwall mining

The shortwall technique is not widely used in Australia. It involves the use of continuous miners to shear coal from relatively small panels 40 to 60 metres wide. The continuous miner is protected from roof collapse by movable roof supports called jacks (chocks) as it moves through the coal seam. Coal is removed from the working face area by shuttle cars or by conveyor belt.

Conventional mining

Conventional mining, where coal panels are cut and then blasted from the seam, has disappeared from Australian mines. This method was extremely labour-intensive and was regarded as less productive and more dangerous than other methods of underground mining.

B.4 Physical and chemical characteristics of coal

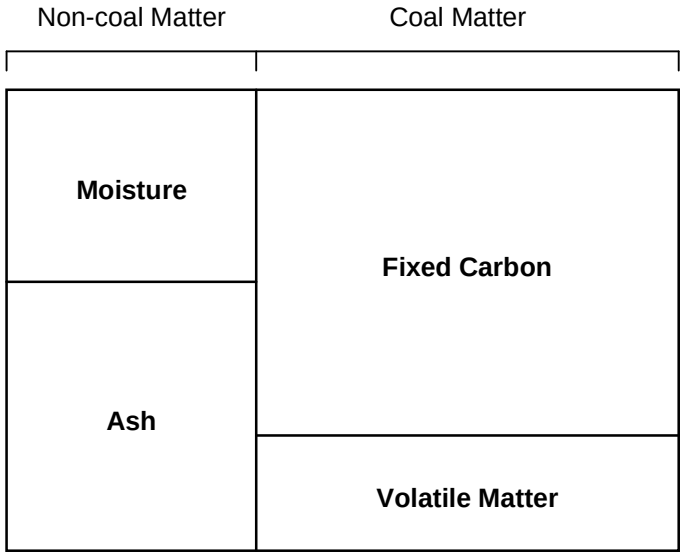
There are many types of coals. They can be distinguished by their physical and chemical characteristics. These characteristics determine the suitability of coal for various uses.

Coal is mainly composed of carbon (see Figure B.6). Coal also generates volatile matter when heated to decomposition temperatures. In addition, coal contains moisture and ash-forming mineral matter. The elements of carbon, hydrogen, nitrogen, sulphur and oxygen are present in the coal matter. The combination of these elements and the shares of volatile matter, ash and water vary considerably from coal to coal. It is the fixed carbon content and associated volatile matter of coal that control its energy value and coking properties and make it a valuable mineral on world markets.

Generally:

- *fixed carbon content* influences the energy content of the coal. The higher the fixed carbon content, the higher the energy content of the coal;

Figure B.6: **Analysis of coal**



- *volatile matter* is the proportion of the air-dried coal sample that is released in the form of gas during a standardised heating test. Volatile matter is a positive feature for thermal coal but can be a negative feature for coking coal;
- *ash* is the residue remaining after complete combustion of all organic coal matter and decomposition of the mineral matter present in the coal. The higher the ash content the lower the quality of the coal. High ash content means a lower calorific value (or energy content per tonne of coal) and increased transport costs. Most export coal is washed to reduce the ash yield (beneficiation) and ensure a consistent quality.
- *moisture content* refers to the amount of water present in the coal. Transport costs increase directly with moisture content. Excess moisture can be removed after beneficiation in preparation plants but this also increases handling costs; and
- *sulphur content* increases operating and maintenance costs of end users. High amounts of sulphur cause corrosion and the emission of sulphur dioxide for both steel producers and power plants. Low sulphur coal makes installation of desulphurisation equipment to meet emission regulations unnecessary. Southern hemisphere coals generally have a low sulphur content relative to Northern hemisphere coals.

In the ranking system discussed below, higher rank coals have lower levels of moisture and volatile matter. Higher rank coals also tend to have higher fixed carbon content and energy content.

Other coal properties, such as grindability, vitrinite reflectance and the crucible swelling number are also important when assessing quality. Generally, higher rank coals have better coking qualities. Coking coals are less plentiful than thermal coals and receive a higher price.

B.4.1 Classification of coals

International classification

As coal resources are widely distributed and traded, many national systems have been proposed for the classification of coals. The various national classification systems have proved useful for categorising each country's coal resources and comparing imported coals of similar geological age and rank. Rank measures the amount of coalification, or alteration, the mineral has undergone in its formation. Coal is subjected to consecutive and continuous stages in evolution, from lignite (brown coal), to sub-bituminous, bituminous and finally anthracite. Coal evolves through these ranks as increases in temperature and pressure decrease the water content and increase the carbon content. Sub-bituminous coal, bituminous coal and anthracite are known collectively as black coal.

In the absence of a widely accepted international coal classification system, there is a tendency in many countries to use the American Society for Testing and Materials (ASTM) classification of coals by rank. Table B.1 shows the four major ranks of coal as defined under the ASTM system. However, this classification system was developed for North American coals which consist predominantly of vitrinite. It is frequently used incorrectly to classify coals where vitrinite contents are low such as Australian bituminous coals.

Table B.1: **Classification of coals by rank, ASTM system**

Class	*Fixed Carbon*		*Volatile Matter*		*Energy*
	Dry	*Moist*	*Dry*	*Moist*	*Moist*
	%	*%*	*%*	*%*	*MJ/kg*
I. Anthracite	> 98–86	> 92–81	< 2–14	< 2–15	35.5–31.4
II. Bituminous	86–54	81–45	14–57	13–40	35.8–24.4
III. Sub-bituminous	55–53	45-37	53–55	36–38	26.7–19.3
IV. Lignite (brown coal)	52	32–26	32–35	38–50	< 19.3

The development of a single simple classification of coals which is unambiguously applicable to all coals world wide and acceptable to the international coal industry remains an unresolved challenge. The International

Standards Organisation is currently attempting the development of an ISO classification system which, while simple, is based on enough key parameters to provide a useful basis for the classification of coal resources of all ranks worldwide (sub. 56, pp. 1–2).

Australian classification

Classification of Australian coals is covered by Australian Standard AS2096 (1987). It has recently been revised and the new standard classifies coals into two broad rank ranges, as follows:

Higher rank if both of the following criteria are satisfied;

- gross specific energy on an ash-free, moist (afm) basis of 21.00 MJ/kg or greater.
- gross specific energy on a dry, ash-free (daf) basis of 27.00 MJ/kg or greater.

Lower rank if either of the criteria is not satisfied.

AS2096 also allows for the quantitative definitions of the ASTM system.

B.4.2 Types of coal

Coking coals

Some types of coal when heated in large ovens, which are sealed to exclude excess air to prevent complete combustion, produce coke and gases. These coals are also known as metallurgical coals.

Coke is a porous solid composed mainly of carbon and ash. It is used in blast furnaces to produce iron and steel. It is also used as a reductant in the refining of other metals such as aluminium. A reductant allows a chemical reaction which separates the metal from its ore.

Other coking coals are used to obtain organic chemicals from the by-products of the coke and gas. These products include fuel gas, tar, benzol, toluol, xylene, and sulphate of ammonia. They are then used to produce dyes, disinfectants, explosives, drugs, synthetic fibres, acetylene, plastics and resins.

Coke quality is related positively to *coke strength*. For the purposes of blast furnace applications, the coal used must be able to form large angular coke that retains its form despite constant heat, pressure, abrasion and collision in the blast furnace. Coking coals are classified as hard, soft or semi-soft.

Hard coking coals, the highest quality coking coal, tend to have moderate volatile matter content, low inherent moisture, low ash and low sulphur levels. Hard coking coals command the highest prices in world markets.

Soft and semi-soft coking coals have a lower fixed carbon content and higher levels of inherent moisture and volatile matter than hard coking coals.

Thermal coal

The major use of black coal is for fuel for thermal power stations. It is pulverised and burnt in steam generating boilers. The steam is then used for the generation of electricity. Thermal coal is also known as energy or steaming coal.

The higher the levels of ash, moisture, and sulphur, the lower the quality of the thermal coal. The lower the quality, the lower the price received on world markets. Much of the world's thermal coal is not of sufficient standard to be traded and its use is restricted to co-located power stations.

Also classified as thermal coals, pulverised coal injection (PCI) coals are used as a supplementary fuel injection into modern blast furnaces to increase the productivity of the coke used in the furnace. PCI coals have low levels of inherent moisture and ash but high levels of volatile matter. However, specifications vary greatly.

Australian thermal coal generally has high energy content (calorific value) and low levels of sulphur, phosphorus and heavy metals.

Washing allows thermal coal to be turned into semi-soft coking coal by reducing the ash content.

C THE AUSTRALIAN BLACK COAL INDUSTRY

This appendix provides a short description of the Australian black coal industry, outlining its importance to the Australian economy, production, domestic consumption and exports. It also discusses characteristics of the black coal labour force. Attachment C1 describes Australia's black coal resources and mining areas.

C.1 History of black coal mining in Australia

Black coal was first mined in the Newcastle area in 1799 and commercial mining had commenced in every State by 1898. Initial development of the industry occurred under heavy government influence. This included the supply of convict labour, the encouragement of systematic coal exploration and the granting of monopoly coal mining rights to the Australian Agricultural Company between 1826 and 1847.

No new convict labour was supplied for coal mining after 1840 and paid immigrant miners from the United Kingdom became the majority of the workforce used in NSW mines. The first coal mining unions were formed in the 1850s as immigrant miners and managers introduced practices and culture similar to that found in England and Wales.

A high level of industrial disputation soon became associated with the industry. Strikes, which occurred regularly after 1860, were often about increased pay and conditions, mine safety or the introduction of new work practices and mining technology which had been improving steadily in the late 1800s.

This gave rise to a history of government regulation through a series of tribunals, commissions and special commissioners which culminated in the formation of the Joint Coal Board (JCB) and Coal Industry Tribunal (CIT) in 1946.

Black coal production reached over 13 million tonnes (Mt) in the mid-1920s with exports reaching one million tonnes per year. The NSW coalfields around Newcastle, Illawarra and along the Hunter Valley dominated production. However, until 1949, the general industrial turmoil evident in the industry damaged production and exports.

The Great Depression and the substitution of petroleum products for coal in industry compounded these problems and the industry began to decline. By the

1950s the black coal industry had suffered further loss of market share due to competition from fuel oil and had become domestically focused. The JCB oversaw rationalisation of the industry which resulted in the closure of many small mines and a large reduction in employee numbers. The CIT's settlement of the 1949 strike brought relative peace to the industry for the next twenty years.

The reconstruction of Japan after the Second World War and its rapid industrialisation led to the development of the large near surface seams of the Bowen Basin in Queensland. Large open cut mines were opened along a 250 km strike length to supply the Japanese steel industry with high quality coking coal. Exports to Japan began in 1959 and had reached almost 20 Mt a year by 1970.

The 1970s oil price shocks created large export markets for Australia's thermal coal in Europe and Asia. Industrialisation of East Asia also provided new markets for Australia's coking coal.

As industry profitability increased as a result of sharply higher prices after the late 1970s, unions launched campaigns for higher wages and the level of industrial disputes increased to an all time high in 1980.

The 1980s also saw the widespread introduction of less labour-intensive longwall mining technology in underground mines. Underground production increased as a result, but employment fell in NSW, where most underground mines were located.

Australian coal exports increased rapidly during this period. In 1985, Australia exported 88 Mt of coking and thermal coal to become the world's largest exporter of black coal, a position it has held since.

In 1950, underground mines accounted for almost all Australian black coal production. However, by 1997, underground mines accounted for less than 30 per cent of Australian black coal production. This change reflected the development of export-focused, open cut mines, particularly in the Hunter Valley in NSW and the Bowen Basin in Queensland.

C.2 The domestic industry

The Australian black coal industry encompasses a range of businesses. In addition to coal mining itself, there are significant processing, transport and support services related to the industry. The industry also has extensive linkages with international and domestic power utilities and steel industries.

In 1995–96, the black coal industry contributed 33 per cent of the turnover, 45 per cent of the total employment and 23 per cent of the total value of exports of the Australian mining sector which includes iron ore, oil and natural gas, gold, aluminium etc. Value added from the black coal industry totalled $5 billion, equivalent to over 1 per cent of Australia's GDP (see Table C.1).

Table C.1: **Size of the coal industry and mining sector relative to the Australian economy, 1995–96**

		Black coal industry	*Mining sector*	*Australia*
Turnover	($b)	10	30	na
Value added	($b)	5	19	489
Exports	($b)	8	34	98
Employment	('000)	25	56	8 300

na Not available.

Source: ABS (Cat. No. 5368.0, Cat. No. 8401.0 and Cat. No. 6202.0).

Australian coal mines have diverse ownership structures. Owners include government business enterprises, publicly listed companies and private firms. There is significant foreign ownership and vertical integration; in addition to specialist mining companies, various large steel producers, international trading houses and power utilities own or have an equity interest in mines. It is also common for an owner to employ another company to manage its mining operations and employ contractors for the extraction of the resource.

There were 118 black coal mines operating in Australia at the end of 1997. This included 58 underground mines and 60 open cut mines. They varied in size from the Goonyella/Riverside open cut mine, which produced over 11 Mt of saleable coal, to the relatively small Burgowan No. 12 operation, which produced under 8 thousand tonnes of saleable coal. Sixty nine mines operated in NSW, 42 in Queensland and seven in other States (JCB and QCB 1998).

C.2.1 Production

Australian production of black coal was concentrated in NSW until the development of large export mines in Queensland in the 1960s. By 1990, Queensland and NSW were producing roughly equal amounts of black coal.

Australian production increased rapidly from the late 1970s. Production for export exceeded production for domestic use in 1976, and has since increased steadily to account for 72 per cent of total production in 1997.

Production from underground mining also increased as longwall miners replaced the older methods of underground extraction during the 1980s.

In 1997, Australia's production of saleable black coal was 217 Mt, an increase of over 180 per cent since 1980. This growth has been shared evenly between NSW and Queensland, which accounted for 48 per cent and 47 per cent, respectively, of Australian black coal production. Table C.2 shows production by State and mine type between 1970 and 1997.

Table C.2: **Saleable coal production by State and mine type** (Mt)

Year	*Underground*			*Open cut*			***Total***
	NSW	*Qld*	*Total*[a]	*NSW*	*Qld*	*Total*[a]	***Australia***
1970	na	na	33	na	na	12	**45**
1975	na	na	30	na	na	31	**61**
1980	31	3	35	12	26	42	**77**
1985	39	4	44	23	57	85	**129**
1986	41	4	46	25	62	93	**139**
1987	44	4	49	26	65	96	**145**
1988	39	4	44	27	65	97	**141**
1989	43	4	49	30	70	106	**155**
1990	46	6	53	33	71	110	**163**
1991	46	7	54	35	72	114	**168**
1992	44	9	54	41	78	126	**180**
1993	43	9	54	42	77	126	**180**
1994	42	11	54	44	78	130	**184**
1995	45	12	57	45	82	136	**193**
1996	47	11	59	47	84	140	**199**
1997	49	14	63	56	89	154	**217**

a Includes other States' production.
na Not available.
Sources: JCB and QCB (various).

Mining is heavily concentrated in two regions in Australia. The Sydney Basin in NSW and the Bowen Basin in Queensland account for the vast majority of Australia's production and exports of black coal. Therefore, the effects on employment of expansion or contraction of the industry have been heavily regionalised.

Four companies controlled mines that produced over 54 per cent of saleable production in 1997. However, there are many small producers. The top seven producers are shown in Table C.3.

Table C.3: **Leading Australian black coal producers, 1997**

Company[a]	*Saleable production*[b]	*Percentage of total*
	Mt	*%*
BHP	54.6	25.2
Rio Tinto	30.3	13.9
Shell	18.2	8.4
Oakbridge	14.9	6.8
MIM	10.7	4.9
Peabody Resources	10.1	4.7
Powercoal	8.8	4.0
Other	69.6	32.1
Total	**216.9**	**100.0**

a Production from a mine is credited to a company where it has control or the majority shareholding in a joint venture. For example, Shell owns 82 per cent of the Dartbrook mine, so all production from Dartbrook is credited to Shell.

b Data are preliminary and may be subject to revision. Columns may not add up due to rounding error.

Source: JCB and QCB (1998).

C.2.2 Domestic consumption

The major consumers of black coal in the domestic market are the steel, aluminium and cement industries and coal-fired power stations.

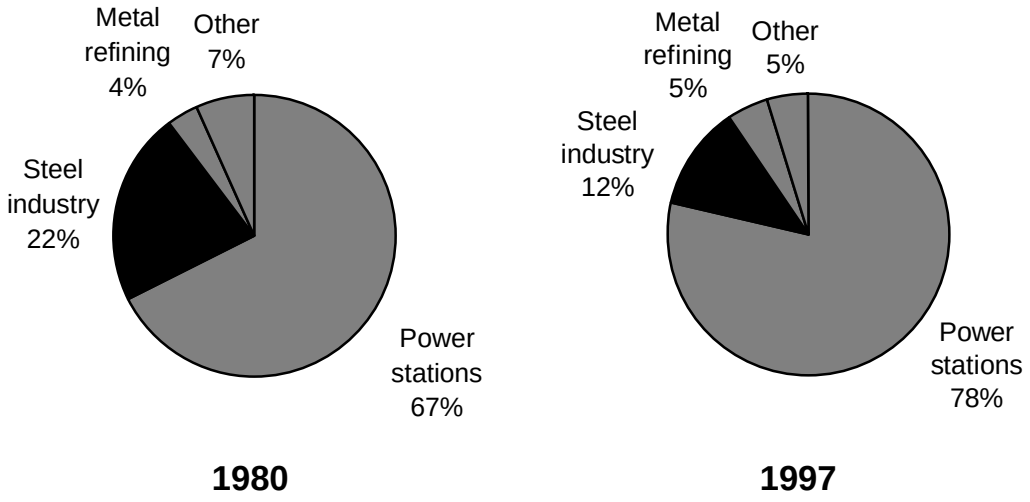
Approximately 8 per cent of coking coal production is used by the domestic steel industry. The domestic steel industry has declined in importance as a market for black coal in both absolute and relative terms between 1980 and 1997. The closure of the Newcastle steelworks in 1999 will see this trend continue (ACIL 1997b).

Over 41 per cent of Australian thermal coal production is used to supply the local power industry and other domestic industrial consumers. Black coal was used to generate 56 per cent of Australia's electricity in 1995–96 (ABARE 1997i). Many export mines use the domestic power industry to offload marginal coal that is unsuitable for export. The development of the National Electricity Market is the most important recent development for the domestic thermal coal

market. Projections of domestic demand for coking and thermal coal are provided in Appendix L, Attachment L2.

Figure C.1 shows the change in shares of domestic coal consumption for 1980 and 1997. Table C.4 shows domestic coal consumption by tonnage for major consumers between 1980 and 1997.

Figure C.1: **Domestic black coal consumption by industry**



Sources: JCB and QCB (various).

Table C.4: **Domestic black coal consumption, by consumer** (Mt)

Year	*Power stations*	*Steel industry*	*Metal refining*	*Cement industry*	*Other*	***Total***
1980	24.5	8.1	1.2	0.9	1.5	**36.4**
1985	30.7	6.3	1.9	1.0	1.9	**41.9**
1990	38.8	7.5	2.1	0.9	2.1	**51.4**
1991	39.0	7.1	2.3	0.8	2.1	**51.4**
1992	40.1	7.1	2.4	0.9	2.2	**52.7**
1993	41.5	7.2	2.7	0.8	1.6	**53.9**
1994	41.9	6.9	2.8	0.9	1.7	**54.2**
1995	44.5	7.4	2.9	0.7	1.8	**57.2**
1996	46.4	5.9	2.9	0.8	1.8	**57.9**
1997	47.2	7.1	2.9	0.9	1.9	**60.0**

Sources: JCB and QCB (various).

C.2.3 Exports

Exports of coking coal have been increasing steadily since the early 1960s. Exports of thermal coal increased dramatically in the early 1980s as a result of the 1979 oil price shock. Total black coal exports from Australia in 1997 rose to a record 157 Mt, an increase of 265 per cent since 1980. This comprised 84 Mt of coking coal and 74 Mt of thermal coal.

Queensland and NSW have produced all of Australia's black coal export shipments since 1974. Between 1980 and 1997, Queensland's exports increased by 320 per cent to 84 Mt and the tonnage from NSW increased by 222 per cent to 74 Mt. In 1997, Queensland accounted for 70 per cent of Australia's coking coal exports and 34 per cent of thermal coal exports. NSW exports accounted for the balance. Table C.5 shows exports by State and coal type between 1970 and 1997.

Table C.5: **Coal exports by type and by State** (Mt)

Year	*Coking*			*Thermal*			*Total*		
	NSW	*Qld*	*Total*	*NSW*	*Qld*	*Total*	*NSW*	*Qld*	***Aus***
1970	na	na	17	na	na	1	12	6	**18**
1975	na	na	26	na	na	3	14	15	**30**
1980	na	na	34	na	na	10	23	20	**43**
1985	na	na	50	na	na	38	41	47	**88**
1986	15	34	49	26	18	43	40	52	**92**
1987	16	39	55	27	20	47	43	59	**102**
1988	17	39	56	25	19	44	42	58	**100**
1989	17	39	56	23	20	43	40	58	**99**
1990	17	40	57	28	21	49	46	61	**107**
1991	21	44	66	32	22	54	54	67	**120**
1992	22	46	68	34	24	58	56	70	**126**
1993	24	50	74	35	23	58	59	73	**132**
1994	23	49	72	35	24	59	58	73	**131**
1995	22	52	75	38	24	62	60	77	**137**
1996	24	53	77	40	24	64	64	76	**141**
1997	25	59	84	49	25	74	74	84	**157**

na Not available.

Sources: JCB and QCB (various).

Coking coal

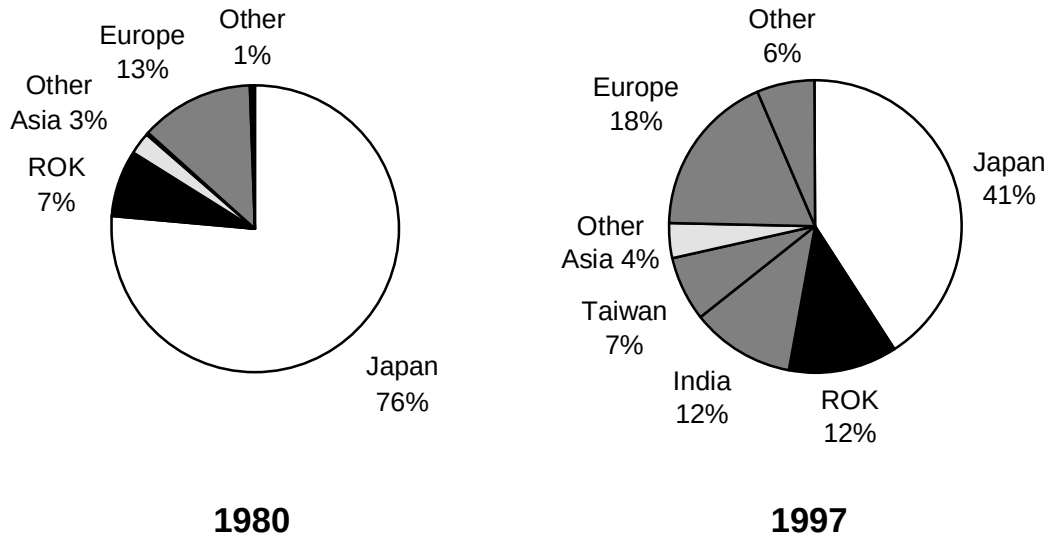
Japan has always been Australia's major market for coking coal. However, its dominance has decreased as the industrialisation of other Asian countries and the decline of the European coal industry have increased demand for Australian coking coal. Japan's share of Australia's coking coal exports has fallen from 76 per cent in 1980 to 41 per cent in 1997. Over the same period, Europe and the rest of Asia increased their shares from 13 per cent and 10 per cent to 18 per cent and 35 per cent, respectively (see Figure C.2).

Figure C.2 and Table C.6 show the changing pattern of Australia's coking coal exports between 1980 and 1997.

Thermal coal

Asia is now the destination for 91 per cent of Australia's thermal coal exports compared with 53 per cent in 1980. Japan, the Republic of Korea (ROK) and Taiwan are the major buyers of Australian thermal coal in the region. Europe's share of Australian thermal coal exports fell from 36 per cent in 1980 to 6 per cent in 1997 (see Figure C.3).

Figure C.2: **Destination of Australian coking coal exports**



a May differ from Table C.6 due to rounding error.

Sources: JCB and QCB (various).

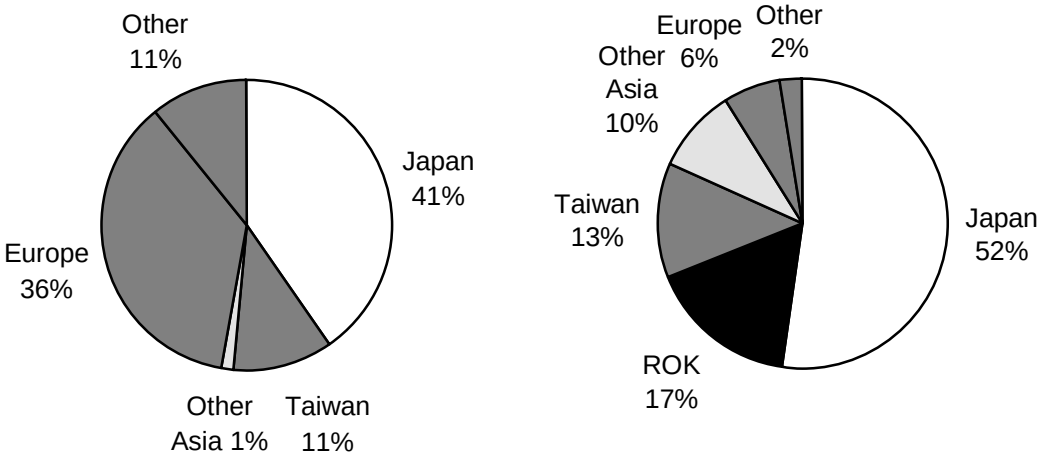
Table C.6: **Destination of Australian coking coal exports**

Country	*1980*		*1985*		*1990*		*1997*	
	Mt	*%*	*Mt*	*%*	*Mt*	*%*	*Mt*	*%*
Japan	25.6	76.4	29.3	59.2	28.3	49.6	34.1	40.7
ROK	2.2	6.8	3.1	6.2	5.1	8.9	10.0	11.9
India	0.2	0.7	2.0	4.1	4.8	8.5	9.6	11.5
Taiwan	0.8	2.5	2.0	4.0	2.8	4.9	6.0	7.2
Other Asia	0.1	0.2	1.4	2.8	3.1	5.5	3.4	4.1
Europe	4.2	12.7	9.6	19.4	10.6	18.5	15.3	18.3
Rest of World	0.2	0.7	2.1	4.3	2.3	4.1	5.3	6.3
Total	**33.4**	**100.0**	**49.4**	**100.0**	**57.1**	**100.0**	**83.7**	**100.0**

Sources: IEA (1997) and JCB and QCB (various).

Figure C.3 and Table C.7 show the changing pattern of Australia's thermal coal exports between 1980 and 1997.

Figure C.3: **Destination of Australian thermal coal exports**



a May differ from Table C.7 due to rounding error.
Sources: JCB and QCB (various).

Table C.7: **Destination of Australian thermal coal exports**

Country	*1980*		*1985*		*1990*		*1997*	
	Mt	*%*	*Mt*	*%*	*Mt*	*%*	*Mt*	*%*
Japan	3.6	40.2	15.3	38.9	27.1	54.7	38.5	52.3
ROK	0.0	0.1	5.5	13.9	3.5	7.1	12.3	16.7
Taiwan	1.0	11.1	3.8	9.6	3.0	6.2	9.4	12.8
Other Asia	0.1	1.3	4.3	11.0	6.5	13.1	6.9	9.4
Europe	3.2	36.3	8.1	20.7	9.0	18.2	4.7	6.4
Rest of World	1.0	10.8	2.3	5.9	0.4	0.7	1.8	2.4
Total	**8.9**	**100.0**	**39.3**	**100.0**	**49.5**	**100.0**	**73.6**	**100.0**

Sources: IEA (1997) and JCB and QCB (various).

C.3 Labour force characteristics

C.3.1 Employment

Since employment in the black coal industry peaked at the end of 1986 at 32 700, it has declined by 27 per cent to 23 800 at the end of 1997. The majority of employment loss was at NSW underground mines. Between 1986 and 1997, employment in NSW underground mines declined by nearly 8000 persons while employment in NSW open cut mines increased by around 700 persons. In Queensland, over the same period, employment in underground mines increased by 200 persons and employment in open cut mines declined by about 900 persons. Table C.8 presents total employment data in the black coal industry by State and mine type.

C.3.2 Wages

Black coal employee earnings are high when compared with average earnings for all industries and with employee earnings in metal ore mining industries. In 1996–97, black coal industry full-time average weekly total earnings (AWTE) were 1.4 times full-time AWTE in metal ore mining industries and two times full-time AWTE for all industries (ABS Cat. No. 6203.0 and unpublished data).

Table C.8: **Employment by State and mine type**[a] ('000 persons)

Year	*Underground*			*Open cut*			***Total***
	NSW	*Qld*	*Total*[b]	*NSW*	*Qld*	*Total*[b]	***Australia***
1980	16.3	2.3	19.7	1.5	5.4	7.9	**27.6**
1981	18.4	2.4	21.4	2.3	6.0	9.4	**30.8**
1982	17.7	2.4	20.6	3.0	6.4	10.7	**31.3**
1983	15.8	2.0	18.4	3.3	7.3	11.9	**30.3**
1984	15.0	1.9	17.7	3.6	8.0	12.9	**30.5**
1985	15.3	2.0	17.9	4.1	8.6	14.0	**31.9**
1986	15.7	1.9	18.2	4.4	8.6	14.3	**32.7**
1987	13.4	1.4	15.4	4.1	8.4	13.8	**29.1**
1988	12.4	1.4	14.4	4.2	8.1	13.6	**28.0**
1989	12.3	1.6	14.5	5.0	8.6	14.8	**29.3**
1990	12.0	1.7	14.3	5.0	9.0	15.3	**29.6**
1991	11.1	2.0	13.5	5.1	8.9	15.1	**28.6**
1992	9.9	1.8	12.2	5.1	8.9	15.2	**27.4**
1993	9.1	2.0	11.4	5.1	8.7	15.1	**26.4**
1994	9.1	2.0	11.1	4.8	8.3	14.4	**25.5**
1995	8.8	2.3	11.2	5.0	8.5	14.6	**25.8**
1996	9.0	2.3	11.4	5.3	8.4	14.8	**26.2**
1997	8.0	2.1	10.2	5.1	7.5	13.6	**23.8**

a Employment working in or about a coal mine or coal preparation plant. It includes administrative, technical and clerical staff. Also includes employees from both the mine operators and outside contractors. Employment as at December of stated year.

b Includes other States' employment.

Sources: JCB and QCB (various).

This equated to annual earnings of almost $80 000 for black coal employees, compared with $57 000 in metal ore mining and $38 000 in all industries.[1]

1 Annual earnings are calculated by averaging ABS quarterly observations of AWTE and multiplying by 52.

C.3.3 Unionisation and unions

The Australian black coal industry has a history of high levels of unionisation. Between 1986 and 1997, the unionisation rate remained above 92 per cent for the black coal industry. In comparison, the rate of unionisation among the total Australian employed labour force fell from 46 to 30 per cent over the same period (ABS unpublished data).

The Construction, Forestry, Mining and Energy Union (CFMEU) is the principal union in the black coal mining industry. The mining division of the CFMEU was formed as a result of the amalgamation of: the Miners' Federation, which covered coal face workers; the Federated Mining Mechanics' Association of Australia, which covered mechanics; and the Federated Engine Drivers' and Firemens' Association, which covered drivers of plant and equipment.

The CFMEU inherited the organisational structure of the Miners' Federation. It is organised into three branches in NSW (Northern, Western and Southern) and separate branches in Queensland and Tasmania.

Aside from the CFMEU, the Australian Collieries Staff Association (ACSA) has industrial coverage of all professional, semi-professional, and clerical employees in the coal industry. The ACSA is the second largest union in the industry after the CFMEU. Since 1992, the ACSA has had representational rights of deputies. In NSW, this jurisdiction overlaps with the State-based Colliery Officials Association which traditionally has covered deputies in NSW.

Other unions involved in the coal mining industry are the Australian Manufacturing Workers Union (AMWU), which represents fitters; and the Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union of Australia (CEPU), which covers electricians.

C.3.4 Working days lost

Sick Leave

Days lost due to sick leave accounted for 40 per cent of total working days lost in the black coal industry in 1996. The absence rate among coal mining employees was 3.8 per cent, 1.2 times the mining industry average (3.3 per cent) and 1.7 times the all industries average (2.2 per cent). However,

absence rates in some other industries, such as rail transport (6.8 per cent), were much higher (ABS unpublished data).[2]

Industrial disputation

Historically, the black coal industry has had a high incidence of strikes compared with other industries. Since 1990, working days lost due to industrial disputes in the coal mining industry have averaged seven times the mining industry average and 35 times the all industries average (ABS Cat. No. 6101.0).

Workers' compensation

About 14 per cent of working days lost in the black coal industry in 1996 were as a result of workers being on workers' compensation leave. Worksafe Australia reported that for the three years from 1991–92, compensation claims in black coal mines were approximately four times the all industry average and were notably higher than in other high-risk mining industries.

C.3.5 Labour turnover

The coal industry has a low rate of labour turnover. The voluntary turnover rate, for the year ended February 1996, was 4.7 per cent for male coal mining employees while the average for employees across all industries was 9.9 per cent (ABS unpublished data).[3]

The corresponding involuntary turnover rate for the coal mining industry was also observed to be below the all industry average (4.8 per cent compared with 8.5 per cent).[3]

C.3.6 Other demographic characteristics

Table C.9 shows selected comparisons of the demographic characteristics of the black coal industry workforce and the total employed labour force.

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[2] The ABS definition of absenteeism is the hours of absence from work due to sickness and injury as a percentage of total hours actually worked by full-time employees.

[3] Voluntary turnover is defined as the number of persons who voluntarily left their job during the year as a percentage of persons who held a job during that year. Involuntary turnover is defined as the number of persons who involuntarily lost their job during the year as a percentage of persons who held a job during that year.

Table C.9: **Selected comparisons of the black coal industry workforce with the total employed labour force, 1996**

	Black coal industry	*Total employed labour force*
	%	*%*
From an English-speaking background	98	86
Born in Australia	90	76
Male	98	57
Full-time	98	75
Age		
15–34	33	44
35–44	25	26
45 and over	42	30
Education		
No post-school qualifications	46	50
Vocational training	48	24
Tertiary qualifications	6	26

Sources: ABS (Cat. No. 6101.0 and unpublished data).

C.4 Rail transport in New South Wales and Queensland

The export coal rail network is located in NSW and Queensland. This section provides an overview of the size, location and nature of the operations. Maps of the rail systems are included in Attachment C1.

New South Wales

Just over 88 per cent of black coal transported in NSW was carried in the northern corridor in 1996–97 and this share has been increasing. To cater for increases in production along the northern corridor, FreightCorp has undertaken fleet expansion and maintenance. The existing northern corridor has an achievable capacity of 66 Mt. It is anticipated that by September 1998 this will increase to 79 Mt through the purchase of 800 wagons (97 tonne capacity) to add to its existing 900 wagons (76 tonne capacity) and by using locomotives which previously were hired to National Rail. In addition, minor improvements in system performance are expected to increase capacity further to 85 Mt.

In 1996–97, FreightCorp transported 59 Mt of black coal, an increase of 11 per cent over 1995–96 and 44 per cent greater than in 1990–91.

Table C.10: **NSW coal rail corridors**

Rail corridor and corridor track length	*Location*	*Origin and destination*	*Type of operation*	*Tonnes hauled 1996–97*	*Average haul distance*
				Mt	*km*
Northern 650+ km	Hunter Valley	*Origin:* Gunnedah and Ulan coal regions *Destination:* Newcastle coal terminals, steel works and power stations	Diesel locomotives and bottom discharge wagons	50.3	106
Western and Southern 230+ km	Wollongong	*Origin:* Kandos region, South Bulli and West Cliff coal region *Destination:* Port Kembla coal terminal BHP Steel Works	Diesel/ electric locomotives and bottom discharge wagons	7.1	203

Sources: IEA (1993a) and FreightCorp.

Queensland

Queensland Rail (QR) advised the Commission that the capacity of the coal rail system would be expanded in anticipation of increased volumes of export coal (127 Mt by 2001–02). QR said:

- $1.1 billion will be invested over 5 years;
- a fleet of 2100 wagons (104 tonne capacity) is being purchased to replace the existing 71 tonne wagon fleet;
- 73 tonne wagons will be upgraded to 80 tonnes;
- additional locomotives are likely to be purchased;
- track capacity will be expanded by replacing timber sleepers with concrete sleepers and constructing new spur lines; and
- track and rolling stock will be modified to enable coal trains to increase their speed from 60 km per hour to 80 km per hour (sub. 34).

In 1996–97, QR transported 91 Mt of black coal, an increase of 3 per cent over 1995–96 and an increase of 33 per cent over 1990–91.

Table C.11: **Queensland coal rail corridors**

Rail corridor and corridor track length	*Location*	*Origin and destination*	*Type of operation*	*Tonnes hauled 1996–97*	*Average haul distance*
				Mt	*km*
Newlands 235 km	Northern Bowen Basin	*Origin:* Newlands and Collinsville region *Destination:* Abbot Point coal export terminal	Diesel locomotives, bottom discharge wagons	7.2	156
Goonyella 715 km	Central Bowen Basin	*Origin:* Oaky Creek and North Goonyella regions *Destination:* Dalrymple Bay and Hay Point coal export terminals	Electric locomotives, bottom discharge wagons (Dalrymple Bay) and tippler wagons (Hay Point)	48.9	233
Blackwater 725 km	Southern Bowen Basin	*Origin:* Gregory and South Blackwater regions *Destination:* RG Tanna and Barney Point export coal terminals and Gladstone and Stanwell Power Stations	Electric locomotives, bottom discharge wagons	23.8	316
Moura 200 km	Moura	*Origin:* Moura *Destination:* RG Tanna and Barney Point export coal terminals and Gladstone Power Station and Queensland Alumina	Diesel locomotives, bottom discharge wagons	7.6	167
West Moreton-Darling Downs 292 km	Moreton Basin	*Origin:* Moreton Basin region *Destination:* Fisherman Island coal terminal and Swanbank Power Station	Diesel locomotives, bottom discharge wagons	2.3	87

Sources: Queensland Department of Mines and Energy and sub. 12.

C1 AUSTRALIAN BLACK COAL RESOURCES AND MINES

The location and quantity of Australia's black coal resources are well established. This attachment describes the size, location and type of Australia's black coal resources and mining activity.

Black coal resources

Australia has 76 billion tonnes of demonstrated black coal resources. Queensland and NSW contain 68 billion tonnes or 90 per cent of the total. This is approximately seven per cent of world black coal resources (Commonwealth Department of Primary Industries and Energy, sub. 43, p. 1).

In addition, there are significant inferred resources in NSW, Queensland and South Australia. Table C1.1 presents Australia's identified black coal resources. Figure C1.1 shows the location Australia's major coal basins.

Table C1.1: **Identified in-situ resources of black coal, 1996** (Mt)

	Demonstrated			*Inferred*
	Underground	*Open cut*	*Total*	
NSW	20 193	13 722	33 915	Very large
Queensland	20 664	13 351	34 015	Very large
South Australia	na	na	5 789	17 980
Western Australia	na	na	1 892	2 434
Tasmania	501	25	526	na
Total	**na**	**na**	**76 137**	**Very large**

na Not available.
Sources: JCB and QCB (1997).

The amount of Australian resources accessible by open cut mining methods is large. However, in the longer term, the depletion of these resources will start to limit open cut production. This points to underground mining methods having to be utilised increasingly to maintain and expand production. The NSW Government explained:

> The majority of any future growth in NSW coal production will come from the Hunter Valley. All major open cut coal resource areas have been allocated, except

> the Mount Arthur North Tender Area and the West Scone/Castle Rocks allocation area near Muswellbrook. In the medium to long term, to maintain growth in supply from the Hunter, development of efficient underground operations will become important as large open cut deposits are depleted. (sub.26, p. 5)

The Queensland Government commented:

> Queensland has identified resources of over 35 billion tonnes of coal but this resource must be considered in terms of the coal type (coking and thermal) and the mining method of extraction. Such an examination reveals, for instance, that remaining in-situ resources of high quality coking coal amenable to open cut extraction methods are only some 1900 Mt, and that resources of high volatile thermal coals amenable to open cut mining in the Bowen Basin amount to only 850 Mt.
>
> Given that saleable coal tonnages are considerably less than in-situ figures this points to a future operating environment characterised by traditionally higher cost underground extraction methods. In the face of continued downward pressure on world coal prices, this presents a threat to the future viability of the industry. (sub. 32, p. 2, executive summary)

Major mining areas

New South Wales

The principal coal resources in NSW are located in the Sydney-Gunnedah Basin. Other large deposits occur in the Oaklands and Gloucester Basins (see Figure C1.1).

The Sydney-Gunnedah Basin is a world class deposit with a length of 450 km and a width of up to 150 km. However, above the coal seams is a thick overburden. Consequently, the coal is economically accessible only around the margins. The Sydney-Gunnedah Basin contains 90 per cent of NSW's demonstrated resources. This represents around 30 billion tonnes of black coal.

The Sydney-Gunnedah Basin has five coalfields: Hunter, Newcastle, Western, Southern and Gunnedah.

- The Hunter Coalfield contains thermal and semi-soft coking coal. Production is for the domestic and export markets. Mining is centred around Muswellbrook and Singleton.
- The Newcastle Coalfield contains thermal and semi-soft coking coal. Production is for the domestic and export markets. Mining is centred around Cessnock, Maitland, Newcastle and Lake Macquarie.

- The Western Coalfield contains thermal coal. Production is for the domestic and export markets. Mining is centred around Ulan, Kandos and Lithgow, principally by underground methods.
- The Southern Coalfield contains NSW's only hard coking coal and also contains thermal coal resources. Production is for the domestic and export markets. Mining is centred around Picton and Wollongong. All mines use underground methods.
- The Gunnedah Coalfield contains thermal coal and semi-soft coking coal. Production is for the domestic and export markets.

The Hunter Coalfield is the most important for NSW's export coal industry. The NSW Government explains:

> The Hunter Coalfield is the major coal producing area in NSW. Over 50% of the State's raw coal production, and approximately 60% of the thermal coal production, comes from the Hunter Coalfield.
>
> Expansion of export thermal coal requirements from NSW will be sourced primarily from the Hunter Coalfield for the next 20 years.
>
> Production from the Newcastle, Southern and Western Coalfields will, essentially, remain static, with any new mines in these areas largely replacing production lost from closure of older mines.
>
> Opportunities for major increases in production from the Gunnedah Coalfield do not seem likely for the next 10 years. This is due to higher freight costs and to the cost associated with developing new infrastructure to support large scale mining operations. (sub. 26, p. 6)

Figure C1.2 shows the operating coal mines in NSW.

Queensland

The majority of Queensland's export quality coal is mined in the Bowen Basin. Smaller deposits are mined in the Surat and Moreton-Ipswich Basins. Non-export coal is mined in the Callide, Tarong and Maryborough Basins (see Figure C1.1). The State contains other resources that are currently uneconomic to exploit.

The Bowen Basin is a world class coal deposit in both size and quality. Containing 27 billion tonnes of demonstrated resources, it accounts for 75 per cent of Queensland's demonstrated in-situ resources. The Bowen Basin includes all of Queensland's 12 billion tonnes of demonstrated coking coal resources.

Mines operating in Queensland are indicated in Figure C1.3.

Western Australia

The Collie Basin is Western Australia's main coal resource, consisting of over one billion tonnes of low ash, high moisture thermal coal. Mining activity is concentrated around Collie.

South Australia

Although there are extensive coal resources in South Australia, frequently associated with gas reserves, these are often at great depth. The South Australian Department of Primary Industries and Resources explains:

> The black coal resources of South Australia are immense in tonnage terms (in situ resources exceed 23 billion tonnes) ...
>
> Large resources of generally high moisture, medium ash, variable (low to high) sulphur thermal coals exist in several deposits in the Arckaringa Basin ... and at Leigh Creek. (sub. 46, p. 4)

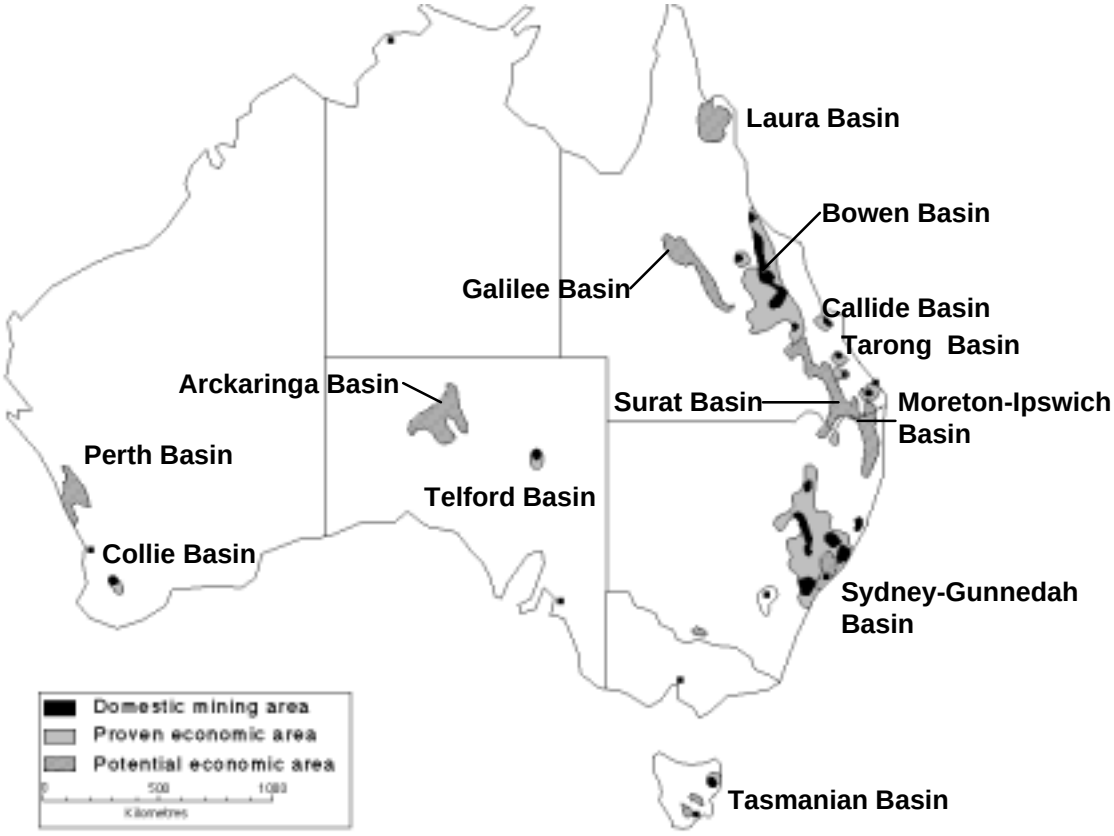
In the Telford Basin, thermal coal exists relatively close to the surface. It is mined by open cut techniques at Leigh Creek for domestic power generation.

Plans exist to exploit coal resources in the Arckaringa Basin for pig iron production as part of the South Australian Steel and Energy project proposal (sub. 46, p. 11).

Tasmania

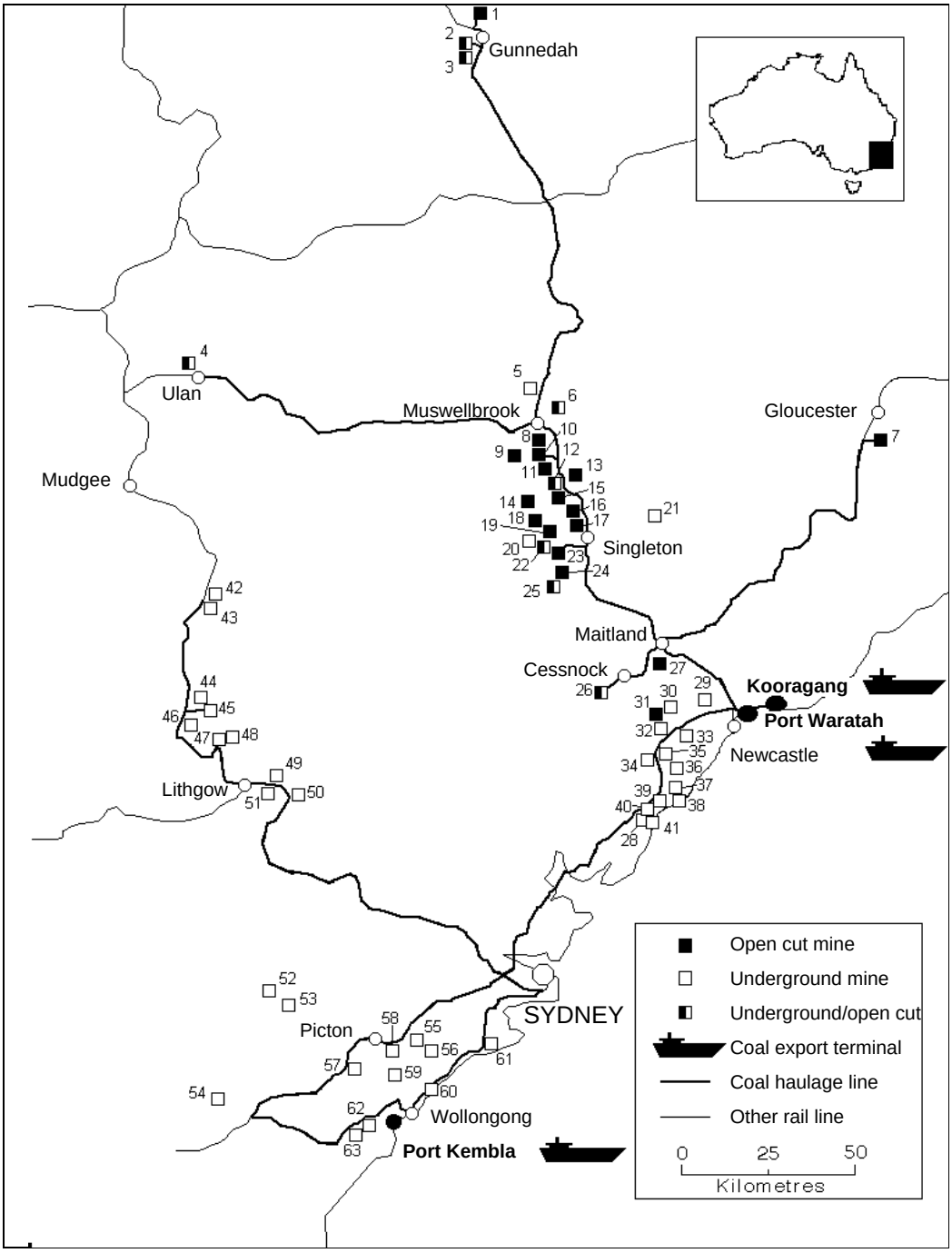
Black coal occurs in the Tasmanian Basin in the Fingal Valley. Demonstrated in-situ resources are 530 Mt of thermal coal with high ash and low sulphur content. The coal mining industry in Tasmania is focused on domestic supply only.

Figure C1.1: **Australia's major coal basins**



Source: Department of Primary Industries and Energy internet site.

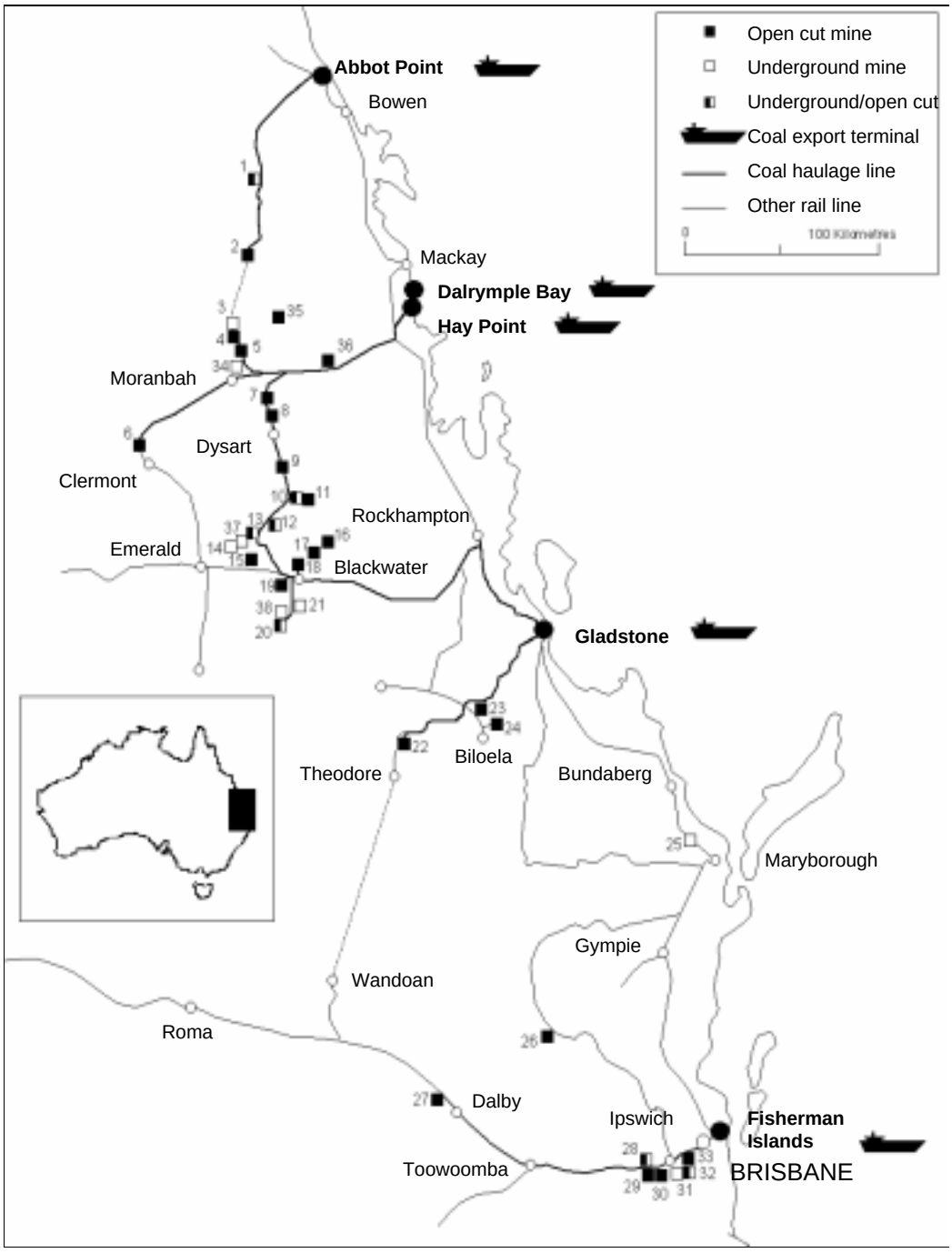
Figure C1.2: **NSW coal mines**[a]



a Mines operating in 1996–97. Mines may have opened, closed or changed mining method subsequently.

Source: Joint Coal Board.

Figure C1.3: **Queensland coal mines**[a]



a Mines operating in 1996–97. Mines may have opened, closed or changed mining method subsequently.

Source: Queensland Coal Board.

NSW mines

1	Vickery	23	Warkworth No. 1	45	Invincible
2	Gunnedah	24	Mount Thorley	46	Ivanhoe No. 2
3	Preston Extended	25	Saxonvale/South Bulga	47	Springvale
4	Ulan	26	Pelton/Ellalong	48	Angus Place
5	Dartbrook	27	Bloomfield	49	Clarence
6	Muswellbrook No. 2	28	Munmorah	50	Canyon
7	Stratford	29	Gretley	51	Blue Mountains
8	Bayswater No. 2	30	West Wallsend	52	Brimstone
9	Bayswater No. 3	31	Westside	53	Oakdale
10	Drayton	32	Newstan	54	Berrima
11	Liddell	33	Teralba	55	Appin
12	Cumnock No. 1	34	Cooranbong	56	West Cliff
13	Mount Owen	35	Awaba	57	Tahmoor
14	Howick	36	Myuna	58	Tower
15	Ravensworth/Narama	37	Wallarah	59	Cordeaux
16	Camberwell	38	Moonee	60	South Bulli
17	Rixs Creek	39	Chain Valley	61	Metropolitan
18	Hunter Valley No. 1	40	Wyee	62	Elouera
19	Lemington	41	Endeavour	63	Avon
20	United	42	Kandos No. 3		
21	Great Greta	43	Charbon		
22	Wambo	44	Baal Bone		

Queensland mines

1	Collinsville	15	Ensham	29	Ebenezer
2	Newlands	16	Yarrabee	30	Jeebropilly
3	North Goonyella	17	Jellinbah East	31	New Hill
4	Riverside	18	Curragh	32	New Hope
5	Goonyella	19	Blackwater	33	Rhondda
6	Blair Athol	20	South Blackwater	34	Moranbah North
7	Peak Downs	21	Cook	35	Burton
8	Saraji	22	Moura	36	South Walker
9	Norwich Park	23	Boundary Hill	37	Crinum
10	German Creek	24	Callide	38	Kenmare
11	German Creek East	25	Burgowan		
12	Oaky Creek	26	Meandu		
13	Gregory	27	Wilkie Creek		
14	Gordonstone	28	Oakleigh		

D THE INTERNATIONAL COAL MARKET

This appendix examines the international trade in black coal. It discusses supply, demand, trade barriers and the various arrangements under which coal is sold internationally.

D.1 The coal trade

Coal's use, both as an input to the steel industry and as a source of energy, has ensured it a major role in most countries' industrialisation. Being expensive to transport and store, the majority of world black coal production has been consumed within 50 km of the mine. However, as industrialisation has spread, trade in coking and thermal coal has increased. Three recent events have had a significant impact on international coal trade.

First, the oil shocks of 1973 and 1979 increased demand for thermal coal as prices for fuel oil increased. Many nations converted power stations from oil to coal and, as a result, thermal coal became a widely traded commodity. Second, the European coal industry declined as economic resources were depleted and subsidies for domestic industries were reduced. Third, the industrialisation of Asia caused that region to become the largest destination for traded coal.

In 1996, nearly four billion tonnes of black coal were produced globally, 88 per cent being used in the country in which it was produced. Australia supplied around one third of the 479 million tonnes (Mt) of black coal which was traded in 1996.

Over 92 per cent (440 Mt) of coal traded on the international market was transported by ship (IEA, 1997).

D.2 Supply

Coal deposits are widespread and many countries have coal mining industries. Nineteen major coal deposits are expected to produce over 90 per cent of the world's black coal output between 1990 and 2010 (IEA 1993b). These coalfields are expected to produce more than 20 Mt a year until 2010 (see Figure D.1).

Figure D.1: **The World's major coal deposits**

a	Western Canada	h	Colombia/Venezuela	o	Ranigani/Jharia, India
b	Western USA	i	Donetsk, FSU	p	Kalimantan, Indonesia
c	Illinois, USA	j	Pechora, FSU	q	Bowen, Australia
d	Appalachian, USA	k	Karaganda, FSU	r	Sydney, Australia
e	East Pennine, UK	l	Ekibastuz, FSU	s	Karoo, South Africa
f	Ruhr, Germany	m	Kuznetsk, FSU		
g	Upper Silesia, Poland	n	China		

Source: IEA (1993b).

Countries with large domestic coal markets which consume the majority or all of domestic production include the United States, China and countries of the former Soviet Union (FSU). These countries contain approximately 55 per cent of the world's economically recoverable reserves. While they do not dominate the export market, they have the capacity to release excess domestic supplies to the world market in response to increasing prices. In China and the FSU countries, this capacity has been limited by infrastructure bottlenecks (see Chapter 2).

Other major suppliers to the world market are countries which have large domestic resources but consume little themselves. This group includes Australia, Indonesia, South Africa, Poland, Colombia and Canada. These countries have emerged as major suppliers of thermal coal and/or coking coal. Since 1985, Australia has been the world's largest exporter of black coal.

Table D.1 provides international production and export data for the major black coal producing nations for 1980 and 1996.

Table D.1: **World production and exports, 1980 and 1996[a]** (Mt)

Country/Region	*1980*		*1996*	
	Production	*Exports*	*Production*	*Exports*
FSU countries	553	29	308	22
Poland	193	31	138	27
Germany	94	13	53	1
UK	130	4	50	1
Czech Republic	18	7	10	7
Other Europe	57	2	28	4
Total Europe	**1 045**	**86**	**587**	**62**
Colombia	4	0	30	25
Venezuela	0	0	6	4
Other South America	7	0	5	na
Total South America	**11**	**0**	**41**	**na**
US	710	83	878	83
Canada	20	15	40	35
Other North America	3	0	2	0
Total North America	**733**	**99**	**920**	**118**
China	620	6	1 375	30
India	114	0	271	0
Indonesia	0	0	45	36
Other Asia	83	1	54	na
Total Asia	**818**	**7**	**1 745**	**na**
South Africa	115	28	208	59.5
Other Africa	5	0	8	na
Total Africa	**120**	**29**	**216**	**na**
Australia	72	43	195	139
Other Oceania	2	0	2	2
Total Oceania	**74**	**43**	**197**	**140**
World	**2 802**	**264**	**3 705**	**479**

a Preliminary figures. Totals and sub-totals may not correspond because of rounding errors.
na Not available.
Source: IEA (1997).

D.3 Demand

Economies which have no domestic coal resources, or uneconomic or low quality resources, are the major customers of coal exporters. This group includes many European countries, Brazil, Japan, the Republic of Korea (ROK), Taiwan and India.

Since the 1960s, the structure of international trade has undergone fundamental change. The decline of the European coal industry and the increasing industrialisation of Asia have provided large markets for exporters of thermal and coking coal (IEA 1997).

Freight costs have contributed to the development of two major regional coal markets (see Table D.2). Asian countries are supplied by Australia, Canada, Indonesia and China because of geographic proximity. Europe is supplied principally by the United States, South Africa, Poland and Colombia.

The link between the two regions is provided by the United States (thermal and coking coal) and South Africa (thermal coal) which can supply to both Europe and Asia (see Box 2.3 in Chapter 2). When prices are high or freight rates particularly low, other exporters, such as Australia, sell coal into both markets. (IEA 1997).

Table D.2 shows the regional nature of the black coal trade in 1996. Over 83 per cent of exported coal was destined for Europe and Asia.

Table D.2: **World exports, by destination, 1996**[a] (Mt)

	Coking coal	*Thermal coal*	*Total black coal*
Asia/Pacific	103	131	233
Europe/Mediterranean	56	110	166
North America	6	14	20
South America	15	6	21
Other	11	28	39
World	**190**	**289**	**479**

a Preliminary figures. Totals may not correspond because of rounding errors.

Source: IEA (1997).

Coking coal

Detailed data for world trade in coking coal have been collected since 1978. From that time, the volume of trade in coking coal has grown by 66 per cent, to reach 190 Mt in 1996.

The three biggest suppliers of coking coal have increased their dominance of the market over the last 15 years. In 1980, Australia, the United States and Canada supplied 68 per cent of coking coal traded internationally. By 1996, they were supplying 81 per cent.

Over this period trading patterns changed, as European and Japanese consumption of coking coal remained stable, while demand in the rest of Asia increased dramatically. In 1980, Europe accounted for 41 per cent of world coking coal imports (56 Mt), Japan for 45 per cent (62 Mt), while the rest of Asia accounted for just 5 per cent (7 Mt). By 1996 these shares had changed substantially: Europe accounted for 29 per cent of world imports (56 Mt), Japan for 34 per cent (66 Mt) and the rest of Asia for 20 per cent (37 Mt).

This shift was due to the rapid industrialisation that took place in Asia during this period. In particular, heavy industry began to migrate to Asia from Europe (IEA 1997). The ROK and Taiwan were the major Asian importers of coking coal apart from Japan.

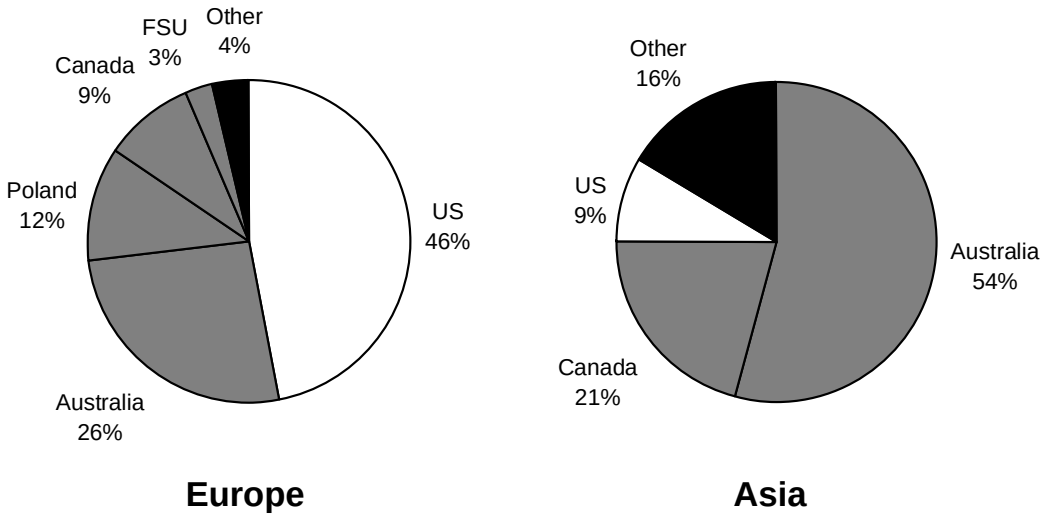
Table D.3 shows the major importers of coking coal between 1980 and 1996. Figure D.2 shows the major suppliers to these regions in 1996.

Table D.3: **Major coking coal importers** (Mt)

	1980	*1985*	*1990*	*1995*	*1996*[a]
Japan	62	69	68	65	66
ROK	4	8	10	17	18
India	1	2	5	9	11
Taiwan	0	3	4	5	6
Other Asia	2	3	8	3	2
UK	2	7	9	7	8
France	11	8	8	7	7
Italy	11	10	9	7	7
Belgium	4	5	7	5	5
Other Europe	28	31	30	28	29
Brazil	4	7	10	12	12
Canada	6	6	5	4	6
Other	1	0	4	23	14

a Preliminary figures.
Source: IEA (1997).

Figure D.2: **Exporters' shares of European and Asian coking coal markets, 1996**



Source: IEA (1997).

Thermal coal

Detailed data for world trade in thermal coal have been collected since 1978. From that time, trade in thermal coal has grown by 229 per cent — more than three times faster than trade in coking coal.

Between 1978 and 1980 imports of thermal coal into Europe increased by 50 per cent and into Asia by 174 per cent, as the 1979 oil price shock immediately affected demand. The long-term effects of the shock saw continued strong growth in thermal coal demand in both Europe and Asia.

The rise in demand has seen an increase in the number of suppliers to the world thermal coal market. In 1980, South Africa, the United States, Poland and the USSR supplied 80 per cent of the world market. In 1996, Australia was the largest exporter of thermal coal. South Africa, the United States, Indonesia and China all exported more than 20 Mt. Poland and the countries of the former Soviet Union were still major suppliers (see Figure D.3).

The rapid increase in demand from Asia has seen its share of world thermal coal imports grow from 14 per cent (16 Mt) in 1980 to 45 per cent (131 Mt) in 1996. This growth has been at the expense of Europe, whose share of thermal coal imports declined from 74 to 38 per cent. However, total tonnage imported into Europe has increased substantially from 84 Mt to 109 Mt.

Japan was the world's largest importer of thermal coal in 1996 (see Table D.4). Large amounts of thermal coal also went to the ROK, Taiwan, Germany and

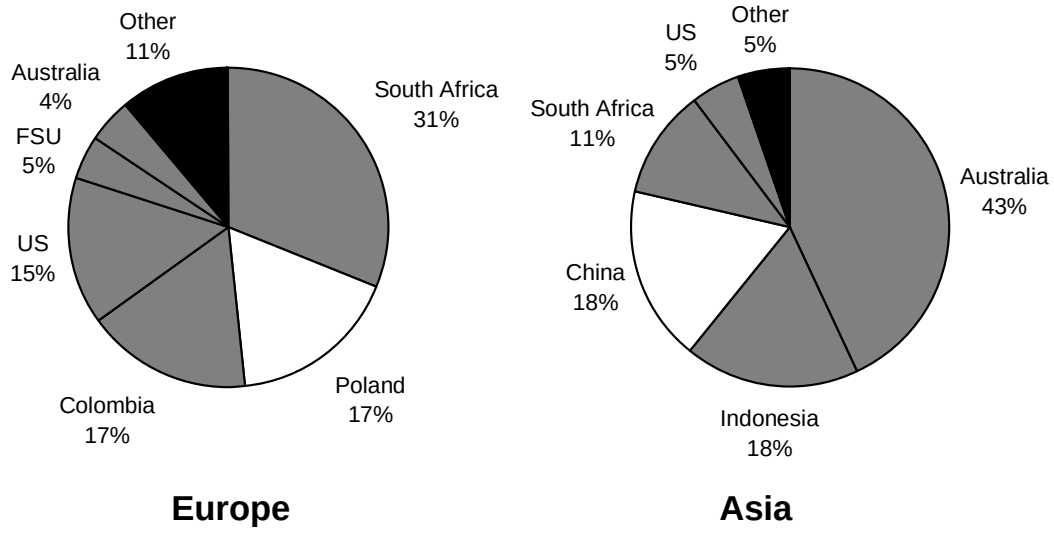
Denmark. Together these five economies accounted for over 48 per cent of world imports.

Table D.4: **Major thermal coal importers** (Mt)

	1980	*1985*	*1990*	*1995*	*1996*[a]
Japan	6	24	36	57	61
ROK	2	10	12	27	28
Taiwan	2	7	14	25	25
Other Asia	6	16	19	17	17
Germany	10	13	13	14	14
Denmark	6	10	13	13	13
Netherlands	2	4	7	12	12
Italy	3	6	12	11	10
UK	5	6	6	9	9
Spain	2	4	6	10	9
Belgium	6	5	8	9	8
Other Europe	50	54	45	37	35
Other	13	17	28	36	48

a Preliminary figures.
Source: IEA (1997).

Figure D.3: **Exporters' shares of European and Asian thermal coal markets, 1996**



Source: IEA (1997).

D.4 Trade barriers

Barriers to trade in coal are low compared with those applying to agricultural products and many manufactured goods. Most major coal importers have low or no barriers to coal imports. For example, Japan, the ROK and Taiwan, which together account for 45 per cent of world black coal imports, have tariffs below two per cent and negligible subsidies.

Nevertheless, some countries provide assistance to their domestic coal industries. This assistance reduces the size of markets available to coal exporters and was a source of concern for inquiry participants.

D.4.1 Tariffs

Tariffs on coal exist in various countries of interest to Australian exporters. In addition to uniformly applied tariffs, which reduce total coal trade, trade blocs and preferential tariffs can cause trade diversion. The Commonwealth Department of Primary Industries and Energy explained how this can damage Australia's coal exports:

> ... while uniform tariffs add to costs, they are often not discriminatory because all coal exporters to the given market will be forced to factor tariffs into their prices. Preferential tariff arrangements can be far more damaging, in that they are usually linked to membership of trade blocs, or bilateral trade arrangements ... The net result is that Australian coal exporters can be disadvantaged in, or even forced out of markets because a coal competitor has preferential access to a market. (sub. 43, p. 11)

Table D.5 provides a list of coal import tariffs, including those applying under preferential regional trade agreements.

D.4.2 Non-tariff barriers

Many countries also provide subsidies and other forms of non-tariff assistance to their domestic coal industries. In most cases, this assistance is provided to facilitate regional adjustment following industry rationalisation and market deregulation. As such, most programs are winding down and are expected to be removed by 2005. The major programs are outlined below.

Table D.5: **Tariffs on black coal imports**

Country	*Applied actual rate*[a]	*Comments*
Bulgaria	5%	Has offered to remove tariffs on coking coal to gain access to the WTO.
Hungary	4.5%	Actual tariff varies between 0 and 15% depending on type of coal and final usage.
Poland	12%	Poland has concessional duties for most other European countries.
Turkey	2.8-3%	High standard coking coal exempt.
Brazil	2%	Imports from Mercosur countries (Colombia and Venezuela) are duty free.
Chile	11%	Imports of thermal coal from Canada are duty free. Concessions are offered to Colombian coal.
Colombia	5%	Preferential tariffs for Latin American countries.
Venezuela	1%	No duty for Andean Pact countries.
Bangladesh	10%	
China	18%	Has offered to lower tariffs for all coal to 6% to gain access to WTO. Coals that are not available domestically enjoy tariff concessions.
Egypt	5%	
India	Thermal 15% (10%) Coking 8% (3%)	Base tariff rates in parentheses. In addition, duties totalling 5% were introduced in 1997 as a one-off revenue-raising measure, which will lapse automatically in early 1999.
Indonesia	5%	
Republic of Korea	1%	Temporary import duty, concessions apply.
Malaysia	5%	ASEAN members exempt from duty.
Pakistan	20%	
Papua New Guinea	11%	
Philippines	20%	ASEAN preferential tariff 13%. Tariffs to be reduced to 3% by 2000.
Thailand	1%	
Vietnam	2%	
European Union, Japan, Taiwan	none	

a Actual tariff rate currently applied to black coal imports, expressed as a percentage of fob import value.

Source: Department of Primary Industries and Energy, sub. 43, Attachment 1.

European Union

European Union Member States wishing to provide assistance to high cost coal mines must present an activity reduction plan to the European Commission. Plans are approved only if the assistance addresses social and regional problems created by the reduction in inefficient coal production. Large subsidies are paid to the French, Spanish and German coal industries. The European Commission has stated that its target is to remove these subsidies by 2005.

Approved State aid to the French coal industry was very large in 1996, amounting to 4.5 billion francs ($A1.2 billion).[1] However, the IEA (1997) stated that: "coal exploitation will cease completely in France in 2005" (p. I.165).

Spain continues to have some of the highest subsidies in Europe. Government assistance to the coal industry amounted to over $US700 million ($A1.1 billion) in 1997 and a further $US5.9 billion ($A9.5 billion) has been allocated to the industry between 1998 and 2005. Most quantitative restrictions on imports will be removed in 1998 but 15 per cent of the domestic market will be reserved for the domestic industry (compared with 40 per cent at present). The IEA (1997) noted that:

> Under a recent agreement negotiated between trade unions and the Spanish Government, [black] coal production will fall from 18 Mt in 1997 to 13 Mt in 2005. (p. I.167)

Spain's coal plan for 1998 to 2005 was approved recently by the European Commission (ICR 1998g).

In Germany, coal import quotas and the levy on electricity consumption, imposed to subsidise domestic coal purchases, were abolished in 1995. Since 1996, electricity producers have been free to choose their sources of coal supply. Subsidies now come from the federal budget. Current plans reduce subsidies from DM9.25 billion ($A8.4 billion) in 1998 to DM5.5 billion ($A5 billion) in 2005. Over that period, accumulated subsidies are expected to amount to more than DM61 billion ($A55 billion). The IEA (1997) stated that: "by 2005, about ten or eleven mines are expected to be in operation, producing about 30 Mt per year" (p. I.166). While German production should halve over the period, subsidies on a per tonne basis will remain large in 2005.

German subsidies for 1997 also were approved recently by the European Commission. However, the decision is the subject of appeal by several UK coal

[1] Exchange rates are the average of the buy/sell price as quoted on the 29 May 1998. One Australian dollar bought 62 US cents, 3.37 francs and 1.1 DM.

producers and the UK Government is seeking to block the approval of future German subsidies in the European Commission (ICR 1998g).

Eastern Europe and the Former Soviet Union

Previously under tight State control and subject to cross-subsidies and price controls, the coal industries of the former communist bloc are being restructured. While these economies maintain subsidies for their domestic industries, most are committed to non-subsidised production (IEA 1997). These subsidies are used to close non-viable mines, provide social support to unemployed miners and clean up environmental damage. Many of these economies have also removed price controls and opened their markets to imports. As inefficient mines are being closed and efficient mines are being privatised, production is falling and imports are growing (IEA 1997).

A good example of this restructuring is provided by Russia. It committed $US1.1 billion ($A1.8 billion) for subsidies in 1997. However, subsidy payments are intended to cease by 2000. The International Coal Report (1998c) reported that of the 140 mines declared non-viable in 1993, 94 had been closed by the end of 1997 leaving 46 to be closed during 1998 and 1999. No viable mines received subsidies.

Asia

Japan's two remaining mines are expected to close once subsidies are removed in 2002.

In India, price controls for coal above a calorific value of 4200 kcal/kg were removed in 1997. Other price controls will remain in force until 2000. Limited foreign investment in Indian coal companies has been allowed since 1997.

China's current five year plan for the domestic coal industry assigns $US120 million ($A190 million) for subsidies to the state coal mining sector and provides $US360 million ($A580 million) in soft loans. No subsidies are paid to private or joint venture mines (Mining Journal 1997).

D.4.3 Steel

Tariff protection and subsidies provided to industries which use coal as an input also change the pattern of coal consumption around the world. In particular, assistance to steel industries will tend to increase coking and PCI coal exports to those countries.

For example, Japan, the ROK and Taiwan, which collectively accounted for 52 per cent of 1997 Asian crude steel production, have tariffs on iron and steel

products that range from 0–8 per cent, 1–8 per cent and 0–15 per cent, respectively.

An agreement to eliminate tariffs on steel was reached during the Uruguay Round of GATT. This agreement included the major steel producers — Japan, the United States, Canada and the European Union (DFAT 1993). However, significant non-tariff barriers for steel, such as anti-dumping measures, still exist in many countries.

D.5 Sales mechanisms

There are essentially three ways in which coal is bought and sold:

- by long-term contract;
- by tender; and
- on the spot market.

D.5.1 Long-term contracts

During the 1960s, Australia began supplying coking coal to Japan through the use of long-term contracts. One of the main reasons for the development of long-term contracts for coal trade was to provide a degree of security for new mines, thereby reducing the risk incurred by financiers. These contracts also provided security for buyers as price, quality and quantity were clearly specified.

Initially, long-term contracts (for 10 to 15 years) set a base price at the completion of negotiations, which was to be escalated on the basis of cost changes, and reviewed after a set period. However, due to divergence between the 'market' price of coal (the price of equivalent coal on the spot market and under newer contracts) and the contract price during the oil price shocks of the 1970s, none of these long-term contracts maintained their base price provisions for more than a few years. Instead, annual negotiations to determine price, tonnage and quality characteristics became the norm. Often contracts included options for increasing or decreasing tonnage within a certain range.

Relationships between buyers and sellers continued virtually unchanged once the formal long-term contracts expired. For example, most Australian mines established under long-term contracts with Japanese customers continued to sell to these customers after the expiry of the contracts.

Contract arrangements were not used only for trade in the Japanese market. Other Asian buyers, especially Korean and Taiwanese buyers, also purchased

on the basis of long-term contracts with long-established suppliers and annual negotiations on price and quantity.

Benchmark pricing in the coal industry

Throughout the 1980s and early 1990s, the annual contract negotiations between Japanese buyers and their suppliers were the most significant negotiations in the market for traded coal. The prices determined in these negotiations reflected the state of demand and supply and helped to establish market prices which were reflected in other contracts and tenders.

The Japanese steel mills, operating in a coordinated manner and collectively known as the JSM, negotiated prices for coking coal. One of the steel mills would be appointed as the lead negotiator for the initial contracts with producers. Prices in subsequent contracts would be based on these 'benchmark prices', adjusted for coal quality. The Japanese power utilities (JPU) also approached their contract negotiations as a single entity, again with one or two of them chosen to represent the JPU in negotiations with thermal coal producers from a particular country.

In contrast, no similar collaboration occurred among buyers in the European coal market. With regard to contracting in the European market, ABARE (1993) said:

> In the European market, prices are negotiated between buyers and major suppliers such as companies in the United States and South Africa. There is no formal collective buying arrangement, similar to that of the JSM, in the European market. (p. 18)

However, the 'benchmark pricing system' for coking coal has broken down. The JSM's collective negotiation of prices was officially abandoned for the JFY 1997 negotiations in favour of individual negotiations with suppliers. ABARE (1997e) stated:

> For coal contract negotiations for JFY 1996, the Japanese steel mills replaced the benchmark coal price system with the 'fair treatment system' [now known as the individual negotiation method]. Under the new system, each coal company negotiates with individual steel mills over coal quality, price and quantity. (p249)

More recently, the 'benchmark pricing system' has broken down in the thermal coal market. For JFY 1998, the Japanese power utilities (JPU) have discontinued collective negotiations in favour of individual bargaining with suppliers and the issuing of tenders. The International Coal Report (1998f) explained:

> A new benchmark of sorts emerged — $34.50 basis 6,700kc GAD. ... Chubu itself is believed to be supporting a view that the new price is not a benchmark, but that

> it is a price for Chubu and that the company doesn't much bother what the rest of the industry does [Chubu was the JPU's lead negotiator with Australian suppliers].
>
> One sign that this benchmark is no such thing comes from the action of Japan's biggest coal using regional power company, Tohoku ... Tohoku has followed the Chubu settlement by calling on all its Australian suppliers to make proposals [instead of adopting the price established following Chubu's settlement]. (p19)

However, one participant argued that collective negotiations by Japanese buyers have continued informally despite the breakdown of 'benchmark pricing'. Asia Pacific Strategy stated:

> I'm very sceptical that the abandonment of benchmarking is going to cause any real change to this behavioural characteristic [forming buying cartels], it's almost a national characteristic in as far as the Japanese negotiators are concerned. They compete in their home markets but when they're dealing with a foreign supplier, they seem to naturally create a monopsony or an oligopsony. (trans.p. 166)

This view conflicts with evidence provided by participants and industry information. For example, Camberwell Coal has said that it had negotiated different prices with each of the six Japanese steel mills it supplies (sub. 13, p. 1). Likewise, the Japanese utilities Chubu, Tohoku, Chugoku, Shikoku and Hokuriku have individually invited proposals from suppliers for contract settlements for the first time and early indications suggest settled price ranges are different for each utility (Australian Coal Report 1998a, 1998b and ICR 1998f).

D.5.2 Tenders

The letting of major tenders for coal is a relatively new feature of the international coal trade. However, tenders are employed by increasing numbers of large steel makers, State-owned power utilities and the new independent power producers in the Asian region. Major thermal coal tenders include those of Taipower, the State-owned Taiwanese power utility, and Kepco, its ROK equivalent.

Generally, for an open tender, the buyer determines a detailed specification for the coal required and the criteria for evaluating tenders. Current Taipower contracts can be one to seven years in duration and are usually for around 500 000 tonnes a year. These open tenders have minimum quality specifications which are tight but not mine-specific (Taiwan Power Company, Invitation for Bid No. 87-ON-L1102). These broad specifications increase competition amongst sellers while maintaining the quality of the coal the buyer is purchasing.

D.5.3 Spot sales

In recent decades, the spot market was used by producers of both thermal and coking coal to sell coal that was surplus to contract requirements or does not meet the quality standards set in contracts. For buyers, the spot market offers generally lower prices than those negotiated under contracts. However, spot buyers take the risk that substantially higher prices may have to be paid in periods of high demand or low supply. This risk can be offset by maintaining stockpiles or developing ready access to alternatives. There is no futures market currently operating for black coal.

There are a number of types of transactions that make up what is known as the spot market. An example is Taipower's three month tenders. These consist of a three month delivery schedule of shipments (usually eight to twelve vessels of 65 000 tonnes). Suppliers bid for as many of the shipments as they desire, having to fulfil the quality specifications and delivery times. A shipment is awarded on price (Taiwan Power Company, Invitation for Bid No. TPC8103).

However, over recent years, the use of the spot market has become more widespread and is no longer a function solely of surplus coal over contract supplies. Japanese customers are now buying a greater share of their coal on the spot market or via spot tenders. The Commonwealth Department of Primary Industries and Energy made a conservative estimate of the increase in spot purchasing:

> ... about 4.4 Mt to 4.8 Mt of thermal coal [6–7 per cent of Japanese imports] is likely to be purchased by the Japanese utilities on the spot market in JFY 97, a substantial increase from about 3 Mt in JFY 96. Industry sources suggest that one major utility, Chugoku, has indicated a willingness to procure over 20% of its tonnage this way during JFY 97.(sub. 43, p. 15)

The Australian Coal Report (1998b) states that:

> Recent estimates from Japan suggest that about 8.5 Mt of thermal coal will be bought through tenders and spot purchases in JFY 1998. ... Proportionately, 19.5% of the estimated 44.0 Mt to be bought by Japanese utilities in JFY 1998 will be by this method. Last year it was 15.75%.

This trend is also apparent in other major Asian coal importers. For example, Kepco has also indicated a willingness to increase its share of spot sales. The International Coal Report (1997a) recently reported on Kepco's purchasing policies:

> Kepco, currently tendering for 600 000t, is planning regular spot tenders in 1998, possibly every month ... The company has decided to lean more heavily on spot purchases, following the very low price levels seen in recent trades.
>
> ... [These low prices] have persuaded Kepco to abandon its rigid contract-only buying policies. (p. 13)

E HISTORY OF INDUSTRIAL RELATIONS IN THE AUSTRALIAN BLACK COAL INDUSTRY

The history of industrial relations and trade unions in the black coal mining industry revolves around industrial disputation and government intervention in the form of specialist tribunals. The following summary draws heavily on the work of Martin et al (1993), Mumford (1993) and Turner (1982).

E.1 Pre-Second World War

The Newcastle convict settlement provided almost all of the initial workforce for the growth in black coal mining that occurred around Newcastle from 1799. However, convict labour was viewed as too costly and was gradually replaced by migrant miners who required less supervision. By 1847, there were few remaining convict miners. Trade unionism was imported to the NSW coal fields with the early migrant miners between 1839 and 1847. The formation of miners' clubs followed the expansion of mining. The first union emerged in 1856 at the Newcastle Coal and Copper Mine. By the 1850s, trade unionism had become a major force in the coal mining industry, with the formation of a district union in Newcastle in 1860.

The first major industrial stoppages by workers occurred in 1861 and 1862. These resulted from proprietors' attempts to form an association to lower wages. An attempt to incorporate the settlement of disputes by arbitration and wage fixation was made during the resolution of a 1873 strike.

Periods of declining market conditions tended to exacerbate the poor industrial relations climate as miners' wage claims were resisted by employers. A general strike in 1888 was marked by attacks on non-union labourers, demonstrations, arrests and prison sentences.

A Royal Commission into the 1888 strike in 1890 found that the level of disputation, as evidenced by strikes, was accentuated by the then existing arbitral systems. In response, both State and Commonwealth governments endeavoured to resolve conflict in the coal mining industry by regulating the processes of industrial relations. Provision for an arbitration court was made under *The NSW Trades Disputes Conciliation and Arbitration Act 1892*. A Federal system of conciliation and arbitration was established in 1907.

As with many attempts at regulating the industry, government arbitration was met often by the refusal of both the employers and unions to abide by rulings and the identification of legal loopholes enabling the avoidance of these rulings. The government arbitration system also failed to lower the high level of disputation and, in the years following, the level of industrial action escalated. The NSW coal industry had 26 strikes between July 1908 and August 1911, each of which was settled outside arbitration.

The Australian Coal and Shale Employees Federation, otherwise known as the Miners' Federation, was registered federally in 1913 from State-based unions. At that time, it was the dominant union in the Australian coal mining industry. By 1928, it covered an estimated 83 per cent of the industry's employees.

The first national coal mining stoppage occurred in November 1916 over demands for the eight hour day to apply to all mines across NSW. Until 1950, general industrial turmoil was evident in the black coal industry (see Section E.3).

Causes of strikes ranged from changes in work practices, due to the introduction of electricity and mechanisation (1907), to the promotion of socialisation and nationalisation (1909). The NSW Government's decision to introduce non-union labour into the Rothbury mine, during the 1929–30 strike, caused unprecedented violence, resulting in the death of one miner. Strikes resulted in large revenue losses for owners, the loss of domestic contracts and damage to the coal export trade.

E.2 The Second World War

During the Second World War, a series of legislative measures was introduced to ensure that the supply of coal needed for the war effort was delivered reliably. Coal was needed for electricity generation, gas production and steel production. The legislation failed to achieve this purpose (see Box E.1).

The Commonwealth Government appointed Davidson Commission of 1945 found that the lack of discipline that existed in the coal industry could be attributed to:

- weak and divided leadership within the Miners' Federation and antagonism between communist and non-communist mine workers;
- attempts to weaken and abolish compulsory arbitration to enable powerful unions to dictate terms to the industry, as well as the success of nearly all strikes in gaining some concessions;

- the reluctance of the Commonwealth Government to enforce existing laws against strike action and the appeasement of union demands under the threat of industrial action; and
- the Miners' Federation's opposition to dismissals regardless of the reason (Davidson 1946).

Box E.1: **The black coal industry during the Second World War**

The period during the Second World War was characterised by critical shortages of coal for Australia's war effort and near disastrous levels of industrial disputation in the black coal industry. The Government made numerous attempts to decrease the level of industrial unrest through a series of tribunals. That all were unsuccessful, typified the outcome of government intervention until the settlement of the 1949 general strike.

These attempts included the "exhortations" of the 1939 Royal Commission, for miners to discontinue their use of collective strength and management to behave "impeccably" as industrial problems continued unabated.

In February 1941, a Commonwealth Control Board was established. It was replaced in November 1941, under national security regulations, by a Conciliation Commission. Miners' demands for the establishment of a pension fund, the removal of penalties for stoppages and refusing to work a half Saturday and the authorisation of pit top meetings were all granted. However, the high level of industrial disputes continued.

Prime Minister Curtin arranged for a special conference in May 1942. From this meeting the Canberra Code emerged. Again there was agreement between unions and mine owners to cooperate and maintain discipline in the industry. Pit committees were established to prevent stoppages and increase the production of coal. However, the number of disputes continued to increase and coal production fell between 1942 and 1943.

Further legislation established a Central Coal Authority (*The National Security Act 1943*) and, a year later, provided for a Coal Commissioner to assume responsibility for the control of any mine in the interest of defence (*The Coal Production (War Time) Act No. 1 1944*).

Throughout this period of intense coal shortages it was estimated that disruptions in coal mining lowered production by 23 per cent. Alternatively, 18 per cent of the coal labour force would have been available for other tasks to aid the war efforts.

Source: Martin et al (1993).

E.3 Post-Second World War

The Joint Coal Board (JCB) was formed in 1946 as a result of the *New South Wales Coal Industry Act 1946* and the *Commonwealth Coal Industry Act 1946*. The JCB was established to address problems in the industry, especially the acute shortage of coal. Its aims included the rationalisation of the industry and its resources, safeguarding health, and the promotion of mechanisation.

This joint legislation also made provision for the establishment of the Coal Industry Tribunal (CIT). The CIT was granted both the Commonwealth powers of the Industrial Relations Commission and the State powers of the Industrial Commission of New South Wales, however, there was no right of appeal. As such, the CIT was responsible for determining the wages and employment conditions for the majority of employees in the NSW black coal industry, as well as Queensland and Tasmania by virtue of the Commonwealth Act.

From 1946 industrial disputes in the black coal industry were considered and determined by a two tiered arbitral system which was entirely separate from the mainstream Commonwealth and State industrial relations systems. The first tier involved the CIT, while the second tier was formed by Local Coal Authorities in NSW, and the Board of Reference in Queensland. The two tiers were distinguished according to the matters they dealt with, industry matters being dealt with by the CIT while local matters were the responsibility of the Authorities and Board. Decisions of both tiers were legally binding and enforceable. In practice, the powers of the CIT in determining disputes, and its definition of industrial disputes and industrial matters, were almost identical to those of the NSW and Commonwealth jurisdictions. Moreover, the CIT generally paid regard to the decisions of the Federal IRC as well as other tribunals.

The general strike of miners that occurred on 26 June, 1949 was the first serious test of the new system. It was precipitated by the CIT's rejection of the "unrealistic" demands presented by the Miners' Federation amidst a national climate of rationed electricity and gas, the closure of factories, and general unrest within the coal, steel and waterfront industries which were dominated by the Communist Party of Australia.

The Government responded to the strike through the use of the army and navy to ensure that some coal was produced. Its effect was to enforce the powers of the CIT. The strike's conclusion brought relative peace to the industry for the next twenty years.

The growth in the export market increased demand for coal in the 1960s and relative industrial peace ensued. However, the jailing of union leader Clarrie O'Shea in 1969 saw disputation return to the coal industry. Campaigns for

higher wages arose again in the 1970s and continued into the 1980s as the price of coal increased rapidly following the oil price shocks. The level of disputation increased to an all time high in 1982, when 74 per cent of lost production was attributable to disputes over wage claims.

The mining division of the Construction, Forestry, Mining and Energy Union (CFMEU) was formed in the early 1990s as a result of the amalgamation of the Miners' Federation with the Federated Mining Mechanics Association of Australia and the Federated Engine Drivers and Firemen's Association (FEDFA). The CFMEU inherited the organisational structure of the Miners' Federation and is the principal union in the black coal mining industry.

The increased national emphasis on enterprise bargaining from 1987 was mirrored in the coal industry, even though it was not formally part of the general Federal system until 1995. The CIT's September 1988 industry restructuring decision responded to deteriorating market conditions by changing "the principles of work practice applicable in the coal industry in a fundamental way" (Smith 1991, p. 25). This decision foreshadowed the Structural Efficiency Principle established by the Australian Industrial Relations Commission (AIRC) as part of its two tier wage principle and involved unions relinquishing established working conditions in order to gain wage increases. In an attempt to contain costs the decision extended shift lengths, introduced all year round production, extended overtime and introduced less prescriptive rostering arrangements. The trend to decentralised bargaining, encouraging a greater focus on productivity, flexibility, and competitiveness at the workplace, was accelerated by the insertion of provisions into the key awards enabling the parties to enter into certified agreements. According to Pragnell (1995), these agreements had many features in common with certified agreements in the Federal system.

In July 1995, the Commonwealth Government's desire to bring the coal industry into the mainstream of industrial relations resulted in the CIT and its associated Local Coal Authorities and State Boards of Reference being abolished and their functions assumed by the AIRC. Awards of the CIT continued as awards of the AIRC, and the AIRC was required to have regard to decisions of the CIT where they were relevant to coal mining matters before the AIRC. However, the *Workplace Relations and Other Legislation Amendment Act 1996* (Cth) repealed this requirement. The coal industry was assigned to a panel of members headed by a presidential member. Commissioners in Sydney and Brisbane deal with coal mining matters.

F BLACK COAL AWARDS

This appendix documents formal work arrangements found in two of the black coal industry awards:

1. *The Coal Mining Industry (Production and Engineering) Interim Consent Award, September 1990* (the P&E Award); and
2. *The Coal Mining Industry (Supervision and Administration) Interim Consent Award, 1990, New South Wales and Tasmania* (the ACSA Award).

These are presented in Tables F.1 and F.2, respectively.

Under s.158A of the former *Industrial Relations Act*, all awards were to be modernised and consolidated. Accordingly, the P&E Award was re-written and re-organised and was handed down in December 1997 as *The Coal Mining Industry (Production and Engineering) Consolidated Award 1997*. Since this process did not involve changes to any entitlements or conditions and many of the submissions for this inquiry refer to specific clauses in the former P&E Award, for this report the Commission continues to refer to the former, rather than the modernised, P&E Award.

At the time of writing, the parties to the P&E Award were involved in the first stage of the two stage award simplification process but this had not been finalised (see Section 4.3.2). Nonetheless, an arbitrated AIRC decision of 26 May 1998 (CN40113 of 1998) does provide some determinations on some those matters over which agreement had not been reached. Two matters are currently subject to appeal. The implications of the negotiations as well as the arbitrated decision are referred to in the appropriate sections throughout Chapters 4, 5 and 6.

The ACSA Award has yet to commence the award simplification process.

Table F.1: **Overview of formal work arrangements in the *Coal Mining Industry (Production and Engineering) Interim Consent Award, September 1990*[a,b]**

Type of arrangement	*Clause*	*Award provision*
Size of the workforce		
Recruitment	*22(c)*	Preference of employment to union members (party to the award) on retrenched members list. Exemptions to its use where: (1) recruiting >20 people; (2) retrenched members have absence record greater than industry average; (3) required skills not among those on list; and (4) when there is no one on the list. Prior to employer using exemption, must discuss with union. Exemptions also apply to some sites and/or employers. In any event, preference is to be given to individuals who are members of a registered union.
	22A	Preference of employment to retrenched members of CFMEU / AMWU / CEPU in Qld at Callide Coalfields (which was exempted from clause 22(c)).
	27	NSW only — employers must select in order of seniority from retrenched members list.
	32	NSW only — apprentices exempt from clauses 22 and 27.
	25	Qld only — employers must give preference of employment to employees who previously were employed in mines owned by the same company. Where clause 25 is not applicable, clause 22(b) states that in Qld preference to be given to CFMEU (UMW) division members.
	Schedule E[c]	For workplaces using open cut work model, employer can hire a new employee for levels 4–6 in production stream or 5–6 in engineering stream only if there are no existing employees at lower levels who are appropriate.
	Schedule F[c]	For workplaces using underground work model, new employee cannot be appointed to levels 5 or 6 if there are not existing employees at lower levels who are suitable.
Retrenchment	*24*	Must adhere to 'last to come, first to go' (LOFO) principle. (See also procedural arrangements.)
	29(g)	Qld only — notice of termination of employment to those on accident pay will not take effect until employee is no longer incapacitated or until the maximum period of 78 weeks from the date of the incapacitation.
	32	NSW only — apprentices exempt from clause 24.
Dismissal	*5(e)*	An employee not to be dismissed for reasons which are harsh, unjust or unreasonable.
	29(g)	NSW only — notice of dismissal to those on accident pay will not take effect until employee is no longer incapacitated or until the maximum period of 78 weeks from the date of the incapacitation.
Retirement		No provision.

Type of arrangement	*Clause*	*Award provision*
Use of casuals and contractors		No provision.
Manning levels		No provision.
Hours of work and roster arrangements		
Ordinary hours	*6(a)*	35 hours per week.
Part-time hours		No provision — except after maternity, paternity or adoption leave up to child's second birthday (see clause 33).
Overtime hours	*12(b&c)*	Employees required to work reasonable overtime hours. At least 10 consecutive hours off duty after completion of overtime.
Shift arrangements	*6(b)* *6(d)*	Maximum shift length 8 hours. Shift length greater than 8 hours only by agreement. Designated starting and finishing places to be agreed except at underground mines where starting and finishing place is the surface.
Roster arrangements	*6(e)* *6(f)*	An employee's place on roster shall not be changed, except on one week's notice or payment at overtime rates. Rostered days off allowed for (see also Annexure 1).
Paid breaks	*7*	30 minute break each shift, taken before 5 hours of work. If work exceeds 5 hours without break, overtime pay is received for work in excess of 5 hours.
	12(e)	For those on 7 hour shifts, provides for a 30 minute meal (or crib) break and meal allowance for more than 1.5 hours of overtime. For each 4 hours of overtime, further crib break and meal allowance or meal. Above clause to be used as a guide for developing agreements on crib breaks among those on more than 7 hour shifts. Such agreements to be registered.
	Annexure 1	New provisions in award on crib breaks do not affect existing agreements.
Annual leave	*15*	Monday–Friday and 6 day roster employees: 5 weeks per year. Roster employees who work holidays and 34 Sundays: 6 weeks per year. Seven day roster employees working 7 hr shifts: 30 ordinary working days. Other rosters: agreement to be reached but guide is 6 weeks for 7 day roster employees and 5 weeks for all other employees. Constraints on when annual leave can be taken — not more than 3 periods, one of which is 3 weeks. Employee to give at least 4 weeks' notice in writing.

Type of arrangement	*Clause*	*Award provision*
Long service leave	*19*	13 weeks after 8 years. Conditions also placed on time of taking leave. Portable long service leave scheme provided interruption between employment not greater than 3 months or by agreement between specified parties.
Sick leave	*16*	15 days per year. Accumulated (without limit), paid out on retirement or retrenchment. No entitlement while off work on workers' compensation matter. Employees must inform employer within 72 hours of commencing sick leave. Employees must produce authenticification upon request for any period of sick leave.
Parental leave	*33*	Covers maternity, paternity and adoption leave. Part-time employment allowed after above leave to the child's second birthday.
Other leave	*16A*	Sick leave, unpaid leave, annual leave, time off in lieu of overtime or make-up time can be used for care of immediate family member.
	18	Paid bereavement leave (2 days) and pressing domestic need leave (1 day).
	14	Public holidays to be observed on specified dates except by agreement, when they can be taken on another date.
	14(h)	7 day, 6 day or 5 day weekend employees may be asked to work on public holidays but for at least two public holidays in one year, no work is to be scheduled.
	17	Jury duty — employees to notify employer as soon as possible of dates required for jury service.
Remuneration and on-costs		
Base pay	*8*	Specifies 9 minimum rates for 107 specified occupations in Groups A to I. Group J specifies 7 rates for open cut work model and Group K specifies 6 rates for underground work model. Provision for youth (up to age 18) wages less than adults.
	10	Except for workers employed on work models, employees who perform mixed functions on a shift will be paid at the highest rate for the whole shift.
	Schedules E&F[c]	Work models establish a wage system based on skills *acquired* rather than tasks actually performed. Transitional arrangements mean that workers remain on previous rates if it is in excess of that established for the skill level under the work model.
	Schedule E[c]	Open cut work model: no restrictions on number of employees obtaining accreditation of skills up to level 3 in production stream and level 4 in engineering stream. Employer, however, can limit number of employees appointed higher levels. Unlike those aged 53 years and over, employees aged under 53 years who elect not to gain additional skills consistent with the work model will not have their pre-existing rate of pay adjusted in line with Award Rates of Pay and are required to have their skills recognised through the skills audit process.

Type of arrangement	*Clause*	*Award provision*
	Schedule F[c]	Underground work model: progression to level 4 automatic upon successful completion of required training modules. Except that requirement to progress from level 3 to 4 is completion of only one training module (and complete other modules as required). Progression to level 4 (production stream) by employer appointment after successful completion of nominated modules. Employer may limit access to levels 5 and 6 (engineering stream) and also need to complete nominated modules successfully. Unlike those who have indicated their intention to retire within 2 years of the implementation of the work model, those employees who elect not to gain additional skills under the work model will not have their pre-existing rate of pay adjusted in line with Award Rates of Pay and are required to have their skills recognised through the skills audit process.
Overtime pay	*12*	Mon–Fri workers: time and a half for first three hours, double time thereafter. Six–seven day roster workers: double time.
	12(c)	If resume work before 10 hours of rest after overtime, then paid at double time during ordinary hours.
	12(d)	Irrespective of whether notified before or after leaving the mine, an employee recalled to work overtime shall be paid for a minimum of 4 hours at the appropriate rate (except in unforeseen circumstances).
Shift pay	*13*	Shift workers receive 115 per cent of ordinary rate. Regular night shift workers receive 125 per cent of ordinary rate. Penalties to be cumulative. If a regular day shift worker works on any other shift for 3 or more consecutive days, they are to be paid at overtime rates for the first of these shifts. If work less than 3 consecutive days, other shifts to be paid at overtime rates (except where the need is caused by failure of another employee to come on duty).
	8(i)	Additional shift payments for afternoon and night shift for open cut employees.
Weekend pay	*14*	Minimum payment is 3 hours. Any work on a Saturday paid at time and a half for first 4 hours, double time thereafter. Any work on a Sunday paid at double time.
Annual leave pay	*15(l&m)*	Paid prior to commencement of leave and paid at 120 per cent of ordinary rate or what would have been earned ordinarily during projected roster (whichever is the greater).
	5(i)	Except on termination, annual leave pay cannot be paid or accepted in lieu of leave.
Bonus pay	*Annexure 1*	Removal of reference to bonus from the award. Bonuses to form part of individual mine agreements.
Sick pay	*16(g)*	Paid at the appropriate rate for the employee's classification for the ordinary hours (to a maximum of 8 hours) of the shift missed due to the employee's illness.
	16(h)	On retrenchment, termination or death, unused sick leave of 10 or more days is paid at the rate of 7 hours/unused day.

Type of arrangement	*Clause*	*Award provision*
Accident pay	*29*	Employees receiving payments under nominated workers' compensation Acts to receive accident pay from employers until the employee is no longer incapacitated or for a maximum period of 78 weeks from the date of the injury. For the first 39 weeks, accident pay is the balance of the weekly amount paid under the relevant Act and what the worker normally would have earned while on sick leave. For the subsequent 39 weeks, accident pay is the balance of the weekly amount paid under the relevant Act and the prescribed incapacitation rate at the time of the injury. Intermittent absences arising from the one injury are cumulative in the assessment of the 78 week limit. NSW only — following the expiry of retrenchment notice, employment will be terminated but employer still has liability to pay accident pay.
Superannuation contributions		No provision.
Severance and retrenchment pay	*26(a)* *26(b)*	One week's pay for each year of service. Exemption applies if within 7 days of termination, the employee could be transferred to another mine (at the same level and in the same local area) owned by the same company. In addition to severance pay, when retrenchment is due to technological change, market forces or diminution of reserves, employee receives two weeks' pay for each year of service. Minimum payment of two ordinary weeks of pay. Exemption applies if within seven days of termination, the employee could be transferred to another mine (at the same level and in the same local area) owned by the same company. Payment should not be greater than the amount the employee would have received if he had remained employed until the age of 60 years. Tribunal can grant relief from obligations of severance and retrenchment pay granted under special circumstances.
Special rates and allowances	*8(h)*	Rates and allowances include — washery, water, longwall (NSW only), shaft sinking or drift driving (NSW only), live sewer work (Qld only), dirty work, erection of scaffolding, first aid officer, first aid attendant, heat, height (Northern District, NSW), timber drawing, boom welding, licensed plumber, height (electrical / mechanical), damage to clothing and tools (electrical / mechanical – FEDFA), confined spaces (electrical / mechanical – FEDFA), shaft work (electrical / mechanical), and underground (electrical / mechanical).
Public holidays	*14(f)* *14(h)*	Employees not working on a public holiday: paid at ordinary rates. Employees working on a public holiday: ordinary hours paid at double time and overtime paid at treble time. Public holidays to be paid at ordinary rates during strike periods.
Working clothes and safety boots	*11*	Employer to provide one pair of safety boots and two sets of outer clothing per year without charge to employee.

Type of arrangement	*Clause*	*Award provision*
Travel	*28*	Employer to reimburse any reasonable transport expense incurred in travelling between home and mine when the mine is shut down. Time spent travelling outside of normal hours between ordinary location of work and temporary location is to be paid for at ordinary rates. If normal means of transport is unavailable, employer to provide transport home or pay for one hour at ordinary rates in lieu. For remote mines, employer and union to reach agreement about travelling allowance. Agreement to be registered.
Training costs	*Schedule E*[c]	All training and travel costs associated with work model to be paid for by employer.
Other on-costs	17	Jury duty — while employee is on jury duty, employer is to reimburse difference between normal pay that would have received while on jury leave and jury attendance pay.
Functions, tasks and skills		
Functions	*34*	Employee-appointed stewards are allowed time during working hours to perform normal union business.
	Schedule E[c]	For workplaces using open cut model, while no limit to employee numbers at level 3, does allow limits to employees accredited with a particular skill within this broad level — such limitations to be advised.
	Schedule F[c]	For workplaces using underground model, intention for cross-skilling between engineering disciplines and between engineering and production streams.
Job and task demarcation	*8*	Nine occupational groups. Workplaces with work models have 6 or 7 bands.
	Schedules E&F[c]	Work models designed to facilitate multi-skilling of workers. For workplaces using the work models, specifically rules out use of seniority principle in daily allocation of tasks.
Training	*32*	Employment of apprentices under relevant State training Acts except where they conflict with conditions set out in this clause.
	Schedules E&F[c]	Work model intention that employees utilise all the skills for which they have been accredited within the relevant stream. No employee is obligated to gain additional skills.
	Schedule E[c]	For workplaces using the open cut work model, longest serving employees to be offered training opportunities.
Qualifications	*Schedules E&F*[c]	Training within work model context to be part of structured and nationally accredited training programs.

Type of arrangement	*Clause*	*Award provision*
Procedural arrangements		
General	*31*	Award should not be read so as to interfere with existing customs and practices (except where specified). Custom and practice are viewed as 'in substance' agreements and hence any change entitles either unions or employers to apply to vary the award accordingly. Also, current award should not interfere with any previous award, order or determination (except where it specifically does so).
Dispute settlement	*5(f)*	Unfair dismissal arrangements.
	21	There should be no stoppages of work during a dispute over interpreting award or during the course of employment. If dispute not settled, it outlines the process for dispute settlement. Discussions along a number of steps between: (1) employee and immediate supervisor, (2) mine union representative and mine representative, (3) mine union representative and mine manager, (4) district official and nominated company official, (5) refer to relevant industrial authority. By agreement between parties, can bypass steps (2)–(4) for speedy resolution.
	30	Establishes Boards of Reference to settle disputes arising from the award and determine matters specifically assigned by the Award. Chaired by a Commissioner of AIRC, members to be 3 each of employer and union representatives. Decisions can be reviewed and altered by Presidential member of the AIRC.
Agreement making	*20*	Can trade-off or substitute provisions but need written consent of district/State secretary of union. Tribunal approval required.
Negotiating change	*23*	Right of entry to not more than two accredited union officials for each union party to the Award.
	23A	Employer's duty to notify employees and their unions of 'significant effects' (defined to include termination of employment; major changes in composition, operation or size of employer's workforce or in the skills required; elimination or diminution of job opportunities, promotion opportunities or job tenure; the alteration of hours of work; the need for retraining or transfer of employees to other work or locations or the restructuring of jobs). Employer's duty to discuss change with employees and their unions. (Discussion to include: introduction of change, likely effect of change on employees and measures to avert or mitigate adverse effects. Employer must give prompt consideration to matters raised by employees or their unions regarding change. Discussions to commence as early as practicable after definite decision made. Employer to provide in writing to employees and their union relevant information about changes. No requirement to disclose information which is inimical to employer's interests.)

Type of arrangement	*Clause*	*Award provision*
Redundancy	*26(b)* *23B*	Four weeks' notice of retrenchment to be given. Employer to hold discussions with employees and their unions. (Discussions to include reasons for proposed terminations, measures to avoid or minimise terminations and measures to mitigate any adverse effects on employees.) Employer to provide in writing to employees and unions information about proposed terminations. No requirement to disclose information which is inimical to employer's interests.
Payment of wages	*9*	To be paid each Friday, unless otherwise agreed.
Work models	*Schedules E&F*[c]	Skills audit to be conducted prior to implementing open cut work model. Changes to national work model to suit individual mine requirements to be negotiated and registered as a clause 20 agreement. Work models to be reviewed by the National Joint Working Party within 3 months of implementation.
	Schedule F[c]	Underground work model not to be implemented until site agreement (which contains certain specified features) is placed before the Tribunal.
Safety management		No provision.

a Award coverage: award applies to persons engaged in work performed in the coal mining industry in NSW, Queensland and Tasmania and is binding upon: employers listed in Schedule A of the award; the CFMEU and its members employed in classes of work or classifications set out in Schedules B, C or D of the award; the Automotive, Food, Metals, Engineering, Printing and Kindred Industries Union and its members employed in the classes of work or classifications set out in Schedule C of the award; and the Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union of Australia and its members employed in the classes of work or classifications set out in Schedule C of the award.

b Occupational coverage ranges across basic semi-skilled work, semi-skilled plant and machine operator, to skilled trades levels.

c Under the 1989 Structural Efficiency Principle, employers and employees in the coal industry agreed (via two National Joint Working Parties) to introduce a new system of work organisation (that is, reducing job demarcations and broadening the classification structure) for production and engineering workers. This led to the development of the so-called open cut work model and the underground work model. However, the actual implementation of the relevant work model at each mine site is voluntary and is subject to the registration of a formal agreement through (and approval by) the CIT (and now the AIRC). Typically, clause 20 of the award has been used as a vehicle for implementing or modifying the relevant work model (Pragnell 1995). Hence, whether some of the formal work arrangements set out in the above table are observed at various mine sites will depend on the adoption (or not) of the relevant work model as set out in Schedules E and F of the award.

Source: *Coal Mining Industry (Production and Engineering) Interim Consent Award, September 1990.*

Table F2: **Overview of formal work arrangements in *The Coal Mining Industry (Supervision and Administration) Interim Consent Award, 1990, New South Wales and Tasmania*[a,b]**

Type of arrangement	*Clause*	*Award provision*
Size of the workforce		
Recruitment		No provision.
Retrenchment	*24(a)*	Preference in retaining employment given to members of the ACSA aged 60 years and under according to length of service at the mine. Second preference to those aged over 60 years according to membership of ACSA and level of seniority.
	24(b)	Possible for individual mine and ACSA to reach a decision regarding retrenchment which might be inconsistent with clause 24(a).
	18(g)	Notice of termination to employees while absent from work on sick leave not to take effect until expiration of the sick leave or the employee is fit for duty, whichever happens first.
Dismissal	*5(d)*	Employer has right to dismiss an employee without notice for refusal of duty, neglect of duty or misconduct and in such cases the wages shall be payable up to the time of dismissal only.
Retirement		No provision.
Use of casuals, and contractors	*6*	Casuals and temporary employment allowed but only upon agreement with ACSA or appropriate industrial authority.
Manning levels		No provision.
Hours of work and roster arrangements		
Ordinary hours	*7(a)*	Employees in Groups A to F: average of 35 hours per week. Employees in Groups G to N: average of 37.5 hours per week. Employees in Groups O to P: average of 40 hours per week. Ordinary hours averaged over 4 weekly period or in the case of 6 and 7 day roster employees, over the length of the roster cycle (or other agreed period). The ordinary working hours of any shift to be worked to be agreed (where no agreement, industrial authority to determine).

Type of arrangement	*Clause*	*Award provision*
Part-time hours		No provision.
Overtime hours	*14(b)*	Agreement may be made to have time off in lieu of overtime at a mutually convenient time.
	14(c)	All employees required to work reasonable overtime.
	14(d)	All employees (except Groups G to P) to have at least 10 hours off duty between work on successive days. If this does not occur, then time off is to be taken without the loss of pay of ordinary hours on the following day. If, however, instructed to resume duty without 10 consecutive hours off then work is to be paid at double time during ordinary hours until released from duty. Following release, employee is entitled to 10 consecutive hours without the loss of ordinary pay.
	14(e)	Overtime worked on call back not to be regarded as overtime for purposes of rest period in clause 14(d) where actual time on the recall is less than 4 hours.
Shift arrangements	*7(b)*	Employer to determine shift length to maximum of 8 ordinary hours. Shifts of more than 8 ordinary hours can be implemented only by agreement.
	7(c)	Number and spread of ordinary shifts can be varied by employer or by order of appropriate industrial authority.
Roster arrangements	*7(d)*	Employee's place on a roster shall not be changed, except with one week's notice of such change or payment at overtime rates.
	7(e)	Rostered days off allowed. Employer to give 4 weeks notice of rostered day off (except by agreement). With agreement of employer, individual employees able to substitute the rostered day off for another day.
Paid breaks	*8*	Crib break of 30 minutes per shift to be counted as working time. Employees in Groups A to F not to work for more than 5 hours without a crib break. If work for more than 5 hours without crib break, employee to be paid for work beyond 5 hours at overtime rates until crib break is taken.
	14(f)	Overtime after 7 ordinary hour shifts — for all employees (except Groups G to P), where overtime work is more than 1.5 hours, unless agreed otherwise, before starting overtime must have a paid meal break of 30 minutes. Unless notified the previous day of overtime, employer to supply a meal or meal allowance (except for those employees who can reasonably go home for a meal). After each 4 hours of overtime worked following a crib break, employees to have a further crib break and either be supplied with a meal or meal allowance.
	14(g)	Overtime after shifts other than 7 ordinary hours — for all employees (except Groups G to P) appropriate arrangements to be agreed to ensure that an employee working overtime is allowed adequate breaks for crib and 14(f) to be used as a guide. Agreement to be registered with the AIRC.

Type of arrangement	*Clause*	*Award provision*
	19	Jury service — employer to reimburse difference between amount paid for attendance at jury and the amount of wage that would have been received in respect of ordinary pay as if the person had not been on jury service. Employee to notify of jury service leave as soon as possible and give proof of attendance.
Annual leave	*17(a)*	Monday to Friday and 6 day roster employees — 5 weeks annual leave, credited on the anniversary of commencement.
	17(b)	Roster employees who work holidays and 34 Sundays per year — 6 weeks annual leave, credited on the anniversary of commencement.
	17(c)	7 day roster employees on 7 ordinary hours shifts — 30 ordinary working days, credited on the anniversary of commencement.
	17(d)	Other roster employees — period of annual leave to be determined by agreement or relevant industrial authority. A guide to be 6 weeks per annum for 7 day roster employees and 5 weeks per annum. Agreement to be registered with AIRC.
	17(e)	Pro-rata leave to be given for employees who worked 7 day, 6 day or 5 day weekend roster during the relevant 12 month period.
	17(f)	Annual leave to be given and taken in not more 3 periods (one of which to be of 3 weeks duration) except those employees who take full accumulation in one period. (Exception possible by agreement.) Employee to give at least 4 weeks notice in writing and allowed to take leave unless, in the opinion of management, the operations will be adversely affected by the granting of leave at that time.
	17(g)	Employees allowed to take leave before right has accrued. If the employee fails to qualify for the leave then employer can recover the pre-payment by deduction from monies payable to the employee.
	17(h)	Public holidays falling during leave period to be added to leave.
	17(m)	Annual leave to accrue at the rate of 3.3654 hours for each completed week of service except where 6 weeks or 30 days annual leave is granted. In the latter case, annual leave to accrue at the rate of 4.0385 hours for each completed week of service.
Long service leave		No provision. See *Long Service Leave (Staff) Award*.
Sick leave	*18(a)*	Upon commencement and every subsequent 12 months, each employee credited with 15 days sick leave.
	18(b)	Unlimited accumulation.
	18(c)	Sick leave taken to be deducted from accumulated sick leave.
	18(d)	No entitlement to sick leave if employee is entitled to workers' compensation.

Type of arrangement	*Clause*	*Award provision*
	18(e)	Employee to notify of inability to attend as soon as possible but no later than end of first shift missed. Employee to prove that absence was on account of illness or injury.
Parental leave	*21*	Maternity leave provisions.
Other leave	*16(d)*	At least 10 public holidays specified per annum.
	16(e)	Possible to reach agreement between management and majority of employees to observe any holiday on a day other that prescribed in Clause 16(d).
	20	Maximum of 2 days paid bereavement leave for death of specified family members (where leave is extended to cover balance of shift if employee notified of death when at work). One day of paid pressing domestic leave.
Remuneration and on-costs		
Base pay	*10*	Minimum rates specified for employees from Group A to Group P. Junior rates specified as percentage of Group A rate. Graduate rates specified as percentage of Group J and K rates. Cannot use the award as a basis for paying employees less than rate currently received (if receiving more than minimum set out in award).
	12	Where employee's work involves mixed functions, minimum wage to be paid is that for the highest relevant rate and for the entire shift concerned.
	5(b)	Employee to lose pay for actual time of non-attendance or non-performance.
Overtime pay	*14(a)*	Monday–Friday employees in Groups A to F: overtime at time and a half for first 3 hours and double time thereafter. All 6 or 7 Day Roster employees and Monday to Friday employees in Groups G to P: all overtime at rate of double time. To calculate overtime under this clause, appropriate weekly rate to be divided by 35. Agreement may be reached to average overtime payments over the length of a defined period. In this case, overtime to be calculated on a pro rata basis.
	14(e)	Call Back — an employee recalled to work overtime (whether notified before or after leaving the mine) after leaving the mine shall be paid for a minimum of 4 hours at appropriate rate for each time recalled. Employee not required to work for full 4 hours if job is completed in a shorter period. (Sub-clause not to apply in cases where it is customary for employee to return to perform a specific job outside their ordinary working hours.)
Shift pay	*10(f)*	Roster employees in Groups G to N working a 6 or 7 day roster, pay to increase by 3.2 per cent and for Groups O and P by 3.4 per cent.
	15(a)	For all time worked on afternoon or night shift, 15 per cent shift premium.

Type of arrangement	*Clause*	*Award provision*
	15(b)	Permanent night shift (that is, night shift only or on night shift for period longer than 4 consecutive weeks or works on a roster which does not give at least one third of the employee's working time off night shift in each roster cycle), 25 per cent shift premium.
	15(c)	Open cut employees additional shift premium — $1.80 per afternoon shift and $3.61 per night shift.
	15(d)	Change of shift pay — all normal day shift employees (except Groups G to P) who are required to work another shift for at least 3 consecutive working days, to be paid at overtime rates for the first shift so worked and thereafter be paid according to appropriate provisions. If required to work for less than 3 consecutive work days, overtime rates to be paid for all afternoon or night work (unless the requirement is caused by the failure of any other employee to come on duty at the proper time).
	15(e)	For 6 and 7 day roster employees — percentages in clauses 15(a) to (d) to be cumulative on any penalty rate prescribed and calculated on the ordinary rate.
Weekend pay	*16(a)*	Unless continuous with work commenced on the previous day, an employee (other than those on ordinary hours of work) called to work on a weekend or public holiday to be paid for at least 3 hours at the appropriate rate (to be calculated by dividing the weekly rate by 35).
	16(b)	For 7 day, 6 day or 5 day weekend roster employees — Saturday work to be paid at time and a half for first 4 hours and double time thereafter.
	16(c)	Sunday work paid at double time.
Annual leave pay	*17(m)*	7 day roster employees — payment to be according to projected roster (including weekend and holiday pay up to double time, shift allowances and any rostered overtime) or at 120 per cent of the employee's ordinary rate (whichever is the greater) 6 day roster employees — payment to be according to project roster (including weekend and holiday pay up to double time, and any rostered overtime); or 120 per cent of the employee's ordinary rate (which ever is the greater). Monday–Friday roster employees — payment to be according to projected roster (including any rostered overtime) or at 120 per cent of employee's ordinary rate whichever is the greater.
	17(i)	Payment in lieu of annual leave not allowed.
	17(k)	Annual leave to be paid on pro-rata basis where employer shuts down the mine or section(s) of a mine. Four weeks notice of shut-down to be given.
	17(l)	Annual leave to be paid in advance on commencement of leave.
Bonus pay		No provision.

Type of arrangement	*Clause*	*Award provision*
Workers' compensation		See Accident Pay provisions (clause 28).
Sick pay	*18(f)*	Payment at appropriate rate for ordinary hours (to a maximum of 8 hours) of the shift missed.
Accident pay	*28*	Employees in receipt of weekly workers' compensation payments (according to the *Workers' Compensation Act 1986, NSW*) are entitled to receive accident pay from employer subject to sub-clauses (a) to (h).
	28(a)	Received until either incapacity ceases or up to 78 weeks from date of injury (whichever occurs first).
	28(b)	For the initial 39 week period, accident pay is the difference between workers' compensation pay and the amount that would have been received if the employee had been on paid sick leave. For the subsequent 39 week period, accident pay is the difference between workers' compensation pay and the rate prescribed for the classification of the incapacitated employee at the day of the injury.
	29(c)	Payment for part weeks to be on a pro-rata basis.
	29(d)	No entitlement to accident pay while on annual leave, long service leave or for paid public holidays.
	29(e)	Where an employee receives a lump sum workers' compensation payment, the employer's liability to pay accident pay ceases on the date of the lump sum payment.
	29(f)	Where an employee recovers damages from the employer or a third party independent of the Act, then the employee must repay the total accident pay received and is not entitled to future accident pay.
	29(g)	Where employment is terminated while on accident pay, the termination shall not take effect until the incapacity ceases or the expiration of the 78 week period above (whichever occurs first). Where employee is retrenched, the employer is still liable to continue accident pay for specified period.
	29(h)	The 78 week period starts from the first day of incapacity for work (which may be subsequent to the date of injury). Intermittent absences arising from the one injury are to be cumulative in the assessment of the 78 week limitation.
Superannuation contributions		No provision.
Severance and retrenchment pay	*26(a)*	Severance pay: 1 week's pay for each completed year of employment. Employer not liable if employee is re-employed in similar or higher permanent position at another mine operated by the same employer within 7 days of date of termination.
	26(b)	Retrenchment pay: where termination is because of technological change, market forces or diminution of reserves, in addition to severance pay, employee to receive 2 ordinary weeks' pay for each completed year of employment with a minimum payment of 2 ordinary weeks' pay. Employer not liable if employee is re-employed in similar or higher

Type of arrangement	*Clause*	*Award provision*
		permanent position at another mine operated by the same employer in the same District within 7 days of date of termination. Maximum entitlement set at amount employee would have received until the age of 60 years.
	26(c)	Under special circumstances employer may be granted relief from obligation to pay retrenchment pay.
	26(b)	Casuals and temporaries not eligible for severance or retrenchment pay.
	17(j)	Annual leave to be paid on pro-rata basis on termination of employee (except by dismissal for wilful misconduct). Annual leave loading not payable pro-rata. Annual leave paid on termination.
	17(h)	Sick leave to be paid out on termination (either through retrenchment, or through mine workers' pension legislation because of age, or through ill health, death) to employees who have accrued ten or more days of unused sick leave paid on the following basis: Group A to F employees — 7 hours of ordinary pay for each day accrued and not taken; Group G to N employees — 7.5 hours of ordinary pay for each day accrued and not taken; and Group O to P employees — 8 hours of ordinary pay for each day accrued and not taken.
Special rates and allowances	*10(g)*	Special rates include: (1) Washery Allowance — in lieu of all other disability allowances except water money; (2) Water Money — for Group A to F employees; (3) Longwall Allowance; (4) First Aid Officer; and (5) First Aid Attendant.
Public holidays	*16(f)*	For employees not working on public holiday — pay is to be at appropriate rate. For those working on public holidays, rate for work during ordinary hours is at double time and rate for overtime on a public holiday is at treble time.
	16(g&h)	Provisions relating to rostered days off and public holidays.
Working clothes and safety boots	*13*	Each employee entitled to one pair of safety boots per year at no charge by employer. Each employee entitled to 2 sets of industrial outer clothing at no charge by employer.
Travel	*27(a)*	Expenses incurred in excess of the normal expenses incurred in travelling between home and the mine will be refunded to employees who are asked (and who do) attend the mine when the mine is on annual leave shutdown.
	27(b)	Under circumstances where the employee is required to work away from usual location, travelling time is to be paid at ordinary rates where travel time is in excess of normal travel time from home to work.
	27(c)	Where employees are asked to work overtime (either pre- or post-shift) and their normal means of transport is unavailable, employer is to provide transport home or pay one hour at ordinary rates in lieu.
	27(d)	When a mine is considered remote, agreement can be reached as to payment of travelling allowance. Such agreement to be registered and become part of the Award.

Type of arrangement	*Clause*	*Award provision*
Training costs		No provision.
Other on-costs	*22*	Housing — where employer requires employee to occupy a mine residence, it is to be provided rent free.
	25	Union representative allowed necessary time during work hours to interview the employer.
Functions, tasks and skills		
Functions	*5(b)*	Employees to perform work reasonably required by the employer, including work which is incidental or peripheral to the employees' main task.
Job and task demarcation	*9*	No new classifications can be created by employer unless by agreement but because of differing mine circumstances not all classifications need to be used at each mine.
	10	85 occupations grouped into 16 broad Groups (A to P) — range from Group A 'Tracer, Surveyors Assistant, Clerk, Stores Clerk, Laboratory Assistant, Technical Assistant, Trainee, and Coal and/or Dust Sampler 1st year of Adult service in the coal mining industry' to Group P 'Undermanager (In Charge)'.
Training		No provision.
Qualifications		No direct provisions except those provided for in clause 10.
Procedural arrangements		
General	*5(a)*	Employment is on a weekly basis.
	11	Wages to be paid each Friday, unless otherwise agreed. When employer elects and employee has reasonable direct access to financial institution(s), wages to be paid direct into specified account of employee. Wages to be paid by cheque where agreed. In absence of agreement to contrary, employer not to keep more than one week's pay in hand.
	29	Provisions to establish Board of Reference in Tasmania under the AIRC.
	30	Except where stated, the Award is not to be read as interfering with existing customs and practices. Customs and practices are viewed as in substance agreements between the parties.
Dispute settlement		No direct provision except indirectly via clause 29, which establishes Boards of Reference.

Type of arrangement	*Clause*	*Award provision*
Agreement making	*31*	Any agreement which proposes to substitute and/or trade-off and/or set off any matters, then any agreement shall not be implemented without the written acceptance of the Branch Secretary of the ACSA. The agreement shall: (1) have a specific term; (2) include the ACSA in any dispute resolution process; and (3) be referred to the AIRC for approval prior to implementation. If the written acceptance of the Branch Secretary is withheld unreasonably, the employer may apply to the Tribunal for approval.
Negotiating change		No provision.
Redundancy	*5(c)*	Employment can be terminated by a week's notice on either side, given at any time during the week or by the payment or forfeiture of a week's wages as the case may be.
	11(e)	Upon termination of employment, wages due paid on last day or forwarded within 72 hours.
	26(b)	Where retrenchment is due to technological change, market forces or diminution of reserves, employer to give employee one month's notice of retrenchment.
Payment of wages		No provision.
Safety management		No provision.

a Award coverage: all coal mining industry employers in the NSW and Tasmania named in Schedule 'A' of the Award in respect of members of the Australian Collieries' Staff Association employed by them, the ACSA and its members.

b Occupations covered by the Award: all professional; semi-professional; supervisory; semi-supervisory (including Deputies); administrative and clerical employees in the coal and oil shale industry.

Source: *The Coal Mining Industry (Supervision and Administration) Interim Consent Award,* 1990, (New South Wales and Tasmania).

G BLACK COAL AGREEMENTS

This appendix sets out the formal arrangements found in eight recent black coal industry agreements, certified under the Federal jurisdiction. All agreements relate to the production and engineering workforce within each mine. They include the following:

- Stratford — brownfield open cut mine (truck and shovel). Owned by Stratford Coal Pty Ltd and operated by Henry Walker Contracting Pty Ltd. Major shareholder: CIM Resources Pty Ltd. Located 95 km north of Newcastle, NSW.
- Burton — brownfield open cut mine (truck and shovel). Owned by Burton Coal Joint Venture. Operated by Thiess Contractors Pty Ltd. Major shareholder: Portman Mining Ltd (95 per cent). Located 40 km northeast of Moranbah, Queensland.
- Ensham — greenfield open cut mine (dragline). Owned by Ensham Resources Pty Ltd. Major shareholder: Idemitsu Kosan (85 per cent). Located 40 km northeast of Emerald, Queensland.
- Muswellbrook — brownfield open cut mine (truck and shovel). Owned by Muswellbrook Coal Company Pty Ltd. Major shareholder: Idemitsu Kosan Co Ltd (100 per cent). Located 5 km northeast of Muswellbrook, NSW.
- Southern Colliery (German Creek) — brownfield underground mine (longwall). Owned by Capricorn Coal Development Joint Venture. Major shareholder: Shell Company of Australia Ltd (47 per cent). Located 70 km northeast of Emerald, Queensland.
- South Bulli — brownfield underground mine (longwall). Owned by Bellambi Collieries Pty Ltd. Located 15 km north of Wollongong, NSW.
- Crinum — greenfield underground mine (longwall). Owned by Broken Hill Proprietary Co Ltd (59 per cent). Located 60 km northeast of Emerald, Queensland.
- Oaky Creek — brownfield open cut mine (dragline). Owned by Oaky Creek Coal Joint Venture. Major shareholder: MIM Holdings Ltd (75 per cent). Located 60 km north of Blackwater, Queensland.

The eight agreements are documented in Tables G.1 to G.3.

Table G.1: **Overview of formal work arrangements in recent black coal mining agreements: Stratford, Burton and Ensham**

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
Size of the work force			
Recruitment	36 — nominally one cleanskin for one current or retrenched miner. Selection based on skills, work history and other standardised prerequisites such as aptitude tests, medical fitness tests and drug and alcohol tests. Positions for retrenched and current mineworkers shall be discussed between the parties prior to employment. Where no suitable current or retrenched mine workers apply and upon agreement with the union, cleanskins shall be considered. 37 — increase in hands — where company decides on an increase in hands former retrenched employees who apply shall be re-engaged on a length of service at the mine basis and according to their respective work stream. Provision for the company and union to reach alternative agreement.	12 — recruitment — Award provisions apply subject to the following: the parties will cooperate fully with a view to the application of equal employment opportunity standards to all recruitment and will not apply artificial barriers that restrict employees being drawn from across the total community. 1 — union coverage — preference of employment in the engagement of labour shall be given to applicants who are members of the CFMEU or who undertake to join the CFMEU within 14 days of accepting employment.	20 — equal employment opportunity — personal merit and criteria related to the effective performance of the job shall determine employment, selection for specific jobs, and career progression.
Retrenchment	26 — parties will endeavour to agree upon method for reduction to occur addressing the following: whether the reduction can be achieved entirely or partly by volunteers; criteria in	No provision — see Award.	5 — security of employment — no forced retrenchments during the life of the agreement except in the event of an unforseen major circumstance beyond the control of Ensham and its employees

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
	selecting employees will include skills, attendance, competence, performance, physical fitness for the role etc; and upon failure to achieve the desired number of volunteers, remaining redundancies will be achieved by agreement. Redundancies determined according to length of service in respective streams upon failure to reach agreement.		preventing Ensham from carrying out the business of coal mining. 20 — equal employment opportunity — personal merit and criteria related to the effective performance of the job shall determine termination of employment.
Dismissal	5.6 — grounds for unfair dismissals same as Award but in addition includes the ground of physical or mental disability.	No provision — see Award.	No provision in Agreement.
Use of casuals, contract employment and contractors	Appendix B — contractors — parties recognise need to engage contractors at various times both on and off site, and that this will not threaten the job security of the workforce. Where contractors are required to perform work normally performed on site the following will apply: at least one week's notice will be given to the appropriate union representative prior to work commencing, and agreement reached on the nature and scope of the work; full use of available site labour should be made; the disputes procedure will be followed where the parties fail to agree on the use of contractors. The company will determine and advise the appropriate union representative of the use of contractors for work not normally carried out by site	13 — contractor/sub-contractors. Provision for contractors and sub-contractors to be used for peak loads, specialist work or economic reasons. On and off site contractors may be used to supplement the facilities on the mine where it is economical and practical to operate on a component charge-out basis, such components being serviced by contractors, as well as where required for major works. The employer may also contract the functions of sampling, office cleaning and village services. Relevant site delegate to be given as much notice as possible of such requirements.	9.1.2 — casual employees — may be utilised to a maximum of 7 shifts in any 14 day period. Casuals shall receive an additional amount of 7.8 per cent of their appropriate salary. Casual employees are specifically excluded from the benefits in clauses 8 (other than 8.1 to 8.3), 12, 13, 15, 16, 17, 19 and 22. 9.1.3 — contractors — may be utilised in a stand alone situation and where the economics for the short-term duration do not warrant 7 days x 12 hours operation or the contract labour involves utilising skills or equipment that is not incidental in the site Schedule of Skills. Ensham undertakes to ensure that all contractors meet Award/industrial agreement obligations relevant to their operations.

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
	personnel. Equipment failure requiring contractors to perform repair work shall be notified to the appropriate union representative as soon as possible. Contractors will work in accordance with this Agreement. The Company will advise the union at least one week prior to the commencement of a major shut down. 32 — casual employment — at discretion of company and upon notification to the appropriate union representative casuals may be used for annual leave absences other than single day absences. Other requirements for casual labour shall be by agreement between the parties and shall be determined on economic criteria and flexibility considerations. Casual labour will be supplied by United Mine Support Services.		
Manning levels	Appendix E — 'hot seat' change-over.	No provision — see Award.	No provision.
Hours of work and roster arrangements			
Contract of employment	Same as Award.	No provision — see Award.	6 — same as Award except employment by the fortnight. In addition Ensham only able to deduct payment for period where employees stood down where coal mining unable to be carried out for 28 days, not 4 days as in the Award.

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
Ordinary hours	8 — average of 35 hours per week — same as Award. Shifts will be of 8.5 hours duration providing 42.5 hours of rostered work each week.	2 — average of 35 hours per week — same as Award.	No provision.
Part-time hours	No provision — see Award.	No provision — see Award.	No provision.
Overtime hours	Shift arrangements provide an average of 7.5 hours of overtime per week. Overtime allowance will be 17 hours per week averaged over a 4 week period. Christmas, Easter and one other nominated period may be subject to an additional, reasonable overtime allowance. Overtime attributed to train loading may not be restricted by the overtime allowance. Overtime restrictions apply to contractors as per Appendix D; however, the overtime allowance for Contractors is 17 hours per week averaged over a 2 week period.	2 — hours of work — employees may be required to work a reasonable amount of rostered overtime or as the need arises as per Award. Appendix A — Monday–Friday roster averages 5 hours of rostered overtime per week. 7 day roster averages 7 hours of rostered overtime per week.	7.4.5 — provides a minimum 10 hour break where an employee is recalled to work or works beyond a 12 hour shift.
Shift arrangements	8 — a 2 shift rotating weekly roster (day and afternoon shift) will generally be worked for mine operations. The CHPP plant operates with 3 crews rotating on the basis of 2 day shifts and 1 afternoon shift. Night shift and Permanent day workers will work on a fixed shift basis. Normal starting and finishing times specified. ‘Hot seat’ change-over to occur in accordance with Appendix E. Introduction of alternative shift rosters by agreement.	2 — hours of work and rosters — travel to and from designated work areas shall be in addition to normal shift identified in Appendix A.	12 hour shift arrangement (see roster arrangements).

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
Roster arrangements	8.8 — starting and finishin g places for shifts and CHHP employees shall be at the muster point adjacent to the bath house. Appendix E — 'hot seat' change-over — a 'hot seat' change-over between operating crews will take place on the job, allowing time for exchanging information and plant inspections. For all other employees (ancillary plant, excavators, other employees involved on continuous operations or other employees as the operation requires) the off-coming shift will continue working until relieved.	2 — hours of work and rosters — on commencement of operations employees will work the Monday–Friday pattern. At discretion of employer roster may be moved to 7 day pattern. Appendix A — 12 hour shifts provided for both Monday–Friday and 7 day rosters.	7 — hours of work — Ensham site-based roster comprises 6 crews. 4 crews work on a rotating roster of day and night shifts while 2 crews are permanently on day shift. Each crew works 7 days on followed by 7 days off. Week commences on Tuesday.
Paid breaks	11 — crib breaks same as Award except that crib breaks are scheduled to commence between 3 and 5 hours from the start of the shift. 9.5 — paid meal break of 30 minutes and a meal or $7.30 to be provided before starting 3 hours' or more overtime which is outside of their normal shifts. 9.6 — each consecutive 5 hours' of overtime shall attract a further paid crib break and a meal or $7.30.	7 — two paid 30 minute crib breaks per 12 hour shift, to be taken in a manner not interfering with the continuity of work. An employee shall not be required to work for more than five hours without a meal/rest break.	7.3 — meal breaks and refreshment facilities. Two 30 minute paid meal breaks and one 10 minute 'smoko' in each 12 hour shift to be taken to suit individual and operational needs. The first meal break shall normally be taken between 3.5 and not more than 5 hours after shift starting time and the second meal break no more than 5 hours after completion of the first meal break. Adequate refreshment facilities suitable for heating and cooling of pre-cooked foodstuffs shall be provided.
Annual leave	22 — generally same as Award. 25 days' annual leave each year. May be taken in single days to a maximum of 5 per annum. Upon termination paid at the rate of 8.5 ordinary hours. Employees with more than	5 — annual leave taken in the form of 17 shifts for Monday to Friday roster or 21 shifts for 7 day roster employees. Except where otherwise agreed to be taken in block of consecutive shifts	12 — annual leave of 210 hours for each completed year of service, accruing at the rate of 16.1538 hours for each completed Ensham site-based roster cycle.

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
	25 days' annual leave may be directed by the company to take annual leave.	within one year of falling due. Minimum of one block may be taken at any time.	
Long service leave	23 — same as Award except payment upon termination does not exclude dismissal for serious or wilful misconduct. In addition, no provision for union officials — credit for prior service.	No provision — see Award.	17 — same as Award but does not include provision for union officials — credit for prior service.
Sick leave	17 — entitlement same as Award. Employees to notify within 24 hours of commencement of sick leave and estimated likely duration. A doctor's certificate is required for any sick leave of 2 consecutive days or more or any subsequent days where an employee has already taken 3 single days in a year. Appendix C — establishes a 3 step absenteeism procedure. In assessing an employee's absenteeism record, consideration shall be given to: the total number of days absent; patterns of absenteeism; recent and long-term absence; and any other factors affecting the employee's ability to attend for work.	6 — paid in advance to the individual or a nominated superannuation fund every 6 months equivalent to half of 15 days of 7 hours ordinary pay. Employees to notify, where practicable, of absence and expected duration prior to the first shift affected. Advanced payment to be deducted from monies owing should an employee terminate his employment during any six monthly term. Employer to facilitate employee participation in income protection scheme if they desire at the expense of the employee. Employer's right to seek explanations for absence, implement an absenteeism review procedure, and take disciplinary action concerning undue absenteeism is not affected. Employee has access to an appropriate industrial authority in a dispute over undue absenteeism.	13 — personal leave — entitlement of 84 hours (= 7 x 12 hour days) personal leave credit for the first full year of employment and 60 hours (= 5 x 12 hour days) credit for each ensuing year. Any credits in excess of 12 days may be transferred into Superannuation fund on the anniversary of employment. Refunded on retrenchment. 14 — sick and accident/salary continuance insurance — an employee unable to work for a period in excess of 7 rostered shifts due to personal illness shall be provided with salary continuance insurance.

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
Parental leave	24 — entitlements as prescribed in the *Workplace Relations Act 1996* (as amended).	No provision — see Award.	18 — provisions of Schedule 14 of the *Industrial Relations Act 1988* apply to and are deemed to form part of the agreement.
Other leave	18 — jury leave — same as Award. 19 — compassionate leave — same as Award but includes grandparent and grandchild. Pressing domestic leave — same as Award but in addition employee must supply satisfactory evidence. 20 — special family leave — employee with responsibilities in relation to members of their immediate family or members of their household requiring care and support may use accumulated sick leave for that purpose. Employee required to establish illness with medical certificate. Employee must inform company of intention to take special family leave, the person requiring care and the reasons for taking leave and the estimated absence. With the consent of the company an employee may take unpaid leave to care for a family member who is ill once all other sources of accumulated leave are exhausted.	No provision — see Award.	19 — jury service — same as Award except that employee continues to be paid instead of being reimbursed. 16 — bereavement leave — same as Award except provision for additional leave to be approved for bereavement reasons by Ensham in which case the employee will not suffer any loss in pay for approved leave under the circumstances.
Remuneration and on-costs			
Base pay	10.2 — aggregate weekly wage incorporates most allowances: Level 1 — Induction — $711.55 Level 2 — Experienced — $759.70	3 — earnings. Appendix A — total annual salaries include all disabilities except advanced sick leave. Mineworker (7 day roster)	8.1.2 — annual salary packages Continuous day/night roster: Level 1 — $78 584 Level 2 — $73 056

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
	Level 3 — Advanced — $786.45 Wages increase by 2.91 per cent after 12 months. Wages include allowances for 'hot seat' change, tolerance time and flexibility of crib times. 31 — parties to explore salary sacrificing arrangements with intention of benefiting both parties to the agreement.	Production — $75 250 Engineering — $75 470 Washery — $75 670 Mineworker (Monday to Friday) Production — $58 750 Engineering — $58 970 Washery — $59 170 Co-ordinator (7 day roster) Production — $77 750 Engineering — $77 970 Washery — $78 170 Co-ordinator (Monday to Friday) Production — $60 500 Engineering — $60 720 Washery — $60 920	Level 3 — $69 756 Level 4 — $63 130 Level 4A — $58 622 Continuous day roster: Level 1 — $73 430 Level 2 — $68 278 Level 3 — $65 164 Level 4 — $58 994 Level 4A — $54 862 8.1.3 — rates increase by 3 per cent on July 1 1996 and a further 4 per cent on July 1 1997.
Overtime pay	9.1 — all overtime worked is paid at double time.	Appendix A — Rostered overtime is included in annualised salary at Monday–Friday roster and 7 hours for the 7 day week roster. One hour of non-rostered overtime per rostered period is included in annualised salary. This amount to be reviewed and adjusted on a six monthly basis based on site work records. No back pay. Appendix A — Travel to and from designated work areas provided for at overtime rates in salary calculations.	7.4 — hours beyond roster — no employee will be required to work in excess of 12 hour rostered shift or be recalled after completion of shift other than in an emergency or extreme circumstances and only then by agreement. An employee required to work in such circumstances shall not be required to work in excess of 4 hours excluding a meal break. An employee required to work for more than 1.5 hours beyond the 12 hour rostered shift will be supplied with a meal and a paid 30 minute break. 7.4.4 — payment for hours beyond roster Continuous Day/Night roster: from $50 to $67 depending on level.

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
			Continuous Day roster: from $46.80 to $62.60 depending on level.
Shift pay	8.7 — afternoon shift attracts a loading of 15 per cent while night shift attracts a loading of 25 per cent.	Appendix A — Dayworkers receive the same amount as provided above in annualised salary less $3 000.	8.1.2 — Annualised salary approximately 7 per cent higher for continuous day/night roster than for day roster.
Weekend pay	No provision — see Award.	3 — included in annualised salary.	No provision.
Annual leave pay	No provision — see Award.	5 — paid annualised salary — includes average rostered and unrostered overtime, allowances etc.	No provision.
Bonus pay	Henry Walker CFMEU — Stratford Coal Mine Bonus Agreement 1997. A weekly bonus of $335 to be paid upon ratification of the agreement. Bonus applies to individuals on days worked and days of approved leave. Twelve months after the expiration of the Industrial Agreement and upon achieving Coal and Waste Production Targets for the previous 12 months a further $15 per week Bonus will become available.	Salary levels adjusted on 1 February 1997 according to total volume of material moved per man shift worked: from 2.5 to 7.5 per cent for 945 m^3 to 1080 m^3, respectively.	8.3.2 & .3 — production reward scheme — $120 per employee per week. Performance incentive payment — employees at level 2 who perform all the skills consistent with that level as required and who attend for work no less than 92 per cent of the time between 1 January 1995 and 1 January 1996 shall receive a performance incentive payment of $25 per week. This will be increased to $50 per week from 1 July 1996 for the review period from 1 July 1995 to 1 July 1996. Either 50 per cent or 100 per cent of the payments may be made into an approved superannuation fund.
Workers' compensation	27 — workers' compensation — injured employee entitled to payment in accordance with *Workers' Compensation Act 1987* (as amended) as it relates to the coal mining industry.	No provision — see Award.	No provision.

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
Sick pay	17.4 & .7 — paid for rostered shift (8.5 hours pay). Payment of sick leave on termination — an employee who has accrued ten or more days' sick leave shall be paid 8.5 hours ordinary pay for each day upon retrenchment, termination arising from the Mineworkers' Pension Legislation or ill health, or death.	Appendix A — advanced annual sick leave payments: Mineworker — $1758.60; and Co-ordinator — $1836.30	13.3 — personal leave credits refunded to employees on retrenchment. 14 — Ensham covers all employees with 24 hour Sickness and Accident/Salary Continuance Insurance and Total Permanent/Disablement/Death cover insurance.
Accident pay	28 — same as Award.	No provision — see Award.	15 — same as Award except that for the second period of 39 weeks a weekly payment of $850 is made.
Superannuation contributions	29 — provisions of Coal Super Retirement Income Fund, as varied from time to time, apply to employees under the Agreement.	No provision — see Award.	No provision.
Severance and retrenchment pay	5.5 — contract of employment — required period of notice same as Award.	No provision — see Award.	22.1 & .2 — one twenty-sixth of the employee's annual payment for each completed year of service together with the production reward payment and the accommodation assistance subsidy. Special circumstances — same as Award.
Special rates and allowances	10.1 aggregate wage absorbs all allowances with the exception of: tool allowance — $20 per week; first aid allowance — $2 per day; and first aid officer — $3.45 per day.	3 — earnings — annualised salary covers all allowances.	No provision.
Public holidays	21 — entitlements same as Award. Paid for 8.5 hours. No provision for rostered day off falling on a public holiday.	No provision — see Award.	11 — 10 days listed plus any day gazetted in Queensland. No work performed on Christmas day or Boxing Day. Public

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
			holidays falling in an employee's on-shift work roster are worked.
Working clothes and safety boots	14 — in addition to Award entitlements employer to supply one set of protective hat and glasses, one winter jacket, one set of wet weather gear and any other miscellaneous safety gear. Tradesmen to receive three additional sets of protective outer clothing.	No provision — see Award.	8.7 — entitlements generally same as Award except for an additional set of industrial outer clothing. Industrial outer clothing and safety boots replaced annually, and at other times only in extenuating circumstances. Requirement that safety and protective equipment are worn and continued failure to do so could jeopardise an employee's continued employment.
Travel	25 — same as Award.	9 — Thiess to supply travel to and from the village and the job site. Employees to arrange their own travel to and from their place of residence and the mine village. Discussion over provision of transport from major population centres to occur after employee's residential patterns are confirmed.	No provision.
Training costs	No provision — see Award.	No provision — see Award.	No provision.
Other on-costs	16.7 — disputes procedure — where an industrial issue is referred to an industrial authority representatives and witnesses shall not suffer any loss of pay and the company shall pay reasonable travel and other expenses. Any more than two representatives / witnesses shall be by agreement.	8 — accommodation — individually allocated ensuite units and three meals per day to be supplied to employees for their rostered days only.	8.4 — accommodation assistance subsidy — $134 per week. 8.6 — financial advice from a properly accredited financial adviser; limits apply. Resource assistance for employees— reasonable costs associated with the use of a bargaining agent/representative collectively elected by employees other than the union(s).

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
			Health and welfare advice — paid facility of health diagnostics immediately upon engagement and annually thereafter. Subsidised accommodation — $25 shall be deducted from employees for each week worked for provision of accommodation and meals. 14.2 — Funeral benefit — $5 000 on account of any deceased employee.
Functions, tasks and skills			
Functions	13 — union activities — monthly paid union meetings provided that CHPP continues to operate and train loading will be maintained if required. National and district representatives allowed to enter the workplace provided that they meet provisions under the *Workplace Relations Act 1996* and the *Coal Mines Regulation Act 1982*. Employees elected as Lodge Officials will be recognised as representatives of the union and, upon approval by the Company will be allowed reasonable time to carry out their duties and be granted paid leave to attend union meetings and/or TUTA training. National CFMEU campaigns will exempt Stratford where the issues do not directly concern the site. Appendix G — delegates attendance at meetings — during delegates' normal shift	11 — monthly union meetings — where monthly union meeting is to be held will be arranged to minimise interference with operations. Where practicable, will be held outside working hours. Where unavoidable for meetings to be held in working hours, no deduction of pay unless meeting extends beyond 2 hours.	21 — right of entry — union officer duly authorised by the National Secretary entitled to enter premises provided that he has permission of the General Manager — Mine; the officer reports to the authorised representative, entry to Ensham is for the purpose of interviewing members of the union or inspecting employment records for members of the union, the officer does not hinder or obstruct any person in the performance of their work; and the officer exercises every care to preserve the privacy and confidentiality of any information gained during entry granted under this clause. Right of entry may be withdrawn if any clause is breached or if the officer's methods are offensive. Clause shall not impede the registered manager of the mine from complying with statutory obligations pursuant to the *Coal Mining Act (Qld)*.

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
	no loss of pay, two delegates' to attend monthly delegates meeting in Cessnock, and company-called meetings outside the delegates normal working shift attendance paid at normal penalty rates, such hours in addition to usual weekly limits on overtime. CHPP delegates' only required to attend union meetings concerning matters affecting the CHPP.		26 — union membership — Ensham employees may be members of the AMWU, CFMEU or CEPU.
Job and task demarcation	Appendix A — Stratford work model. Provides for production and engineering streams, no demarcation within streams. Three levels: induction, experienced and advanced. Progression to advanced level is by appointment by the company, and may include statutory functions and appointments.	4 — flexibility of operations — demarcation exists between production and engineering streams. 2 levels (mineworker and co-ordinator). Scope to integrate production and engineering skills around the Coal Preparation Plant and Train Loading facilities.	10 — schedule of skills— reduced number of levels compared with Award. Five levels (Level 4A to Level 1). No demarcation between production and engineering streams. Progression from Level 4A to Level 2 is via acquisition of additional agreed skills. Progression to Level 1 is by appointment.
Training	Appendix A — work model. No loss of pay to occur when training is carried out during normal shift time. Travelling time in excess of normal work requirements to be reimbursed. Workers' compensation insurance during any such travelling will be maintained for the term of this agreement.	10 — first aid/fire training — all employees can be required to attend Rescue, First Aid and Fire Fighting training outside normal working hours. Counted as non-rostered overtime.	No provision.
Qualifications	No provision — see Award.	No provision — see Award.	No provision.

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
Procedural arrangements			
Relationship with Award	3.5 — Agreement replaces P&E Award and all other Awards and Agreements including site agreements previously applicable to Henry Walker employees at the Stratford Mine.	P&E Award applies where agreement is silent.	2 — Agreement sets out the provisions and entitlements of employees employed under terms and conditions of this agreement at the Ensham Mine. No other Award or Agreement shall apply to such employees.
General	31 — salary-sacrificing — agreement to explore salary-sacrificing arrangements with intention of benefiting both parties to the Agreement.		
Dispute settlement	5.7 — dispute settlement procedure for unfair dismissals — same as Award. 16 — disputes procedure — same as Award except step 3 of the Award procedure (where the union representative at the mine meets with the mine manager) is omitted. In addition, a 48 hour cooling off period applies before the dispute is referred to the appropriate industrial authority. Work continues under prevailing conditions prior to the written notification of the dispute. Where the conditions themselves are disputed, work to continue without prejudice and in accordance with the reasonable direction of the Company, the employees' recognised skills and safe working practices.	15 — dispute resolution and consultation. Discussed initially between immediate parties (employee and relevant supervisor). If not resolved, union representatives to confer with senior management. Where matter remains unresolved it shall be referred to the appropriate industrial authority. After speaking with the supervisor, an unsatisfied employee may address the issue in writing. The head of the employer's Queensland mining division to respond within 7 days of the receipt of the query. Changes to the organisation of work to be discussed through the above process at a level appropriate to the issues involved. Parties agree to take all possible steps	23 — disputes avoidance procedure — 4 step process: Step 1 — matter discussed and investigated in first instance between employee and the employee's co-ordinator. If unresolved; Step 2 — investigation and discussion referred to Department Manager for further discussion. If unresolved; Step 3 — matter referred to a representative nominated by the employee, and the General Manager-Mine for further discussion (includes initiator of grievance / Co-ordinator / Department Manager and the employee's nominated representative). If unresolved; Step 4 — matter referred by Ensham, the employee or the employee's representative to the AIRC for resolution. Status quo existing prior to the dispute remains. Until dispute avoidance procedure has been completed, work will proceed

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
		to avoid industrial action from disputes concerning Burton-specific issues.	without stoppage or the imposition of any ban, limitation or restriction.
Agreement making	3.3 — parties undertake to commence negotiations for a replacement agreement 3 months prior to the expiration of the Agreement.	14 — agreement to remain in effect while a replacement is negotiated.	25 — variation of the agreement — any term may be varied by agreement of a majority of persons subject to a number of conditions. Limits on which clauses may be varied during life of Agreement. Agreement shall be binding on any successor to, or assignee or transmittee of, the business, including any Corporation which acquires or takes over the business.
Negotiating change	33 — variations to the agreement — agreement may be varied by consent of both parties and ratified by the AIRC.	No provision — see Award.	24 — joint consultation process — to be followed where the parties wish to vary any of the items listed in clauses. 24.1 — meetings held with employees covering all shifts (four meetings required), at which all employees will have the opportunity to discuss any matter relating to any changes to the organisation, safety issues or performance of work. Meetings held at shift changeover time. Meetings are the mechanism for establishment of any further consultative groups where required.
Redundancy	26 — retrenchment and severance pay — same as Award except: 4 weeks' notice of impending retrenchment and a minimum of 3 weeks' pay (at the rate of 8.5 ordinary	No provision — see Award.	No provision (no forced retrenchments during life of agreement).

Type of arrangement	*Stratford*[a]	*Burton*[b]	*Ensham*[c]
	hours) per year of service; accrued sick leave at the time of retrenchment will be paid at the rate of 8.5 ordinary hours for each day; and accrued annual leave at the time of retrenchment will be paid at the rate of 8.5 ordinary hours for each day.		
Payment of wages	10 — same as Award except that wages paid by EFT fortnightly on a Friday into an account(s) nominated by the employee. Company will maintain deductions for employees. Statement issued to employees on a day prior to pay day detailing total amount of wages and deductions.	No provision — see Award.	8.2 — same as Award except that wages paid fortnightly by EFT no later than Friday of the second week of each roster cycle to a maximum of 2 accounts. Prior to each pay day a statement detailing amount deposited to be issued or mailed to each employee. Upon termination, salary due to employee to be deposited to employee's nominated account on the day termination takes effect, or on the next day if the institution is closed.
Safety management	No provision — see Award.	No provision — see Award.	No provision.

a Agreement binding on Henry Walker Contracting Pty Ltd and its employees who are members of the CFMEU and is defined by the terms and conditions of the Mining Contract that Henry Walker Contracting Pty Ltd has with the owners of the Stratford Coal Mine. Two year agreement expiring on 17 August 1999 unless varied or extended by agreement.

b Agreement between Thiess Contractors Pty Ltd and the CFMEU. Agreement from 2 February 1996 to 1 December 1997.

c Agreement binding on Ensham and employees as defined and the Automotive, Food, Metals, Engineering, Printing and Kindred Industries Union (AMWU). Three year agreement expiring on 23 November 1998. Provision to vary Clauses 7, 8, 16, 18, 22, 23 and 24 if agreement to extend the operation of the Agreement.

Table G.2: **Overview of formal work arrangements in recent black coal mining agreements: Muswellbrook, Southern Colliery and South Bulli**

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
Size of the work force			
Recruitment	21 — no provision giving preference to unionists in recruitment. Award provisions substituted with a statement acknowledging the role of unions at the workplace in promoting good industrial relations practice. Time also given for union reps to address new employees and the company has agreed to provide a simple means by which employees can pay union dues. 27 — preference to former employees who were retrenched and those who apply to be re-engaged in order of seniority in respective class of work — same as Award (for NSW mines).	Clause 10 — selection and recruitment of employees conducted in accordance with procedure contained in Appendix 1. This provides for the following steps: employment requisition and specification; written advertisement; assess applicants' responses; conduct screening interviews; conduct targeted selection interviews; assess results; selection process; reference checks; advise union of preferred candidate(s); candidate and family to visit site, town, accommodation; and job offer and medical. Preference given to unionists as per clause 22 of the Award. If this practice is found to be discriminatory by the AIRC, preference will not necessarily be given. 10.2 — Consultative Committee to review procedure.	No provision — see Award.
Retrenchment	25 — 'last to come, first to go' provision — same as Award. 38 — guarantee of employment — during the life of the agreement, no employee is to be subject to forced retrenchment.	14.7 — 'last to come, first to go' provision — same as Award. However, 'last to come, first to go' shall be subject to all other things being equal and the *Industrial Relations Act 1988* (Cth) as amended.	No provision — see Award.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
		14.2 — Intention of the parties that there shall be no forced retrenchments during the term of this agreement. Employment levels may be reduced through natural attrition and / or through a voluntary redundancy program.	
Dismissal	5(d) — employer dismissal rights — same as Award. 5(e) — unfair dismissal — same as Award. 5(g) — prior to summary dismissal of employee under 5(d), employee to be stood aside with pay until an urgent meeting is convened between employer and union representatives.	15(1) — employment may be terminated by the provision of one month's written notice. 15.5 — subject to provisions of the *Industrial Relations Act 1988* as amended.	No provision — see Award.
Use of casuals, contract employment and contractors	42 — parties acknowledge need for contractors but recognise need for prior consultation and notification of contractors on an agreed basis. Employer must make contractor aware that the employees must be financial members of the appropriate union and, where applicable, a register is to be filled in on arrival and departure of contractor. In event of dispute, joint working party to resolve. If not resolved then disputes process to be invoked. Rates of pay: Production and Engineering $606.58 (inclusive of $28 tool allowance). If bonus pay is applicable rate to increase by $28.	12.1 & .2 — temporary labour may be employed to cover peak work, or to cover unforeseen labour shortages for a period not exceeding six months. Prior to employment of temporary labour discussions will take place within the self-managed work group. 23.1 & .2 — work deemed necessary or desirable according to good business practice, efficiency and cost effectiveness may be contracted out. Discussions shall take place within self managed work groups to determine peak labour requirements and scheduling.	21 — use of contractors limited to circumstances where there is a lack of expertise amongst existing work force or where specialised equipment is required or time limits require the use of contractors. Details type of notification to be provided to the union depending on the type of work to be performed. Terms and conditions of contractor employees are, except where provided for by this Agreement, determined by relevant Award/agreement. Contractor employees shall be paid an ex-gratia payment equivalent to the district average bonus, be members of the appropriate union, have superannuation

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
			paid into Coal Super. Where additional labour is sought by the contractor, consideration will be given to retrenched mineworkers who possess the skills required for the work.
Manning levels	43(c) — manning and allocation of labour: (1) Engineering and Production employees divided into four crews with equal spread of skills on rotating shift basis; (2a) Shotfiring crew of 3 personnel, 2 being Shotfirers and 1 being Trainee Shotfirer, to work a permanent day shift roster; (2b) Trainee Shotfirer after training and accreditation to undertake a period of 12 months' work as an appointed Shotfirer to fully develop competencies; upon completion of 2b, person to return to Production roster and then the position of Trainee Shotfirer to be advertised internally at the mine; (3) day to day allocation of employees will attempt to give all employees varied access to their skills and training while bearing optimum production requirements in mind; (4) employee's accredited skills to be utilised at least once every 3 months to maintain accreditation; (5) Engineering workers to work in all areas of the mine; (6) Employee assigned to Bathhouse duties shall utilise other skills if required during the course of the shift (but not at the expense of the cleanliness of the bathhouse).	No provision — see Award.	29 — allocation of manpower on each shift between panels, longwall, and servicing outbye at the discretion of Shift Undermanager according to work priorities and effective achievement of production plans. Utilisation and deployment is based on skills, competence, training and operational requirements. Minimum manning levels for longwall and panel manning. Fitter may be allocated to further work, either underground or on the surface, depending on work priorities after completing surface mechanical work. No overtime coverage for surface fitter on weekends unless required for a specific task. Order of preference for statutory surface electrical coverage. An engineer may only be used where a surface electrician or failing that an electrician is unavailable.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
Hours of work and roster arrangements			
Contract of employment	5 — same as Award except 5(g) — provision for employee to be stood aside with pay prior to summary dismissal pending meeting between employer and employee representatives.	9 — same as Award except employment by the month.	4 — same as Award.
Ordinary hours	6(a) — 35 hours per week — same as Award.	19.1 — 35 hours per week — same as Award.	5 — 35 hours per week — same as Award.
Part-time hours	No provision except after maternity, paternity or adoption leave — same as Award.	No provision — see Award.	No provision — see Award.
Overtime hours	11 (b&c) — reasonable overtime and rest period after overtime — same as Award. Additional clause — if more than 14 consecutive hours is worked on a Sunday then the employee is entitled to a 10 hour break.	21.1 & 21.2 — additional hours and 10 hour rest period after working additional hours — same as Award. Additional clauses 21.3 to 21.5 — an employee is not to receive additional payment for additional hours worked. An employee recalled to work outside rostered shift will have rostered hours reduced by an equivalent amount or, by agreement, can take equivalent time off in lieu. A meal is to be made available to the employee if he was not informed the previous day of the requirement to work additional hours.	5 — average of 5 hours overtime per week in roster. 11.3 — 10 hour break to be provided between work of successive days Monday to Friday and 8 hour break Saturday and Sunday.
Shift arrangements	6 — shift length hours, number and spread of shifts, starting and finishing places, rosters and rostered day off — same as Award.	19.2 — Shift lengths of up to 9.5 hours may be rostered by the company where necessary for ensuring continuity of operations through a changeover or hand over of work on the job. Other shift	5.5 — Employer may determine shift length up to a maximum of 8 ordinary hours. Shift lengths in excess of eight hours can only be implemented by agreement.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
		arrangements — same as Award.	26 — shift swaps among similar or same skilled employees and make up shifts are allowed in rare and unusual circumstances which cannot be covered by other forms of leave. Provisions include that no additional cost is borne by the company, the shift swapped is made up the shift before or after the rostered shift, and 24 hours' notice of a swap is provided. 27 — shift changes are determined according to seniority. Where there are no applicants the vacancy will be filled by the most junior person for a move backwards, and the most senior person for a move forwards.
Roster arrangements	6(e) — employee's place on roster — same as Award.	22 — work performed on a rotating shift roster. Roster provides continuous five day Monday to Friday coverage and includes weekend coverage of necessary shifts. An employee can be moved from one shift in the roster to another on the provision of 24 hours' notice. Work other than day shift to be performed on the weekend shall first be discussed with the Consultative Committee.	5 — Rostered hours shall average 40 hours per week. A rostered shift is 8 hours, comprising 7 ordinary plus 1 hour at overtime rates. 30.6 — work roster patterns as required from time to time after discussions with the local executive.
Paid breaks	7 — crib time — same as Award. 11(e) — crib breaks for those on 7 hour or greater shifts — same as Award.	20 — 30 minute paid crib break during each shift. Crib to be taken so as not to disrupt continuity of production throughout the shift and the safe	7.3 — Work Through Crib — $8.50 payment made at discretion of undermanager or engineer where crib cannot be taken at employee's

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
		operation of Southern Colliery. Employee recalled to work to receive paid 30 minute break within the first two hours of commencing work unless agreed otherwise. Other provisions same as Award.	convenience during a shift. Other provisions same as Award. Discontinued if becomes a daily occurrence and conditions attached are not fulfilled. 30.3 — practice of 10 minute 'smoko' at beginning of each shift will be replaced by a refreshment break consistent with the job at hand and which does not hinder continuity of operations. 30.4 — Crib breaks will be organised in work teams as will the method of taking them to ensure continuity of operations.
Annual leave	14 — conditions same as Award. 14(f) — maximum of 5 single days allowed if arranged and ratified by Senior Mining Official so as not to impede production.	15 — Provisions similar to Award. Entitlement of 17 shifts for 5 day pattern of work or 21 shifts for 7 day pattern of work. Proportionate leave to accrue in line with Award. To be taken in consecutive shifts within a year of falling due, unless agreed otherwise.	14 — Provisions similar to Award except: period of five weeks' annual leave for Monday to Friday employees or employees engaged under a roster that does not require them to work recognised holidays or 34 Sundays per year; leave taken in accordance with the leave roster upon the provision of four weeks' written notice and management believes the granting of leave will not affect the operations of the mine. 13 — allocation of annual leave — introduces minimum leave slots on each shift and for each classification during the year. Additional slots

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
			available when circumstances allow and in extenuating circumstances. Allocation on a first come first served basis. Written confirmation of application will be provided. Allocation of available leave slots during peak periods will be managed by employees and their representatives.
Long service leave	19 — entitlements and conditions — same as Award, except — 19(b) — interruptions of more than 3 months of employment in coal industry shall not count as service.	29 — entitlements same as Award.	13 — allocation of long service leave as for annual leave.
Sick leave	15 — entitlements same as Award. In addition: employees are asked to contact their supervisor prior to being absent on sick leave; first 5 days of sick leave can be used with sick leave declaration form, the balance must have certification of proof. More than 2 consecutive days requires certificate; and policy adopting a 4 stage procedure to address unacceptable patterns of absenteeism.	26 — entitlements same as Award. In addition: where practicable an employee shall inform the employer of inability to attend for work, stating the nature of the illness or injury and the estimated absence prior to the next rostered shift. An employee shall prove to the satisfaction of the employer that such absence was due to illness or injury.	15 — entitlement same as Award but may also be used for personal leave. In addition: where practicable an employee will notify the employer of a sick leave absence and estimated date of first shift back at least 45 minutes prior to the commencement of the shift; sick leave claimed on the day before or after a statutory holiday or a known strike requires production of a medical certificate; employees with 3 or more years' service and with a credit of 10 or more days' unused sick leave may receive 7 ordinary days' pay for each day's credit upon termination for reasons other than misconduct; accrued sick leave balances may be paid into the Coal Superannuation Fund; up to 5

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
			days' sick leave may be used for personal business; applications for personal leave made 2 weeks in advance will be automatically approved. In addition applications made less than 2 weeks but more than 48 hours in advance will be approved provided the operation of the mine will not be affected.
Parental leave	30 — maternity, paternity and adoption leave — same as Award.	30 — unpaid maternity, parental and adoption leave — same as provided in the *Industrial Relations Act 1988.*	No provision — see Award.
Other leave	13 — public holidays entitlements and conditions — same as Award. 16 — special family leave — same as Award. 17 — jury leave — same as Award. 18 — bereavement leave and pressing domestic need leave — same as Award.	31— public holiday entitlements and conditions — same as Award. 27 — compassionate leave — same as Award but excludes step child. 28 — jury leave — same as Award except that company pays employee normal salary provided the employee forwards to the company such amount they are paid for jury service. The employee is not paid where he attends jury service on a day on which he is not rostered to work. 32 — Trade Union Training Authority (TUTA) leave — company may grant up to 6 days' paid TUTA leave per year. 33 — Leave to attend local council meeting — an employee who is a member of the local council may have up to a total	16 — compassionate leave — same as Award. 17 — jury service leave — same as Award. Where no provision — see Award.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
		of 2 shifts per month off work to attend local council meetings without loss of pay. 34 — Defence Force Reserve Leave— an employee who is a member of the Defence Force Reserve may be granted up to a maximum of 16 consecutive working days each year to attend the annual camp. 40 — AIRC proceedings and state conferences — up to 2 accredited representatives may attend the hearing/conference where the company has submitted the application and the district office of the union requires their attendance. Reasonable travelling time included.	
Remuneration and on-costs			
Base pay	Appendices A&B — two streams — production and engineering and 2 classifications — induction ($606.84 per week) and production or engineering worker ($707 per week). Apprentice pay — same as Award except for 4th year apprentice (higher pay in agreement). Youth pay — same as Award. No mixed functions provision. Apprentice and youth provisions — same as Award.	16.1 — employees receive an annual salary paid in recognition of the performance of work in accordance with the roster annexed to the agreement as Appendix 2. The annual salary increases after 12 months and 24 months. Salaries: $71 200 upon certification; $73 692 12 months after certification; $76 271 24 months after certification 16.2 — The annual salary excludes Award clauses dealing with: hours; crib time; wage rates; overtime; afternoon and night shifts; Saturday, Sunday and	6.1 — Majority of classifications applicable under the Award are eliminated. Classifications are grouped into five gradings with weekly wages as follows: Group A — $543.50; Group B — $556; Group C (2 years' experience) — $570; Group D (Special Class) — $598.60; Group E (Washery) — $576, $590 and $618.60. Agreement includes increase of $7 to apply as of 30 September 1996. Rates contain the third $8 safety net adjustment.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
		holiday work; and transport.	6.3 — National safety net wage increases are offset against wage rates contained in the Agreement and gain share amounts.
Overtime pay	11 — rates — same as Award. 11(c) — paid at double time if resume work prior to 10 hours rest after overtime — same as Award. 11(d) — overtime paid at minimum of 4 hours for call back — same as Award.	16.3 — An employee required to perform work in addition to that necessary to satisfy the roster which is annexed to this agreement (unrostered overtime) shall receive time off in lieu on an hour for hour basis.	Similar provisions to Award. In addition: 11.3 — overtime must be organised so that where reasonably practicable employees will receive a 10 hour break between Monday to Friday and an 8 hour break Saturday and Sunday. 11.5 — An employee required to work after completing rostered shift will automatically receive a meal allowance. If working longer than 4 hours employees supplied with a meal and a paid crib break. 30.2 — volunteers working 2 hours beyond rostered shift finish time are paid a mini shift payment. Work in designated areas will go to volunteers from that area.
Shift pay	12 — shift rates — same as Award. 8 — additional shift pay — same as Award.	See base pay provision.	18 — shift work and shift allowances — same as Award, except: employees working continuous overtime on afternoon and night shift shall receive a shift allowance of 10 per cent of their appropriate hourly rate. Employees commencing overtime on afternoon or night shift on the weekend shall be paid

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
			a shift allowance equal to 10 per cent of the hourly rate. 7.5 — mini shift payment — paid to employees who volunteer to continue work for two hours following their rostered shift finish time. [Production — $60 and Engineering — $63.] Amounts increase by $3 on September 30 1996. Further increase equivalent to CPI payable to Production employees, while Engineering increases by $3 and CPI on March 31 1997.
Weekend pay	13 — same as Award.	See base pay provision.	12 — same as Award.
Annual leave pay	14(n) — change in annual leave accrual rate from 3.3654 hours for each completed week of service in Award to 3.846 hours in agreement. Otherwise rates are same as Award.	25 — 5 weeks' annual leave paid at normal salary. In addition, on termination an employee is to be paid for untaken annual leave at the weekly base rate specified for level 4.6 of the underground work model contained in the Award as at the date of certification plus any national CPI increases which may occur between that date and the date of termination.	14 — 5 weeks' annual leave for employees working Monday to Friday or on a roster that does not require them to work on recognised public holidays or 34 Sundays per year. Paid the greater of their projected 42.5 hour roster or 120 per cent of their ordinary rate.
Bonus pay	36 — Bonus agreement to continue from previous agreement. 37 — Budget cost saving scheme: employee share in annual payment (being the difference between budget cash costs and actual cash costs) proportioned on the basis of labour costs to total costs. Amount to be divided by the	17.1 — employees shall be paid a bonus in accordance with the Bonus Agreement. 17.2 — employees shall have the opportunity to participate in any changes to Bonus Agreement during the Enterprise Agreement's term through the Consultative Committee.	8 — South Bulli bonus — consists of two components: weekly development metres advance and weekly longwall retreat metres. Bonus is paid for paid annual leave, paid sick leave, personal business leave, approved union business and other authorised paid absences.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
	number of employees at the mine and paid after the end of March each year.		Bonus is not paid for any other absence. Average bonus is paid for people working during a formal shutdown period where no production is planned and those not required to work are paid the appropriate leave bonus. Upon approval of 20 or more employees, an amount between 10 per cent and 100 per cent of weekly bonus may be paid into CoalSuper. 9 — performance improvement and payment — series of annual performance targets to be set and additional payments attained upon their successful achievement. 7.2 — Continuous Production Payment — $28 subject to achievement of quarterly targets set by Mine Manager. Paid to employees directed to maintain continuous work which prevents taking of a crib break during the shift. Payment discontinued if becomes a daily occurrence without the attached conditions.
Workers' compensation	No provision.	No provision — see Award.	No provision — see Award.
Sick pay	15(g) — same as Award. In addition: 15(j) — on termination, retrenchment or death, unused sick leave of 10 or more days is paid at rate of 8 hours of ordinary pay (cf 7 hours in	26.9 — On termination, retrenchment, death or resignation an employee with more than ten day's accrued unused sick leave shall be paid for the accrued sick	No provision — see Award.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
	Award) plus payment of a day's average bonus as per annual leave calculation for each accrued sick days leave he/she is paid.	leave at the rate of $148.40 per day.	
Accident pay	29 — entitlements and conditions — same as Award.	No provision — see Award.	No provision — see Award.
Superannuation contributions	39 — provisions of the *Coal and Oil Shale Mine Workers (Superannuation) Act (NSW)* and the *Occupational Superannuation Industrial Agreement (CIT 17 June 1986)* to apply to employees under the agreement.	No provision — see Award.	No provision — see Award.
Severance and retrenchment pay	26 — entitlements — same as Award. 15(2) — retrenchment — an employee over the age of 45 who has completed at least two years' continuous service with the company shall be entitled to an additional weeks salary.	No provision — see Award.	No provision — see Award.
Special rates and allowances	8 — special allowances — reduced number compared with Award, paid at same rate as Award. (Includes: first aid officer, first aid attendant, heat allowance and damage to clothing and tools.) Tool allowance $28 per week (cf $7.34 in Award).	See base pay provision.	7.1 — weekly allowances — payable in compensation for all disabilities and special conditions encountered in activities undertaken at South Bulli: Inbye — $50 (Production) and $72 (Engineering); Outbye — $30 (Production) and $50 (Engineering); Surface — $20 (Production) and $30 (Engineering); Washery — $28.80 (Production) and $28.80 (Engineering). 7.6 — other allowances — daily allowances: First aid officer — $3.40; Advanced resuscitation — $2.50; First aid attendant — $2; and Meal

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
			allowance — $4.80. Weekly allowances: Tool allowance — $8.30; Leading hand 3-10 — $12.09; and Leading hand 10-20 — $19.
Public holidays	13(f) — public holiday rates and conditions — same as Award.	31 — public holiday entitlements — same as Award. Rates absorbed into annualised salary.	12.4 — public holiday entitlements — same as Award except that only 9 public holidays specifically listed plus any gazetted holidays in Agreement as opposed to 10 in the Award.
Working clothes and safety boots	10 — same as Award plus payment equivalent to one industrial work jacket every 2 years.	11 — same as Award except that receive an additional set of outer clothes and a pair of gumboots per year and a winter coat every two years.	28 — same as Award plus hardening of prescription lenses for safety glasses. OH&S Committee to continuously explore and implement improvements in protective clothing and safety equipment.
Travel	28 — transport costs — same as Award.	No provision — see Award.	11.6 — employees working overtime in excess of 4 hours who were unaware prior to leaving home shall be supplied transport home. Transport shall also be supplied to overtime of less than four hours when circumstances beyond an employee's control prevent use of his own transport.
Training costs	43(d) — payment for training on a shift (other than normal rostered shift) to be paid at appropriate rate at ordinary hours.	No provision — see Award.	No provision — see Award.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
Other on-costs	17 — jury make-up pay — same as Award.	36 — accommodation assistance — terms and conditions of the Town rental and Single Accommodation Scheme shall apply to all permanent employees.	33 — death benefits — company to pay a funeral benefit of $225 to beneficiaries of deceased mine workers who qualify for funeral benefits from the Joint Coal Board welfare fund. Upon the death of a member of the south Bulli mortality fund $3 will be deducted from all fund members' wages to be paid to the beneficiary. For each $3 deducted the company will pay $1.50 to a maximum of $1500. The company will pay $25 000 to the nominated beneficiary of an employee who dies on or off site under certain conditions.
Functions, tasks and skills			
Functions	34 — stewards/lodge officer — same as Award.	38 — employee representatives — generally same as Award except that prior to leaving place of work to carry out duties as representative, employee must notify supervisor and the management representative of plans to meet. 39 — union meetings — to be held monthly on weekends to minimise disruption. Where the representative is required by the company to attend a meeting it will be without loss of pay. Unpaid leave may be provided for two accredited representatives to attend a meeting off site which does not involve the company. Written notice giving	24 — recognition of appointed representative similar to Award. Company to supply facilities for use by representatives. A half day meeting to occur between Lodge and company once a month to resolve problems. Lodge committee allowed one day per month to meet. Lodge executive allowed 35 days' paid leave per annum to cover union business. Four days' paid TUTA leave for elected representatives in their first year of election other than members of the Lodge executive. Paid leave for a maximum of 2 employees to attend consent matters at industrial tribunals.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
		reasons must be provided.	Employee representatives to notify company of absence due to union business 48 hours prior to absence. Employee representatives to notify company as soon as practicable of issue(s) affecting operation of Bellambi Collieries, including means to mitigate effects of issue(s). Company seeks and expects exemption from industrial action on issues addressed in the Agreement. 25 — Maximum of 1.5 hours paid at time and one half is available per month for union meetings, provided company is supplied with 24 hours' notice, production is maintained, shifts do not reach pit bottom earlier than 17 minutes prior to the expiry of the meeting time, and a maximum of two meetings in the absence of extenuating circumstances. Company may address such meetings although such time will not be included in the 1.5 hours. Lodge executive to discuss with company a need for a full work force meeting.
Job and task demarcation	43 — work model: parties accept the need for flexible work practices and elimination of demarcation. Seniority to play no role in the day to day allocation of an employee to a task contained in the employee's skill bank.	11 — employee career path established.	No provision — see Award.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
Training	Appendix A — Production workers to have complete induction training and agree to train in 3 of the 11 main skills and any of the 8 ancillary skills as appropriate. Appendix B — Engineering worker to have completed induction and agree to train in all 9 mechanical skills or all 7 electrical skills and any of the 8 ancillary skills as appropriate. 43 — aim of work model to have the work force trained in as many skills as is practicable for the operation of the mine. In-house accreditation of skills acquired, where appropriate.	No provision — see Award.	22 — affirmative action — all employees to participate in affirmative action education. 34 — environmental training for all employees on how the environment is affected by their work and measures to prevent or mitigate these affects.
Qualifications	No provision.	No provision — see Award.	No provision — see Award.
Procedural arrangements			
Relationship with Award.	Agreement supersedes the P&E Award and any other Awards or agreements applying to employees under the agreement.	Agreement is read and interpreted in conjunction with the P&E Award. Where there is any inconsistency between the agreement and the P&E Award the agreement shall prevail.	The Agreement replaces and / or sets off the provisions of the P&E Award to the extent of the inconsistency between P&E Award provisions and the clauses contained in this agreement. Where there is no mention of an Award provision, the appropriate P&E Award clause still applies.
General	No provisions relating to maintenance of custom and practice at mine.	No provision — see Award.	30 — introduces new work patterns to ensure continuity of operations. Appropriate mix of skills required for overtime will be nominated by the company. The first wind will be 15 minutes to the hour.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
			35 — all previous custom and practice, except the arrangement for payment of double bonus on long service leave, ceases from the operative date of the Agreement. Future custom and practice is not binding on the parties unless agreed in writing and incorporated in the Agreement.
Dispute settlement	20 — dispute settlement process — same as Award.	8.1 — while dispute procedure being followed, work shall continue normally and without interruption. Continuance of work shall not prejudice the final settlement of a dispute. 8.3 — same procedure as Award but eliminates third layer of Award dispute settlement, whereby site officials of the union discuss the matter with senior representatives of the company prior to the involvement of district officials of the union.	19 — corrective action procedure — unacceptable levels of work performance or behaviour will be subject to a specified process of corrective action. 20 — grievance and dispute resolution — same general procedure as Award. In addition, grievance forms are to be completed during stage 2. Safety disputes procedure is outlined, similar to general disputes procedure. During dispute, work proceeds under existing conditions; however, where those conditions are disputed, work shall continue in accordance with the reasonable direction of the employer, the employee's recognised skills, competencies and training and safe working procedures. Procedure does not interfere with disciplinary action taken under Award contract of employment clauses. Also includes provision for

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
			payment for time spent on resolving grievances. Cooling-off period: where safety or industrial dispute arises which may give rise to industrial action, either party may invoke a 24 hour cooling-off period. No industrial action is to occur until total available union membership is balloted after 24 hour-cooling off period. 22 — affirmative action — dispute resolution procedure to process any disputes relating to equal opportunity or affirmative action. 32.3 — Lodge Executive to inform their members of the appropriate person to speak to, ensuring that grievances are resolved as close as possible to the source of the problem. Lodge Executive to take action to ensure that grievances are solved outside of their regular monthly meetings.
Agreement making	4(e) — agreement binding upon any successor to the business. 40A — mid term review process — 2 months prior to mid term of agreement, parties to meet and discuss effectiveness and any necessary changes. 40B — agreement review process — prior to expiry of agreement, joint working party to meet and exchange views on success of	4.2 — parties may agree to extend the agreement beyond its initial term of three years upon a review of the agreements performance. 4.3 — six months prior to the expiry of the agreement the parties shall meet to discuss whether or not a further agreement is appropriate. 41 — review of agreement — parties	No provision — see Award.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
	agreement and whether the aspirations of employers, employees and unions have been achieved. Details of options to be discussed and process to reach agreement over implementation of options on expiry of agreement.	shall continuously review the performance of the agreement and monitor adherence to its terms.	
Negotiating change	22 — right of entry to unions — similar to Award provisions but AIRC no longer required to issue authority. 23 — introduction of change — same as Award but no provisions on establishment of boards of reference.	7 — Southern Colliery Consultative Committee — a prime function of the Consultative Committee is the facilitation of communication and the exchange of information at Southern Colliery. Comprises two members of management and two employee representatives who are members of the union. Similar mechanisms involving employees shall be used to undertake specific assignments as required.	31 — Bellambi Collieries Monitoring Committee — purpose is to ensure that the mine is self funding. Committee to oversee the performance of the mine including the operation of the agreement. To meet monthly and will assist in solving problems affecting mine performance or operation of the agreement. Minutes taken and distributed to work force. 32 — communications — meetings convened every 4 months to present information about South Bulli to the work force, a weekly newsletter to provide up-to-date information to employees regarding mine production and maintenance plans and performance. Company management agrees to be visible. Communications provided to Lodge Executive before attaching to payslips. Employees are expected to provide Lodge Executive with a wide mandate to discuss a broad range of issues with the company.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
Redundancy	5(h) — notice of termination by employer depends on length of continuous service and age. 24 — redundancy process — same as Award.	14 — employment security — generally same redundancy process as Award (that is, obligation to hold discussions with employees and union); however, the practice of last to come, first to go is subject to any relevant provisions of the *Industrial Relations Act 1988* and all other things being equal.	No provision — see Award.
Payment of wages	9 — generally same as Award except that pay day not necessarily on a Friday as stipulated in Award and payment only by electronic funds transfer (EFT). (Cheque option was available in Award.)	18 — paid monthly by EFT into a maximum of three bank accounts. Must be paid by the 25th day of the month.	10 — paid every Thursday by EFT into a maximum of four accounts. Can extend pay period by the agreement of a majority of employees. Upon request and for a minimum of 20 employees per institution the company will electronically transfer funds and dues to superannuation funds, the union and medical benefit funds.
Safety management	41 — OH&S — includes statement that all employees accept responsibility for safety of activities under their control and acknowledge their prime responsibility for protecting themselves and their fellow workers from injury and for maintaining plant, equipment and working environments in a safe condition. Condition of employment that employees comply with specified regulations and policies.	35 — Provisions of the *Workers' Compensation Act* 1990 (Qld) as amended shall apply to the parties. 24 — performance testing — impaired performance testing procedure established to determine whether employee impaired due to consumption of alcohol; side effects of medication; personal stress/disorientation or any other factors.	23 — establishes an OH&S Committee representative of the entire work force. Employee participation in safety meetings, audits, accident and incident investigations, developing and writing safe work procedures, paid safety training and reporting unsafe acts and conditions. Provision of resources by the company for OH&S.

Type of arrangement	*Muswellbrook*[a]	*Southern Colliery*[b]	*South Bulli*[c]
		Provision for medical examination. Impaired employees may be immediately removed and appropriate action initiated in line with existing procedures.	

a Binding on Muswellbrook Coal Company Ltd and its employees Muswellbrook No. 2 Open Cut who are members of the CFMEU (UMW Division) and the AMWU. Two year agreement, expiring March 1999.

b Binding on Capricorn Coal Management Pty Ltd and the AMWU and its members employed by the company at Southern Colliery. Three year agreement expiring on 3 June 1999.

c Binding on Bellambi Collieries Pty Ltd, the CFMEU (the parties) and employees of South Bulli Colliery who are members of the CFMEU. The Agreement comes into force 10 July 1996 and expires 31 March 1998.

Table G.3: **Overview of formal work arrangements in recent black coal mining agreements: Crinum and Oaky Creek**

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
Size of the work force		
Recruitment	Appendix 4 — Employee Recruitment Procedure. Merit based. Applicants from retrenchment list and BHP Coal employees seeking a transfer also follow recruitment procedure. Selection process comprises 6 Crinum people who will be trained in Targeted Selection interviewing techniques. Also tests for aptitude, literacy, numeracy and comprehension tasks. Three standard format reference checks will be made before any person is offered employment. Candidates reaching the final stages of the selection process required to undergo a Coal Board medical examination.	11 — Employment Medical Examinations — provision for pre-employment medical examinations for prospective employees in accordance with Queensland Coal Board regulations. Provision to test existing employees at direction of Mine manager to ensure required level of fitness is maintained.
Retrenchment	7 — employment security — intention of the parties that there shall be no forced retrenchments during the term of this Agreement. If mine needs to downsize during life of the Agreement, consultation to occur between the parties on a program including voluntary retrenchments. Where reduction requires forced retrenchments, subject to legal obligations of the parties, it shall be implemented on the basis of 'the last to come, the first to go'.	No provision.
Dismissal	6 — contract of employment — right of the company to dismiss an employee without notice for refusal of duty, neglect of duty or misconduct is subject to relevant provisions of the *Workplace Relations Act 1996.*	

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
Use of casuals, contract employment and contractors	42 — Engagement of Contractors — lists tasks on which contractors will be engaged. Provision for Crinum employees to participate in projects carried out by contractors. Contractors engaged under Crinum Mine Maintenance and Minor Construction Agreement in Appendix 12. Appendix 12 — use of contractors determined by lack of expertise/skill in the local workforce, a need for specialised equipment, an urgency to complete work to maintain production or due to any safety requirement, cover peaks in production and/or maintenance and cost effectiveness.	19 — Use of Outside Contractors on Site — outside contractors may be employed in whatever work it determines. Such decisions at the discretion of the Company and nothing in this Agreement limits or qualifies the Company's right. No union right of veto but the Company to provide the site delegate with as much notice as possible. Where work ordinarily performed by Oaky Creek Underground employees, Company to include in conditions of contract the requirement that the contractor complies as a minimum with the terms and conditions of the Award or certified agreement that applies to it and its employees and that these are not less than the ordinary time weekly base rate specified in this Agreement. Contractors are not to be used to limit the access of employees to overtime, but may be used on weekends to avoid interruption to production or where it is convenient to arrange work on that basis. Contractors to be used for equipment and component overhaul and rebuilds, tradespersons employed by Oaky Creek are to be provided with assistance to upgrade their skills to keep abreast of technological changes appropriate to fault finding in plant and equipment serviced by them. Provision for uniform safety standards and statutory induction requirements to apply to employees and contractors. Provision for union access to contractors. Company to encourage contractor to employ casual or temporary labour from within the local community.
Manning levels	7 — employment security — agreed minimum numbers for the life of the agreement.	35 — provision for flexible manning arrangements. Allocation of manpower on each shift shall be at the discretion of the Shift Undermanager.

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
Hours of work and roster arrangements		
Contract of employment	6 — same as Award except that in the case of a breakdown of plant or machinery, deductions from pay to only occur after breakdown has continued for more than five consecutive days (Award provides for four consecutive days). In addition, consultation to occur with CFMEU representatives concerning these significant breakdowns.	11 — same as Award.
Ordinary hours	15 — hours of work — 35 hours per week — same as Award.	12.1 — hours of work — 35 hours per week — same as Award.
Part-time hours	No provision — see Award	No provision.
Overtime hours	19 — generally same as Award. Employees shall be available to work reasonable overtime to ensure the continuity of production and the safe operation of the Mine and following the occurrence of significant events. 19.5 — callouts — does not include Award provision that an employee cannot be required to work the full four hours where specific job to be performed is completed in less than 4 hours.	17 — same as Award except that reasonable overtime may be extended in abnormal circumstances and the extent of such overtime shall not be subject to any industrial ban or limitation. Allocation of overtime shall be managed by the Company and allocated by the supervisor. Overtime to be offered without discrimination on the basis of union membership having regard to availability of individuals, the skills mix required for particular jobs, attendance of employees in the previous week and the fairness in the provision of equal access to overtime opportunities to employees. Provision to extend the number of jobs required to be performed in a recall where the work is essential and requires immediate attention or the employee was advised at the time of notification.
Shift arrangements	15.2 — shift length — set at: 8.75 hours for 5 day roster employees 9.5 hours for Section Coordinators 12.5 hours for Maintenance Coordinators. While these arrangements will be held in place for the duration of the Agreement, parties may implement alternative roster arrangements by agreement.	12.2 — shift work to be worked Monday to Friday. Upon the provision of a month's notice by the Company, a variety of shift work arrangements may be introduced, including shifts up to 12 hours duration, shifts extending over 7 days per week and rotating shifts. 12.3 — deputies required to work weekends as ordinary time shall work 12 hour shifts.

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
	24 — swap shifts — provision to swap shifts. If an employee swaps a shift he must work the immediate preceding shift or the immediate shift following the rostered shift. Where request for swapped shift at initiative of Company, 8.75 hours to be worked in a single shift and employee to be provided with a paid ten hour break and transport.	12.4 — designated starting and finishing places for underground miners will be on the surface and employees are to be present at such places at the commencement time of their shift. 12.5 — the Company with the agreement of a majority of employees may substitute the rostered day off an employee is due to take for another day in the case of a breakdown in machinery or a failure or shortage of power or some other emergency situation. Provision for individual agreement. Appendix 6 — 14 day/3 week shift roster arrangements: Night Shift — 11pm–7am (Sunday-Friday) Day Shift — 7am–3 pm (Friday-Monday) Afternoon Shift — 2pm to 12 midnight (Monday-Thursday) Appendix 7 — 3/12 hour (Friday-Monday) rotating roster shift arrangements: Day Shift — 7am–7pm (Friday-Friday) Night Shift — 7am–7pm (Friday-Monday)
Roster arrangements	16 — Roster system 5 day rotating roster — provides continuous coverage from the commencement of night shift each Monday for a period of 120 ordinary hours and will be worked by engineering and production employees. Continuous Roster — maintenance coordinators appointed by the company. Six day roster — section coordinators and engineering mine workers. Changes between roster systems — change for a continuous roster employee shall be where possible at least 7 days. All other changes to 5 and 6 day roster employees can be made given reasonable notice. 20.7 — five additional production days per annum, whereby the	12.2 — an employee may be required to transfer to a different roster upon receiving not less than a week’s notice.

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
	Longwall and two Development Units are operating. 'Hot seat' changes maintained. Days worked agreed by the production crew and the Company on a ten weekly cycle. 20.8 — provision for an additional fully manned Development Panel to work on the Longwall (where deemed necessary for safety reasons). Such 24 hour period to count as a nominated Production Day.	
Paid breaks	19.6 — provision for a meal to be supplied to employee after 4 hours' overtime. Award includes option of a meal break or payment.	18.1 — crib breaks same as Award for 7 and 8 hour shifts. 18.2 — 2 paid 30 minute crib breaks to be provided each 12 hour shift. Crib breaks to be taken before the 5th hour and the completion of nine and a half hours. If not taken before these times the employee shall be paid at appropriate rate of overtime between the due time for taking cribs and the time at which the crib is taken. 18.3 — provision for staggered cribs or otherwise taken as directed to ensure continuous operations. No provision for recognised smokos.
Annual leave	27 — generally same as Award with some differences. 5 weeks' annual leave for employees on a 5 day roster. 21 days (210 hours) for employees on a continuous 7 day roster. May be taken in unlimited periods providing one period is at least 3 weeks. Each area to maintain own roster for taking of annual leave to ensure that needs of the business and employees are complemented.	Appendix 5.5 — same as Award. Appendix 5.6 — Annual Leave/Long Service Leave Allocation — provision for such leave to be spread evenly over all crews/departments to alleviate unnecessary delays and consequent loss of production and bonus through reduced manning levels. Provision for management to allocate leave at their discretion.
Long service leave	28 — same as Award except that does not include provision for payment for retrenched miners with 6 years service unable to find further employment.	Appendix 5.4 — same as Award except that does not include provision for Union Officials – Credit for Prior Service.
Sick leave	22 — attendance — review of every employee's attendance record between the employee and their supervisor as an information and awareness exercise. 23 — unlimited sick leave provision. Abuse subject to a detailed	Appendix 5.1 — sick leave accrues on the basis of 120 hours per year for 12 hour shift employees and 105 hours for all other cases. Absences for less than half a day shall not be deducted. Accumulative without deduction. Employees to notify the Company

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
	4 step disciplinary procedure. Monthly review of statistics and provision for ongoing 6 monthly reviews with employees. 10 days of sick leave taken in 1 or 2 day lots with or without certificates over a 12 month period will result in a loss of Production Bonus for 12 months. Employees must notify supervisor of inability to attend at least 90 minutes prior to commencement of shift and then after every further 48 hours' absence; submit application for leave form; and provide medical evidence where required.	of their inability to attend to work at least 30 minutes prior to the scheduled commencement of work and shall produce satisfactory proof if required.
Parental leave	Parental leave and adoption leave — as per Part 6A Division 5 of the *Workplace Relations Act* and the Regulations (Schedule 14).	Appendix 5.7 — Parental leave — same provisions as Award except that no provision concerning effect of paternity leave on employment.
Other leave	25 — Family Leave — available for current partner; parent, principal carer, or parent in law; child or step child; other dependant relative; brother or sister; or a member of the employee's current household. Employees to notify area coordinator of inability to attend where possible 90 minutes prior to the commencement of their shift. Granted and paid at normal salary plus bonus subject to provision of medical evidence; the submission of an application for leave form; and leave of one day only up to an annual maximum of five days. In extreme circumstances a family leave application of more than one day but not more than five days in any one year may be approved by the Department manager. 26 — Bereavement Leave — same as Award except that reasonable travel time within Australia may also be granted. Must notify supervisor of inability to attend and likely length of absence as soon as possible. If additional leave is required, the employee should use other leave provisions.	28 — Jury Service — same as Award except that continues to receive salary subject to forwarding to the Company payments received for attendance. Appendix 5.2 — Special Family Leave — same as Award. Appendix 5.3 — Compassionate Leave — same as Award.

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
	29 — Jury Service — same as Award except that continues to receive salary subject to forwarding to the Company payments received for attendance. 30 — Leave to attend local Council meetings — up to a total of 24 shifts per year shall be available to each employee who is a member of a local Council. 31 — Defence Force Reserve Leave— leave to enable regular training commitments and the annual camp. Applications to be made 4 weeks in advance. Employee to reimburse Company all payments received for attendance. A statement of earnings to be provided to the Company. Shorter periods to be met by using single days of annual leave. 33 — Unpaid permitted leave — available in special circumstances. Granted subject to permission of Area Coordinator and according to operational requirements.	
Remuneration and on-costs		
Base pay	10 — remuneration — current salary includes, and is in lieu of the following Award entitlements: ordinary weekly pay rate, rostered overtime, rostered holiday work, shift penalties and the Crinum allowance. 11 — Rates to increase by 2.5 per cent on the first Sunday after the commencement of the Crinum Agreement 1997; a further 2.5 per cent from the first Sunday after the first anniversary of the commencement of the Crinum Agreement 1997. If the Crinum Agreement is extended an additional year a further 2.5 per cent shall be payable from the first Sunday after the second anniversary of the commencement of the Crinum Agreement 1997. 12 — ordinary hourly pay rate, including 2.5 per cent increase after commencement of the Agreement —	13 — base rate of $580.70/week is for the purpose of calculating applicable rates for Youth Miners and Apprentices and for defining the minimum base pay applicable to contractor employees. Underground Crew Member (Tradespersons and Miners): $633.60 Deputy: $712.30 Further provision for individually identified employees to receive $667.60 for the life of the Agreement in return for accepting Fixed Term Employment. 32 — Minimum rates of wages to be paid to apprentices comprises the relevant percentage of the base rate of $580.70 less $39.20, plus $39.20. Provisions of *Employment, Vocational Educational and Training Act 1988* apply except to the point of inconsistency with the terms of their contracts of employment:

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
	Level 5: $22.0795 Level 4: $19.7426 Level 3: $18.5752 Level 2: $17.4047 Level 1: $16.6251.	During first year's experience — 40 per cent During second year's experience — 55 per cent During third year's experience — 75 per cent During fourth year's experience — 90 per cent 33— Minimum rates of wages to be paid to Youth Miners: 15–16 years of age — 40 per cent of base rate 16–17 years of age — 55 per cent of base rate 17–18 years of age — 75 per cent of base rate Base rate is $580.70. Employees will also receive bonus and conditions relevant to underground employees under the Agreement.
Overtime pay	Appendix 5 — included in annualised salary.	17 — same as Award.
Shift pay	Appendix 5 — included in annualised salary.	20 — same as Award except for provision for 12 hour shifts at night which are to be paid at 120 per cent of the ordinary rate. No shift allowance is payable for a 12 hour shift worked during the day.
Weekend pay	No provision — see Award.	21 — same as Award.
Annual leave pay	27 — same as Award	Appendix 5.5 — same as Award.
Bonus pay	Appendix 6 — $1 per metre of development advance. Longwall bonus will be $2 per metre Longwall retreat up to 65 metres and $3 for every metre of Longwall retreat over 65 metres. Added together and paid weekly.	15 — consists of 2 components, 'Weekly Development metres advance' and 'Weekly Longwall retreat metres'. Longwall retreat based on metres: from 41 — 50m per week at $360 per metre to 326m and over at $170 per metre into pool for distribution to eligible employees. Eligible pool of employees does not include employees absent from work due to unpaid absence. Number of eligible employees shall vary according to the number of employees in any one week. Any differences of opinion to be dealt with through the Disputes Procedure.
Workers' compensation	No provision — see Award.	No provision.

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
Sick pay	23.4.4 — paid for each shift of sick leave at the appropriate salary rate plus bonus.	Appendix 5.1 — maximum payment at employee's classification for ordinary hours to a maximum of 10 hours for 12 hour shift workers, 7.5 hours for employees working shifts in accordance with Appendix 7, or 7 hours in all other cases. Upon termination, death or retrenchment an employee who has accrued at least 70 hours or more of unused sick leave to be granted payment of unused hours.
Accident pay	Appendix 3 — rehabilitation and accident policy — same as Award except that Company continues to pay employee directly. The company in turn receives the employee's weekly entitlements from Work Cover.	34 — same as Award except that Company may give notice where an employee is certified as totally and permanently incapacitated and never likely to return to work. Liability of the Company to pay accident pay continues after termination.
Superannuation contributions	No provision — see Award.	36 — provisions of QCOS shall apply to employees for the duration of the Agreement.
Severance and retrenchment pay	50 — retrenchment pay at rate of three weeks per year of service and severance pay at rate of one week per year of service. Company has two weeks as opposed to one to find alternative employment carrying equal or greater pay to avoid retrenchment liability. One week to avoid severance liability.	30 — same as Award.
Special rates and allowances	10 — remuneration — a special Crinum allowance equivalent to $16.70 per week shall be incorporated into each employee's salary. Paid in recognition of all special disability factors (dirt and wet) at Crinum Mine which are not reflected in other payments provided for in this Agreement.	14 — Oaky Creek Underground Allowance shall be paid in lieu of all special rates and allowances to Underground employees. 12 hour/3 day weekend roster employee to receive $45 per 12 hour day worked. 10 hour/4 day roster employee to receive $37.50 per 10 hour day worked. 8 hour/5 day roster employee to receive $30 per day worked. All other ordinary/other shifts to receive $30 per day worked. Allowance includes compensation for all disabilities, conditions and special requirements such as: leading hand; tools; water money; live sewer work; dirty work; erection of scaffolding; first aid officer;

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
		First Aid Attendant; heat; height; isolation; Plumber's Licence; height (electrical/mechanical); confined spaces; shaft work; continuous production and absence of 'smokos'. 43 — Performance of Higher Duties — provision for an employee to fill positions on a temporary basis for a full shift or longer following agreement between the employer and employee.
Public holidays	20 — public holiday provisions — generally same as Award except: does not include Award provision that no work will occur on 2 public holidays nominated by the employer. 6 and 7 day roster employees shall not be required to work Christmas Day and Boxing Day. Provides option for employees required to work a public holiday to be paid at triple time, or paid at double time plus accrue a Statutory day. All Statutory holidays accrued during the year must be taken by December 31 each year. Time of taking subject to operational constraints. Holidays not taken will be paid out in the week falling around December 31. Christmas Day and Boxing Day may be carried forward to the next calendar year.	21 — same as Award.
Working clothes and safety boots	36 — 4 additional sets of working clothes compared with Award (where employee undertakes own laundry) or 7 additional sets of working clothes compared with Award (where laundered by contractor at employee's expense). One pair of safety boots supplied. Gumboots available on request. Winter coats issued every three years. Replacement generally on a wear and tear basis.	41 — same as Award except additional provision for a winter jacket which is to be replaced every 3 years. Footwear and clothing to be replaced under extenuating circumstances where damage occurs during the course of employment through no fault of the employee. Other protective equipment to be supplied on an as needs basis. Repetitive failure to wear appropriate safety and protective equipment will lead to an employee's continued employment being jeopardised. 42 — provision for replacement of an employee's tools and clothing damaged in the performance of normal duties.

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
Travel	34 — transport provided to and from Emerald for normal rostered work and if required for overtime.	
Training costs	No provision — see Award.	No provision.
Other on-costs	35 — Accommodation Assistance — Appendix 11 — Crinum Home Ownership Scheme — consists of either a house, land and loan package or a loan only package. 37 — Company to supply necessary tools. 38 — Health Benefit — Health Fund arrangements as agreed at BHP Coal State Consultative Committee. 39 — Death and Disability — Company Scheme pays $100 000 upon death or disablement of an employee. 40 — Leasing Program — agreement to introduce.	
Functions, tasks and skills		
Functions	49 — Employee Representatives — recognition same as Award. Representatives permitted to discuss issues with Mine Management and employees during working hours subject to agreement and appropriate paperwork.	8(e) — provision that seniority will play no role in the allocation of duties, shifts, job movements or promotions. 39(a) — Union representation. Company to recognise Union representatives as elected representatives of union members at the workplace subject to a number of conditions. These include: the performance of each union representative's obligations under the Agreement as their primary responsibility, no more or less favourable treatment to union representatives than other employees, ensuring strict compliance with the Disputes Procedure and the right of the Company to review, alter, amend or withdraw their support to the union and their representatives in conducting their affairs at Oaky Creek in the event of unlawful industrial action being embarked upon. 39(b) — Provision to allow union representatives the necessary time during working hours to interview the Company or its representatives on matters affecting the employees represented by

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
		the union. This is subject to union representatives only leaving their job with the authorisation of their immediate supervisor. Absences from the job being restricted to the necessary period as identified by the employee and as agreed between the Supervisor and the Union representative. Such absence permitted only where the first stage of the Disputes Procedure has not been complied with and all efforts made to resolve the issue at the lowest possible level. Union representative to provide a written account of the result of discussion to which they absented themselves. 39(c) — Provision for leave of absence for union representatives to attend bona fide union business. Consideration to be given to productive requirements of the operation or the Company's interests. Approved leave at the discretion of the Company. If absence is not approved by the supervisor, leave is to be regarded as unauthorised absence. 39(d) — Maximum of 10 days' paid leave of absence per year available for Union training. 10 days to be split by agreement between the respective unions and their representatives. 39(e) — Provision for maximum of 2 hours' paid attendance at monthly Union meetings. Meetings to be conducted off site on Sundays and issues raised and outcomes to be provided to Employee Services Manager by Union representative. 39(f) — No paid time off available to Union representatives for interviewing/attempting to recruit employees of outside contractors. 39(g) — Provision for Union representatives to address new company employees during induction provided that Company officials are present and no coercion applied. 39(h) — Provision for paid leave in circumstances other than those outlined above by agreement and restricted to exceptional circumstances.

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
		39(i) — Payment for employees or their representatives where paid leave approved by the Company is limited to employees' loss of rostered earnings. Otherwise unrostered time spent on bona fide union business will not be payable. Exception is where Agreement provides otherwise.
Job and task demarcation	41 — Demarcation — agreement that subject to safety and operation of the Crinum Work Model demarcations giving rise to inefficiencies will not have a place at Crinum Mine. Appendix 8 — Work Model — two streams of mineworker, production and engineering. Five levels with progression based on acquisition of additional skills. Level 5 is by appointment. New entrants paid at level 1.	8(a) — provision that an employee's classification or union membership/non-membership will not limit the scope/range of work or training they are required to perform, and that no skills possessed by an employee will be quarantined from use on the job. Work to be organised to maximise the flexibility of the workforce. Principal consideration in the allocation of work will be that an individual is competent to perform a given task safely. 8(b) — provision for production employees to be trained in, and perform when competent, routine maintenance on equipment. 8(c) — provision for tradespersons to be trained in, and perform when competent, production tasks to enhance teamwork and facilitate efficiency of operation with the exception of continuous miners. 8(d) — provision for deputies to participate in production duties as part of the team and exercise overall leadership qualities. 8(e) — provision that seniority will play no role in the allocation of duties, shifts, job movements or promotions. 8(f) — provision for staff/management to perform production or engineering tasks within their competence and ancillary to their staff/management duties or where providing a hand. Training to undertake such tasks is agreed.
Training	No provision — see Award.	40 — training to be consistent with the ongoing skills and competencies required by the operation. Fair opportunity and treatment of employees to be provided.

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
		Provision for co-operative approach to training through the documentation of processes, procedures and other relevant materials for reference purposes.
Qualifications	No provision — see Award.	No provision.
Procedural arrangements		
Relationship with Award	Agreement replaces in part, provisions of the P&E Award. It includes terms and conditions of employment for those employees covered by the Award. Where this agreement differs from an Award provision then this Agreement prevails.	Agreement contains all conditions of employment and entitlements of employees employed under its terms and conditions by Oaky Creek Coal Pty Ltd to the exclusion of all other Awards, Agreements and industrial instruments.
General	43 — Environment — provision of adequate resources to familiarise employees with BHP Coal Environment Policy, relevant legislation, site requirements and the necessary aspects of the Plan of Operations.	23 — absenteeism procedure — absenteeism records to be reviewed every 2 months. Unsatisfactory attendance triggered by the total number of days absent (trigger points being 8 days in 12 months or 5 days in 6 months), patterns of absenteeism, recent and long-term attendance and any other factors affecting the employee's ability to attend for work. Where attendance is unsatisfactory, and an employee is absent from work without a good and sufficient reason, the following 4 step process shall occur: the employee shall be verbally consulted by their supervisor on the first occasion; on the second occasion the employee is to be verbally counselled by Management in the presence of a union delegate and a written warning issued highlighting the seriousness with which a third offence shall be viewed by management; on the third occasion the employee to be verbally counselled by Management in the presence of a union delegate and a written warning issued to the employee, with a copy sent to the union, that a fourth offence shall warrant dismissal; and on the fourth occasion the employee is subject to dismissal. Written warnings lapse 12 months after their issue if no subsequent offence is committed during that period or within the 6 months following their removal. An employee who

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
		is absent for 3 or more consecutive days and who does not notify the Company of such absence and reasons for such absence shall be dismissed. Provision for redress to Disputes Settlement Procedure if employee considers absence was with good and sufficient reason. 38 — communication — general manager of the mine site to address the workforce at least every 3 months during working hours to provide information which affects their employment. Information includes mines budget and targets, performance against budget, safety performance and policies, major changes in organisation structure, technology, production or policy that may significantly affect employees. Significant change which adversely affects employment, and measures to avert or mitigate such effects, to be debated by the Oaky Creek Coal No. 1 Underground Mine Consultative Committee.
Dispute settlement	45 — Disputes Procedure — same as Award. The 4 stage dispute process excludes discussion between District officials of the CFMEU and Senior company officials as contained in Award. Parties agree to avoid use of legal argument before AIRC unless necessary to resolution of issue. Work to proceed under conditions prevailing before the dispute. Where these conditions disputed, work to continue at reasonable direction of employer; the employee's recognised skills, competence and training; and safe work practices. 47 — Fair Treatment — provides 4 step Fair Treatment Plan which is proceeded through in differing time frames depending on seriousness of matter. Remain on Plan until recover desired behaviour. 48 — Anti-discrimination /Harassment P rocedure — employee may pursue complaint through Fair Treatment Plan or provisions of BHP Policy on Harassment and Discrimination at Appendix 14.	22 — same procedure as Award except that if conciliation fails to resolve the issue, issues concerning the interpretation are to proceed to the Federal Court; issues of non-compliance are to proceed in accordance with the compliance sections of the WR Act, and if the matter is within the items listed in s.89A of the WR Act the Commissioner who conciliated shall arbitrate the matter with the parties retaining their rights of appeal. Work to proceed while the procedure is being followed in accordance with the reasonable direction of the Company, the employee's skills, competence, training and safe working practices.

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
Agreement making	53 — Duration of Agreement — parties agree to review operation of Agreement and if agreed, to extend the Agreement for a further year without any additional claims than those detailed within Agreement.	
Negotiating change	No provision — see Award.	6 — provision to establish Oaky Creek Coal No 1 Underground Mine Consultative Committee to oversee operation of the Agreement. Comprises 3 management representatives, 2 CFMEU and 1 CEPU representatives. To meet once every 2 months and the minutes to be issued to all committee members and posted on all noticeboards. 9 — all previous custom and practice, whether documented or not, will cease from the operative date of the Agreement. No further customs or practices shall be recognised or bind the parties unless agreed in writing and incorporated into the Agreement.
Redundancy	No provision — see Award.	31 — same provisions as Award with a number of exceptions. The practice of last on, first off does not apply. Moreover, Company to notify relevant unions at the option of the employees concerned.
Payment of wages	9 — salaries paid directly into a maximum of five accounts by no later than Friday of each week. Mineworkers failing to submit signed time sheets prior to 9am on Monday of each week will not be paid for that day until a signed and authorised time sheet is forwarded for inclusion in the next pay run.	16 — same as Award except provision for deduction of union dues and upon termination wages due to an employee to be deposited into their account on the day termination takes effect.
Safety management	3 — OH&S —Appendix 2 — Alcohol Testing Policy — no one permitted to remain in the workplace while under the influence of alcohol (blood alcohol content of 0.05 gm/100ml or greater). Non-compliance may result in disciplinary action. Commitment to ongoing education program. Recognises dependence as a treatable condition. Details methods of testing for alcohol. Promotes voluntary testing. Details mandatory testing procedure, including	24 — provision for Oaky Creek Coal No 1 Underground Mine OH&S Committee to be established. State legislation and regulations to be complied with. Chaired by Mines officer. Ability to make recommendations to management concerning the Rehabilitation Policy. 25 — provision to review current Rehabilitation Policy to ensure needs of Organisation and legislative requirements are met.

Type of arrangement	*Crinum*[a]	*Oaky Creek*[b]
	after an accident resulting in death or serious injury, damage to equipment or property, or near misses with potential serious injury or equipment damage. All tests and results shall remain confidential. Performance Improvement Procedure — First offence detailed on file. Second offence within six months of the first results in details recorded on file and professional counselling. Third offence within 12 months of the first. Process involves rehabilitation. Leave available for voluntary rehabilitation and reimbursement of costs. Provision for suspension without pay after fourth offence within 2 year period. 5 positive readings within 3 years of the first offence results in dismissal. 44 — Flood Procedure — involves safe transportation of Crinum employees during flood periods which involve a threat of road closure. 46 — Safety Resolution Procedure — similar to Dispute Procedure. 4 stages, final stage being discussion between District Mines Officer, Department of Minerals and Energy Inspector of Coal Mine and the nominated senior Company officials. Appendix 3 Workplace Rehabilitation Policy — details rights and responsibilities of injured/ill employees, their families, fellow employees and various coordinators. Includes injury plan of action and individual case management as well as arrangements for selected/alternate duties.	26 — Drugs and Alcohol — provision for routine and targeted alcohol testing where it is believed an employee's performance is impaired by alcohol. Drug testing protocol to be established during the term of the Agreement. Appendix 4 makes provision for drug and alcohol education and sets a maximum blood alcohol content of 0.05 per cent. All tests to be witnessed. Any person over 0.05 per cent will be retested prior to the commencement of the next shift. A blood test to be taken in the event of a disagreement over the results of a breath test. Wages for the day are to be paid and medical expenses reimbursed in the event the breath test was incorrect. Refusal to take the test will constitute a failure of the test. An employee who refuses to accept transport home after failing a test and instead drives himself offsite shall be reported to the local police. Provision for rehabilitation of employees who fail a test. Appendix 3 — OH&S issue resolution protocol. 5 step procedure. If unable to resolve issue satisfactorily proceed from individual employee to supervisor, to Superintendent and Miners officer, to Line Manager and Statutory Manager, to General Manager or Department of Mines and Energy or to District Check Inspector.

a Binding on BHP Coal Pty Ltd, the CFMEU and members of the CFMEU employed at Crinum. Two year Agreement expiring on 17 October 1999.

b Binding on Oaky Creek Coal Pty. Ltd., the CEPU and the CFMEU. Agreement to operate for one year from the date of certification by the AIRC.

H METALLIFEROUS AWARDS AND AGREEMENTS

This appendix provides an overview of a small number of metalliferous awards and collective agreements in the two main metalliferous mining States of Queensland and Western Australia. No State or Federal individual agreements are summarised in this appendix.

The awards and agreements presented in Tables H.1 to H.3 are as follows:

- *Queensland Mining (Non-coal) Award — State*;
- Cannington — Broken Hill Proprietary Ltd mine. Agreement made under the jurisdiction of the Queensland Industrial Relations Commission;
- Gunpowder — Gunpowder Copper Ltd mine. Agreement made under the jurisdiction of the Australian Industrial Relations Commission;
- Mt Isa — Mt Isa Mines Ltd mine. Agreement made under the jurisdiction of the Queensland Industrial Relations Commission; and
- BHP Iron Ore Ltd Western Australia mines — Mt Newman Joint Venture and Mount Goldsworthy Mining Associates Joint Venture. Agreement made under the jurisdiction of the Western Australian Industrial Relations Commission.

Industrial relations in Queensland and Western Australia

The *Workplace Relations and Other Legislation Amendment Act 1996* (Qld) regulates industrial relations in Queensland. It largely reflects the (Federal) WR Act but differs slightly in that it confines awards to 19 allowable matters. The Queensland Industrial Relations Commission (QIRC) may determine the number of hours which part-time (minimum continuous hours of employment per day) and casual employees (minimum number of hours for single continuous engagement) may work. Under the Queensland Act new awards will be restricted to core matters that collectively provide a safety net of fair minimum wages and conditions. Existing awards will be simplified so that they cover only these 19 core matters.

The general conditions contained in part 12 of the former *Industrial Relations Act 1990* (Qld) applying to award employees continue for 18 months. Existing provisions allowing the QIRC to make orders for minimum wages in non-award areas will also be retained. This provides an opportunity for these provisions to be incorporated into awards where this has not already occurred. These include

limiting the hours of work to six days in any period of seven consecutive days, 40 hours in any period of six consecutive days and eight hours in any day, overtime rates at time and a half and double time for more than one shift per day, one week sick leave for each completed year of service, 13 weeks' long service leave for 15 years of continuous service, and 52 weeks' unpaid parental leave.

In contrast to the Federal and Queensland industrial relations systems, the *Minimum Conditions of Employment Act 1993* (WA) sets out statutory minimum conditions applying to all employees in Western Australia. The Act is designed to provide a base for the parties to negotiate from and applies to all employers and employees, whether they are covered by a workplace agreement, award or common law contract. The Act provides a minimum rate of pay, 4 weeks' annual leave per year, 10 days paid sick leave per year, 2 days' bereavement leave per year, 10 public holidays per year and 52 weeks' unpaid parental leave. The minimum wage is reviewed annually by the Western Australian Industrial Relations Commission and a recommendation is made to the Minister.

Table H.1: **Overview of formal work arrangements in *Queensland Mining (Non-coal) Award — State*** [a,b]

Type of arrangement	*Clause*	*Award provision*
Size of the workforce		
Recruitment	*2.7*	Preference of employment given to financial members of Australian Workers' Union (AWU), Queensland.
	2.16	Initial probationary period of employment of 12 weeks (for induction, initial company training and assessment of employee's performance). Employees to be advised of unsatisfactory performance. Period of probation to count for accrual of leave entitlements but no entitlement to paid leave during this period (except sick and bereavement leave).
	2.1.1	All employees, except casuals, are employed by the week.
Retrenchment	*2.7*	Preference of employment in retrenchment given to financial members of AWU (Qld).
	2.1.2	Employees' notice of termination is the same as for employer (but no additional notice based on employee's age). Notice of termination by employer specified (based on years of continuous service with the employer)— ranges from 1 week's notice for one year of continuous service or less to at least 4 weeks' notice for employees with more than 5 years of continuous employment.
	2.1.3	In addition, employees over 45 years of age at the time of the giving of notice with 2 or more years of continuous service are entitled to an additional week's notice.
	2.1.6	During probationary employment period, either party may terminate employment by giving one day's notice.
	2.1.4	In lieu of notice, compensation must be paid as if the employee had continued employment for the relevant period.
Dismissal	*2.1.5*	Employer can instantly dismiss an employee for misconduct or other grounds that justify summary dismissal.
Retirement		No provision.
Use of casuals, contract employment and contractors	*2.1.7*	Fixed-term employees are engaged for a fixed term and are able to accrue pro rata leave entitlements. Details of the fixed term shall be in writing and may only be varied, in writing, by consent of the parties. If change to employment on a weekly basis during contract period, accrued service entitlements shall form part of the employee's period of continuous service.
	2.1.9	Casual employment allowed.
	6.9	Contract and/or piecework is allowed in all classes of work provided that the contract or piecework is not a condition of employment and that the piecework rate ensures a certain weekly minimum pay level is reached.
Manning levels		No provision.

Type of arrangement	*Clause*	*Award provision*
Hours of work and roster arrangements		
Ordinary hours	*4.1.1*[c]	Ordinary hours of work not to exceed an average of 38 hours per week.
	4.1.2[c]	Unless agreed otherwise, ordinary hours for day workers shall be worked continuously between 6am and 6pm.
	2.1.9	Casual employees shall be employed for a minimum of 4 hours on each engagement and shall work no more than 8 hours per day or 38 hours per week without payment of overtime (unless otherwise agreed when engaged in conjunction with a cyclic roster).
	4.3	Employees entitled to an unpaid half to 1 hour meal break (as agreed between the employer and the employees) to be taken between the fourth and sixth hours from the ordinary starting time.
Part-time hours	*2.1.9*	Part-time employees are engaged by the week to work up to an average of 32 regular hours per week. Ordinary daily hours are to be worked continuously excluding meal breaks.
Overtime hours		No direct restriction, except those implied by clause 4.2.6 for shift workers.
Shift arrangements	*2.2.1*	Employees may be required to transfer from day worker to shift worker (and vice versa), provided that at least 48 hours of notice is given by the employer of such change and has had 10 hours off duty between shifts (clause 4.1.4).
	4.1.4[c]	For shift workers, ordinary hours shall not exceed 10 hours in any shift, 152 hours in any four week roster and 304 hours in any eight week roster. Shift workers shall work at times required by the employer, provided that a shift shall not extend beyond 10 hours, inclusive of a paid meal break of at least 30 minutes. An employee is not required to work more than one shift per day with the exception of changeovers. By agreement between the employer and the majority of employees, 12 hour days may be worked provided that: (1) the employer and employees are guided by the ACTU Code of Conduct on 12 hour shifts; (2) proper health monitoring procedures are introduced; (3) suitable rostering arrangements are made; and (4) proper supervision is provided. (See also clause 4.2.6 under paid breaks.)
Roster arrangements	*4.1.4*[c]	For shift workers, work is to be carried out over consecutive recurring cycles, with each cycle consisting of a specific number of consecutive working days followed by a specific number of consecutive non-working days. Shift work rosters shall be agreed between the employer and majority of shift workers. Agreement shall include the pattern of working and non-working days, commencing and finishing times of ordinary hours for respective shifts, and shall be posted to provide at least 7 days' notice of any change. Seven days' notice shall be given to an employee required to transfer to another shift roster.

Type of arrangement	*Clause*	*Award provision*
Paid breaks	*4.1.4*[c]	Shift workers shall work at times required by the employer provided that a shift shall not extend beyond 10 hours, inclusive of a paid meal break of at least 30 minutes.
	4.2.3	A paid meal break of 30 minutes is given for overtime continuing for more than 2 hours beyond the ordinary (or agreed roster) ceasing time.
	4.2.6	An employee without at least a 10 hour break between the termination of ordinary work one day and the commencement of ordinary work the next day (due to working overtime) to receive a 10 hour break after the completion of overtime without loss of pay for ordinary time not worked during such break. An employee who has not received a 10 hour break in the 24 hours immediately prior to ordinary commencement time on a Monday shall be released after completing such overtime without loss of pay for ordinary time worked during such break. An employee instructed to resume or continue work without receiving a 10 hour break to be paid at double time until he receives a 10 hour break. The employee shall not lose pay for ordinary working time during such a break. (This subclause applies to shift workers who rotate from one shift to another as if 8 hours were substituted for 10 when overtime is worked: (a) for the purpose of changing shift roster; or (b) where a shift worker does not report for duty; or (c) where a shift is worked by arrangement between the employees themselves.)
	4.3	All work done during the recognised meal break (normally unpaid) will be paid at double time rates and will continue until such break is taken.
	4.4	Rest Pauses: a paid 10 minute break in the first and second half of daily work to be taken so as not to interfere with necessary continuity of work. Where the majority of employees agree, these may be combined into a single 20 minute break.
Annual leave	*5.1.1*	For all employees (except casuals) for each completed year of employment, annual leave to accrue as follows: (a) a minimum of 5 weeks for continuous shift work, worked over 7 days per week; (b) not less than 4 weeks in any other case; (c) pro rata where an employee is engaged for work carrying an entitlement of 4 or 5 weeks' leave in a 12 month period. Periods of three months or less of periods of unpaid leave of absence to be included in the calculations.
	5.1.2	Annual leave excludes statutory holidays during the period of leave.
	5.1.6	Reasonable notice of the commencement of annual leave shall be given to the employer.
Long service leave	*5.6*	All employees entitled to long service leave on full pay as per Part 12, Division 2 of the *Industrial Relations Act 1990* (Qld).

Type of arrangement	*Clause*	*Award provision*
Sick leave	*5.3.1*	For each completed year of service, all employees (except casuals) entitled to 60.8 hours of sick leave. For those with less than one year of service, sick leave entitlement to accrue at the rate of 7.6 hours of sick leave for each 6 weeks of employment.
	5.3.3	Where absence from work is more than 2 days, employee must produce medical certificate specifying period he/she is unable to work and promptly notify the employer in order to receive full payment for the absence.
	5.3.4	In cases where (1) the absence is approved by the employer or (2) the employee is dismissed, stood down or terminated for a period of less than 3 months, then where the employee is subsequently re-employed by the employer, continuity of service record for the purposes of accruing sick leave is unbroken.
Parental leave	*5.5*	Provisions of the *Family Leave Award* (Qld) to apply. This Award is to be displayed in accordance with the relevant Act. Provisions concerning Special Responsibility Leave can be altered by agreement provided that departure does not reduce the employee's entitlements. Part-time work can be performed by agreement in circumstances specified in the *Family Leave Award*.
Other leave	*5.2.1*	Eleven public holidays recognised on specified dates.
	5.2.2	Where a public holiday falls on a day that a continuous shift worker or seven day worker is rostered off they shall receive an additional day of leave. This may be taken in conjunction with annual leave or paid as 7.6 hours if the additional time off disrupts the roster.
	5.2.3	Where the majority of employees and the employer agree, statutory holidays may be substituted for other ordinary working days, provided that work performed on the substituted holiday shall be paid at the applicable holiday rate.
	5.4	Bereavement Leave — weekly employee upon the death of specified list of family members is entitled to 2 days of leave up to and including the day of the funeral without deduction of pay. Notice shall be given and proof furnished to the employer.
Remuneration and on-costs		
Base pay	*3.3*	Pay rates are minimum weekly rates for mine employees grades 1 to 9, inclusive of the base rate and supplementary payment.
	2.1.9	Casual employees to receive an hourly rate equal to one thirty eighth of the appropriate weekly rate plus 19 per cent loading.
	2.4	Employer has right to deduct pay for any day an employee cannot be usefully employed for causes which the employer cannot reasonably control.

Type of arrangement	*Clause*	*Award provision*
	6.5	Where an employee is required to work in an area covered by the Award but in another workplace, the employee shall be paid at the scheduled rate of wages fixed by this Award (including travel time to this place of work) but not exceeding 8 hours' wages in any one day and provided that the employee remains in the service of the employer for at least 1 month.
	6.9	Minimum piecework rate to ensure that the average competent employee can earn at least 30 per cent above the Award rate.
Overtime pay	*4.2.1*	Day workers — all time worked in excess of ordinary working hours (38 per week) shall be paid at the rate of time and a half for the first 3 hours and double time thereafter.
	4.2.2	Employees working cyclic work patterns either on day or shift work shall be paid overtime at double time.
Shift pay	*4.1.4*[c]	Shift workers employed on afternoon or night shift, Monday to Friday, shall be paid an allowance of 15 per cent of the hourly rate for a mine employee grade 2 for each hour worked.
Weekend pay	*4.1.3*[c]	Ordinary hours worked by day workers or shift workers to be paid at time and a half on Saturdays and double time on Sundays.
Annual leave pay	*5.1.2*	Statutory holidays while on annual leave to be paid in advance at the rate payable immediately prior to that holiday under the Award (whether in excess of or at the ordinary rate).
	5.1.5	Annual leave pay (including proportional payments) to be calculated as follows: (a) shift workers — wage rate is the rate payable on the employee's roster or projected roster, including Saturday and Sunday shifts; (b) day workers — ordinary award wage rate for the annual leave period plus 17.5 per cent annual leave loading.
	5.1.7	Payment in lieu of annual leave is unlawful.
	5.1.8	Annual leave entitlements are credited on the basis of a 38 hour week and applicable rates of pay are calculated on a 38 hour division. Prior credits to be converted according to a specified formula.
Bonus pay		No provision.
Workers' compensation		No provision.
Sick pay	*5.3.2*	Accumulated sick leave to be credited on the basis of a 38 hour week and payment worked out on a 38 hour divisor. Credits converted according to a specified formula.

Type of arrangement	*Clause*	*Award provision*
Accident pay	*6.4*	Employees who leave work before the completion of a shift because of accident (or cease work to attend to an injured person) to be paid the full shift. Employees must report to and seek leave from the shift boss or foreman to cease work and must return to work immediately after the errand or purpose for which the employee obtained leave is completed.
Superannuation contributions	*3.6*	Employers and employees to observe the terms and conditions of the declaration of 'Policy on Occupational Superannuation' and any subsequent decisions of the QIRC.
Severance and retrenchment pay	*2.1.7*	Fixed-term employees on contract for less than 12 months not eligible for termination, change and redundancy payments at end of fixed-term engagement.
	2.3	Employees and employers to observe the terms and conditions of the 'Statement of Policy of Termination of Employment, Introduction of Changes, Redundancy' contained in the decision of the Full Bench of the QIRC.
	5.1.3	An employee terminated at the expiration of a full year of employment shall be paid 4 or 5 weeks' annual leave and ordinary pay for any statutory holiday which occurs during that period.
	5.1.4.	For employees terminated prior to a full year of employment, annual leave will be paid out at the rate of one-ninth of ordinary pay if employed on continuous shift work over 7 days and one-twelfth of ordinary pay for other work, calculated in accordance with sub-clause 5.1.5.
Special rates and allowances	*3.7*	Allowances include: (1) divisional and district; (2) single all purpose disability (covering wet or hot work, wet ground, working in water or rain, winze and shaft sinking and rising, height, cleaning flues and isolation) (not applied if site disability allowance paid); (3) site disability (QIRC can vary the Award if satisfied there are special and compelling circumstances not contemplated in original award provision); (4) single all purpose exploration and surface prospecting (paid for disabilities associated with working in the open and thereby being subject to adverse conditions — isolated under-developed locations, exposure to heat, cold, wind, dust, mud, dirty conditions, lack of amenities) (all purpose disability allowance not to apply if exploration and surface prospecting allowances are paid); (5) underground (paid only to mine employees grade 1 to 4 who are working underground); (6) tool (paid where employees required to use their own tools, not payable during annual leave); and (7) first aid (paid to recognised 'First Aid Person' who holds appropriate certificate).
	4.2.4	Meals or meal allowance: where overtime extends for more than 2 hours beyond the ordinary or agreed roster ceasing time, a meal is to be supplied at the employer's expense or a meal allowance paid.

Type of arrangement	*Clause*	*Award provision*
	4.2.5	Call back or Recall to Duty: employees recalled to work after completing their normal or prescribed hours, or after completing their rostered shift, and having left the site or on their rostered day off shall receive a minimum 2 hours' pay at the appropriate overtime rate. If the job is completed within a shorter time, the employee shall not be required to work the full 2 hours except in unforseen circumstances. (This subclause shall not apply where it is customary for an employee to return to the job site out of hours to perform a specific task where standard overtime rates would apply.) Actual work which is less than 2 hours shall not count as overtime for the purpose of clause 4.2.6.
Public holidays	*5.2.4* *5.2.5*	Work performed on a public holiday shall be paid at the rate of double time and a half with a minimum of four hours. Time worked on holidays outside the working hours specified in the award, prescribed by the roster, or usually worked on the day of the week on which the holiday usually falls shall be paid at double the rate specified in clause 5.2.4 (that is 5 times the Award rate).
Working clothes and safety boots	*6.8*	Each employee to be provided, on commencement, with three sets of work clothes and one pair of suitable safety footwear free of charge. Where any employee terminates or is terminated within 6 months of receiving clothing and footwear then the employee shall pay the appropriate proportionate amount of the value of the clothing and/or footwear (but excludes employees terminated due to ill health or age). The employer will replace any item of footwear or clothing on a fair wear and tear basis.
Travel	*6.11*	Travelling Time — Prospecting: where an employee travels away from usual place of employment and/or residence for reasons of prospecting, the employee shall be conveyed to and from the camp (or pick up place) free of charge and shall be paid at ordinary rates for the travelling time up to a maximum of 8 hours. Where the prospecting work is performed at a place away from the camp or pick-up place, the employees shall be paid travelling time one way at ordinary rates. Where an employee is dismissed, the employee shall be provided, at dismissal, with transport to the nearest place at which public transport is available to the employee's place of residence, whichever is the nearer.
Training costs		No provision.
Functions, tasks and skills		
Functions	*2.2.2*	An employee may be directed to carry out such duties and use such tools and machinery as within the employee's skill level, competence and training, provided such duties are not designed to promote deskilling. Such directions will be consistent with a safe and healthy working environment.

Type of arrangement	*Clause*	*Award provision*
Job and task demarcation	*3.2*	Classification structure for mine employee from grade 1 to grade 9 — broad job descriptions and competencies (including some detail on qualifications for use of specified plant and equipment functions) for each of the 9 levels are described. Employees at the grade 6 level hold trade qualifications or have progressed by experience and training to an equivalent level of skill. Pay relativities are expressed in relation to mine employees grade 6.
Training	*3.2.1.*	Standard induction training to cover: conditions of employment; mine and plant safety; first aid procedures; movement around the site; work and documentation procedures; quality control and quality assurance; and introduction to supervisors and fellow workers.
Qualifications	*3.2*	Employer also to recognise any prior learning applicable to the skills and competencies required for each employee. Employees must have demonstrated competency on specified pieces of equipment and for trades occupations hold the relevant trade qualifications, as well as post-trade courses for the higher skill occupational classifications.
Procedural arrangements		
General	*6.1*	Mining camp standards: where employees are required to live in a permanent camp, the Award sets out minimum standards for accommodation and messing facilities and arrangements to be provided. Employees engaged on surface prospecting and exploration are excluded from this clause.
	6.2	Provision of cook paid for by employer where 7 or more employees engaged on surface prospecting and exploration work. An employee detailed to do cooking shall be paid at no less than the cook's rate. Accommodation and messing facilities will be provided and be of reasonable standard. Disputes to be addressed through clause 2.6.
	6.3	Crib Places: A 'plat' to be set aside for crib time (where it is the practice of employees to take their crib underground). Employees required to remain on dredges to be provided with shelter enabling them to eat their crib without getting wet. Minimum facilities to be provided by employer set out in Award.
	6.7	A good and sufficient supply of drinking water to be kept at each level in all mines and at convenient places in all smelting works and surface workings.
	6.12	Tributers: arrangements for payment of royalties etc.
	6.13	Employer to supply a wet bulb thermometer, placed at the convenience of employees to test temperature. Work in regard to hot places to be in accordance with s.221(9) of the *Industrial Relations Act 1990* (Qld).
Dispute settlement	*2.6*	Explicit recognition that individual problems arise from time to time and matters should be resolved promptly. Agreed by employee, employees and AWU that grievances be resolved without loss of pay and loss of production. Employer committed to grievance resolution through open communication and without any stoppage of work or any ban,

Type of arrangement	*Clause*	*Award provision*
		limitation or restriction on the performance of work. Specified grievance process in 3 steps: (1) aggrieved individual to raise matter with supervisor who attempts fair and prompt resolution; (2) if matter not resolved, refer to appropriate department manager; and (3) if need be the matter shall be referred to the manager of operations who shall resolve the matter as soon as practically possible. An employee may nominate a representative to be present during the process at any stage. Where matter unresolved either party may exercise its rights under the *Industrial Relations Act 1990* (Qld). During the three-step grievance process, normal work and production activities to continue and no stoppages of work or any form of limitation of work shall occur.
Agreement making	*1.6*	At each enterprise or workplace, consultative mechanisms and procedures to be established comprising representatives of the employer and employees. Union entitled to be represented. Consultative mechanisms and procedures to be appropriate to the size, structure and needs of the enterprise or workplace. Application to vary the Award conditions by agreement to be made to the QIRC and to become a schedule of the Award (where this clause is used to vary the Award). Pre-requisites for QIRC to vary the Award include: that the purpose is to make the workplace operate more efficiently according to its particular needs; that the majority of employees covered by the Award genuinely agree to it; and the award variation meets the requirements of the no disadvantage test set out in the *Industrial Relations Act 1990*, (Qld).
Negotiating change		See clauses 1.6 and 2.3.
Redundancy	*2.3*	Except as provided for in clause 2.1.2, employers and employees must observe the terms and conditions of the 'Statement of Policy of Termination of Employment, Introduction of Changes, Redundancy' contained in a decision of the Qld Full Bench. Provision of clause A (termination of employment) in that decision does not apply in this Award except in circumstances resulting from technological changes and/or redundancy as set out in clauses B and C of that decision. Employers to display a copy of the full bench decision so as to be easily read by employees.
Payment of wages	*3.5.1*	Wages to be paid at least fortnightly by Electronic Fund Transfer directly into employee's account in any financial institution.
	3.5.2	Where an employee is paid on a day other than a regular pay day, the employee is to be paid by cheque. No more than 3 days' pay are to be held as back time.
	3.5.3	Upon discharge or resignation, wages and holiday pay shall be paid within two working days of ceasing employment. Where employee has given the prescribed notice period, all wages and holiday pay shall be paid at or before time of termination.

Type of arrangement	*Clause*	*Award provision*
	3.5.4	Each employee shall be supplied a statement in accordance with the *Industrial Relations Act 1990* (Qld).
	6.10	Union Tickets: Employer (on written request of any employee) to deduct union dues from wages and forward contributions to the AWU.
Safety management	*6.6*	First Aid — employer to provide an ambulance stretcher at every mine together with an adequate supply of first aid equipment and requisites. Duty of mine manager or smelting works to convey seriously injured to nearest hospital as soon as possible. For mines with ten or more people (or when required by the Inspector of Mines), manager to ensure that at least one person is qualified and the holder of a first aid certificate.
	6.14	Statement that the parties to the Award are committed to achieving healthier and safer jobs through workplace changes aimed at improving efficiency and productivity. This is to be accomplished by a comprehensive approach to managing occupational health and safety which aims to: control hazards at source; reduce the incidence and costs of occupational injury and illness; and where practical provide a rehabilitation system for workers affected by occupational injury or illness.

a Award coverage: all employees engaged in metal and/or mineral exploration and development work and/or to all employees engaged in the mining and/or smelting and/or reducing and/or refining of ores including phosphates and gemstones throughout the State of Queensland and to the employers of such employees. Exceptions to this coverage include those workplaces with workers performing the above duties which have Industrial Agreements with the AWU as well as the following specific awards: *Mount Isa Mines Limited Award; Queensland Nickel Employees' Award — State; Mineral Sands Industry Award — State;* and *Quarry, Crushed Stone, Sand and Gravel Industry Award — State.*

b Occupational coverage: ranges across basic semi-skilled work, semi-skilled plant and machine operator, to skilled trades levels.

c The following mines are excluded from the hours of work provisions set out in clause 4.1: Mt Leyshon Gold Mine; Pajingo Gold Mine; Ravenswood Gold Mine; and Selwyn Gold Mine.

Source: *Mining (Non-coal) Award — State*, Queensland.

Table H.2: **Overview of formal work arrangements in recent metalliferous mining agreements: Cannington, Gunpowder and Mt Isa**

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
Size of the work force			
Recruitment	No provision — see Award.	12(e) — Company is an equal opportunity employer in all sections including underground. Award Clause 20 — positions at Mineworker levels 1–4 offered to financial members of AWU or those undertaking in writing to join upon employment.	3.5 — Multi-area employees normally employed on the surface in the Mining Area may be required to work underground at the election of the Company. 3.5(e) — employees regularly required to undertake higher duties will be nominated by the company. Numbers of competent persons to fill in on the Production Contract to be determined by the Company. Replacements on a vacancy basis only. Production Contract conditions will apply.
Retrenchment	No provision — see Award.	No provision.	4.4(b) — notice periods for termination of employment depends on length of service and age of employee.
Dismissal	No provision — see Award.	No provision.	4.4(b) — notice period for termination does not apply in the case of dismissal for misconduct or other grounds that justify summary dismissal.
Use of casuals, contract employment and contractors	No provision — see Award.	5.6 — casual employees — engaged to work no less than two hours on any one day to a maximum of 30.4 hours in any one week unless otherwise agreed. See also Award Clause 8.5 — contract parties allowed and formed for particular	

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
		duties. Can be paid according to directly measurable performances, replacing the Gunpowder production bonus for those particular duties. See Award 8.9 – 8.15 — provisions detailing: establishment of contract terms and conditions, conditions of appointment for permanent and temporary members; notice of termination of contract; employees performing work (at bonus rates); contract workers working outside normal duties (at appropriate pay rates); and pay and work arrangements where contract party members unable to perform normal duties (if no work available, contract workers to be paid appropriate hourly wage rate without bonus or contract payment for relevant period).	
Manning levels	No provision.	No provision.	No provision.
Hours of work and roster arrangements			
Contract of employment	No provision — see Award.	No provision in Agreement, see Award — Clause 13.6 & 13.7 — entitlements accrue during paid absence. Unpaid leave in excess of one week or unauthorised leave accrual continuity. Award Clause 20 — Award forms part of contract of employment for employees engaged as Mineworker Level 1 to 4. Employees not specifically engaged as casuals deemed to be employed by the week. Unnotified absence exceeding 5 days shall be	No provision.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
		taken as abandonment of employment. Three months probationary period. Company employment benefit schemes do not apply to unsatisfactory probationary employees. Employees to observe rules and regulations laid down by employer pertaining to affairs of the Gunpowder community. Failure to observe results in disciplinary proceedings.	
Ordinary hours	No provision — see Award.	See Award — Clause 5 — 38 hours in a one week period. Ordinary days of work shall be Monday to Friday inclusive. Ordinary hours shall be worked between 5am and 8pm daily. Maximum length of a single ordinary period of continuous duty shall not exceed 7.6 hours, excluding meal breaks except where agreed in writing.	No provision — see Roster Arrangements.
Part-time hours	No provision — see Award.	See Award — Clause 5.5 — ordinary hours for part-time employees shall be between 7.6 and 30.4 hours per week. Such hours when fixed shall be deemed to be the employee's ordinary hours.	No provision — see Award.
Overtime hours	No provision — see Award.	See Award — Clause 6 — overtime comprises hours worked in excess of 38 in a week, a single period of planned continuous duty in excess of 7.6 hours where no roster is agreed or any hours worked outside the employee's rostered hours.	3.2(a) — included in annualised salary.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
Shift arrangements	No provision — see Award.	See Award — Clause 6 — provides for day, afternoon and night shifts. Shift start and finish times: Day: between 5am and 8pm Afternoon: between 1pm and 2am Night: between 2am and 12 noon. Shifts may be swapped with permission of supervisors and paid as if no change occurred. Workers and supervisors may rearrange one or several rostered shift starting times by agreement at least 24 hours in advance of the proposed shift starting time. Pay to remain same. An employee may be required to transfer from their rostered shift to another shift, provided employee has at least 16 hours' notice of change prior to the starting time of the new shift and has a ten hour break prior to commencing the new shift. 9.4 — Saturday or Sunday work requires a minimum of 3.8 hours' work. Where this is not the case a minimum of 7.6 hours' ordinary time wages shall be paid.	5.3 — effort to be made to minimise occurrences where 10 hour break not provided. No additional payment where no 10 hour break. Unrostered hours will be counted on an equivalent time basis if worked longer than normal shift. 5.5 — practice is to provide a minimum of 12 hours notice to change shifts. Where it is not possible, lesser notice may be given by agreement with employees.
Roster arrangements	No provision — see Award.	7(d) — treatment plant roster identical to underground roster in respect of shift start and finishing times and the cycle, but not in respect of meal breaks and number of days worked per year. An equal time roster will apply and be deemed day work.	5.2(b) — rostered hours with additional hours. Employee's salary takes into account the requirement to work additional hours from time to time. Expected to work reasonable number of unrostered hours depending on operational requirements. Provision for time

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
		7(e) — Service personnel will work a 21 day cycle of which 14 days are worked and 7 days are off, generating a payment of 74 hours' pay per week. No additional penalties beyond those contained in agreed roster.	off in lieu if employee works more than predetermined number of unrostered hours in a consecutive 13 week period to meet emergency/ operational requirements. An employee 'called back' will be credited with a minimum of 2 hours to be offset against any additional hours to be worked in that 13 week period. 5.2(c) — employees required to work only rostered hours who are subsequently required to work outside their normal hours will receive time off in lieu. To be used in the next quarter or as part of annual leave. 'Call backs' credited for a minimum of 2 hours. 5.2(d) — certain rosters include provision for the working of flexible hours. Recognised in salary. To be worked at times to meet operational requirements.
Paid breaks	No provision — see Award.	7(a) — underground: — meal break of up to 45 minutes may be taken during each shift at an agreed time. 7(b) — underground: — a rest period of 20 minutes duration or two rest periods of 10 minutes duration will be allowed during each shift. Provision for other arrangements to be made by agreement. 12(c) — employees can accrue a maximum of 3 RDOs to be taken at a mutually agreed time.	5.4 — meal breaks to be taken at mutually agreed time, normally around the middle of the shift.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
		See Award 5.7 — paid rest pause of 20 minutes for all employees in the first half of their daily work. Taken so as not to interfere with continuity of work. See Award 9.9 & 9.10 — starting times for crib or meal breaks may be brought forward or delayed for up to one hour without penalties where continuity of production is otherwise affected. Where delayed for more than an hour, the period of delay shall be paid at double time. An employee required to continue working for more than two hours after his ordinary/rostered ceasing time shall be allowed a 30 minute paid crib, and a subsequent 30 minute paid crib after each further four hours worked.	
Annual leave	No provision — see Award.	See Award 13 — shift workers on continuous roster: 35 consecutive days. All other employees: 28 consecutive days. Part time employees receive pro rata entitlement while casual employees receive no entitlement. Leave will accrue on a pro rata basis to employees engaged in work with different annual leave entitlements. Cannot be discharged. Taken at a time determined by the employer within 6 months of accrual after consulting employee. Four weeks notice of leave to be provided to employee. Employee may take leave with employer's approval in a maximum of two periods. May	6.2 — day workers and continuous shift workers entitled to 5 weeks and 2 days per annum. Continuous shift workers entitled to 6 weeks and 2 days per annum. May be accumulated for 2 years. Seven days (public holidays) are anticipated to be worked by employees and thus included in annual leave. If not required to work, annual leave entitlements adjusted. Annual leave to be taken by agreement, or failing agreement, at a time specified by the Company. Leave loading is included in annual salary.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
		be taken on a pro rata basis during temporary closures if leave entitlements are insufficient.	
Long service leave	10(b) — 13 weeks' paid leave after 10 years completed service and pro rata after 7 years.	See Award 14 — Thirteen weeks after 10 years service. Pro rata upon termination after 7 years. Taken in a maximum of 3 periods.	6.2 — entitlement equal to 13 weeks after 10 years' service. Accrued entitlement subject to a 'no disadvantage test'. Employee receives the higher of the value between leave under Agreement and previous rate, had the leave been taken immediately prior to the Agreement. Test applies only to accrued or pro rata leave at the date the Agreement came into existence.
Sick leave	10(a) — discretionary sick leave policy will apply with salary, as detailed in the offer of employment, being continued according to length of service, work performance and the individual circumstances of each case.	See Award 15 — 60.8 ordinary time hours per completed year of service. Cumulative to a maximum of 13 weeks in any one year except by agreement. Notification to employer within 5 days of commencement of absence or upon return to work. Where no certificate is produced, satisfactory evidence is to be produced. Sick leave available to an employee who is absent to care for/transport a spouse/child for medical aid. Annual/long service leave disrupted for a minimum of 7 consecutive days due to illness of spouse/child and involving hospitalisation may be substituted for paid sick leave.	6.4(c) — employees unable to attend work due to illness or a non-work-related injury are required to notify their Superintendent of absence and expected duration prior to commencement of the employee's normal rostered shift. Failure to notify will result in non-payment of salary support. Satisfactory attendance to be monitored and poor/ inconsistent attendance to be dealt with through Process to Ensure Effective Personal Behaviour.
Parental leave	No provision — see Award.	12(b) — an employee other than a casual employee shall be entitled to unpaid Parental Leave in accordance with the Australian	

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
		Industrial Relations Commission's decision on Parental leave as contained in Prints J3596 and J5512.	
Other leave	No provision — see Award.	See Award 16 — leave of absence without pay — work-related absence not eligible for training leave is subject to approval of employer. All other approved paid absences paid at ordinary time. Approved leave without pay subject to discretion of employer and not available retrospectively. Employee attending to injured person entitled to leave without pay provided they return to work upon completion. See Award 17 — bereavement leave — maximum of three ordinary time working days. Available for spouse (including de facto), child, step child, adopted child, parent, step parent, parent in law, foster or adoptive parent, grandparent, sibling, step sibling, sibling in law. Relatives or other persons not described may be included subject to discretion of employer. Proof to be furnished to employer if required.	6.4(c) — Salary support may be used for Family leave provided prior notification to commencement of shift.
Remuneration and on-costs			
Base pay	9 — Annualised salary based on all work performed, including, for example, all hours worked, shift premiums etc, allowances or any other amount which	Remuneration: Mineworker Level 1 — $421.70/week Mineworker Level 2 — $458.90/week Mineworker Level 3 — $496.10/week Mineworker Level 4 — $520.90/week	3.2 — payment systems — two remuneration systems implemented in the Mining area. All-inclusive annualised salary — replaces all amounts, allowances, penalty rates, overtime payments and any other payments otherwise

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
	otherwise might be payable under the Award. Team leader or Operator/ Technical Specialist — $66 000 Advanced process — $61 000 Basic process — $56 000 New employee — $52 000 An additional amount of $6 000 per annum will be paid to employees working underground on a permanent basis.		due to an employee. Annualised base salary plus a production component — employees paid an annualised base salary plus a production component, replacing all amounts, allowances, penalty rates, overtime payments and any other payments otherwise due to an employee. Indicative all-inclusive annual base salary and production component for seven day continuous shift worker in Mining Operations in the Mining Area for 42 paid hours/ week. Mine Production (MP) Advanced Operator 1 — $93 650 MP Advanced Operator 2 — $77 850 MP Advanced Operator 3 — $74 000 MP Advanced Operator 4 — $70 000 MP Operator 1 — $66 000 MP Operator 2 — $62 000 MP Operator 3 — $58 000 Indicative all-inclusive annualised salary for a Underground Maintenance dayworker in the Mining Area for 40 paid hours per week (5 day, Monday-Friday). Under Ground Maintenance (U/GM) Technical Officer — $55 000 U/GM Advanced Technician — $52 000 U/GM Technician 1 — $48 000 U/GM Technician 2 — $44 000 U/GM Assistant 1 — $40 000 U/GM Assistant 2 — $35 700 Indicative all-inclusive annualised salary for a

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
			seven day continuous shift worker in Underground Maintenance in the Mining Area for 42 paid hours per week. Under Ground Maintenance (U/GM) Technical Officer — $66 000 U/GM Advanced Technician — $63 000 U/GM Technician 1 — $60 000 U/GM Technician 2 — $56 000 U/GM Assistant 1 — $50 000 U/GM Assistant 2 — $45 700 Indicative all-inclusive annualised salary for a Surface dayworker in the Mining Area for 40 paid hours per week (5 day, Monday-Friday): MS Technical Officer — $48 000 MS Technician Advanced — $43 400 MS Technician 1 — $39 000 MS Technician 2 — $36 300 MS Operator — $33 750 MS Attendant 1 — $31 050 MS Attendant 2 — $28 350 Indicative all-inclusive annualised salary for a maintenance dayworker in Ore Handling in the Mining Area for an average 40 paid hours per week (Monday-Sunday): Maintenance Technical Officer — $48 000 Maintenance Technician Advanced — $64 300 Maintenance Technician 1 — $60 200 Maintenance Technician 2 — $56 000 Maintenance Assistant 1 — $46 250 Maintenance Assistant 2 — $41 200

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
Overtime pay	No provision — see Award.	See Award 9.5 — employees to receive a 10 hour break between completing overtime after ordinary work on one day and prior to commencing ordinary work the next day. An absence during ordinary working time the next day, because of such ten hour break, shall be paid at single time. An employee who does not receive 10 consecutive hours off duty between the termination of the employee's ordinary work one day and the commencement of the employee's ordinary work the next day shall be paid double the ordinary time wage rate until released from duty. Applies to shiftwork except where shift rostered exceeds eight hours, a shift worker does not report for duty, or a shift is worked by arrangement between the employees. See Award 9.6 — an employee recalled to work from off site shall be paid double the ordinary rate for a minimum of 3.8 hours. Recalls of less than 2 hours do not require a 10 hour break. See Award 9.7 — employees called out on emergency work shall be entitled to payment for such work and travel time for a minimum of four hours at ordinary time wages. See Award 9.13 — employees may be required to work a reasonable amount of overtime or to provide satisfactory evidence of genuine inability to do so.	

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
Shift pay	No provision — see Award.	See Award 11 — rostered afternoon shifts: hourly allowance of 15 per cent of the Level 3 ordinary hourly rate. Rostered night shift: hourly allowance of 20 per cent of the Level 3 ordinary hourly rate.	3.5 — salary calculated to include where an employee has been nominated to change shifts underground. Additional payments: An employee spending between 15 and 45 per cent of his time underground to receive an amount equal to 30 per cent of the difference between the salary for the Multi Area grade and the underground grade. An employee spending between 40 per cent and 60 per cent of their time underground to receive 50 per cent of the difference between the two grades. An employee spending 60 per cent or more time underground will be classified as an underground employee for salary purposes.
Weekend pay	No provision — see Award.	See Award 9.2 & 9.3 — work performed after 2am on a Saturday which ordinarily forms part of that roster shall be paid at time and a half for the first 7.6 hours. All other cases shall be paid at double time. All work performed on a Sunday shall be paid at double the ordinary time wage rate.	3.2(a) — included in annualised salary.
Annual leave pay	No provision — see Award.	See Award 13 — rostered shift workers paid according to roster/projected roster, including Saturday, Sunday or holiday shifts and payment for one rostered overtime shift per annum.	6.1(e) — included in annualised salary. For employees on annualised salary with production bonus, the six day average principle shall apply for the contract to which the employee is signed on.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
Bonus pay	No provision.	See Award 8 — contract work and bonuses — contract work or bonuses shall be in addition to wage rates contained in Award. Contract and bonus pay rates should exceed the following minimum percentages of the Level 3 ordinary time hourly wage rates: underground — 30 per cent; SX/EW — 15 per cent; all other areas — 5 per cent. See Award 9.12 — contract/bonus payments calculated at ordinary time and are not subject to any penalty payments. See Award 13.8 — bonus/contract payments received for annual leave based on average bonus/contract earnings during 6 full pay periods immediately preceding the taking of annual leave. 10 — bonus payments in effect at time of Agreement shall continue until all trials are completed and agreement reached with all parties to any bonus changes.	3.5(f) — target performance must be achievable. Salary exceeding benchmark achieved where production greater than target. Employees can earn in excess of their preserved salary where performance exceeds targets
Workers' compensation	No provision.	No provision.	No provision.
Sick pay	No provision — see Award.	No provision.	6.4 — salary support — payments made to all Services Area employees in the event of genuine personal illness or injury at the all inclusive annualised salary for the grade for a 40 hour dayworker (including 26 Additional Hours). Maximum of 64 hours per annum and

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
			is cumulative. Accrued sick leave as at 1 January 1994 can be paid out in full during Agreement or upon termination.
Accident pay	No provision — see Award.	No provision.	No provision.
Superannuation contributions	No provision — see Award.	See Award 21 — 6 per cent of the ordinary weekly rate, or at rates prescribed by *Superannuation Guarantee (Administration) Act (Qld) 1992*. Paid to all employees who have been employed for a period of 5 consecutive weeks and worked a minimum of 50 hours. Employees able to make additional contributions.	No provision — see Award.
Severance and retrenchment pay	No provision — see Award.	See Award 20.6 — employment terminated by provision of 2 ordinary working days' notice. 13 — except for details outlined below; the terms and conditions of the Statement of Policy contained in the decision of the Full Bench of the QIRC dated 16th of June 1987 will apply. Severance pay: 1 year or less — $900 1 to 2 years — $2 700 2 to 3 years — $3 600 3 to 4 years — $4 500 4 years and over — $5 000. Relocation only includes employees resident at Gunpowder or Mt Isa irrespective of length of service. Relocation to a point of	4.4 — notice of termination: 1 year or less — 1 week's notice; 1 to 3 years — 2 weeks' notice; 3 to 5 years — 3 weeks' notice; and 5 years and over — 4 weeks' notice. Employees over 45 years of age and with 2 years' continuous service shall be entitled to an additional weeks notice. If appropriate notice is not given, payment in lieu to be made, based on corresponding grade for an employee in the Services area. Fixed-term/ specific task employees to be given one weeks notice. Notice provisions do not apply to casual employees or employees dismissed summarily or for misconduct. Company may withhold monies if employee fails to provide the required notice.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
		choice anywhere in Australia. Covers cost of removal of personal effects (with some exclusions) from Gunpowder or Mt Isa. Cost to a maximum of $3 500 (or $4 000 in the case of WA and Tasmania) paid on presentation of receipts by a removalist. Travel allowance of $500 for single employee or $1 000 for employee with spouse/dependants except where moving to Western Australia or Tasmania where allowances are $1 000 and $1 500 respectively. Where full relocation costs are paid by new employer, no entitlement to above.	7.1 — Excess Labour Separation Arrangements — unaltered as per 1995 Framework Agreement. Wage rates increased by Average Weekly Ordinary Time Earnings (AWOTE).
Special rates and allowances	No provision — see Award.	No provision.	3.4(b) — salary of existing employees preserved based on 1995–96 projected total earnings. The salary of employees subject to salary preservation will remain unchanged by future annual salary increases until the salary for the position exceeds the employee's preserved salary. Salary preservation ceases where an employee changes position or roster. Due consideration will be given to restoring an employee's salary-preserved amount where he changes back within 3 months.
Public holidays	No provision — see Award.	See Award 9.8 — employees required to work on a public holiday will be paid 2.5 times the employee's ordinary time wage rate. An employee required to work on a public holiday who fails to do so shall not be	6.3 — employees working continuous shift roster may be required to work Christmas Day, Labour Day, Easter Saturday and Monday in accordance with shift roster requirements.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
		paid unless satisfactory evidence is produced detailing genuine inability to attend. See Award 18 — 11 public holidays. Employees not required to work on a public holiday shall be paid at ordinary time. Where public holiday falls during annual/long service leave paid as public holiday and annual/long service leave reimbursed accordingly. 7(f) — Christmas Day, Boxing Day and New years day to be observed as public holidays except where continuity of operations is required. When not specifically rostered on, all non-continuous shift rostered personnel will observe all other gazetted public holidays on the proclaimed day.	
Working clothes and safety boots	No provision — see Award.	See Award 20.12 — employer to provide tools and equipment, including personal protective equipment, required for employee to work effectively. Employer to replace due to fair wear and tear and employee to replace due to negligence. Reasonable value may be deducted from employee's wages if fails to return articles upon termination. 9 — on commencement all employees supplied with 2 sets of clothing/overalls, 1 winter jacket for employees working in the open, and 1 pair of safety gum boots and 1 pair of safety boots or shoes. Clothing/overalls replaced every 12 months,	No provision.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
		winter coat replaced every 2 years and other items replaced on a fair wear and tear basis. Safety equipment to be supplied taking into account the requirements of the work involved. Employer to pay $25 toward the cost of hardening each pair of prescription glasses.	
Travel	No provision — see Award.	8 — fly in/fly out arrangements to Brisbane may be raised during the life of the Agreement. In addition to existing arrangements from Mt Isa. Company to provide fuel and maintain existing bus to be utilised as a pick-up vehicle. No change to existing annual air travel entitlements or existing bus arrangements involving community matters during life of agreement.	No provision.
Training costs	No provision.	11 — training can be conducted by any competent employee. Training will be discussed/reviewed during life of Agreement. See Award 8.3 — employees undergoing on-site training shall be paid 50 per cent of the Gunpowder production bonus rate applicable for the duties most closely associated with the training in question. Competent persons conducting on-site training sessions shall be paid 150 per cent of the Gunpowder production bonus rate applicable to the duties most closely associated with the training in question. Duties performed	3.5(c) — no additional payment for delivering training and no adjustment of targets for Production Contract purposes. Employees undergoing training retain all-inclusive annualised salary. An employee on an annual base plus production component who is undergoing training in another Production Contract will not attract any production component. Where such an employee is on a preserved salary will receive 85 per cent of preserved salary while undergoing training.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
		between training sessions shall be paid at the appropriate contract or bonus payment for those duties.	
Other on-costs	No provision — see Award.	See Award 7.3 casual loading of 22.5 per cent. See Award 10 — meal allowance of $7.10 or a meal to be supplied to employees required to work overtime for more than two hours beyond ordinary ceasing time. See Award 12.5 — union /OH&S representatives attending meetings outside normal working hours at request of employer paid at ordinary time wage rate plus the minimum bonus rate. 12(d) — Company house allocated to two persons employed by the Company for share accommodation, only one of the employees shall be assigned the house. In the event that the employee assigned the house is no longer employed by the Company then the employee sharing the accommodation shall no longer be entitled to maintain occupancy or be assigned a house.	3.5(d) — salary adjusted where performing higher duties for more than 4 consecutive shifts. Will receive the higher amount of current grade or 90 per cent of the higher grade. Where undergoing training salary will remain unchanged. 3.5(e) — employees regularly required to undertake higher duties will be nominated by the company and paid an additional $2 000. If filling in for more than 4 consecutive shifts then 90 per cent of the grade salary and the production component for the Production Contract will apply for the full duration. No additional payment other than $2 000 if filling in for 4 consecutive shifts or less. No additional payment where employee undergoing training. 5.7 — payout of flexible credits — paid at rate applicable immediately prior to Agreement. 7.2 — grandfathered financial assistance for medical, hospital and dental expenses above the MIMEHS and Medicare fees to employees joining prior to Agreement.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
Functions, tasks and skills			
Functions	7 — communication with the AWU, Queensland. It is agreed that: An AWU official may participate in six monthly business planning sessions in which the Company's management will discuss the current business and operating environment; There will be discussions between the Company and the AWU prior to annual salary reviews including an assessment of salaries in the metalliferous hard rock mining industry; The Company will provide to the AWU upon request details of the criteria used by it in assessing individual, team and business performance that is to be used in setting remuneration levels; The Cannington Problem Solving Procedure will incorporate a provision permitting an employee who wishes to do so to request the	See Award 12 — employee's representative — appointed job representative upon notification to employer to be recognised as accredited union representative. Allowed to accompany/represent employees in discussions or negotiations related to the terms and conditions contained in Award or make representations to employer in accordance with Dispute Settlement Procedure. See Award 12 .6 — right of entry — as per *Metalliferous Mining Regulations 1985 (Queensland)* and *Section 286 of the Workplace Relations Act 1996* — right to interview employees upon production off written authorisation and limited to meal breaks/non-working hours unless permission otherwise. See Award 12.7 — right of representation for employees upon provision of at least 4 hours' notice.	1.5 — The AWU has representational rights in the Mining Area, excepting the Underground Equipment Workshop, and the AMWU has representational rights in the Underground Equipment Workshop.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
	AWU to assist in the resolution of the problem.		
Job and task demarcation	No provision — see Award.	See Award 4 — Progression through the classification structure is based on the acquisition of skills as identified in the relevant training schedule. Progression to Level 4 requires completion of introductory training and introductory supervisor's courses and approved qualifications in first aid. Maintenance of any classification requires use of all skills in classification level at least once every 12 months or being prepared to undertake a refresher course. Employees classified as Level 3 or 4 who have successfully completed the introductory supervisor's courses and hold an approved first aid qualification may act as relief supervisors for a maximum of three months. See Award 20.11 — at liberty of employer to transfer an employee from one section to another.	4 — flexibility of work — any employee, including staff, can carry out any work which is safe, legal and which they are competent to perform.
Training	No provision — see Award.	See Award 4.2 — Joint Training Committee — responsible for facilitation and review of training programs. Comprises two management and employee representatives. Meet every 3 months.	No provision — see Award.
Qualifications	No provision — see Award.	No provision.	No provision — see Award.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
Procedural arrangements			
Relationship with Award	Unless altered by this Agreement, the provisions of the Mining (Non-Coal) Award — State shall apply.	Agreement to be read in conjunction with the Gunpowder Copper Ltd Award 1996 provided that to the extent of any inconsistency between that Award and this Agreement the latter shall prevail.	Supersedes the Mt Isa Mines Ltd Award in many areas except as identified fully in Appendix A to this Agreement. Where in respect of any remaining provisions in the Mt. Isa Mines Ltd Award there is any inconsistency with this Agreement then the Agreement shall prevail. Certified Agreement shall be read in conjunction with the Mount Isa Mines Ltd — Industrial Agreement — Long Service Leave and where there is any inconsistency, this certified Agreement shall apply. Certified Agreement replaces all other Industrial Agreements in their entirety for the duration of this Certified Agreement.
General	6 — recognition by company — company recognises AWU as the appropriate union to represent, as required, the industrial interests of employees within the scope of this Agreement.	No provision.	3.8 — Personal Effectiveness Review (PER) — provides feedback on performance and forms basis of ongoing training and development programmes. Provides objective ground for assessments related to remuneration, promotion and career development. Carried out six monthly. Parties committed to principle of linking salary to PER on an annual basis. PER supported by training. Complaints concerning PER assessments not considered under Fair Treatment System.
Dispute settlement	Set out in Attachment to Agreement — problem-solving	See Award 19 — subject to provisions of Part VI of the *Workplace Relations Act*	3.8(f) — complaints arising from PER raised with Departmental Manager in first instance.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
	procedure: Matter must first be raised and discussed with the employee's supervisor. If matter remains unresolved, matter discussed with department manager. If matter still remains unresolved, employee may involve General Manager Cannington. Where the matter remains unresolved may be referred to the QIRC (provided it has jurisdiction to deal with the matters).	*1996.* Matter to be discussed initially between employee and immediate supervisor. If not settled matter referred to superintendent of the section. Employee entitled to be accompanied by union representative or official during ensuing discussions. If not resolved, matter formally referred to Operations Manager or Deputy Operations Manager. If agreement not reached within 2 days, issue may be discussed between the employer and the branch or district secretary of the union. If no settlement, the matter may be referred to the AIRC for resolution. Where dispute arises out of change in existing work practice, practice reverts to that in existence prior to the change until a settlement is reached. Normal work to continue during dispute except where injurious to health or contrary to safe working procedures. Continuation of normal work shall not prejudice final settlement.	Right to union representation. If unsatisfied referred to 3 member committee, comprising General Manager Human Resources and 2 nominated Human Resources Superintendents for investigation. Where necessary may be referred to respective General Manager. Joint Steering Committee to meet on six monthly basis to consider procedural problems. 4.3 — employee exhibiting unsatisfactory behaviour will be formally counselled by their supervisor. Required improvement explained. Counselling recorded in writing. Further instance of unsatisfactory behaviour results in a first written warning from supervisor. Further instance of unsatisfactory behaviour results in a final written warning by Superintendent. First and final written warning valid on personal file for two years from date of final warning. Upon further instance of unsatisfactory behaviour following final written warning, employee must show cause as to why employment should not be terminated. Unsatisfactory behaviour not dealt with in isolation from another incident of unsatisfactory behaviour. Right to union representation after receipt of first written warning. Employee may be stood aside for remainder of shift and the following shift with or without pay while incident is investigated. If employee believes unfairly treated, may access Fair Treatment System.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
			Appendix A — Fair Treatment System — employee to discuss concern with supervisor, if unresolved, with Superintendent, then Manager followed by the General manager. May then be referred to the Queensland Industrial Relations Commission. Right to union representation.
Agreement making	No provision — see Award.	No provision.	1.9 — Committees formed for the purposes of this Agreement to maintain an ongoing role in monitoring the Agreement to ensure its effective implementation. 1.10 — parties will commence work towards the extension or replacement of this Agreement to ensure its effective implementation.
Negotiating change	No provision — see Award.	See Award 25 — enterprise flexibility — consultative mechanism and procedure to vary Award. Requires approval of majority of employees, consultation with AWU and requirement that variation does not disadvantage employees terms and conditions. Any reduction in overall terms and conditions cannot be contrary to the public interest.	5.2(c) — Occasions where employees without additional hours built into their salary work unrostered hours, to be reported to General Manager to see if a roster change is needed. 5.2(b) — Managers personally accountable for ensuring that employees do not work excessive unrostered hours. More than 26 additional hours worked in a quarter will be reported to the General Manager. 5.3 — General Manager to receive report each pay of employees who have not received a 10 hour break. 5.6 — agreement to introduce new rosters shall not be withheld unreasonably.

Type of arrangement	*Cannington*[a]	*Gunpowder*[b]	*Mt Isa*[c]
Redundancy	No provision — see Award.	No provision.	7.1 — Excess Labour Separation Agreement (ELSA) provided under Company policy as part of the August 1995 Framework Agreement. ELSA not to be altered for the duration of the agreement.
Payment of wages	No provision — see Award.	See Award 20.9 — paid by EFT into a nominated account.	3.7 — salaries paid twice monthly by EFT into nominated account. Adjustments made in the next mid-point month or upon termination. Production component paid in next pay period after it was earned. To streamline payroll function, employees encouraged to continue normal salary payments while on annual leave. However, requests for payment in advance will be made.
Safety management	No provision — see Award.	9(c) — Company reserves the right to conduct alcohol testing in situations where serious damage or Lost Time Injury occurs as a result of an accident. See Award 12.2 — two employees to be appointed by workforce as OH&S representatives, approved by employer and AWU. Bi-monthly discussions.	

a Agreement made between BHP Minerals Pty Ltd and the Australian Workers' Union of Employees, Queensland. Three year agreement expiring 28 May 2000.

b Agreement binding upon Gunpowder Copper Ltd, the AWU and any contractors or subcontractors performing or executing any work covered by this Agreement on behalf of the Company. Agreement operates from first pay period on or after 6 December 1995 and remains in force until 30 June 1996. Except where stated, clause numbers refer to those in the Agreement.

c Agreement made between Mt Isa Mines Ltd and the AWU and the AMWU. Applies to employees covered by the Mount Isa Mines Limited Award who are employed in the Mining Area. Agreement operative from 1 August 1996 and shall remain in force until 31 August 2000.

Table H.3: **Overview of formal work arrangements in BHP Iron Ore Ltd (WA)**[a]

Type of arrangement	
Size of the work force	
Recruitment	Agreement I Clause 2.2 — positions to be advertised across the site as they become available. Employees required to apply each time a vacancy is advertised. Selection to be based on the best applicant after considering the requirements of the advertised position and the applicant's personal qualities. Short-listed applicants to be interviewed by a Personnel Officer and Area Supervisor. An employee from the receiving area to be involved in the consideration of applicants. Arrangement to apply to transfers from one department to another and from day work to shiftwork positions. Agreement with MEWU that relief shift positions will be filled by seniority. Further discussions to occur regarding other transfers intra and inter-department. Certain positions (based on frequency of vacancies and number of interested applicants) will utilise an interest list and a transfer list. Provisions apply to acceptance and refusal of offers. Agreement II Clause 6 — selection of personnel for entry into the Mining Department will be initially into level 1 and from there applicants who have responded to an advertisement will be assessed according to work, attitude, attendance, timekeeping and past discipline.
Retrenchment	Award Clause 31 — Employer to consider all things being equal (I) the length of service within the employee's classification in the case of tradespersons or CMEWU classifications; and (ii) the length of service with the employer and the employee's competence to perform in the other classification where transfer is involved. When assessing 'all things being equal', employer to consider: qualification and other experience; suitability for other employment; availability of housing or other accommodation; domestic or other compassionate factors; attendance record; general work performed; and the policies of the appropriate unions. Employers and unions to discuss in detail, with intention of reaching agreement, how these procedures are to apply.
Dismissal	Award Clause 5 — period of notice: 1 hour for casual employees; or either 7 consecutive days counted from the time notice is given or five ordinary time shifts which, if the notice is given not later than one hour after the commencement of an ordinary time shift, shall include that shift (whichever is the shorter of these periods).
Use of casuals, contract employment and contractors	Agreement I Clause 3.3(v) — casual employees engaged on an hourly basis for a minimum period of 3 hours in work agreed with the union(s). Casual employees will not be appointed for a period in excess of 4 continuous weeks. Employees may be engaged for a short duration to meet the needs of the Company as agreed with the union(s). Unless agreed otherwise a maximum term of 6 months applies, upon which the Company is to consider making them permanent. Short-term employment not to be used in lieu of acting opportunities for existing employees or to offset the career opportunities of Company employees. Employees appointed

Type of arrangement	
	in Perth to be provided with return airfare to Perth on satisfactory completion of their contract while local appointments to receive 2 days' pay to assist in pursuing alternative employment. Agreement II Clause 5.5.4 — provision for services of explosives vendors in the form of 'specialised' loading applications. Provision for Company to inform Blast Crew and the Union(s) prior to the use of such services. Agreement II Clause 11.4 — provision for short-term employees in Mining Department during school holidays. Limits period of engagement according to time of year. Agreement II Clause 5.1.2.3 — provision to use small numbers of contractors for work over longer periods of time on a particular task in the Mine Maintenance area. In particular, contractors may be used for construction, modification, project, specialised and warranty work as required. In addition, contractors may be utilised for surges in peak workloads including major breakdowns, accident damage and to reduce backlog as required. Company to provide union(s) and work groups with notice and details of contractors. Contractors may also be utilised for non-core activities — specified in Appendix 2 as: servicing and maintaining photocopiers, specified workshop equipment, transformers, electric overhead travelling cranes, monorails, mobile slewing cranes/buses, refrigeration and airconditioning to office building and workshop and glass repairs/replacement and contractors to provide fuel and lubrication at Newman Airport.
Manning levels	Agreement II Clause 7 — numbers of trainees in each level and on each skill in the Mining Department to be based on operational requirements. Agreement II Clause 5.1.4 — Number of engine drivers working at Power Station to be reduced from 16 to 12 (or 3 per shift) by transfer and/or voluntary redundancy. To maintain shift manning, the Company may employ short-term employees for leave coverage. May be a requirement to move employees from one shift to another.
Hours of work and roster arrangements	
Contract of employment	Agreement III Clause 2 — condition of employment that every employee at the Mt Newman Joint Venture comply with the terms of the Industrial Relations Agreement (Revised 1997).
Ordinary hours	Agreement I Clause 3.3(v) — All time worked in excess of 8 ordinary hours per day shall be deemed overtime. Other conditions to apply on a pro rata basis.
Part-time hours	Agreement I Clause 3.3(v) — A casual employee required to work in excess of 8 hours in any one day or 40 in any one week shall be paid overtime at the applicable rate. Provision for part-time employment upon union(s) agreement and comprising a minimum of 8 ordinary hours any day and less than the ordinary hours per week.

Type of arrangement	
Overtime hours	Agreement II Clause 10 — failure by an employee to report for work after accepting an offer of overtime disqualifies an employee from consideration for the following 2 rotations except in exceptional circumstances. Consistent failure to report for overtime after accepting offers will result in disqualification. Appendix 3 establishes procedures.
Shift arrangements	Agreement II Clause 3.3(iv) — Award provisions which prevented the implementation of new and different shift arrangements ceased to apply. Rosters based on shifts of 8 to 12 hours may be introduced under the following conditions: - rosters are implemented for a 12 month trial period; - proposed rosters and trial details are agreed between the parties; - trials are without prejudice to future general Award conditions not contained in this subclause; - Award will be varied by agreement by the parties so that such alternative shift systems are implemented; - trial problems will be discussed by the parties and if unresolved processed in line with the Industrial Relations Agreement; - with the agreement of the parties a trial may be aborted if it is not working and previous arrangements reinstated; prior to the end of the trial a formal review is to occur whereby the alternative shift roster may be adopted, previous arrangements reinstated or other options examined; - the parties genuinely intend to give such arrangements a fair and balanced opportunity to be assessed; and - the parties will not use such trials to pursue alternative shift roster arrangements without similar conditions being met. 12 hour shift systems introduced in Mining, Ore processing Production and Ore Processing Shift Maintenance. Conditions apply. Agreement II Clause 5.1.3 — sets out shift structure within ore processing.
Roster arrangements	Agreement I, Clause 3.4 — 12 hour, 2 shift 4 panel shift system introduced in favour of eliminating smokos on the current 4 panel, 3 shift 8 hour shift system in order to increase operating hours of major equipment.
Paid breaks	Agreement I, Clause 3.3(iii) — employees who work 1–1.5 hours to 2 hours' overtime immediately after completion or 2 hours prior to the commencement of the rostered shift shall receive a 15 minute rest break immediately prior to commencement of the overtime. If an employee works 2 hours of overtime immediately following the rostered shift they shall receive an additional payment of 20 minutes at overtime rates if no additional crib break is taken since the mid-shift crib break. An employee required to work 4 hours overtime immediately after their rostered shift shall receive a 15 minute rest break and be paid for 4.5 hours at overtime rates prior to commencing the overtime. He shall also receive a meal ticket in lieu of an overtime meal and a 30 minute break. An employee required to work 4 hours' overtime prior to commencing their shift without receiving 4 hours' notice shall receive a 30 minute crib prior to commencing their shift and be supplied with an overtime meal. An employee working between 4 to 8 hours' overtime immediately after the rostered shift shall receive a 15 minute rest break prior to commencing their shift, take the breaks allowed to the employees rostered on that shift and receive a meal ticket. Where afternoon or night shift is worked for

Type of arrangement	
	the purpose of periodic overhaul, afternoon shift shall receive 2 ‘smoko’ breaks of 15 minutes each, a half hour meal break and a meal ticket. Night shift shall receive 2 ‘smoko’ breaks of 15 minutes each, a meal and a half hour meal break, and a meal ticket.
Annual leave	Award Clause 23 — period of 25 rostered shifts or rostered days leave (with payment of wages for 190 hours) after a period of 12 months’ continuous service. Seven day shift workers receive an additional five roster shifts (with payment of wages for 38 hours). Agreement III Clause 6 — maximum of 10 days annual leave may be taken as single days or in periods of less than 1 week. At discretion of supervisor based on requirements and included in limits of the number of employees on leave at any time. Agreement III Clause 7 — Travel Assistance — an employee’s spouse and children may claim travel assistance independently of the employee. Non-cumulative.
Long service leave	Award Clause 25 — entitlement of 1.3 weeks for each 12 months of continuous service (where the definition of continuous service is specified) but there is no entitlement until the completion of 5 years of service. Restrictions on how leave can be taken.
Sick leave	Agreement I Clause 2.3(i) — employees to notify Department of absence prior to commencement of shift. Provision to consider extenuating circumstances which prevent this. A medical certificate is required after 2 single day absences in a year. Award Clause 26 — entitlement of 76 ordinary hours in each year of service, cumulative.
Parental leave	Agreement III Clause 5 — Special leave — where an employee’s spouse or child leaves the site for medical reasons, employee entitled to maximum of 40 hours paid leave in a year. Maximum of 2 days carers leave where employee’s spouse or single parent employee’s child is ill or in an accident. Day workers may also utilise up to 24 hours and shift workers may use up to 16 hours. Special leave and sick leave limited to 40 hours per year. Annual leave or unpaid special leave available if additional leave required. Satisfactory proof to be provided.
Other leave	Agreement II Clause 2.3 — Special Leave — 40 hours off site leave per year available to 12 hour shift employees. Any unused portion may be utilised for special leave on site. Annual leave or unpaid special leave available if additional leave required.
Remuneration and on-costs	
Base pay	Agreement I Clause 4 — Aggregate wage introduced. Base Payment comprises Ordinary Hours, Group 1 Disability, District Allowance, Service Allowance and Medical Subsidy. Four Panel Shift Work Payment comprises Shift Allowance, Shift Change, Public Holidays, Public Holidays in lieu, 20th shift Accrual, Penalty Shifts, LDO Buyout, Annual Leave and Long Service Leave (LSL) with Loadings. Three Panel Shift Work Payment comprises Shift Allowance, Shift Change, Public Holidays, Public Holidays in lieu, 20th shift Accrual, Penalty Shifts, LDO Buyout, Annual Leave and LSL with Loadings.

Type of arrangement	
	Day Work payment comprises Meal Break, LDO Buyout, Annual Leave and LSL with Loadings. Aggregate salary for Days classifications ranges from $31 942 to $45 909. Aggregate salary for 4 panel ranges from $43 908 to $51 979 (applies only to AWU classifications). Aggregate salary for 0.25 4 panel ranges from $43 428 to $62 500 (applies to AWU, CMETU Cranes, MEWU and AEEFEU classifications). Aggregate salary for 0.50 4 panel ranges from $44 694 to $64 431 (applies to AWU, TWU, Prod Worker, MEWU and AEEFEU classifications). Aggregate salary for 3 panel ranges from $41 262 to $59 086 (applies to AWU, TWU, MEWU and AEEFEU classifications). Aggregate salary for 2 panel ranges from $36 142 to $47 804 (AWU and MEWU classifications). Agreement II Clause 2.2.2 — income maintenance calculations for Mine Maintenance classifications. Agreement II Clause 6 — details of salary schedules for first and second 6 per cent increase in pay. Agreement II Clause 7.4 — if there is substantial breakdown of support for the Continuity Agreement by a workgroup, that workgroup will be advised that the Company wishes to review the implementation of the second 6 per cent increase for that workgroup only. Agreement III Clause 9 — details of salary schedules for first 5 per cent increase and second 4 per cent increase.
Overtime pay	Award Clause 10 (2) — all time worked in excess of ordinary hours paid at double time. However, time worked by a continuous shift worker in excess of ordinary hours of work paid for at ordinary rates if it is due to private arrangements between employees themselves.
Shift pay	Agreement I Clause 4 — Aggregate wage introduced.
Weekend pay	Award Clause 13 — all time worked on a Saturday or Sunday paid at double time. All time worked by continuous shift workers at ordinary hours paid at time and a half on a Saturday and double time on a Sunday. Additional rates paid to shift workers who work on the weekend.
Annual leave pay	Award Clause 23 — to comprise the pay that the employee would have received for 7.6 hours immediately prior to proceeding on leave; 25 per cent of that pay; and his/her service pay. Continuous shift workers: pay to comprise the amount (including shift penalties and payment for the 20th shift but not including the service pay) which they would have earned during the roster period; 20 per cent of the above; and service pay.
Bonus pay	No provision.

Type of arrangement	
Workers' compensation	No provision — provisions of *Workers' Compensation Act* to apply.
Sick pay	Award Clause 26 — payment prescribed in First Schedule (wages plus service pay and district allowance on the basis of 8 hours or 7.6 hours as nominated by employee for each day or shift of sick leave).
Accident pay	Award Clause 26 — Sickness and Accident Scheme established with benefits payable under certain circumstances.
Superannuation contributions	Agreement III Clause 8 — BHP Iron Ore Employees' Provident Fund preferred in house fund. Company contributions to increase by 1 per cent to 9 per cent. Pending satisfactory operational performance, further increase of 1 per cent available in either superannuation contribution or aggregate wage rates. Agreement II Clause 2.4 — employees provided with the opportunity to sacrifice part of their future earnings to be paid as additional employer contributions to the BHP Iron Ore Employees' Provident Fund. Conditions apply.
Severance and retrenchment pay	Award Clause 31 — retrenched employees entitled to: 152 hours' pay, plus 38 hours' pay (including service pay) for each complete year of service; and payment at rate prescribed in First Schedule. Employees entitled to pro rata payments in accordance with award. Employer also to pay for transport of employee and their dependants and personal effects back to original place of engagement or to new place of employment within Australia.
Special rates and allowances	Agreement III Clause 9 — Award Allowances not included in Aggregate Wage — Meal provisions — $8.20 or voucher; NACA — Mine — $0.18 per hour; NACA Loadout tunnels — $0.11 per hour, SMR — $0.40 per hour; House Drains — septics — $4.60 per day; EPCO sewerage tank — $4.60 per day; HIAB certificate — $3.80 per week; HIAB motor vehicle — $10 per week; Plumber's registration — $17.70; Electrical SECWA "B" licence — $16.30 per week; Electrical Dual Licence — $16.30 — per week, Electrical Restricted licence — $7.60 per week; Concentrator — $0.34 per hour; Shift tradesperson — $15.30 per week; Unsupervised shift tradesperson — $11.40 per week; Construction allowance — $4.90 per week; Rigger/scaffolder — $7.10 per week; Rigger/certified scaffolder — $13.40 per week; Height money — $1.90 per day; Leading hand 2–5 — $33 per week; Leading hand >5 $40.80 per week; Driver coordinator — $4 247.90 per annum; and Jimblebar Junction — $2 792.50 per annum. Further 4 per cent increase to above allowances provided in Agreement. Agreement II Clause 5.4 — Leading Hand allowance in recognition of removal of union restrictions. Tool allowance to form part of aggregate wage.

Type of arrangement	
Public holidays	Award Clause 12 — time worked on a public holiday other than by a continuous shift worker (during which the time would have been ordinary hours) shall be paid at the rate of double time. In addition, employee is to receive 7.6 hours leave with pay to be taken in conjunction with next annual leave (unless agreed otherwise). Otherwise, time worked on a public holiday to be paid at rate of double time and a half. Time worked on a public holiday by continuous shift workers to be paid at double time plus shift allowance. All overtime to be paid at the rate of double time and a half plus appropriate shift allowance. In addition, continuous shift workers receive 8 hours leave with pay for each occasion their RDO falls on a public holiday. When continuous shift worker works in excess of five public holidays in any one year, he will receive 7.6 hours leave with pay for each public holiday.
Working clothes and safety boots	Award Clause 17(8–10) — Employer to provide sufficient supply of protective equipment (for example, helmets, hand screens, goggles, glasses etc). Employees to sign acknowledgment of receipt and be responsible for equipment. Each employee to be issued, free of charge, two pairs of safety footwear during each year of service and four sets of working attire.
Travel	Agreement II Clause 2.5 — the removal of personal effects on termination will be on a distance equivalent basis to locations other than Perth.
Training costs	Award Clause 37 — Management will make training available to employees which will assist in the individual's career progression, enhance his portability of skills, improve productivity and meet the operational needs of the Company.
Other on-costs	Agreement I Clause 3.5 — joint task team established to generate alternative crib arrangements to the current meals service. Agreement II Clause 2.1 — catering — price of a meal ticket to an employee will increase to $2.40 on implementation of the Agreement and will increase to $3.60 at the commencement of the second 12 months of the Agreement.
Functions, tasks and skills	
Functions	Agreement II Clause 5.1.2 Appendix 4 — provides details of job description and skills required on Mineworker levels 1 to 3. Appendix 5 — Service truck operator may join mineworker classification set out in Appendix 4 or perform duties set out in this appendix. Appendix 6 — Checkpoint Accountabilities: sets out general requirements of all jobs (for example, work safely). Agreement II Clause 5.1.5 Appendix 1 — provides details of job description and skills required for Mine Planning — Mineworker levels 1 to 3.

Type of arrangement	
Job and task demarcation	Agreement I Clause 2.1 — provision for elimination of demarcations including within and between unions, within and between areas of the operations, between Shift workers and Day workers and within and between classifications and classification streams. Agreement I Clause 3.1 — general demarcations eliminated as part of efficiency measures. Agreement I Clause 3.3 — specific demarcations eliminated in the Mining Department. Agreement I Clause 3.4 — specific demarcations eliminated in Ore Processing. Agreement I Clause 3.6 — specific demarcations eliminated in Maintenance Classifications. Agreement II Clause 5.1.1 — further elimination of demarcations in the Mining Department. Progress in classification structure related to the attainment of essential skills, base skills and advanced skills. Agreement II Clause 7 — progression between levels is dependant on the employee's ability to meet the competency requirements for each skill set by the Training Committee. Agreement II Clause 5.1.2 — further elimination of demarcations in the Mine Maintenance area. Agreement II Clause 5.4 — No restrictions to be imposed by any unions on employees wishing to volunteer to accept position of Leading Hand.
Training	Agreement II Clause 5.6 — no training lists. Interested employees will need to apply each time an advanced skill is advertised. Selection is based on obtaining the best person for the job after considering attendance, safety record, discipline, work performance and attitude. Agreement II Clause 7 — provision for written and performance testing. Agreement II Clause 8 — provision for the establishment of a Training Committee for the mining operation. To comprise up to 4 company representatives and up to 6 union representatives. Training Committee to oversee the new classification structure and oversee and review training delivery or skills acquisition. Disagreements to be progressed in accordance with the Industrial Relations Agreement 1989.
Qualifications	Agreement II Clause 5.7 — an employee in the Mining Department unable to meet consistently the standards required of a classification or who is unwilling to participate in training required by the Company to fulfil requirements to be referred to the Training Committee, or if a consistent occurrence then the employee will be reclassified downwards.
Procedural arrangements	
Relationship with Award	Agreements I, II and III shall, to the extent of any inconsistency, supersede, replace and prevail over the provisions of the *Iron or Production and Processing (Mt Newman Mining Co Pty Ltd) Award* No A29 of 1984.

Type of arrangement	
General	Agreement II Clause 5.1.4 — Process established to assist in closure of power station.
Dispute settlement	No provision.
Agreement making	No provision.
Negotiating change	Agreement III — 3 — Ongoing Change Agreement II: 1. Company may originate change; 2. Unions to be notified of any issue/change — written notification to both State and site representatives; 3. Without prejudice discussions if required (30 days maximum); 4. If agreement reached, implementation of change; 5. If disagreement, Company may either decide not to proceed with change or conduct a trial period; Company may nominate trial period of between 1 to 6 months depending on the issue; and 6. After the completion of the trial period the Company may decide to proceed or not to proceed to full implementation. Agreement III — 4 — Continuous Improvement — work group level processes, systems or structures to be instituted to explore opportunities to improve efficiency within the work group, identify performance levels against Key Performance Indicators, examine means to achieve and monitor such performance levels, and implement changes in accordance with SELL principle (Safety, Efficiency, Legality and Logic). Agreement II Clause 5.4 — Acting staff: further discussions to take place to finalise matter.
Redundancy	Award Clause 31 — employee is deemed redundant if surplus to requirements as a result of technological change, merger, takeover or reorganisation of work or production methods or procedures or to market conditions but not if terminated for misconduct or unsatisfactory service nor if offered but fails to accept appropriate alternative employment with the employer. Before any employee is retrenched, employer to give written notice to State Secretary of Union concerned, stating reasons for intended action, the numbers and classifications of employees likely to be involved, and the proposed order of terminations. Individual employees likely to be made redundant then advised in writing by employer. Employees to receive at least three months' notice but pay in lieu thereof shall not be paid where employee resigns prior to expiration of notice.

Type of arrangement	
Payment of wages	Agreement I Clause 4 — aggregate wage to be paid in equal fortnightly payments and will be varied only on a fortnightly basis by payment of overtime at the rate applicable to each level, payment of allowances not included within the aggregate wage and deductions of unauthorised absences or unpaid leave at the rate applicable to each level for the period of such absences.
Safety management	Award Clause 32 — process established for cyclones. Award Memorandum of Agreed Arrangements — safety code established.

a Agreement I operative from 24 July 1993 for a period of 2 years and applies to employees of BHP Iron Ore who are covered by the *Iron ore Production and processing (Mt. Newman Mining Co Pty Ltd) Award* No. A29 of 1984.

b Agreement II operative from 25 November 1995 for a period of two years.

c Agreement III operative from 25 November 1997 for a period of two years.

I US BLACK COAL AGREEMENTS

This appendix presents an overview of formal work arrangements in unionised and non-unionised black coal mining workplaces in the United States. It should be noted that unionised mines account for a relatively small proportion of all black coal mines in the United States.

The formal arrangements governing unionised black coal mining workplaces are presented in Table I.1. These workplaces operate under the umbrella of the *National Bituminous Coal Wage Agreement of 1993*. Because the *National Labour Relations Act* (NLRA) excludes supervisors and managerial employees, this agreement covers only the US equivalent of the Australian production and engineering workforce.

Documentation of the formal arrangements governing non-unionised mine sites is problematic, since non-union workplaces are obliged only to meet legislated minimums and the system is based largely on common law contractual arrangements.

I.1 Legislated workplace standards

There are a number of legislative requirements which must be met by both unionised and non-unionised black coal workplaces in the United States. In particular, the *Fair Labor Standards Act* sets a minimum wage and minimum overtime rates of pay. The minimum wage is currently $US5.15 per hour (as of 1 September, 1997). Increases in the minimum wage are passed in a bill by Congress and signed into law by the President. This wage applies to employees of enterprises with turnover of at least $US500 000 per year. It also applies to employees of smaller firms if the employees are engaged in interstate commerce or in the production of goods for commerce. In addition, the Act has a sub-minimum wage for employees under the age of 20 years of age. This is currently $US4.25 per hour and applies for their first 90 consecutive calendar days of employment with an employer. The Act does not place a limit on the total hours which may be worked. However, it does require that covered employees, unless otherwise exempted, be paid not less than one and one half times their regular rates of pay for all hours worked in excess of 40 per week.

The *Fair Labor Standards Act* seeks to protect the educational opportunities of youths and prohibits their employment in jobs and under conditions detrimental to their health and well-being. The Act includes restrictions on the hours of

work and occupations for youths under the age of sixteen and declares certain jobs as being too dangerous to be performed by minors under the age of eighteen. The black coal industry is one such declared area.

The *Employee Retirement Income Security Act* governs certain activities of most employers who have pension or welfare benefit plans. Pension plans are established and maintained to provide a retirement income or to defer income until termination of covered employment or beyond. Welfare plans are established and maintained to provide health benefits, disability benefits, death benefits, prepaid legal services, vacation benefits, day care centres, scholarship funds, apprenticeship and training benefits, or other similar benefits. Pension and welfare plans must meet a wide range of fiduciary, reporting and disclosure requirements.

Other statutes which set workplace standards include the following.

The *Immigration and Nationality Act* restricts employment to persons who may legally work in the United States (citizens and nationals of the United States and aliens authorised to work in the United States). The Act protects US citizens, and aliens authorised to accept employment in the United States from discrimination in hiring or discharge on the basis of national origin and citizenship status.

Protection is afforded to 'whistleblowers' under a number of environmental Acts. The Acts prohibit an employer from discharging or discriminating against employees in relation to the disclosure of safety and health hazards to their employer or to the appropriate federal agency.

The *Family and Medical Leave Act* (FMLA) provides an employee with up to 12 weeks protected, unpaid leave during any 12 months for the birth and care of the employee's child or placement for adoption or foster care of a child with the employee. In addition, the entitlement includes caring for an immediate family member who has a serious health condition or an employee's own serious health condition. Employees do not accrue benefits during periods of unpaid FMLA leave but must be returned to employment with the same benefits at the same levels as existed prior to the commencement of leave.

The *Uniformed Services Employment and Reemployment Act* provides those who have served in the armed forces the right to re-employment with their former employer.

The *Worker Adjustment and Retraining Notification Act* applies to employers with 100 or more employees, not counting employees who have worked less than 6 months in the last 12 months and not counting employees who work an average of less than 20 hours a week. The Act requires an employer to provide

60 calendar days' notification of plant closings and mass layoffs. This time frame is designed to provide workers and their families with some transitory time to adjust to the loss of employment and to search for alternative employment.

The *Employee Polygraph Protection Act* applies to most private employers. The Act generally prohibits the use of lie detector tests either for pre-employment screening or during the course of employment.

The *Consumer Credit Protection Act* is designed to protect employees from dismissal because their wages have been garnisheed to repay a debt. The Act also limits the amount able to be garnisheed from an employee's wages in any one week.

The *Federal Mine Safety and Health Act of 1977* (the Mine Act) covers mine operators and miners throughout the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, Guam and the Trust Territory of the Pacific Islands. Under the Mine Act, the Mine Safety and Health Administration (MSHA) performs four annual inspections of underground mines and two annual inspections of surface mines. Any violations discovered during inspections and investigations are to be cited and are subject to civil penalties. All violations must be corrected within the time frame established by the MSHA. MSHA's regulations arise from the requirements of the Mine Act. These regulations cover health and safety standards designed: to prevent the occurrence of hazardous conditions; for the immediate notification of accidents, illnesses and injuries; for training programs to meet the statutory requirements of the Mine Act; and to obtain approval for certain equipment used in gaseous mines.

The *Black Lung Benefits Act* (*Title IV, Federal Mine Safety and Health Act of 1977, as Amended*) covers present and former coal miners and their surviving dependants. Basic monthly benefits available to eligible claimants as of 1 January, 1997 range from $US445.10 per month to a maximum of $US890.20 per month for claimants with 3 or more qualified dependants. These rates are adjusted periodically in line with percentage increases in Federal pay. Black lung claims existing prior to 1970 are met by the Black Lung Disability Trust Fund. Claims based on employment after 1970 are met by coal mine operators either directly or through insurance.

Table I.1: **Overview of formal work arrangements in the *National Bituminous Coal Wage Agreement of 1993*[a]**

Type of arrangement	*Article*	*Agreement provision*
Size of the workforce		
Recruitment	*IA(d)*	Right to hire is vested exclusively with the employer.
	II(A)	JOBS Program designed to achieve job security for classified employees through extended panel rights and training. Detailed provisions including: the first 3 of every 5 job openings at any existing, new, or newly acquired non-signatory mine of the employer to be filled by classified laid-off employees covered by the agreement or by active employees who have expressed an interest; and the order of selection from laid-off and active employees by seniority (provided these employees have the ability to do the job) and by geographic location (ie first from those employees located in the district where the other operation is located, second from contiguous districts and third from non-contiguous districts).
	II(D-2)	When the above hiring process is exhausted, union to provide a list of qualified miners for consideration but with no obligation on employer to hire.
	III(k)	No person under 18 years of age to be employed inside any mine or in hazardous occupations outside any mine. If State law provides a higher minimum age, then the State law is to prevail.
	XVII(d,e & f)	Employees who are idle because of a reduction in the workforce shall be placed on a 'panel' from which they shall be returned to employment on the basis of seniority as defined in article XVII(a). A panel member shall be considered for every job which he has listed on his lay-off form as one to which he wishes to be recalled. Panel members can revise panel form once a year. Superintendent of the mine and the recording secretary of the local union to be the joint custodian of the panel records. Laid-off employee is obliged to keep custodians informed of any change of address. Employees notified of recall by certified mail at last known address have right to accept or reject a job which becomes available. However, if the offer has been listed as one to which he wishes to be recalled and the employee rejects the offer or fails to respond within 4 calendar days after receipt of such notice, or accepts but fails to report for work within a reasonable time, his name shall be removed from the panel and he shall sacrifice his seniority rights at that mine. Employees who are placed on a panel shall retain the seniority earned prior to their lay-off and, in order to protect relative seniority standing, will continue to accrue seniority while on the panel. Laid-off employees who place their names on panels at other mines shall not accrue seniority on panels other than their own.

Type of arrangement	*Article*	*Agreement provision*
	XVII(h)	Provisions setting down the order of recall from persons on lay-off status — when a job or training vacancy exists which is not filled by employees within the active workforce or from the mine panel, panel custodians to review the list of employees on the panel from other mines and employer to recall the senior employee with the ability from employer's other mines (1) within the same UMWA district (2) within geographically contiguous UMWA districts (3) from remaining UMWA districts on the panel at that mine and who has listed the job to be filled as one for which he wishes to be recalled.
	XVII(i)	Job bidding — the filling of all permanent vacancies and new jobs created during the term of the agreement to be made on the basis of seniority. Set process to be followed: (1) display of job or vacancy posted in conspicuous place in the mine for period of 5 days; (2) any employee can bid on the vacancy during the 5 day posting period while eligible laid-off panel members who have listed the job are presumed to have bid on the basis of seniority; (3) at the close of the posting period, the most senior employee of those in (2) is selected. Processes (4) to (11) set down arrangements to be followed in certain circumstances (eg. if the job is in a less dusty area, the most senior worker who holds a letter from the US Department of Health and Human Services advising that he/she has contracted black lung disease has the option to transfer to this job ahead of those who do not hold such a letter).
	XVII(j)	If a job vacancy is not filled by job bidding, then job may be filled by hiring a new applicant who has the ability to perform the work. If this is not successful, a training opportunity is to be posted for a period of 7 days. Employee to be trained is to be selected from applicants in accordance with article XVI(g).
	XVII(k)	Transfer to other mines — when a mine is being abandoned or closed, employees whose names are on the panels of other mines shall be transferred to other mines where work is available (at same level position) but seniority at new mine not to begin until the date they commence work (except where employees from mine being abandoned or closed are required to remain to assist with closing and dismantling work, in which case they have the right to transfer later and their seniority will be retrospective to the day they would have been transferred had they not remained).
Retrenchment	*IA(d)*	Right to discharge is vested exclusively with the employer.
	XVII(b)	In all cases where the workforce is to be reduced, employees with the greatest seniority shall be retained provided they have the ability to perform available work.
	XVII(k)	Employees who are laidoff can choose to be placed on the panel of other mines of the same employer in the same UMWA district and choice of other districts provided that request is made in writing within 5 calendar days after

Type of arrangement	*Article*	*Agreement provision*
		their lay-off. (Signatory companies to the agreement and subsidiaries of own employer are treated as the employer for panel rights purposes.)
Dismissal	*IA(d)*	Right to discharge is vested exclusively with the employer.
	XXIV(a)	No employee may be disciplined or discharged except for just cause. The burden shall be on the employer to establish grounds for discharge in all proceedings.
Retirement	*XXII(f)*	No employer to have a policy of compulsory retirement based solely on age for employees covered by the agreement.
Use of casuals and contractors	*IA(g)*	Limits on contracting and sub-contracting on: (1) transport of coal — allowed only where contracting out of this activity is consistent with prior practice and custom and provided that such work is not contracted out when employees who customarily do such work are laid off; (2) repair and maintenance work — not to be contracted out except where work is performed by supplier or manufacturer under warranty (in such cases on written request on a job-by-job basis) or where employer does not have equipment available or regular employees (including laid-off workers) with necessary skills not available; (3) rough grading in mine reclamation work — no contracting allowed; (4) where contracting out is permitted, prior custom and practice shall not construe employer's choice of contractor.
	IA(i)	Construction work — construction work customarily performed by classified employees is not to be contracted out unless such employees with the necessary skills are working no fewer than 5 days per week or its equivalent for employees working on other schedules. Where contracting out is permitted, it shall be in accordance with prior practice and custom.
	II(B)	Employer cannot lease, sub-lease or license out of any bituminous coal lands, mines or other facilities unless numerous detailed conditions are satisfied. These conditions include that the lessee-licensee agrees in writing to offer employment first to employees in employer's operations covered by the agreement and order of selection is as for article II(A) above.
Manning levels	*V*	Provisions relating to circumstances in which full-time helpers on face equipment in underground mines are or are not required.
	XXI(b)	Provisions relating to manning of surface mining equipment. Acknowledgment of continuation of past custom and practice in provisions.

Type of arrangement	*Article*	*Agreement provision*
Hours of work and roster arrangements		
Ordinary hours	*IV(a)*	Basic Work Week — starts at 12.01 am Monday.
	IV(b)	Basic Work Day: (a) Inside employees — 8 hours (or 40 hours per week) from portal-to-portal (or collar-to-collar or bank-to-bank) including a staggered 30 minutes without any intermission or suspension of operation throughout the day; (b) Outside employees — 7 hours and 15 minutes (or 36.25 hours per week) including a staggered 30 minutes without any intermission or suspension of operation throughout the day but may be extended to 8 hours if the work involves dumping, handling or preparation of coal and the manufacture of coke provided overtime is paid for work in excess of 7 hours and 15 minutes per day; and (c) Outside continuous employees — 8 hours (or 40 hours per week) including a staggered 30 minutes without any intermission or suspension of operation throughout the day.
Part-time hours		No provisions.
Overtime hours	*IV(d)*	Employer has full rights to schedule mine operating times, crews etc. However, employees are to be given the opportunity to share the overtime and work on premium days on a fair and equitable basis.
Shift arrangements	*VI*	Employer has right to work mines for extra shifts with different crews.
	VIII	Each shift to have regular starting time established in accordance with past practice and custom. Staggered starting time option available where employees must be lowered into the mantrap or for those employees who perform safety, maintenance or other functions essential to the safe and efficient operation of the mine or surface facility. Starting times in surface facilities do not have to be the same as for the mine. Employer has right to change crews at the face and to require reasonable amounts of overtime necessary to allow this to occur.
	XVII(n)	When a permanent vacancy or new job is filled at a mine where shift rotation is not practiced, the employee with the greatest seniority shall be given their shift preference (ie. day, afternoon, midnight) in accordance with same process as job bidding process.
	XXI(g)	Swing shift — to be used for stripping shovels, draglines, overburden drills and all other classifications which regularly work 7 days a week. When operator uses a swing shift, the regular crew shall be assured of 6 days each week except weeks in which holidays occur.
	XXI(i)	Upon approval of two-thirds of the local union members at the mine, a surface mine employer may elect to extend the work day of employees who mine and load coal to 8 hour shifts — provided that the employees on 8 hour shifts are regularly paid a minimum of three quarter hours of overtime at applicable rates and that work on the seventh day

Type of arrangement	*Article*	*Agreement provision*
		remains optional. Prior to implementation, employer and union agree to share overtime equally and that swing crews are utilised in accordance with XXI(g).
	Appendix C (Part 1)	Alternative schedules — notwithstanding the traditional work schedule set down in article IV, the employer may establish 7 day continuous operations consistent with the schedules set forth in this appendix, provided that the overall employment level at the operation is increased (subject to some exceptions) and mandatory overtime is eliminated. Where an employer establishes alternative schedules, conditions apply on (a) weekend/holiday schedules; (b) overtime for weekend/holiday crew; (c) holidays for weekend/holiday crew; (d) paid time off for weekend/holiday crew; (e) modified weekday schedules; (f) overtime for modified weekday crew; (g) paid time off for modified weekday crew; (h) bereavement; and (i) taking of contractual days.
	Appendix C (Part 2)	Other alternative schedules — employer or the local union has the right to propose other alternative schedules in addition to those proposed in Part 1 above. Local union membership must ratify and the overall employment level at the operation must increase and mandatory overtime must be eliminated.
	Appendix C (Part 3)	Notice of changes — where employer has established alternative schedules (under part 1 or 2 of Appendix C), the employer has the right to change the scheduled workday, work week, or starting time of any shift, or to implement the traditional schedule (article IV) or any alternative schedule adopted, on 30 days' notice.
	Appendix C (Part 4)	If the workforce is reduced below the base level of employment set out in Part 1 Appendix C, the weekend/holiday schedule must be abolished and further scheduling at the mine or facility shall then be governed by terms and conditions of article IV.
	Appendix C (Part 7)	Changing crews at the face — at operations with alternative schedules, notwithstanding the provision to the contrary regarding the elimination of mandatory overtime, the employer has right to change crews at the face including the right to require reasonable amounts of overtime to allow this to occur. However, in no event will an employee working on a Saturday, Sunday or holiday under the weekend/holiday schedule be required to work beyond regular scheduled 12 hour shift.
	Appendix C (Part 8)	Overtime work — where employees are working on alternative schedules, overtime work will be offered on an as needed basis. An overtime roster must be kept up to date and posted in each operation for the purpose of distributing overtime on an equitable basis to the extent practicable.
	Appendix C (Part 9)	Idle day work — for employees on alternative work schedules, idle day work to be scheduled on an as needed basis and equitably.

Type of arrangement	*Article*	*Agreement provision*
Roster arrangements		See above.
Paid breaks		See shift arrangements.
Annual leave	*XIII(a)*	14 consecutive days to be taken in 3 separate regular vacation periods except in 1998 where there will be 2 periods. No regular or staggered vacation during 1993 among workers returning from strike; instead they are to receive pay in lieu for all days of vacation accrued as of 31 May but not taken in 1993.
	XIII(b)	Dates set down for regular vacation periods each year of the agreement.
	XIII(c)	Employer may, irrespective of past practice to the contrary, operate the mine without interruption and schedule regular vacations of 14 days for each employee during the calendar year. In this event, employer must file a written declaration with the respective district president of the UMWA by January 1 of relevant year. Times of vacation to be at times desired by individual employee so long as this does not interfere with the efficient operation of the mine and so long as not more than 15 per cent of the work force at a mine elects to be off on the same day. Should there be a conflicting choice of vacation between 2 or more employees, the choice will be determined on seniority basis.
	XIII(e)	For calendar years 1993 to 1997, each employee with one year of continuous employment with employer is entitled to 4 additional days of (floating) paid vacation. If employer has a Christmas shutdown period, specified number of floating vacation days to be used each period, otherwise employee to give 30 days' notice of taking floating vacation days at some time during the calendar year in which they are due. Unused floating vacation days to be paid in lieu (paid at regular rate plus overtime) or may carry over no more than 4 floating vacation days into the next calendar year. Any days carried over can only be used for leave pursuant to the *Family and Medical Leave Act 1993* (or receive pay in lieu at the end of the calendar year). No employee can accumulate more than 8 floating vacation days in any calendar year.
	XIV	Additional (graduated) vacation days per year corresponding to length of continuous employment with the employer — commencing at one additional day per year for employees with over 6 years up to 7 years of continuous employment increasing to a maximum of 13 additional days for employees with 18 years or more of continuous employment. Strict definition of continuous employment but is not broken by lay-off, transfer from one mine to another for the same employer or by sale, lease, sub-lease or assignment to successor company. Employee forced to cease work because of injury or illness to be paid out full amount of unused graduated vacation time for calendar year he ceases work as well as for year he returns to work.

Type of arrangement	*Article*	*Agreement provision*
	Appendix C (Part 6)	Employees working on alternative schedules have option to schedule off for staggered regular vacation, floating vacation days or graduated vacation days provided that this does not interfere with efficient operations and so long as not more than 15 per cent of the workforce on the weekend/holiday crew or the modified weekday crew at an operation elects to be off on the same day.
Long service leave		No provision.
Sick leave	*IX(e)*	5 days per year during the calendar years 1993 to 1997 (eligible after serving one year or more of classified service). For calendar year 1993, each employee who returns to work from a strike as scheduled following ratification of the agreement may take a maximum of 2 days of personal or sick leave for the remainder of the calendar year. Entitlement of 3 days personal or sick leave for calendar year 1998. Sick leave not to be utilised for period less than one full regular working day. Employee to notify at least 24 hours in advance or at least 2 hours in advance in the case of sudden sickness, accident or emergency. Unused sick days can be paid in lieu thereof or carried over to next calendar year. No employee can accumulate more than 10 personal or sick leave days in any calendar year.
Parental leave	*IX(f)*	Family and medical leave — 12 weeks' unpaid leave of absence for (i) birth of child, (ii) placement of child for adoption or foster care, (iii) care for family member with serious health condition or (iv) serious health condition of employee (under provisions of *Family and Medical Leave Act 1993*). During period of absence, employee to continue to accrue seniority, vacation, pension and all other employment benefits provided by agreement. Health and dental care shall continue during leave of absence. Where employee is using family and medical leave for reasons (i) and (ii) above, employee is to first substitute accrued vacation and personal leave. Where employee is using family and medical leave for reasons (iii) and (iv) above, employee is to first substitute accrued vacation, personal and sick leave. All such paid leave to count towards unpaid 12 week entitlement.
Other leave	*IV(d)* *IX(a)* *IX(b&d)* *XII*	No coal to be produced or processed on Christmas Eve and Christmas Day holidays. Paid bereavement leave (3 days — 2 to be consecutive and include the day of the funeral). Time off for jury and military duty. Public holidays — 11 specified paid holidays during first to fourth years of agreement, 6 specified paid holidays during fifth year of agreement. If any holidays fall on a Sunday (except the employee's birthday holiday), then it shall be taken on a Monday. If any holidays (except the birthday holiday) fall on a Monday then work on a preceding Saturday is optional (except for employees covered by article III(o)(10)).

Type of arrangement	*Article*	*Agreement provision*
	XVII(l)	Employees may be granted leave of absence (not to exceed 4 consecutive months) to participate in union activities and to serve as district or international officers or representatives. They shall retain their seniority and continue to accrue seniority while on such leave. Except in certain circumstances, no more than 2 employees may accept temporary union assignment from the same mine at the same time. Entitlement to return to former job and shift.
Remuneration and on-costs		
Base pay	*IV(e)*	Appendix A, standard daily wage rates for work performed according to job titles; Appendix B, Part I, five grades for underground jobs in deep mines; Appendix B Part II, five grades for jobs in strip and auger mines; and Appendix B, Part III, four grades for jobs in preparation plants and other surface facilities for deep or surface mines. Employers cannot introduce any job title or classification that is not in the agreement. If employee thinks they are inappropriately classified, they may file grievance (see article XXIII).
	X	Wage increases: wage increase of 50 cents per hour upon ratification of agreement, 40 cents per hour on first and second anniversary of agreement. Employees who were not on strike during period from 1 February 1993 to date of ratification of agreement to be paid retrospectively the 50 cents per hour increase. Employees who were on strike and returned to work as scheduled to be paid a one time lump sum ratification bonus of $500 in addition to health care bonuses (see Article XX). Employees cannot receive both retrospective wage increase and the bonus.
	IX(c)	Reporting pay — employees who report for work at the usual time (unless notified not to report) to be paid for 4 hours whether or not the operation works the full 4 hours. After the first 4 hours, hours worked to be paid by the hour or fraction thereof. If regular routine work cannot be furnished, employer may assign the employee to other than regular work.
	XVIII	Tonnage rates and hand loading — (a) hand loaders employed on a tonnage rate basis to have rates negotiated between employer and union; (b) where wages are based on weights, employee has the right to a checkweighman of their own choosing to inspect the weighing of coal or to check the accuracy and fairness of other methods of payment. Wages of checkweighman deducted from earnings of employees on an agreed percentage basis; (c) explicit rejection of certain ‘reject’ clauses in district agreements relating to preparation and cleaning of coal; (d) delivery of cars by pushing to be settled by local negotiation; (e) matters affecting the cost of explosives referred to the district conferences; (f) all bottom coal to be taken up and loaded by employee; (g) cutter shall cut coal as directed by the employer; (h) no charge for blacksmithing; (i) rock-dusting to be done at expense of employer; (j) when day men are

Type of arrangement	*Article*	*Agreement provision*
		transferred to loading coal, the individual affected (if aggrieved) shall have the right of review under the settlement of dispute procedure in agreement.
	XXA	Dental plan — provides dental benefits for employees and their eligible dependants at a cost to each employee of $2 per month payable on a payroll deduction basis. Details of plan provided in article.
	XXII	Tramming — machine operator's rate or helper's rate (where applicable) to be paid for the tramming of mobile loading, cutting, continuous mining or related machines and equipment from one location to another.
	Appendix C (Part 5)	Provisions establishing definition of straight time rate/shifts for employees working alternative schedules.
	Appendix C (Part 10)	Reporting pay — among employees on alternative schedules, for reporting pay purposes, employees on the modified weekday crew will be paid 5 hours at the straight time rate, employees on the weekend/holiday crew will be paid 5 hours at the straight time rate for work on Friday or Monday, and 10 hours at the straight time rate for work on Saturday, Sunday and holidays.
Overtime pay	*IV(b)*	Inside, outside and outside continuous employees — overtime hours paid for at time and a half, except as provided in IV(d), with no pyramiding of overtime.
	VI(e)	Employees who have completed regular shift and left premises and are called out on another shift within 24 hour period of regular shift to be paid the applicable premium rate together with any shift differential for the hours worked on the additional shift.
	VI(f)	Time and a half not to be paid whether the regular rotation of shifts requires the working of more than one shift in any consecutive 24 hour period.
Shift pay	*V(c)*	Afternoon shift: all employees, whether paid by the day or by the ton, paid 30 cents additional for each hour worked. Midnight shift: all employees, whether paid by the day or by the ton, paid 40 cents additional for each hour worked. Such shift differentials to be considered part of regular rate of pay in calculation of overtime, premium rates, holiday, vacation, reporting, jury duty, military duty, bereavement pay and personal or sick leave.
	VI(c)	Employees who complete regular shift and continue work into the next shift shall be paid at the applicable differential for all additional hours worked.
Weekend pay	*IV(d)*	Saturday work to be paid at time and a half, except overtime on a Saturday which is paid at double time. Sunday work to be paid at double time.

Type of arrangement	*Article*	*Agreement provision*
Annual leave pay	*XIII(d)*	Employees to receive the sum of 12 times the day wage rate (including any regularly scheduled overtime) plus shift differentials where appropriate (formula specified).
	XIV(f)	Graduated vacation pay based on regular standard daily wage rate including any regularly scheduled overtime at the time vacation payment is due and to include any applicable shift differential.
Bonus pay	*XXII(s)*	Bonus plans — provisions providing: (1) procedures for installation; (2) conditions; and (3) resolution of disputes.
Sick pay	*IX(e)*	Sick pay paid at regular rate (including regularly scheduled overtime where applicable but not including premiums for Saturday, Sunday, holidays or birthday work).
Accident pay	*XI*	Sickness and Accident Benefits Plan — an insurance scheme designed to protect employees against financial hardship resulting from sickness or accident suffered on or off the job by providing compensation for lost earnings. Detailed provisions relating to eligibility of benefits, filing of claims, structure and administration (employer responsible either directly via self insurance or indirectly through insurance carrier) etc. Benefits for disability resulting from accident, either on or off the job, shall be payable for a maximum of 42 weeks regardless of the length of employee's classified employment with employer at the time of the accident. Benefits for disability resulting from sickness are payable according to the following schedule: *Length of employment at date of disability* — *Max number of weeks* 6 months to less than 1 year — 6 1 year to less than 5 years — 13 5 years to less than 10 years — 26 10 years but less than 15 years — 39 15 years or more — 52 The amount of benefits to be: $230 per week during the first year of agreement; $240 per week during second year of agreement; and $250 per week during third to fifth years of agreement.
Severance and retrenchment pay		No provision.
Special rates and allowances		No provision.

Type of arrangement	*Article*	*Agreement provision*
Public holidays	*IV(d), XII(d&e)*	Any work on a specified holiday, paid for at triple time. Pay for holidays not worked paid for at regular pay (including regularly scheduled overtime provided employee was not absent on last scheduled day prior to or first scheduled day following the holiday).
	XII(f)	When holiday (other than birthday holiday) occurs during scheduled vacation, employee to be paid for holiday not worked in addition to vacation pay and to designate another day he wishes to take as a holiday.
	XII(g)	Birthday holiday — employee whose birthday occurs during scheduled work period can elect to take day off as birthday holiday and receive regular pay (including overtime) or to work and receive triple time for all time worked. If birthday falls during non-scheduled work period or on another public holiday, employee can designate another day as the birthday holiday (within 10 days of actual birthday) to be either taken off or worked and paid as above.
Working clothes and safety boots	*III(m)*	Safety equipment and devices, including electric cap lamps, self-rescuers, personal ear plugs, prescription safety glasses exclusive of eye examination costs, non-prescription safety glass or goggles, and knee pads to be provided by employer without charge. Employee expected to provide own personal wearing apparel such as clothing, shoes, boots where worn as part of normal footwear, hats, belts, and gloves. However, employer is to provide employee with annual protective clothing allowance ($190 in 1993, $200 in 1994 and $210 in each year 1995 to 1997). New employees entitled to allowance on first payday following employment.
Travel	*II(F)*	When employees are undertaking training under the UMWA-Employer Skills Training Program, and travel away from the workplace or overnight stay is required, the employer and the local union to meet and establish the amount and manner in which expenses are to be provided for lodging and travel.
Training costs	*II(E)*	UMWA-BCOA Training and Education Fund: employer to contribute 8 cents per employee per hour actually worked in the first two years of the agreement and 9 cents per employee per hour in the third and subsequent years of the life of the agreement.
	II(F)	While employees are undertaking the UMWA-Employer Skills Training Program, employees are paid at their regular straight time classified rate for all time spent in skills training (except where overtime rate is required by statute).
Other on-costs	*III(l)*	Employers who are party to the agreement must provide employees with the protection and coverage of the benefits under workers' compensation and occupational disease laws, whether compulsory or elective, in the relevant State.

Type of arrangement	*Article*	*Agreement provision*
	IX(a)	Pay while on bereavement leave to include regular and overtime pay.
	IX(b)	Jury duty — employer to reimburse difference between normal pay (including overtime or premium time) while on jury service and jury fees received.
	IX(d)	Military duty — upon proof of service, employee entitled to 2 weeks' pay at regular rate (including any regularly scheduled overtime or premium pay) less any amounts received by employee for such duty.
	XX	Health and retirement benefits — general purpose of the plans is to provide health care for working and retired miners and their dependants; pensions for miners upon their retirement; health care and financial support for eligible disabled miners; and financial support for surviving spouses and surviving dependants provided by each of the trusts and plans set out in the article. Each signatory employer must contribute to nominated trusts amounts specified based on cents per hours worked by each of the employer's employees who perform classified work under the agreement. Trusts administered by trustees who have their responsibilities and duties described. Audit, report and notice procedures, administration of trusts, and employer's guarantee of 1950 and 1974 plans and trusts also specified. A general description of several trusts and plans is also provided in the article.
	XXB	UMWA cash-deferred savings plan of 1988 — maintenance of pension plan and trust for employees separate from those in article XX. To provide additional retirement income to employees and their dependants funded by voluntary wage deferrals and, as necessary, employer contributions to pay the cost of administration.
	XXII(n)	Lunches — employees working 2 or more hours in addition to own regular shift or who are called back to work after leaving premises to be provided with lunch at employer's expense.
Functions, tasks and skills		
Functions	*IA(c)*	Supervisors not allowed to perform classified work, except where training classified employees.
	IA(e)	Union representatives allowed reasonable opportunity to campaign during non-working hours in non-working areas, provided there is no interference with production.
	III(d)	Mine Health and Safety Committee (MHSC) to be established and comprise miners employed at the mine and selected by the local union. Members of the MHSC shall participate in and will be paid at their regular rates of pay by the employer for attendance at training sessions.
	XVII(b)	When the number of employees within a job title is to be reduced or employees are to be realigned, detailed specification of seniority procedure for order of retaining and/or moving of people to different functions, job grades and shifts.

Type of arrangement	*Article*	*Agreement provision*
	XVII(m)	Employees who are promoted to a permanent supervisory position not covered by the agreement to forfeit their original seniority and panel rights. Employees may perform such supervisory work on temporary basis not to exceed 60 working days (cumulative) during any contract year without loss of seniority.
	XXI(b)	Duties of oiler, groundman and drill helper specified.
Job and task demarcation	*XIX*	Classification — an employee shall normally be assigned to duties customarily involved with his regular classified job. Every reasonable effort shall be made to keep an employee at work on the job duties normally and customarily a part of his regular job and to minimise the extent of temporary assignments.
	XXI(e)	Repairs on electrical components or circuits supplying power to any device or equipment located at a surface mine shall be done by qualified UMWA electricians.
Training	*II(E)*	Establishment of UMWA-BCOA Training and Education Fund to provide financial assistance for training or education to unemployed UMWA miners and/or their family dependants and/or the family dependants of active classified employees in coal-related industries who are seeking employment in the coal industry, in coal-related industries or in any other vocation, trade or employment of the applicant's choosing.
	II(F)	Establishment of UMWA-Employer Skills Training Program — where new technology or improvements to existing technology is introduced, employer is to provide relevant employees with skills training necessary for the safe and efficient operation of the machine or equipment introduced.
	III(d)	Occupational health and safety training program to be established by the Joint Industry Training Committee.
	XVI	Joint Industry Training Committee to be established, with 3 representatives appointed by UMWA and 3 representatives of industry, appointed by the BCOA. Committee to focus on fostering and promoting the advancement of effective training in the industry, with special attention given to the problems of employers operating 3 or fewer mines and aid in devising training programs for these companies that will permit them to institute effective training programs without imposing undue hardships. Detailed specification of training relating to: orientation for new employees; general retraining programs (every classified employee participating at least once during the calendar years 1993 to 1998); safety training for specific job; maintenance training; new inexperienced employees at underground mines; and skill enhancement program. General training provisions include that any training program to be conducted in accordance with the following: (1) emphasis on health and safety in addition to

Type of arrangement	*Article*	*Agreement provision*
		job requirements; (2) union has opportunity to review each training program and make comments and suggestions; (3) selection of employees for training in accordance with seniority and trainability (definition spelled out of the latter); and (4) management to make periodic evaluation of employee's progress or lack thereof while in training.
Qualifications		No provision.
Procedural arrangements		
General	*IA(d)*	Direction of the workforce is vested exclusively with the employer.
	II(D–3)	Employers to provide monitor (established by UMWA-BCOA Labour Management Policy Committee) with regular reports of all jobs filled pursuant to the job opportunity provisions.
	II(E)	Employer to provide monthly statement on a mine-by-mine basis, the full amounts due and the hours worked with respect to the amounts payable to the UMWA-BCOA Training and Education Fund.
	II(H)	Establishment of UMWA-BCOA Labor Management Policy Committee to identify problems affecting the industry (such as legislation, the environment, technological changes etc), formulate plans to solve those problems and, where appropriate, conduct joint activities designed to implement the plans. Based on premise that mutual cooperation at the highest level is required for industry to maintain and enhance its competitive position. Committee to comprise 4 high level representatives of the UMWA, 4 high level representatives designated by BCOA and one neutral Chairman selected by other members of the Committee.
	VII	Establishes Mine Communication Committees (MCC) at each mine. Top level international union and employer representatives to tour mines to promote improved relationships and introduce concept of MMC. Union membership to include local union President, Mine Committee Chairman and Safety Committee Chairman. To meet no less than once a month with the main function being to identify and discuss any problems or potential problems which, if unresolved, could interrupt the steady and regular operation of the mine and, from time to time, discuss areas of special concern.
	XV	Employer to 'check-off' union dues and fees as well as other nominated areas (eg., credit union, union-sponsored group auto insurance etc) from the wages of employee and to remit to union for distribution to its branches as appropriate. Employer also to submit to the union an itemised statement showing name, social security number, hours worked, amount checked off for dues, initiation fees and assessments etc for check-off of employees (plus a list of employees among whom such financial information has not been collected). In order to comply with *Labor-Management Relations Act 1947*, union must obtain employee's written authorisation and provide this to employer.

Type of arrangement	*Article*	*Agreement provision*
	XXI(c)	Employer to provide centrally located eating place at each major pit which the employer shall keep clean and adequately heated and ventilated to ensure comfortable conditions in all seasons. Cabs of the machine or vehicle may be used as an eating place.
	XXI(f)	Employer to provide sanitary ventilated toilets and be responsible for keeping them clean.
	XXII	Miscellaneous — provisions relating to (a) bath house facilities; (b) access roads; (c) parking facilities; (d) bulletin boards; (e) proper rules negotiated between employer and district president of union to provide for continuous operation of coking and cleaning plants; (g) house coal to be sold to employees (including ex-employees and their widows) who live within a reasonable distance of the mine, for domestic use at cost of production less sales and administration costs; (h) equitable adjustment of house rents subject to union approval; (i) attendance control program (specified policies and procedures and steps to deal with employee absence in prescribed circumstances); (j) memorial periods — UMWA may designate periods not exceeding 10 days during the term of the agreement; (k) work to cease at any mine on any shift during which a fatal accident occurs and mine to remain closed on all succeeding shifts until starting time of next regularly scheduled work of the shift on which the fatality occurred; (l) new machinery — right to install and operate new types of equipment is recognised, procedures set down to give notice to union of new equipment, for parties to agree on the job classification of operator and establish manning requirements for the new equipment. While agreement is being reached, equipment to operate with requirements established by employer but employees have right to file grievance on manning and classification under article XXIII. If the employees prevail, arbitrator to grant retrospective relief with respect to classifications; (o) portals — employer has the right to establish and move portals if adequate facilities, conveniences and safety are furnished to the employees, subject to right of review of union; (p) tools — to be furnished by employer; and (r) union able to use bath house as a meeting place provided no interference with production or intended use of facilities.
	XXV	Neither employer nor union to discriminate against any employee.
	XXVI	All prior practice and custom not in conflict with this agreement shall be continued.
Dispute settlement	*XXIII*	Settlement of disputes — provisions relating to: (a) establishment of Mine Committee (MC) – to consist of at least 3 but not more than 5 employees elected by employees (and at least 1 member of the MC on each shift as far as practicable) with main duties being the adjustment of disputes arising from agreement that the management and employee have not resolved; (b) establishment of District Arbitrators — either: (1) presidents of UMWA International Union and BCOA to jointly establish a panel of impartial arbitrators for each UMWA district with each panel to serve for 18 months or (2) employer and UMWA district may choose to select a district arbitrator or

Type of arrangement	*Article*	*Agreement provision*
		panel of district arbitrators with term agreed upon by appointing parties. If no agreement reached within 90 days of agreement then selection procedure (1) to apply; (c) Grievance Procedure — resolved in steps (1) employee to make complaint to immediate foreman who has authority to settle matter. Foreman to notify employee of decision within 24 hours; (2) if no agreement reached between employee and foreman, complaint submitted on BCOA-UMWA Standard Grievance Form and taken up within 5 working days by MC and management. If complaint not settled, grievance referred to representative of the UMWA district and representative of employer; (3) within 7 working days, district and employer representative to meet and review facts in effort to reach agreement. Members of the MC have the right to be present. No verbatim transcript of testimony shall be taken. Neither district nor employer representative to have participated in steps (1) and (2) above; (4) in cases where agreement is not reached in (3) then within 10 calendar days after referral to them, they refer matter to appropriate district arbitrator who shall decide the case without delay. Cases assigned to arbitrators in rotation. Cases to be heard no later than 15 days after referral to arbitrator. To expedite grievances, arbitrator can hear more than one grievance against same employer on the same day; (d) 10 day limitation — grievances not filed within this period denied and not processed further; (e) earnest effort to resolve disputes — effort to resolve disputes in open manner and as quickly as possible; (f) employee has right of presence of member of MC present to assist him with any discussion with his foreman during step (2) above (except where it will interfere with production). In this case, foreman may have another representative of employer in attendance; (g) right of grievant to be present during all steps of grievance procedure; (h) settlements reached at any stage of procedure to be final and binding on both parties and not subject to further proceedings except by mutual agreement. Settlements reached in steps 2 and 3 to be in writing and signed by appropriate representatives of union and employer; (i) legal counsel is excluded in steps 1 to 4 except by mutual agreement; (j) time limits can be waived by mutual agreement; (k) grievances arising from previous agreement to be resolved in process established by previous agreement.
Agreement making	*XXVI(b,c & d)*	Any provisions in any district or local agreements providing for the levying, assessing or collection of fines or providing ‘no strike’, ‘indemnity’ or ‘guarantee’ clauses or provisions are expressly repealed and shall not be applicable during the term of this agreement. Where this agreement conflicts with any district or local agreement, this agreement shall prevail. Within 6 months following date of signing of this agreement, copies of all district agreements to be provided to International Union and BCOA. All provisions of any contracts or agreements between parties providing for a protective wage clause and a modification of this agreement if a more favourable wage agreement is entered into by the UMWA are made null and void. No district agreement negotiated hereunder to

Type of arrangement	*Article*	*Agreement provision*
		become effective until approval of such contract or agreement by the International Union of UMWA has been obtained first.
Negotiating change	*IA(e)*	Right of entry to authorised representatives of union to ensure compliance with agreement.
	II(G)	UMWA-BCOA Labor Management Positive Change Process (LMPCP)— designed to discard old ways of negotiating in an atmosphere of mistrust and to foster a new environment of mutual trust and facilitate new and creative approaches to labor-management relations through increasing the involvement of employees in the success of the mine. Establishes LMPCP Committees at nominated facilities (made up of 3 members of the Mine Communication Committee and 3 local management representatives, one of whom must be the Superintendent). Employee members of this committee to be compensated by the employer for time spent in meetings at relevant straight time rate. Establishes LMPCP Fund to promote LMPCP Programs at nominated facilities and to pay the expenses of the Chairman of the Labor-Management Policy Committee. Each employer to contribute to LMPCP Fund 3 cents per employee per hour actually worked. Employer's obligations to pay suspended when assets of the Fund equal or exceed $1.3 million and shall not resume until the assets are less than $500 000. Duty of each employer to furnish the UMWA and the Trustees of the Fund a monthly statement showing on a mine-by-mine basis the full amounts due and the hours actually worked with respect to the amounts payable. Amount of grant to nominated facility not to exceed $20 000 per year (for specified uses).
	Appendix C	Provision to introduce alternative schedules in order to provide continuous operations 7 days a week provided the overall employment level at the operation is increased and mandatory overtime is eliminated. Obligation to increase employment levels is subject to an exception for conditions beyond the control of the employer.
Redundancy	*XVII(c)*	Lay-off procedure— management to meet with the Mine Committee at least 24 hours in advance of reduction or realignment and review the available jobs and the individuals to be laid off, retained or realigned. Standard form to be completed by laid-off employee within 5 days of notification and distributed to union within 7 calendar days.
	XXIV(b&c)	Discharge procedure — when management decides to discharge an employee, employee is to be suspended with intent to discharge and to be given written notice stating reason, with copy to MC. After 24 hours but within 48 hours, employee has the right to meet with the mine superintendent or manager. At such meeting, MC or MC representative to be present, and, if requested by employee or MC, a representative of a UMWA district representative also to be present. If requested by district representative, a further 48 hour time limit to be given. Employer entitled to have an equal number of representatives at meeting. If employer informs employee at the meeting that he still intends to discharge, employee remains suspended for a period of time necessary to permit

Type of arrangement	*Article*	*Agreement provision*
		employee to file a grievance and have it arbitrated. If no grievance filed within 5 days of notice of suspension with intent to discharge, the discharge is effective immediately; (d) immediate arbitration if district representative does not believe just cause for discharge exists; (e) regular arbitration — where there is no request for immediate arbitration the employee shall be discharged and case to be processed in accordance with article XXIII; (f) compensation for lost earnings for employee in cases where just cause for discharge is not established.
Payment of wages	*XXII(m)*	Employees paid at least every 2 weeks. Payment by cash or cheque. Discounting of earnings through scrip or tokens prohibited. Employee to receive with pay a statement detailing hours worked and payroll deductions.
Work models		No provision.
Safety management	*III(b)*	Parties to the Agreement abide by the *Federal Mine Safety and Health Act of 1977, As Amended.*
	III(c)	Establishment of Joint Industry Health and Safety Committee — 3 members appointed by the Union, 3 to be appointed by the Employers. At least one of each group to have special knowledge and expertise in coal mine health matters.
	III(d)	Establishment of Mine Health and Safety Committee (MHSC) — comprised of miners employed at each mine and selected by the local union. Union and employer to jointly establish and fund a course of health and safety training for members of the MHSC. MSHC may inspect any portion of the mine and surface installations, dams or waste impoundment and gob piles. Any conditions which endanger lives or bodies of employees to be reported to employer. Employer is obliged to follow MHSC's instructions if the Committee believes imminent danger exists. Sufficient notice to be given of inspection to allow employer representative to accompany. If employer chooses not to participate, Committee may make inspection alone. Procedures established in cases where employer requests removal of one or all Committee members (disputes decided by arbitration). MHSC to meet monthly and employer responsible for paying Committee members for (i) inspecting the mine and surface installations on a regular basis but not less often than every 2 months (in which case the member is paid one shift at regular rate of pay for each inspection); (ii) regular committee meetings up to 2 hours (at regular rate of pay); and (iii) investigating explosions and/or disasters including any mine fatality.
	III(e)	Union officials granted access to mine under prescribed conditions.
	III(f)	MHSC and employer to maintain records concerning inspections, findings, recommendations and actions. Each month, employer is to provide MHSC with two copies of a list of all accidents reported to MSHA.

Type of arrangement	*Article*	*Agreement provision*
	III(g)	Reasonable rules and regulations established by the employer (and not inconsistent with Federal and State laws) to be complied with. Any changes to such rules and regulations to be discussed with MHSC. Any dispute to go through grievance process.
	III(h)	MHSC to be given opportunity to submit comments or recommendations (pertaining to health and safety) on development, modification or revision of mining plans.
	III(i)	If an employee believes, in good faith, that he is working in abnormally or immediately dangerous conditions, he must notify supervisor immediately. Unless there is a dispute between employee and management as to the condition, steps should be taken immediately to correct or prevent exposure to condition. If dispute exists, employee has the right to be relieved from duty. Another employee assigned to relieve is to be paid at the higher of the rate of the job to which he/she is assigned or relieved. If MHSC member or members and management agree that condition does not exist, employee is to return to regular job immediately. If dispute remains unsettled, then appropriate Federal or State inspection agency to be called immediately and dispute settled on the basis of the findings of the inspector. If corrective action required, employer to do so immediately.
	III(n)	Maintenance program to be established at each mine to ensure that equipment is maintained in a safe operating condition.
	III(o)	Procedures established for Special Safety Problem Areas.
	III(p)	Procedures established for Settlement of Health or Safety Disputes. Any grievance which is not filed within 24 hours following the shift on which the grievance occurred shall be invalid.
	XXI(e)	Detailed provisions relating to equipment on machinery etc.

a Agreement between the United Mine Workers of America (UMWA) and the Black Coal Operators' Association (BCOA) and companies that are signatories. All employees working in or about the mine are included in the Agreement except essential supervisors (for example, mine foremen, assistant mine foremen who have inspection duties by law and supervisors who perform no production work).

Source: *National Bituminous Coal Wage Agreement of 1993.*

J STATUTORY POSITIONS

J.1 Statutory positions in black coal mines

The coal industry legislation in both NSW and Queensland includes a requirement to appoint people with particular qualifications to undertake certain functions at each mine.

Tables J.1, J.2 and J.3 provide a detailed list of these statutory positions and their associated functions and qualifications for NSW coal mines, and an indicative list for Queensland coal mines. The tables indicate that the legislation:

- heavily influences the site management structure for each open cut and underground mine (although underground mines are more affected than open cut mines because of the greater number of positions that are compulsory in underground mines);
- strongly affects the number of staff required at each level on site by setting out the functions to be undertaken by each position; and
- influences the nature of management at each mine by setting out the qualifications, training and experience required for each position, as well as the functions to be undertaken by the person filling each position.

J.2 Statutory positions in other (non-coal) mines in New South Wales and Queensland

Fewer statutory positions are required at NSW non-coal mines than at NSW coal mines. There are four Acts relating to non-coal mining in NSW:

- the *Mining Act 1992*;
- the *Mining Legislation Amendment Act 1996*;
- the *Mines Inspection Act 1901*; and
- the *Mines Rescue Act 1994*.

The *Mines Inspection Act 1901* (NSW) (MIA) (which applies to all mines other than mines of coal and shale) sets out 3 statutory positions for non-coal mines in NSW. Tables J.4 and J.5 summarise these appointments and associated certification requirements. It is interesting to note that, in contrast to the coal

legislation, the main function of management as prescribed in the MIA does not emphasise enforcement of compliance with the Act.

Similarly, for non-coal mines in Queensland, the regulations relating to statutory positions (the *Mines Regulation Act 1964* (Qld) covering all mines except coal mines) are less prescriptive than for Queensland coal mines. Managers and assistant managers are the only statutory positions specified by the Act. (Assistant managers are not compulsory.) While winding engines are to be in charge of a licensed person, and surveying is to be undertaken by an authorised surveyor or certificated mine surveyor, these are not specified as compulsory statutory positions (see Table J.6).

J.3 Union involvement in the legislation

Tables J.7 and J.8 show the legislative provisions allocating safety-related responsibilities to union appointees.

Table J.1: **NSW coal mining statutory positions**

Statutory position	*compulsory /optional*	*Qualifications specified in regulations*	*Functions (summary)*
A Government officials			
Departmental Inspectors (various, including Chief Inspector)	optional (Governor may appoint under the Public Service Act)	(**See Table J2** for description of all acronyms in this column) Must hold qualifications prescribed in relation to position. Qualifications for Chief Inspector, Deputy Chief Inspector or Senior Inspector: CCM and not less than 3 years' experience as an inspector; or not less than 3 years' experience as a manager of an underground mine.	Power to enter and inspect mine at any time to ascertain whether Act is complied with, whether mine is safe or reasons for accident. May impose prohibition/restriction on unsafe activities or direct evacuation or closure of mine
B Mining officials			
B.1 Underground and open cut — officials in order of seniority as listed in Schedule 1 of the Coal Mines R egulation Act 1982 No 67			
Superintendent	optional	CCM/CCMOC	Represents owner.
Assistant Superintendent	optional	CCM/CCMOC	
Manager	compulsory	CCM/CCMOC	In charge of all persons employed and all mine operations and enforce compliance with the Act and regulations.
Deputy Manager	optional	CCM/CCMOC	Assumes manager's functions when Manager absent.

Statutory position	*compulsory /optional*	*Qualifications specified in regulations*	*Functions (summary)*
B.2 Underground and open cut — other officials — order of seniority not specified in Schedule 1, CMRA 1982			
Mine Surveyor	compulsory	Registration as a surveyor under the Surveyor's Act 1929 and CCMS.	Comply with surveying and drafting instructions issued by Chief Inspector and Surveyor General; comply with the Act (including in preparing mine plans); carry out surveying work as requested by mine manager; draw attention to inaccuracies in mine plans and keep maps and records.
Mine Electrical engineer	compulsory	CCMEE	Supervise all persons supervising or effecting installation, examination, maintenance of all electrical apparatus at the mine.
Mine Mechanical Engineer	compulsory	For underground or open cut, CCMME or, for open cut, if have approval from chief inspector: can appoint person who has acted in the position for 2 years; or who holds a degree or diploma in mechanical engineering and has 1 year's experience in open cut.	In charge of all persons installing, examining, or maintaining mechanical apparatus.
Electrician	optional	(1) CCMEE or (2) 18 months' experience in the job; or (3) 3 months' experience in the job and an: (i) electrician's licence from Energy Authority of NSW; (ii) electrical trades certificate from NSW TAFE; (iii) electrical engineering certificate from NSW TAFE; (iv) electrical engineering qualification accepted by Institute of Engineers.	

Statutory position	*compulsory /optional*	*Qualifications specified in regulations*	*Functions (summary)*
Plant Manager of Coal Preparation Plant	not specified	Not specified.	In charge of all persons employed and all mine operations and enforce compliance with the Act.
District Check Inspector, Check Inspector, Electrical Check Inspector	optional	District Check Inspector (DCI) must have CCD. Check Inspector: For underground mine, at least one of two people elected must hold CCD and both must have no less than 3 years' practical experience in underground mining; or, where mine is open cut mine, elected person must have not less than 3 years' practical experience in open cut coal mining.	Miners elected to carry out mine inspections on behalf of employees and make reports to management of findings. Where authorised by Chief Inspector, DCI has power to suspend mine operations. DCI to be elected by employees who are members of the Australian Coal and Shale Employees Federation (ACSEF). (The ACSEF is now part of the CFMEU.) Election of check inspectors to be conducted by persons elected by a committee consisting of a representative from each union with members employed at the mine.
Shotfirer	compulsory	CCD/CCE or SP medical test.	Fire explosives.
Fire Officer	compulsory	Instruction in appropriate practices used by the Board of Fire Commissioners of NSW; familiar with workings of mine.	Inspect fire equipment and record condition; arrange for repair and maintenance required under regulation; investigate complaints about fire equipment; replace defective equipment; train fire brigades.
First Aid Officers	compulsory	Recognised first aid qualification.	In charge of first aid room.
Airborne Dust Sample Collector	compulsory	No.	Collect and analyse dust samples.

Statutory position	*compulsory /optional*	*Qualifications specified in regulations*	*Functions (summary)*
B.3 Underground mines — officials in order of seniority specified in Schedule 1, CMRA 1982			
Under-Manager In Charge	compulsory when Manager is appointed Manager of two mines	CCUM	Assumes Manager's functions when Manager and Deputy Manager absent; enforce compliance with the Act and regulations in part of mine over which he has jurisdiction.
Under-Manager (UM)	optional (although cannot work mine without someone qualified as an UM)	CCUM	Assumes Manager's functions when Under-manager-in-charge absent; enforce compliance with the Act and regulations in part of mine over which he has jurisdiction.
Deputy (various types — eg. Production, Outbye, Shaft Sinking)	compulsory	CCD	(First line supervisor/safety officer) In charge of workers and operations in the part of the mine assigned to him; make inspections, ensure unsafe equipment is not used, complete safety report at the end of each shift. In relation to inspections, for example, s.64 of the *Coal Mines Regulation (Managers and Officials-Underground Mines) Regulation 1984* (NSW) specifies that:

Statutory Position	*compulsory /optional*	*Qualifications specified in regulations*	*Functions (summary)*
			(6) The Manager of a mine shall, in respect of every deputy's district (production) in which persons are working, appoint a deputy to inspect: (a) at intervals not exceeding 2 hours-every place in which a continuous mining machine is operating; (b) at intervals not exceeding 4 hours: (i) every place in which persons are working and where the roof and sides are being removed, supported or interfered with; (ii) every working face and safely accessible roadway within 100 metres of any working face; and (c) at intervals not exceeding the duration of a shift — every place or roadway (including all return airways in that district) which have not been inspected pursuant to paragraph (a) or (b).
B.4 Underground mines — other officials not specified in order of seniority in Schedule 1 CMRA 1982			
Ventilation Officer	compulsory	CCUM	Oversee ventilation system and write monthly reports.
Rope Haulage/ Winding Apparatus Operator	compulsory[a]	No.	Work machinery used for transporting persons by winding or rope haulage.
Banksman and Onsetters	compulsory[b]	No.	Where winding apparatus not remotely controlled, banksman (at top of shaft) and onsetter (at bottom of shaft) to receive signals and transmit signals whenever person about to travel through shaft.
Master Sinker	compulsory	Experienced in shaft sinking.	Full charge and control of shaft sinking.
Chargeman	compulsory[c]	CCD	A deputy appointed in charge of the shift in which work is carried out in the shaft at the mine; undertake 4 hour inspections.

Statutory position	*compulsory /optional*	*Qualifications specified in regulations*	*Functions (summary)*
Cap/Oil Lamp Officer	compulsory	No.	Maintain cap/oil lamps in a safe condition and ensure that lamps are inspected and tested regularly; record defects; ensure that cap lamps are securely locked; and that no defective cap lamps are issued.
B.5 Open cut mines — officials in order of seniority specified in Schedule 1, CMRA 1982			
Senior Examiner of an open cut mine	optional	CCE and 2 yrs experience as an examiner.	Enforce observance of Act and regulations in part of mine over which he has jurisdiction; assumes Manager's functions when Manager and Deputy Manager absent.
Examiner of an open cut mine	compulsory	CCE	Assumes Manager's functions when Manager, Deputy Manager or Senior Examiner absent; enforce compliance with the Act and regulations in part of mine over which he has jurisdiction. Functions similar to Deputy in underground mine (including prescriptive rules for inspections).

a Compulsory where the mine is entered by means of winding or rope haulage, where machinery is not automatic and where there are less than 2 means of entry into or exit from mine.

b Where winding apparatus is not remotely controlled or automatic.

c Where work is carried out in the shaft at the mine.

Source: *Coal Mines Regulation Act 1982*, No 67, NSW Seniority of mining officials specified in Schedule 1, Parts A and B.

Table J.2: **NSW coal mining certification requirements**

Acronym	*Certificate*	*Coal Mining Qualifications Board rules to qualify for certificate*
CCM	Certificate of competence to be a manager	• Minimum age 21; • accredited degree or diploma in mining or other qualifications approved by the Board; or • part A exam on mine environment, fires, explosions and rescue; geotechnics and mine surveying; mechanical and electrical engineering; mining practices; plus • 3 years' practical experience in or about a mine (including up to one year at a mine other than an UG coal mine; and 2 years' underground experience in winning coal); • first aid certificate; • evidence of capability for testing flammable gas; • part B exam on legislation (CMRA, OH&S Act and Mines Rescue Act), mine ventilation and coal mining practice (application of engineering principles and legislation); and • oral exam on mining conditions and safety practices in NSW coal mines.
CCMOC	Certificate of competence to be a manager of an open cut mine	• Minimum age 21; • course or courses in engineering accredited by the Board (where a course is not readily available, applicant may apply to sit for an exam); • 3 years' practical experience at surface mining operations, one year of which shall have been at an open cut coal mine; • first aid certificate; • written exam on legislation (CMRA, and OH&S Act), and open cut mining practice (application of engineering principles and legislation); and • an oral exam (mining and related safety practices in NSW).

Acronym	*Certificate*	*Coal Mining Qualifications Board Rules to qualify for certificate*
CCUM	Certificate of competence to be an under-manager	• Minimum age 21; • accredited degree or diploma in mining or other qualifications accredited by the Board; or • part A exam on mine environment, fires and rescue; geology, geotechnics and surveying; mining practices and engineering (Note — compared with mine manager exams, the undermanager exams are a shorter time period with fewer questions and there are three papers instead of four); plus • 3 years' practical experience in or about a mine (including up to one year at a mine other than an UG coal mine; and 2 years' underground experience in winning coal); • first aid certificate; • evidence of capability for testing flammable gas; • part B exam on legislation (CMRA, OH&S Act and Mines Rescue Act), mine ventilation and coal mining practice (application of engineering principles and legislation); and • oral exam (mining conditions and safety practices in NSW).
CCD	Certificate of competence to be a deputy	• Minimum age 21; • accredited degree or diploma in mining or other qualifications accredited by the Board; • 3 years' practical experience in or about a mine (including up to one year at a mine other than an UG coal mine; and 2 years' underground experience in winning coal); • first aid certificate; • evidence of capability for testing flammable gas; • written exam on coal mining practice and legislation; and • oral exam relating to duties of deputy, mining conditions and safety practices in NSW.

Acronym	*Certificate*	*Coal Mining Qualifications Board Rules to qualify for certificate*
CCE	Certificate of competence to be an open cut examiner	• Minimum age 21; • accredited engineering or TAFE course and one year's experience in an open cut coal mine; or • board approved Australian statutory qualification in open cut mining and 3 years' experience at an open cut mine (at least one year in production and at least 3 months in open cut coal); or • in lieu of formal qualifications, a minimum of 5 years' experience in supervising production at a large open cut mine and in addition, at least 3 months' experience in open cut coal mining; and • first aid certificate; • written exam on legislation (CMRA and OH&S Act) and practical open cut operation; and • oral exam relating to mining and safety in NSW.
SP	Shotfirer's permit for an OC mine	
CCMME	Certificate of competence to be a mine mechanical engineer	• Minimum age 21; • accredited course in mechanical engineering; • first aid certificate; • one year's experience in or about a coal mine associated with mechanical engineering aspects of installation, examination, testing and maintenance of plant and equipment — 6 months' experience in underground/OC depending on which mine obtaining certificate for; • written exam in mechanical engineering applied to mining; and legislation; and • oral exam on colliery mechanical engineering and related safety practices in NSW.

Acronym	*Certificate*	*Coal Mining Qualifications Board Rules to qualify for certificate*
CCMEE	Certificate of competence to be a mine electrical engineer	• Minimum age 21; • accredited course in electrical engineering; • first aid certificate; • one year's experience in or about a coal mine associated with installation, testing, examination, and maintenance of plant and equipment — at least 6 months' underground experience (or six months' experience in an open cut coal mine if MEE of open cut coal mine); • written exam on electrical engineering applied to mining (including relevant aspects of legislation) and legislation (CMRA and OH&S Act); and • oral exam on colliery electrical engineering and related safety practices in NSW.
CCMS	Certificate of competence to be a mine surveyor	• Minimum age 21; • accredited course in surveying or other course approved by the Board or sit written exam on mathematics and surveying; applied surveying; • first aid certificate; • practical experience in surveying mines for a period of at least four years, except where candidate has accredited qualification in surveying, has passed through a regular course of mining study and has accredited qualification. In latter case, two years' practical experience in surveying at an underground or open cut mine will be acceptable; • prepare surveys and mine plans for submission to examiners; • written exam on mathematics and applied surveying, mine surveying computations and principles; and legislation (Surveying and Drafting instructions for Coal Mines Surveyors; CMRA and authorities and acts for lease applications); • oral exam on surveying; and • practical demonstration of surveying skill.

Source: Coal Mining Qualifications Board, rules for the conduct of examinations.

Table J.3: **Queensland coal mining officials (indicative list only)**[a]

Statutory position	*Compulsory/optional*	*Qualifications specified in the regulation*
Superintendent	optional	✓
Mine Manager	compulsory	✓
Undermanager, Underground Foreperson or Overperson (UG)	optional	✓
Assistant Manager or Supervisor (OC)	optional	✓
Deputy (function is to make inspections and carry out such other duties as to presence of gas, ventilation, state of roof and sides and general safety as are required by Act and rules of mine)	compulsory	✓
Open Cut Examiner (function is to make such inspections and carry out such other duties as to the state of the sides and the general safety of the open cut excavation)	compulsory	✓
Certificated Mine Electricians	compulsory[b]	✓
Assistant Mine Electrician	optional	✓
Mine Surveyor		✓
Ventilation Officer	compulsory[c]	✓
Miners Officers (elected by workers at a mine to inspect a mine and if unsafe, can suspend operations until mine certified safe by inspector)	optional	✓
District Union Inspector	optional	✓
Winding Engine Driver	compulsory[d]	✓
Pitheadmen and Head Banksmen (UG)	compulsory[e]	
Pitbottomers (UG)	compulsory[e]	
Fire Officer (UG)	compulsory	✓
Shotfirers	compulsory[f]	✓

a Order of seniority not specified in the legislation.
b Where electricity is used.
c Taken to be the mine manager if no one else is appointed.
d Whilst winding engines are being operated.
e When men are being raised or lowered in a shaft.
f Where charging, loading, or firing explosives.
Source: *Coal Mining Act 1925*, (Qld).

Table J.4: **NSW non-coal mining statutory positions**

Statutory position	*compulsory /optional*	*Qualifications specified*	*Summary of functions*
Inspectors (Chief, Deputy, Senior Inspector, Electrical, Mechanical Engineering)	optional (Governor may appoint)	CCM Degree or diploma of mining, electrical or mechanical engineering.	Enforce compliance with the Act and undertake safety checks.
Manager	compulsory	CCM granted under *MIA*; or certificate approved by Board of Examiners of Managers; or CSM granted under the *MIA*; where certificate relates to class of mine. Or — another person where have special approval from Chief Inspector where mine employment does not exceed 20 people.	Reside in vicinity, exercise daily personal supervision, and be responsible for control, management and direction of the mine.
Engine-Driver	compulsory	CCED or certificate approved by the Board of Examiners of Engine-drivers.	In charge of machinery of a class or description in use at any mine in which steam, water, electricity, gas, oil or air or any two or more are used as motive power (except water power used for pumping).

Source: *Mines Inspection Act 1901 (NSW).*

Table J.5: **NSW non-coal mining certification requirements**

Acronym	*Certificate*	*Requirement to pass certificate*
CCM	Certificate of competence to be a manager.	Pass exam set by Board of Examiners of Managers, produce satisfactory evidence of sobriety, experience, ability and general good conduct and practical experience in a mine for at least 3 years.
CSM	Certificate of service as a manager (for above ground mines).	Board of Examiners of Managers satisfied that person has had satisfactory experience in NSW as manager of an above ground mine in or about which more than 20 people were employed.
CCED	Certificate of competence as an engine-driver.	Pass exam set by Board of Examiners of engine-drivers, produced evidence of physical fitness and that sight, hearing and other faculties are unimpaired.

Source: *Mines Inspection Act 1901 (NSW).*

Table J.6: **Queensland non-coal mining statutory positions**

Statutory position	*compulsory /optional*	*Qualifications specified*	*Summary of functions*
Manager	compulsory	First-class mine manager's certificate of competence; or person approved by Board of Examiners; or minimum qualification specified by the Minister	Personally in charge of the mine and the performance of the work done therein and shall be responsible for the control, management and direction of the mine and such work.
Persons to assist manager	optional		

Source: *Mines Regulation Act 1964 (Qld).*

Table J.7: **Union involvement specified by Queensland legislation**

Legislation	*Area of union involvement*	*How union is involved*
Coal Mining Act 1925	s.70A, District union inspector (optional).	United Mine Workers Federation of Australia can appoint by ballot of members 3 district union inspectors. Each must hold at least a deputy certificate. Power to inspect mines, and suspend operations until certified safe by inspector.
Mines Regulation Act 1964	s.18, District Workers Representatives (optional). The function of these representatives is to inspect mines (with notice) twice a month, or more often if the representative considers that the mine may be unsafe. Representatives have the power to suspend work if there is danger to life until mine is certified safe by an inspector.	May be appointed by the Minister from a list of names submitted by each union with members employed in or about a mine or mining operation Submitted persons must have had at least 5 years' experience in mining.

Sources: Queensland regulations (various).

Table J.8: **Union involvement specified by NSW legislation**

Legislation	*Area of union involvement*	*How union is involved*
Coal Mines Regulation (Election of check inspectors, district check inspectors and electrical check inspectors) Regulation 1984	District Check Inspector (Functions outlined in above statutory position table.)	Under s.6, persons entitled to vote at an election of a district check inspector for a mine are the persons employed in or about the mine who are members of the Australian Coal and Shale Employees Federation (ACSEF). (The ACSEF is now part of the CFMEU.)
Coal Mines Regulation (Election of check inspectors, district check inspectors and electrical check inspectors) Regulation 1984	Conduct of elections for check inspectors, district check inspectors and electrical check inspectors.	Under s.8, elections of check inspectors, district check inspectors and electrical check inspectors for a mine shall be conducted by a person elected by a committee consisting of a representative from each union which has members who are persons employed in or about the mine.
Mines Rescue Act 1994	Mines Rescue Board of NSW (Principal functions to provide rescue services for underground coal mines. May provide services to other mines at its discretion.)	Under s.10, (3)(b), of seven directors in all: (i) one Director of the Board to be nominated by the Australian Colliery Staff Association; and (ii) two Directors of the Board to be nominated by the United Mine Workers' Division of the CFMEU.
Mines Inspection Act 1901	s.29, Hours of work and associated working arrangements below ground.	Under s.1, except in cases of emergency, a person is not to be employed below ground in a mine for more than 8 consecutive hours at any time or for more than 48 hours in a period of 7 consecutive days, and each person employed below ground in a mine is to have at least one full day of 24 consecutive hours off work in each period of 7 consecutive days. Under s.2, manager may alter conditions under s.29(1) if has consulted with employees and representative of any trade unions representing employee and must obtain agreement of not less than 65 per cent of employees before making alterations.

Source: NSW regulations (various).

K THE WORK MODELS

This appendix describes the basic characteristics of the black coal mining work models and assesses their flexibility with respect to demarcation and seniority.

The work models are outlined at Schedules E and F to the P&E Award (September 1990). They were introduced as a result of the *1990 Coal Mining Industry Restructuring Agreement* between the production and engineering unions and the employers at a national level. The parties to this Agreement decided to:

- undertake a fundamental review of work organisation;
- provide a rewarding work environment for employees through access to more varied, fulfilling and better paid jobs; and
- establish a simplified award structure. (P&E Award 1990, p. 59)

As part of the review of work organisation, the work models were developed by two National Joint Working Parties, one for the open cut sector and one for the underground sector. Coal Industry Tribunal (CIT) decisions of 1991 and 1994 required that the work models be implemented by agreement at site level.[1]

K.1 Description of the models

While the details of the models differ from mine to mine, most are based on the models outlined in the P&E Award. There are three basic elements:

1. Workers are divided into two streams based on the tasks undertaken — production and engineering. There is limited provision for employees in one stream to gain skills associated with the other stream.

   The production stream includes all skills required to carry out coal handling and preparation work. Some lower level engineering skills are also included to enable production workers to undertake routine inspections, servicing, minor maintenance, and running repairs.

   The engineering stream includes core technical skills relating to the trades — that is, mechanical and electrical skills. Machine operating skills (associated with the production stream) sufficient to enable engineering

[1] For example, the CIT decided that, for the underground work model: "the model is not to be implemented before production to the Tribunal of a site agreement" (CR 4569, 12 October 1992, p. 9).

workers to test operate production equipment before or after repairs or to drive production equipment short distances or operate mobile machinery to effect repairs or installation are also included.

2. A simplified pay system (relative to that outlined in the main body of the P&E Award) — with pay based on acquisition of skills rather than narrow occupational definitions (see Table K.1).

   As Wooden et al (1996) pointed out, while there is greater dispersion in pay rates under the work models than in the traditional Award rates, in practice most employees will be clustered around pay levels 3 or 4 and above. This is because the system is set up to speed employees to levels 3 and 4.

   > ... the priority will be to progress employees to Level 3 production/level 4 engineering as quickly as reasonably possible. (P&E Award, p. 69)
   >
   > To facilitate the movement of employees from levels 1 and 2, training priority will be given to employees in those levels. (P&E Award, p. 68)

   However, the employer may limit the number of employees appointed to upper levels (4, 5 and 6 for open cut mines and 5 and 6 for underground mines).

- Training costs are incurred by employers.

K.2 Demarcation

Relative to traditional Award arrangements, the work models offer significant scope for a reduction in demarcation.

Under traditional pay arrangements in clause 8 of the P&E Award, minimum pay rates are specified for nine groups of occupational classifications — groups A to I. Within each group there are up to 32 occupational/job classifications — though typically fewer than 10 (see Table K.1). This allows for significant demarcation based on:

- occupations — workers are attached to jobs with no switching of tasks between occupations. For example, pay group B includes sinkers and washery operators — neither would perform any aspect of the other's work; and
- equipment capacity — some occupational classifications include different pay rates for operating equipment of different capacities. (In some cases, pay levels and capacities associated with them differ between States.) For example, referring to Table K.2, a truck driver in pay group A would not drive trucks of more than 15 tonnes capacity. Similarly, a truck driver in

pay group B would not drive trucks of capacity outside the range 15–49 tonnes.

Table K.1: **Minimum Wage Rates, Clause 8, P&E Award**

Minimum wage rates			***Wage rates for work models (employees employed in accordance with Schedules E and F)***				
			Open cut		*Underground*		
Award pay group	*No. of job classific'ns in pay group*	*Minimum pay rate*	*Levels*	*Wage rates*	*Levels*	*Wage rates*	
						(1)[a]	*(2)*[b]
		$/week		*$/week*		*$/week*	*$/week*
A	9	516.50	0	516.50	1	516.50	516.50
B	30	529.00	1	542.40	2	529.00	542.40
C	32	543.00	2	568.30	3	543.00	581.30
D	8	561.00	3	594.20	4	571.60	620.10
E	9	571.60	4	620.10	5	591.20	653.90
F	9	592.20	5	653.90	6	612.80	697.90
G	6	612.80	6	697.90			
H	2	627.00					
I	2	644.50					

a On implementation.
b On attainment of productivity target.
Source: Clause 8, P&E Award.

The work models would appear to limit the scope for both these types of demarcation. In terms of occupations, CIT decision 4505 noted an example of how the work models might reduce demarcation in practice:

> Acquisition of skills will lead to a breakdown of current demarcation inflexibilities. The example was given of a brick layer currently doing some work who might require a small excavation. At present this would require a member of the FEDFA to come and dig (mechanically) the hole for the bricklayer. If the bricklayer has the appropriate training to operate a small machine then it will not be necessary to wait for the organisation to produce another person but the bricklayer will be able to use the machine to dig the hole himself. It was emphasised that a person need to be trained and be accredited with the skill to use the skill. (CIT decision CR 4505, 13 January 1992)

In terms of machine capacity, the work model requires production workers to operate all equipment of a particular type (for example, all drills or all

draglines) on site with no separate provisions for equipment of different capacities or in different geographical locations.

In addition, the intent of the work models was to limit demarcation based on union membership. Schedule F (the underground work model) states:

> ... where multiunion coverage of work exists, union membership is not to restrict the use of skills in the model. Unions which do so restrict will be adjudged to be acting contrary to the work model and to this determination. (P&E Award, p. 77)

and:

> ... mineworkers shall utilise all the skills in the stream for which they have been trained and accredited. (P&E Award, p. 89)

However, the delineation of work into streams still restricts the allocation of workers to tasks. This can have significant negative effects on labour productivity and unit labour costs.

Table K.2: **Examples of Award pay rates based on machine capacity**

Pay Group	***Occupation***			
	Truck driver	*Crane operator*	*Grader operator*	*Dragline operator*
	tonnes	*tonnes*	*kilowatts of power*	*cubic metres*
A	15			
B	15–49	20	150	
C	50–119	20–40	150 +	1525 (trainee Qld)
D		40 +		1525
E	120–174			1525–2675 (trainee Qld)
F	175 +			1525–2675 or 2675+ (trainee Qld)
G				2675–80 (Qld) or 2675–46 (NSW)
H				80+ (Qld)
I				46+ (NSW)

Source: Clause 8, P&E Award.

K.3 Seniority

The work models also allow for seniority in the allocation of training and promotion.

Where employers apply limits to the number of employees promoted to upper pay levels, seniority rules generally govern the allocation of training and the allocation of employees to these higher level positions. For example, Schedule F (the underground work model) specifies:

> A new employee at a mine shall not be appointed to levels 5 and 6 unless there are no existing employees at that mine in levels one to four inclusive who are suitable for appointment. (P&E Award, p. 95)

Moreover, the open cut model specifies:

> Unless mutually agreed otherwise, all things being equal the longest serving employee at the mine will be offered the training opportunity. (P&E Award, p. 69)

While the models expressly prohibit seniority in the allocation of employees to tasks, there is some scope for custom and practice to be maintained in the reference to 'mine site arrangements' and thus for seniority to be applied through custom and practice:

> In the new work models, seniority plays no role in the day to day allocation of an employee to a task. Mine site arrangements that currently exist and are used to allocate employees within a task (not to a task) will need to be discussed at the mine site. (P&E Award, p. 88)

L ECONOMY-WIDE EFFECTS OF PRODUCTIVITY CHANGE

This appendix presents results of quantitative analysis of the economy-wide impact of changes in productivity in the black coal industry. The analysis was commissioned by the Productivity Commission from the Centre of Policy Studies (CoPS) at Monash University.

L.1 Modelling the black coal industry

The modelling was undertaken using MONASH, a computable general equilibrium model of the Australian economy developed by CoPS. The Commission chose to use the MONASH model, with modifications described below, because it is a dynamic general equilibrium model. As such, it can provide insights into the long-term impact of productivity changes on the black coal industry, the economy as a whole, and other industries. The choice of model and major assumptions underlying the modelling scenarios were refereed by two external, independent experts, Dr Rod Tyers and Mr David Vincent. Their comments are summarised in Attachment L8. Copies of their written reports are available from the Commission on request.

L1.1 MONASH-Coal

For the purposes of modelling the Australian black coal industry, some modifications to the MONASH model were required. These modifications resulted in a new version of MONASH called MONASH-Coal (see Industry Commission 1997b, Appendix O, for a description of the MONASH model).

In the MONASH model, the input-output database provides a breakdown of the distribution (sales) of commodities (such as coal) and the costs of the industries producing them. This database draws on the Australian Bureau of Statistics (ABS) input-output tables, which recognise a single industry/commodity *Coal; oil and gas*. To model black coal, this industry/commodity had to be disaggregated. Using ABS input-output commodity card data, *Coal; oil and gas* was split into its components: black coal, brown coal, crude oil, natural gas and liquefied natural gas. However, the ABS input-output data do not recognise the two major black coal types — thermal and coking.

The International Energy Agency (IEA) provides detailed energy supply and consumption data for coking, steaming, and sub-bituminous coal. This data was used to provide the necessary sales splits for black coal. The IEA steaming and sub-bituminous coal categories were combined to create thermal coal data for the MONASH-Coal database.

Sales structure

In the IEA data, raw coking coal is not consumed by any industry directly, but is first transformed into oven and gas coke. With some exceptions (such as non-ferrous metals and non-metallic minerals), coke and coking gas is consumed exclusively by the iron and steel industry. Since MONASH does not separate the coking process, it has been assumed that the domestic consumption of coking coal was allocated on the basis of the final consumption of coke. The only final user of black coal in the MONASH database is exports. This has been apportioned to coking and thermal coal in line with IEA export intensities (see Tables L.1 and L.2).

Table L.1: **MONASH-Coal sales structure for coking coal**

User	*Per cent of total*
Basic iron and steel	7
Exports	93
Total sales	**100**

Source: CoPS estimates.

Given that the sales structure of black coal is known (via the ABS input-output commodity card details), and that the sales structure of coking coal can be inferred from the IEA data, the residual is the sales structure of thermal coal.

Table L.2: **MONASH-Coal sales structure for thermal coal**

User	*Per cent of total*
Electricity	34
Other domestic industries	12
Exports	54
Total sales	**100**

Source: CoPS estimates.

Cost structure

Data for apportioning costs were more difficult to obtain. Initially, a simple pro-rating procedure was used to apportion the share of coking and thermal coal in the total sales of black coal. This method implies the same cost structure for coking and thermal coal as for all black coal. Adjustments were then made using detailed data for wages and gross operating surplus supplied by the ABS (see Table L.3).

Table L.3: **MONASH-Coal black coal cost structure** (per cent)

Input	*Thermal coal*	*Coking coal*
Labour	23	22
Capital	20	19
Intermediate inputs	46	40
Other costs[a]	11	18
Total costs	**100**	**100**

a Includes royalties, returns to land and working capital.
Source: CoPS estimates.

L.2 Modelling framework

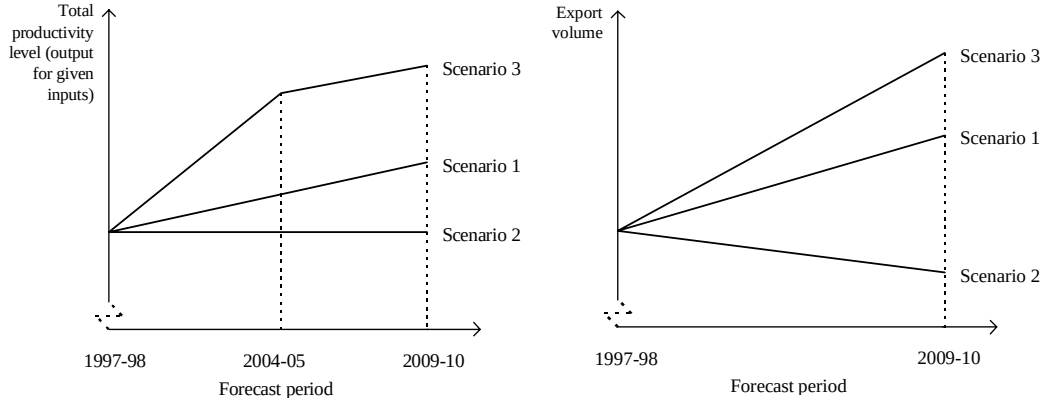
Five scenarios have been modelled by the CoPS which cover a range of productivity outcomes in the Australian black coal industry, as well as possible reactions in international markets. The impact of productivity change is assessed over a 12-year period, from 1997–98 to 2009–10. This period was chosen because it provides a plausible time-frame within which the black coal industry can implement assumed productivity changes and the economy can adjust. Table L.4 summarises the major assumptions underlying each scenario.

It should be emphasised that all the scenarios are illustrative only, designed to isolate the potential impact of productivity change in the black coal industry on the industry's performance and the economy at large. Box L.1 provides a stylised picture of the productivity assumptions incorporated in Scenarios 1 to 3 as well as a representation of export outcomes.

Table L.4: **Summary of major assumptions, Scenarios 1 to 5**

	International market behaviour		
Productivity and cost change in the coal industry	*Competitive world markets*	*Foreign buyers capture part of cost savings*	*Foreign buyers capture full amount of cost savings*
Productivity growth in line with recent trend	Scenario 1 (the base case)		
No productivity growth after 1997–98	Scenario 2		
Accelerated productivity growth	Scenario 3	Scenario 4a	Scenario 4b
Accelerated productivity in coal plus best practice in rail transport	Scenario 5a		
Accelerated productivity in coal plus removal of excess rail charges	Scenario 5b		

Box L.1: **Productivity and export levels in Scenarios 1, 2 & 3[a]**



a This is a stylised illustration of the relationship between assumed productivity gains and export growth. It has not been drawn to scale.

Scenario 1: base case scenario for the economy

Scenario 1, referred to as the base case, sets a 'business as usual' course for the Australian black coal industry, incorporating productivity improvements and structural developments already under way. Base case projections incorporate ABARE predictions for coal export volumes and prices (taking into account

developments in several Asian economies) and reflect an assumption that the average rate of total factor productivity growth observed in the black coal industry over recent years — a little over 1 per cent — continues from 1997–98 until 2009–10.

Under this scenario, in line with ABARE forecasts, the black coal industry is projected broadly to maintain its current shares in international markets. However, given the outlook for subdued growth in world coal markets and weak domestic demand for coal, the black coal industry overall is not expected to grow as rapidly as the average for all domestic industries.

If the base case projections for the black coal industry prove too pessimistic, or optimistic, actual export volumes and prices will vary from base case levels. The implications of this for the base case and the results in the remaining scenarios are discussed below.

The role of the base case

This scenario provides a 'base case' scenario for the whole economy as well as the black coal industry over the forecast period. For modelling purposes, it provides a yardstick against which the remaining scenarios can be assessed. As in the case of coal exports, the implications for the economy of slower growth in major Australian export markets have been taken into account. But circumstances can change.

Importantly, any revision of the base case estimates is unlikely to invalidate the qualitative nature of the results in the remaining simulations. This is because changes in productivity performance of the black coal industry are assessed *relative* to the base case projections. The impact of productivity changes *relative* to the base case (the assessment of which is the main objective of the modelling exercise) will not change significantly if the base case scenario alters, though absolute magnitudes would be affected.

Scenario 2: no productivity improvement

Scenario 2 presents a very pessimistic outlook. It assumes that productivity in the Australian black coal industry remains unchanged at its 1997–98 level over the forecast period. Relative to the base case, this scenario models the impact of a deterioration in productivity in the industry. It is designed to illustrate the importance of productivity growth in this heavily export-oriented industry. Exports are projected to fall relative to both the base case projections and current levels. With the substantial decline of a major export industry, national income is also projected to fall significantly.

Scenario 3: accelerated productivity change

Scenario 3 presents the opposite side of the productivity spectrum. It assumes that labour and capital productivity improve by an additional 5 per cent per year (relative to growth in the base case) between 1998–99 and 2002–03.

For the period 2003–04 to 2009–10, it is assumed that total factor productivity growth resumes its base case rate of a little over 1 per cent per year. Under these assumptions, and assuming competitive world markets, Australian coal exports rise rapidly, both relative to Scenario 1 and current levels, with a significant beneficial impact on national income (sensitivity analysis was carried out in order to gauge the impact on these results of less responsive export demands).

Scenario 4: accelerated productivity change leading to lower coal prices

This scenario models productivity improvements under alternative assumptions about the behaviour of international markets. Specifically, it explores the impact of accelerated productivity improvements when foreign buyers of Australian coal capture part (Scenario 4a) or all (Scenario 4b) of the benefit of cost reductions, by negotiating lower prices for Australian coal. In Scenario 4a, the black coal industry expands output using its existing labour and capital supplies, but the lower price discourages further investment and expansion of the industry. The gains in this scenario for the black coal industry and the economy at large are still significant, though smaller than if prices had not fallen.

Scenario 4b presents an extreme case where foreign buyers of coal capture all of the cost reduction via lower coal prices. Coal export and output volumes still grow relative to 1997–98, but employment and investment in the industry fall very rapidly. While the Commission considers this scenario to be unrealistic, it demonstrates that even if coal prices are forced down by the full amount of cost reductions, the improvement in the productive capacity of the economy resulting from productivity improvements, can still generate higher national output.

Scenario 5: accelerated productivity change in coal coupled with best practice productivity in rail transport of coal and accelerated reductions in coal rail freight rates

Scenario 5a examines the impact of achieving accelerated productivity change in the black coal industry itself as well as in rail transport of coal. Scenario 5b

examines the impact on the coal industry of a more rapid reduction in excess rail freight charges than assumed in the base case.

In Scenario 5a, rail freight rates for coal are assumed to fall by 20 per cent over five years, closing the estimated gap between current levels of rail operating efficiency and best practice. Not surprisingly, under these assumptions, the gains to the black coal industry and the economy are estimated to be larger than the gains achieved in Scenario 3. Scenario 5b also estimates additional gains for the coal industry, albeit smaller than in Scenario 5a. Box L.2 provides a simple conceptual analysis of the impact of each scenario on Australian coal exports.

Issues in modelling

Modelling provides a tool for illustrating the potential impact of productivity change in the black coal industry. While the intention is to capture and highlight major implications of productivity change, any modelling inevitably and necessarily abstracts from some aspects of reality. For example, MONASH-Coal does not take into account transitional costs of adjustment. Any such costs should be taken into account when quantifying the full impact of productivity changes on economic welfare.

It also should be noted that the results of the modelling simulations, as in the case of all models, are influenced by the data and behaviour incorporated in the model and assumptions made about different aspects of the economy. (For a discussion of the economic theory which underlies MONASH see IC 1997b, Appendix O.) Appendix M discusses some conceptual issues relevant to assessing the effects of productivity changes in the black coal industry. These include the role of the base case and base case projections, the measurement of changes in economic welfare, ownership of capital, terms of trade effects, and structural adjustment in labour and capital markets.

L.3 Scenario 1: base case scenario for the economy

Scenario 1, described as the base case scenario, provides a picture of how the Australian black coal industry, and the rest of the economy, might develop over the forecast period. The base case scenario for the period 1997–98 to 2009–10 is generated by imposing on the MONASH-Coal model, a range of assumptions about likely cyclical and structural developments in the black coal industry and the Australian economy.

Box L.2: **Conceptual approach to modelling the black coal industry**

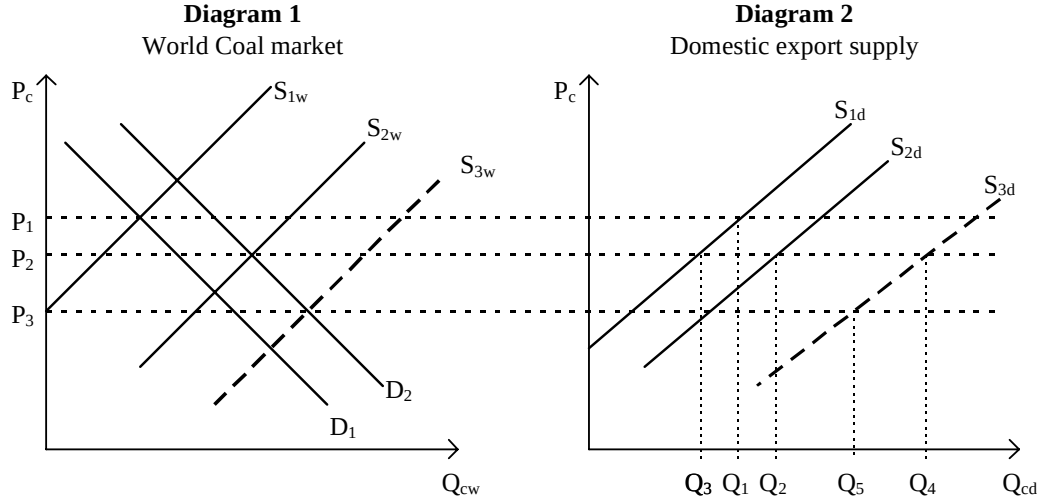


Diagram 1 depicts the world coal market where the interaction of world demand for and supply of coal determines the world price. Initially, with demand D_1 and supply S_{1w}, the world price is P_1. At this price, with domestic export supply represented by S_{1d}, Australian suppliers of coal export Q_1 tonnes of coal (**Diagram 2**).

Scenario 1 (base case scenario)

It is assumed that world demand for coal grows, which of itself tends to push up world prices (represented by the shift of the world demand curve to D_2). However, it is also assumed that world supply increases by an even greater amount (see Attachment L1 for a discussion of these assumptions). Thus the world supply curve shifts out to S_{2w} and the *net* result is a reduction in the (relative) world coal price to P_2.

Without any change in productivity (that is, all else constant, no shift in the local supply curve) this reduction in price would lead to a reduction in Australia's exports to Q_3. In order to maintain market share (in the context of expanding world coal trade) Australia must increase its supply of coal for any price level. In the base case scenario, this is assumed broadly to be achieved by improving productivity which, by reducing unit costs, shifts the supply curve to the right (to S_{2d}). Coal exports thus grow sufficiently (to Q_2) to maintain Australia's world market share (Attachment L4 explains the nature of the productivity improvements assumed in Scenario 1).

Scenario 2 (no productivity change)

It is assumed that the domestic black coal industry does not improve its productivity beyond 1997–98, despite a more competitive world market. This can be analysed as if the initial domestic supply curve (S_{1d}) remains fixed.[a] Given projected lower relative coal prices, export volumes contract, represented by a movement along the initial supply curve S_{1d}. The new equilibrium volume of exports is Q_3.

Box L.2: **Conceptual approach to modelling the black coal industry** (continued)

Scenario 3 (accelerated productivity change)

If the Australian black coal industry were to implement productivity improvements more rapidly, this implies an outward shift of the supply curve *additional* to the shift assumed in the base case, say, to S_{3d}. Assuming that the resulting increase in Australian supply does not affect the world price (this assumption is relaxed below), exports jump to Q_4. Australia significantly *increases* its share of the expanding world coal market.

Scenario 4 (negotiated lower coal prices)

It is possible that, by achieving larger productivity changes (Scenario 3), the resulting shift of the Australian supply curve (to S_{3d}) allows foreign buyers to negotiate a lower price, say P_3 (see **Diagram 1**). This reduction in price induces a lower level of exports than if the price remained at P_2. The new equilibrium is reached by a movement along the Scenario 3 supply curve S_{3d}. Nonetheless, as drawn, exports at Q_5 are still higher than without the productivity improvement. Indeed, only if foreign buyers capture the entire cost reduction will export expansion be choked off.

Scenario 5 (improvements in productivity in coal transport and handling)

A decline in coal transport and handling costs due to productivity improvements (or, indeed, a reduction in 'monopoly' rail rents) can be modelled, in the above diagram, as a downward shift of the black coal industry supply curve. In other words, in this framework, the impact on coal competitiveness and exports will be similar, in qualitative terms, to an improvement in productivity at the mine itself.

a The export supply curve can shift in response to factors other than productivity changes including shifts in the domestic demand for coal. If local demand falls (due to improved efficiency in electricity generation, for example), the coal export supply schedule would shift to the right and exports could increase without additional productivity improvements. But as this would occur in all scenarios, exports in Scenario 2 (no productivity change) must be lower than exports in Scenario 1, the base case (for a given export price).

Scenario 1 assumes that total factor productivity in the black coal industry will continue to improve at broadly the same rate (a little over 1 per cent per year) as in recent years. This assumption is modest compared with plausible productivity improvements in the industry.

For the base case, assumptions must be made about macroeconomic variables including output and employment growth, about changes in international market conditions which affect world commodity prices and about changes in technology and consumer preferences.

These assumptions, when combined with the theory, data and other parameters of the MONASH model, determine projections for the structure of the economy for each year of the forecast period. Major assumptions underlying the base case scenario are examined below.

L.3.1 Macroeconomic assumptions, 1997–98 to 2009–10

Projections for macroeconomic variables including GDP, real consumption, investment and international trade flows as well as growth in factors of production are imposed on the model. These estimates, which are based on macroeconomic projections by Access Economics and the Centre of Policy Studies, are summarised in Table L.5.

Table L.5: **Base case: growth in macroeconomic variables**

Macro variables	*Average annual percentage change 1997–98 to 2009–10*
Real GDP	3.0
Real investment	2.5
Real private consumption	2.9
Export volumes	5.5
Import volumes	3.9
Traditional exports	2.8
Employment (hours)	1.8
Real wage (producer)[a]	1.0
Consumer prices[b]	2.3
Terms of trade	-0.1
Real exchange rate (competitiveness index)[c]	0.0

a The producer real wage is defined as nominal wages relative to the prices received by producers (the GDP deflator), and thus gives an indication of the real cost of labour.

b In all deviation simulations (that is, Scenarios 2 to 5), the consumer price index acts as the numeraire. In other words, growth in the CPI is held at its base case level of 2.3 per cent per year.

c The real exchange rate (or 'competitiveness index'), in the MONASH-Coal model, is defined as the ratio of the domestic price of imports and domestic producer prices (as measured by the GDP deflator). A rise in the real exchange rate (real exchange rate depreciation) indicates that Australia has become more competitive relative to overseas suppliers; conversely, a decline in the real exchange rate (real appreciation) indicates a loss of international competitiveness. Box L.3 further explains the real exchange rate mechanism. In the base case, the real exchange rate is assumed to remain constant, reflecting an assumption that Australia's relative competitiveness will be broadly maintained.

Source: MONASH-Coal simulations.

Over the period 1997–98 to 2009–10, real GDP is assumed to grow at an average annual rate of 3 per cent. This is quite strong relative to average growth over the past decade, and reflects the view of Access Economics that economic developments in several Asian economies will have a significant short-term but less significant long-term impact on Australia's economic growth. As already noted, if these projections prove too optimistic, and the economy grows at a slower rate over the entire forecast period, the modelling results still stand in qualitative terms.

On the supply side of the economy, GDP is driven by employment and capital growth of around 2 per cent (with capital growth somewhat stronger than employment growth), and economy-wide productivity growth of around 1 per cent a year.

On the demand side, investment and private consumption are projected to maintain their shares of GNE, while the share of public consumption is expected to fall. Real exports and imports are projected to grow at 5.5 per cent and 3.9 per cent respectively, generating growth in the volume of net trade.

The base case scenario assumes that Australia, on the whole, maintains its international competitiveness, reflected in the assumption of no change in the real exchange rate over the long run. In the MONASH-Coal model, this means that the *domestic* price of imports rises in line with domestic prices (as measured by the GDP deflator). Box L.3 provides an explanation of the real exchange rate.

L.3.2 Base case projections for black coal

Base case projections for coal exports, domestic sales, output, employment, investment and productivity (where productivity is measured by the primary factor usage per unit of output) are summarised in Table L.6.

Projections for coal exports and domestic sales are based on a range of private and government sources. Attachments L1, L2 and L4 explain in detail the major assumptions underlying the black coal industry base case projections, including those for exports and export prices (Attachment L1), domestic and foreign demand (in particular electricity and steel industry demand) (Attachments L1 and L2), and productivity (Attachment L4).

Box L.3: **The real exchange rate and international competitiveness**

The real exchange rate provides a comparison of domestic costs (which determine the price of non-traded goods) and changes in costs in the rest of the world (which determine tradeable goods prices). It is formally defined as the domestic price of internationally tradeable goods relative to the domestic price of non-traded goods (mainly services).

A depreciation of the real exchange rate, called *real depreciation*, indicates that prices of tradeable goods (in $A) have risen relative to domestic costs. Real depreciation occurs when, all else constant, international prices rise, the Australian dollar nominal exchange rate depreciates, or when domestic costs fall due to productivity improvements or lower inflation.

Following a real depreciation, Australian suppliers of traded goods are in a better position to compete on international markets. Moreover, because the price of tradeable goods (imports and exports) has risen relative to the price of non-traded goods, domestic demand for tradeable goods falls. The net effect of increased supply and reduced domestic consumption of traded goods is an increase in Australia's net exports.

Conversely, *real appreciation* indicates a *decline* in competitiveness which leads to higher imports and lower exports.

In the MONASH model, the real exchange rate is formulated as the price of imports in Australian dollars, relative to domestic costs (as measured by the GDP price deflator).

The outlook for the Australian black coal industry in the base case scenario, which is consistent with ABARE export forecasts, is for subdued growth. This is based on projections for global demand and supply, the domestic market for coal, and the competitiveness of local producers. The ABARE forecasts, and hence the base case, incorporate energy users "own expectations about factors which will influence their energy use" (ABARE 1997g, p. 30), including climate change policies.

World supply of thermal coal, particularly from relatively new coal exporting countries such as Indonesia, is projected to outstrip world demand. Export demand for coking coal is predicted to be virtually stagnant, but competition is expected to be less intense in this market which Australia dominates in terms of both volume and quality. Currently, Australia supplies a little over 20 per cent of thermal coal traded internationally and around 40 per cent of coking coal traded internationally. According to ABARE, these shares are expected to change little in the future. More detail about these projections is provided in Attachment L1.

Table L.6: **Base case: projections for the black coal industry**

	Coking coal		*Thermal coal*	
	Average annual percentage change 1997–98 to 2009–10	*Level 2009–10 (index)*[a]	*Average annual percentage change 1997–98 to 2009–10*	*Level 2009–10 (index)*[a]
Export volume	1.7	123	2.2	130
Domestic sales volume	-1.6	82	1.3	117
Total production volume	1.6	121	1.9	125
Employment (hours)	-5.1	53	-4.5	58
Real investment	-2.7	72	-2.1	78
Primary factor use per unit of output[b]	-2.6	73	-2.9	70

a Index value with 1997–98 = 100.

b A *fall* in the usage of primary factors per unit of output indicates an *improvement* in total factor productivity. Because primary factors account for only part of total production costs, savings in factor use must be larger than one per cent per year in order to reduce unit costs by that amount.

Source: MONASH-Coal simulations.

ABARE and other forecasters predict virtually no growth in coal export prices over the forecast period (see Attachment L1, Table L1.2) and without adequate productivity improvements, the industry faces a price/cost squeeze.

For most of the forecast period it is assumed that some productivity improvements arise from opening new, more capital intensive mines and moderate reforms that result in productivity improvements in existing mines. Attachment L4 explains the basis of this assumption which implies higher capital intensity and lower employment in the industry, continuing a trend which has been evident for several years. However, as Attachment L4 explains, the opening of new mines is not a permanent solution to improving productivity. Eventually, scope for opening new mines and/or obtaining coal through capital intensive open cut techniques will diminish. This development has been incorporated in the base case projections.

Despite projected higher capital intensity in the black coal industry, real net investment in the industry is projected to decline from current levels. In other words, though net annual investment remains positive, growth of capital employed in the industry is anticipated to slow relative to recent growth in the industry and relative to projected capital growth in the rest of the economy.

Domestic demand for thermal coal is projected to grow, albeit at a lower rate than domestic sales for most other industries. This comparatively slow demand growth occurs despite fairly strong growth in the electricity industry (of around 3.1 per cent a year — see Table L.7), the dominant user of thermal coal. Improved efficiency in electricity generation (continuing an historical trend) and increased use of alternative primary fuels (especially gas) are assumed to reduce the demand for coal per unit of electricity output. In addition, more competitive supply arrangements in, and pricing of, electricity are expected to reduce the need for excess capacity which in the past has been required to meet unanticipated demand fluctuations. Development of the National Electricity Market and other factors could increase the share of natural gas in nation-wide electricity output. These possibilities are discussed further in Attachment L2.

Domestic sales of coking coal are projected to decline, reflecting projected weak growth of the local steel industry (see Table L.7) as well as increasing use of less coal-intensive technologies such as electric arc furnaces and pulverised coal injection. The impact on total coking coal output is small, however, as more than 90 per cent of Australia's coking coal is exported.

Given the outlook for exports and domestic sales, production of both coking and thermal coal is projected to grow by 1.6 per cent and 1.9 per cent per year respectively, compared with the base case projection for GDP growth of 3.0 per cent. Overall, therefore, the share of the black coal industry in the economy is projected to shrink under the base case assumptions.

It is estimated that total royalty collections (including both royalties paid directly to State governments and royalties collected through rail authorities) in NSW and Queensland remain broadly unchanged between 1997–98 (estimated to be around $650 million) and 2009–10. However, it has been assumed that remaining excess rail charges (or explicit monopoly rents) will be phased out by 2005–06, reflecting the impact of competition reforms under way. This is estimated to reduce rail revenue by around $300 million per year between 1997–98 and 2005–06. The basis for these assumptions is discussed in more detail in Attachments L3 and L6. If excess rail charges do not decline as assumed, the black coal industry's costs would be higher than projected in the base case. This would mean that potential gains for the industry from rail reform, modelled in Scenario 5, could be larger.

L.3.3 Base case projections for all industries

Base case projections for broad industry sectors are shown in Table L.7. These projections reflect macroeconomic assumptions as well as predicted changes in consumer tastes and production technologies, and specific commodity forecasts.

Table L.7: **Base case: real output projections for major industries**

	Industry	*Average annual percentage change 1997–98 to 2009–10*
1	Agriculture, forestry and fishing	2.9
2	Mining (including coal)	2.8
	Black coal — coking	*1.6*
	Black coal — thermal	*1.9*
3	Food, beverages and tobacco	2.9
4	Textiles, clothing, footwear	2.0
5	Wood and furniture	2.8
6	Paper, paper products	3.6
7	Chemicals	5.0
8	Non-metallic construction	3.0
9	Basic metal products	3.9
	Iron and steel	*1.2*
10	Transport equipment	4.3
11	Electronic equipment	5.8
12	Leather, rubber, etc.	4.0
13	Electricity, gas and water	2.9
	Electricity	*3.1*
14	Construction	3.0
15	Wholesale and retail trade	2.7
16	Transport and storage	4.1
17	Communications	6.7
18	Finance, business services	5.5
19	Ownership of dwellings	2.9
20	Public administration	1.8
21	Health, education, welfare	2.8
22	Hospitality, etc.	3.8

Source: MONASH-Coal simulations.

Communications, electronic equipment and finance and business services are projected to be the strongest growing sectors, followed by chemicals, transport equipment and transport and storage.

This pattern of growth reflects relatively strong investment and 'non-traditional' export growth as well as the continuing introduction of new communications and computerised technologies. Slow growing sectors include textiles, clothing and footwear, and public administration. Growth in mining and agriculture is projected to be slightly lower than projected GDP growth.

L.4 Scenario 2: no productivity improvement

In Scenario 2, it is assumed that there are no improvements in productivity in the Australian black coal industry beyond 1997–98. In other words, total factor productivity growth of a little over 1 per cent per year assumed in the base case, is eliminated. In cumulative terms, and relative to the base case, this implies a deterioration in total factor productivity of around 15 per cent over the entire period modelled. This extreme case is modelled in order to illustrate the role of productivity growth in an industry exposed to international competition.

L.4.1 Impact on the black coal industry

The impact of no further productivity growth on the black coal industry is summarised in Table L.8. Modelling results suggest that without any further productivity improvements after 1997–98, exports of thermal coal could be around 63 per cent lower than the base case projection for 2009–10. For coking coal, the decline in exports could be almost 40 per cent relative to the 2009–10 base case projection.

The large fall in thermal coal exports in part reflects the assumption that international thermal coal markets are intensely competitive (the elasticity of demand for Australian thermal coal exports is assumed to be -20). Evidence suggests that over the medium to longer term, rival producers could be expected to increase their capacity significantly.

Australia's exports of coking coal are assumed to be somewhat less vulnerable, reflecting Australia's large share of this particular market (the elasticity of export demand in this case is assumed to be -10). Hence, the fall in coking coal exports relative to the base case projection for 2009–10, is smaller than the estimated decline in thermal coal exports.

With exports falling significantly, investment and employment in the industry also fall more rapidly than in the base case. The negative impact on employment of a significant reduction in exports and output more than offsets the positive effect on employment of no further labour-saving productivity change in the industry. Employment in 2009–10 in thermal coal is estimated to be 17 per cent

below the base case projection, while employment in coking coal is estimated to be 13 per cent lower. Total industry investment in 2009–10 is estimated to be about 12 per cent below the 2009–10 level in the base case.

The export decline also has ramifications for State government revenues. It is estimated that by 2009–10 total royalty collections could be $218 million lower than in Scenario 1.

The results for this scenario are sensitive to the response of overseas buyers to a reduction in Australia's exports. As already noted, with international markets assumed to be competitive, a rise in production costs (relative to the base case) causes large falls in exports. If foreign demand were less sensitive to higher coal prices, the estimated fall in exports would be smaller. The sensitivity of the modelling results to changes in export demand elasticities is discussed in Section L.5.4.

Table L.8: **Scenario 2: impact on the black coal industry**

	Coking coal		*Thermal coal*	
	Average annual percentage change 1997–98 to 2009–10	*Percentage deviation from base case in 2009–10*	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case in 2009–10*
Export volume	-2.1	-37	-6.0	-63
Domestic sales volume	-1.6	0	1.0	-3
Output volume	-2.1	-36	-2.4	-40
Employment (hours)	-6.2	-13	-6.0	-17
Real investment	-3.7	-11	-3.2	-12
Primary factor use per unit of output	0	38	0	44

Source: MONASH-Coal simulations.

L.4.2 Economy-wide effects

Table L.9 indicates that significantly slower growth of the black coal industry delivers lower growth in real private consumption, investment and GDP. Real GDP is estimated to be 0.3 per cent lower in 2009–10 than in the base case. This represents a substantial loss — more than $2 billion in today's dollars.

The estimated relative decline in real private consumption (0.7 per cent) is larger than the decline in GDP for two reasons. First, in scenarios modelled as deviations from the base case, MONASH-Coal assumes that the marginal propensity to consume of Australians is unity (and the marginal propensity to save, zero). The basis and implications of this assumption for the financing of new investment are discussed in Appendix M. The net effect is that a reduction in GDP affects only one component of national expenditure, real private consumption.[1]

Second, the purchasing power of GDP is reduced by an induced decline in the terms of trade which amplifies the decline in real private consumption. The decline is a direct result of contraction of the coal sector and the consequent expansion of other traditional export industries. This expansion tends to reduce their export prices.

In addition, to the extent that foreigners own part of the existing capital stock, they will bear part of the predicted income (GDP) loss. This effect, which is not incorporated in the results, will moderate the estimated decline in real private consumption.

Table L.9: **Scenario 2: economy-wide impact**

Macro variables	*Percentage deviation from base case 2009–10*
Real GDP	-0.3
Real investment	-0.6
Real private consumption	-0.7
Export volumes	0.1
Import volumes	-0.7
Traditional exports	-5.4
Employment (hours)	-0.1
Real wages (producer)	-0.3
Terms of trade	-0.5
Competitiveness index	1.0

Source: MONASH-Coal simulations.

[1] It is also assumed that growth of real public consumption does not change from the base case (see Appendix M for further explanation).

Real wages are also lower than in the base case. Under the assumptions of the model, this fall is required to maintain aggregate employment growth at its base case level in the long run. Without a fall in real wages, and with the productive capacity of the economy reduced by lower productivity (relative to the base case), unemployment would rise. A very small decline in aggregate employment growth is reported in Table L.9. This arises because the productivity shock is spread evenly over each year of the forecast period. Thus the labour market (and real wages) has not fully adjusted to the assumed productivity shocks by 2009–10. Assumptions in the MONASH model about the labour market are discussed further in Appendix M.

L.4.3 Impact on other industries

As detailed in Table L.10, some sectors of the economy are estimated to grow at a faster rate than in the base case — namely agriculture, and non-traditional export and import-competing sectors. Most service industries experience slightly slower growth than projected in the base case, except hospitality, which is dominated by the export-oriented tourism industry.

Such restructuring of the economy is an inevitable response to the substantial decline in coal exports. In order to restore long-run balance of payments equilibrium, imports must fall and exports must increase to offset the fall in coal export receipts. Overall, the volume of trade is estimated to be smaller in 2009–10 than in the base case.

The adjustment is brought about by declining real national income (which reduces domestic demand for goods and services which, in turn, via real exchange rate depreciation (see Box L.3), reduces imports and encourages production of import-competing goods and exports), as well as reduced demand for factors of production by the black coal industry itself. These adjustments are explored further in Boxes L.4 and L.5.

Table L.10: **Scenario 2: impact on real output of major industries**

	Industry sector	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case 2009–10*
1	Agriculture, forestry and fishing	2.9	1.1
2	Mining (including coal)	1.9	-10.5
	Black coal — coking	*-2.1*	*-35.5*
	Black coal — thermal	*-2.6*	*-40.1*
3	Food, beverages and tobacco	3.0	1.0
4	Textiles, clothing, footwear	2.1	1.1
5	Wood and furniture	2.8	0.0
6	Paper, paper products	3.6	0.2
7	Chemicals	5.0	0.8
8	Non-metallic construction	3.0	-0.2
9	Basic metal products	4.0	1.2
	Iron and steel	*1.2*	*0.1*
10	Transport equipment	4.4	0.7
11	Electronic equipment	5.9	1.2
12	Leather, rubber, etc.	4.1	1.3
13	Electricity, gas and water	2.9	-0.2
	Electricity	*3.1*	*-0.4*
14	Construction	2.9	-0.8
15	Wholesale and retail trade	2.7	-0.2
16	Transport and storage	4.0	-0.5
17	Communications	6.7	-0.5
18	Finance, business services	5.5	-0.3
19	Ownership of dwellings	2.8	-0.3
20	Public administration	1.8	0.0
21	Health, education, welfare	2.8	-0.1
22	Hospitality, etc.	3.9	0.4

Source: MONASH-Coal simulations.

L.5 Scenario 3: accelerated productivity improvements

Compared with Scenario 2, this scenario depicts the opposite side of the productivity spectrum. Scenario 3 models feasible improvements in labour and capital productivity additional to those assumed in the base case. Productivity improvements are assumed to occur smoothly over five years, beginning in 1998–99. Thereafter, for the period 2003–04 to 2009–10, total factor productivity growth resumes its annual trend (base case) rate of around 1 per cent.

Overall, average labour and capital productivity growth in the industry accelerates (relative to base case growth) by around 5 percentage points per year between 1998–99 and 2002–3. Over the 12-year period modelled, this leads to labour and capital productivity growth of around 5 per cent per year compared with around 2.8 per cent annual growth in the base case. The acceleration is assumed to occur through relatively rapid (relative to historical trends) changes in work and management practices in all aspects of mining operations — that is, in the mines themselves, in coal preparation plants and in mine administration.

Examples of the changes in management and work arrangements that might contribute to accelerated productivity improvements include reductions in idle time caused by inefficient shift change-overs and rostering of breaks, 'early knock off', lack of flexibility in roster arrangements and of arbitrary union-based demarcation rules.

Because reductions in idle time improve the productivity of both capital and labour, a neutral productivity improvement — that is, one that equally improves labour and capital productivity — has been modelled. In other words, the productivity change as modelled has not affected the capital-labour ratio implied in the base case. For this simulation, it is assumed that there is no scope to make further savings in intermediate input use.

L.5.1 Impact on the black coal industry

Table L.11 summarises the estimated impact of comparatively large productivity gains on the industry's output, exports, employment and investment.

Exports of both coking and thermal coal are estimated to increase substantially under these productivity assumptions. Results suggest that thermal coal exports in 2009–10 could be almost 80 per cent higher in 2009–10 than in the base case, while coking coal exports could be around 46 per cent higher.

Table L.11: **Scenario 3: impact on the black coal industry**

	Coking coal		*Thermal coal*	
	Average annual percentage change 1997–98 to 2009–10	*Percentage deviation from base case in 2009–10*	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case in 2009–10*
Export volume	5.0	46	7.3	78
Domestic sales volume	-1.6	0	1.5	30
Output volume	4.7	44	5.3	49
Employment (hours)	-4.2	12	-3.2	18
Real investment	-2.0	10	-1.0	14
Primary factor use per unit of output	-4.8	24	-5.2	24

Source: MONASH-Coal simulations.

With higher exports, output of both coking and thermal coal increases at a much higher rate than in the base case scenario — by 4.7 per cent a year for coking coal (compared with 1.6 per cent a year in the base case) and by 5.3 per cent a year for thermal coal (compared with 1.9 per cent in the base case).

Total industry employment (measured as the total number of labour hours), as in all the scenarios, is estimated to decline relative to current levels. But with comparatively rapid productivity change, and higher output and investment than in the base case, the rate of decline slows, so that total industry employment is estimated to be about 15 per cent higher in 2009–10 than in the base case. This suggests that there could be around 2500 more jobs in the industry in 2009–10 than in the base case.

With increased output, total royalty collections are estimated to be about $255 million higher in 2009–10 than in the base case.

L.5.2 Economy-wide effects

The estimated macroeconomic effects of accelerating productivity change in the black coal industry are summarised in Table L.12.

Table L.12: **Scenario 3: economy-wide impact**

Macro variables	*Percentage deviation from base case 2009–10*
Real GDP	0.4
Real investment	0.7
Real private consumption	0.9
Export volumes	0.2
Import volumes	1.0
Traditional exports	5.9
Employment (hours)	0.0
Real wage (producer)	0.6
Terms of trade	0.7
Competitiveness index	-1.5

Source: MONASH-Coal simulations.

Results suggest that rapid improvement in coal productivity could increase annual real GDP in 2009–10 by 0.4 per cent compared with the base case. Expressed in today's dollars, this would represent around $3 billion in 2009–10. Real private consumption is estimated to be 0.9 per cent higher and real investment 0.7 per cent higher than base case estimates for 2009–10.

As in Scenario 2, the estimated change in real private consumption is amplified by the assumption that the entire increase in GDP (adjusted for the income which accrues to foreigners from additional investment) is consumed by the private sector in the current period. However, while in Scenario 2 the terms of trade deteriorated because of induced expansion of traditional exports, in this scenario, the reverse is the case. Expansion of the black coal industry leads to relative contraction of other traditional export industries which, in turn, tends to raise world prices for some major commodities. This indirect effect increases the purchasing power of GDP and thus, increases real consumption further.

However, some of the increase in GDP will accrue to foreign owners of the existing capital stock, moderating the increase in real private consumption. This effect has not been modelled.

Economy-wide real wages also are estimated to be higher in 2009–10 than in the base case (by 0.6 per cent), while total employment is virtually unchanged at its base case level. This reflects the modelling assumption that aggregate employment growth, in the long run, is determined largely by institutional arrangements outside the scope of the model. This assumption is explained further in Appendix M.

If the increase in real wages were moderated, employment, real GDP and real consumption could be even higher. Nonetheless, the results as they stand, underscore the point that improved productivity generates additional income which can be distributed throughout the economy.

The real exchange rate is estimated to *appreciate* by 1.5 per cent. As explained in Box L.3, this indicates a *decline* in Australia's international competitiveness. While this might appear counter-intuitive in the context of significantly improved productivity in the black coal industry, real appreciation is an inevitable response to the increased export receipts and income flowing from improved productivity. Overall, the volume of trade (imports and exports) expands. This process is explained in Boxes L.4 and L.5.

L.5.3 Impact on other industries

Table L.13 summarises the estimated impact of accelerated productivity improvements in the Australian black coal industry on other industries. The results show that all sectors are likely to continue to grow relative to current production levels, though growth accelerates for some and slows slightly, for others.

Industries that expand relative to the base case (apart from the black coal industry) include construction, transport and storage, communications and finance. Industries whose growth rates slow somewhat (relative to growth in the base case) include agriculture, forestry and fishing, hospitality (which includes the export-oriented tourism industry) as well as several manufacturing industries that are exposed to strong international competitive pressures.

Boxes L.4 and L.5 explain the link between black coal industry expansion and the relative expansion or contraction of other industries. Briefly, expansion of the black coal industry requires both factor and intermediate inputs. Industries that compete with the black coal industry for factors of production, especially labour (capital can be obtained internationally), will tend to contract, particularly if their output prices are constrained by international competition. On the other hand, industries that supply inputs to the black coal industry, including capital goods and related services, benefit.

Table L.13: **Scenario 3: impact on real output of major industries**

	Industry sector	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case 2009–10*
1	Agriculture, forestry and fishing	2.7	-1.3
2	Mining (including coal)	3.8	12.1
	Black coal — coking	*4.7*	*44.0*
	Black coal — thermal	*5.3*	*49.3*
3	Food, beverages and tobacco	2.8	-1.1
4	Textiles, clothing, footwear	1.9	-1.4
5	Wood and furniture	2.8	0.0
6	Paper, paper products	3.6	-0.2
7	Chemicals	4.9	-0.8
8	Non-metallic construction	3.0	0.3
9	Basic metal products	3.8	-1.6
	Iron and steel	*1.2*	*0.0*
10	Transport equipment	4.3	-0.8
11	Electronic equipment	5.7	-1.1
12	Leather, rubber, etc.	3.9	-1.2
13	Electricity, gas and water	2.9	0.2
	Electricity	*3.2*	*0.4*
14	Construction	3.1	0.8
15	Wholesale and retail trade	2.8	0.3
16	Transport and storage	4.1	0.6
17	Communications	6.8	0.6
18	Finance, business services	5.6	0.5
19	Ownership of dwellings	2.9	0.6
20	Public administration	1.8	0.0
21	Health, education, welfare	2.9	0.2
22	Hospitality, etc.	3.8	-0.6

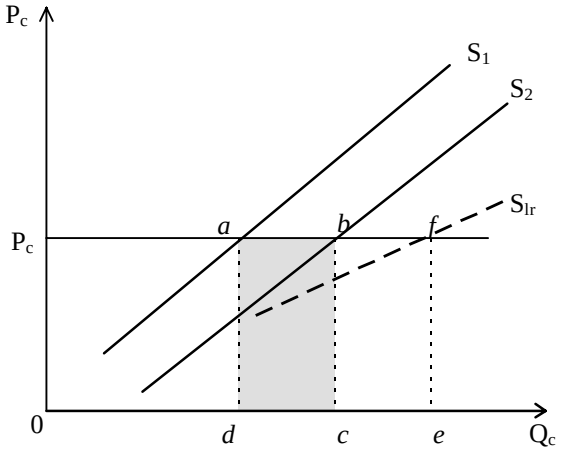
Source: MONASH-Coal simulations.

In addition, higher national income that flows from higher productivity (via increased export income — see Box L.4) encourages expansion of the non-traded services sector at the expense of trade-exposed industries. This shift

occurs as a result of real exchange rate appreciation, brought about by nominal exchange rate appreciation and/or higher domestic costs which result from increased export receipts. Real exchange rate appreciation makes the production of exports and import-competing goods less profitable, and the production of non-traded services more profitable.

Box L.4: **The impact of improved productivity on national income**

An improvement in productivity means that a given level of output can be produced with fewer inputs. Alternatively, more output can be produced with the same amount of inputs. The value of the additional output which can be produced (at the same total cost as before the productivity change) is the pure 'income' effect of the productivity change. It can be thought of as a productivity 'dividend'.[a] The process is illustrated below in a partial equilibrium, comparative static, framework (compared with MONASH which takes into account economy-wide effects over time).



Initially, the Australian black coal industry (short-run) export supply curve is S_1, with the quantity exported 0*d*, at price P_c. With a productivity improvement, as discussed above, costs fall. This is represented by a rightward shift of the short-run supply curve, say to S_2. If the price remains at P_c, the industry will expand production to the point where marginal cost equals price, which is represented by quantity 0*c*. Because this expansion in output and export sales is achieved without drawing resources from other activities in the economy, the entire increase in export receipts, represented by the rectangle *abcd* represents additional net income to the black coal industry, and to the economy. The extra income initially will accrue to coal mine owners and employees and to governments via higher tax receipts. To the extent that dividends are repatriated abroad, this will reduce the net income gain to the Australian community.

Box L.4: **The impact of improved productivity on national income** (continued)

Higher profits will also encourage additional investment in the industry. The resulting increase in capacity is shown by the new long-run supply curve S_{lr}. For price P_c, this implies additional exports (to 0*e*). But, because resources must be drawn into the industry from other parts of the economy in order to expand exports further, the gain to the black coal industry and the economy is smaller than the increase in coal export receipts.

The *net* gain is measured by additional export receipts (area *bcef*) *minus* the area under the long-run supply curve (S_{lr}), which measures the cost of industry expansion. This net gain which arises from more efficient deployment of resources in the economy following the productivity improvement in coal, is *additional* to the gain indicated by area *abcd*.

The analysis so far has assumed no change in the export price of coal. If the price falls as exports expand, both the pure income effect and incentive to expand will be dampened. The increase in income and the additional investment and employment in the industry will have repercussions for the rest of the economy. Those who receive the additional income (including the government) spend or invest it and the ensuing pattern of extra spending will affect the pattern of industry growth. In addition, as the black coal industry becomes a more attractive investment prospect, it will draw resources from other industries and their growth will be moderated.

Thus, while the economy gains overall, and some industries (as well as the black coal industry) gain, some will experience slower growth. (These linkages are explored in more detail in Box L.5) Can this crowding out of some other industries be prevented? The government, for example, could try to offset the additional spending by increasing taxes or reducing its expenditure. But this would have only short-term effects because higher government saving will tend to stimulate private investment in the economy. The driving force behind the restructuring is higher income and a more profitable, expanding black coal industry — the only way to eliminate or moderate the pressure for structural change is to eliminate or reduce the size of the productivity improvement. Even if black coal industry expansion were directly prevented, national income would still increase because resources 'saved' by the productivity improvement could shift to other industries, expanding their output.

a If the productivity improvement is the result of eradication of inefficient work practices, it is possible that workers and/or management incurred costs from their removal. If this is the case, strictly speaking, not all of the measured productivity gain is an income bonus. However, such costs are likely to be transitional whereas the augmentation of national income endures.

Box L.5: **Structural implications of black coal industry expansion**

When an industry (or industries) in the economy experiences significant export and output expansion, equilibrium in the economy is disturbed. Higher exports, all else constant, lead to an export surplus; output expansion leads to excess demand for factors of production.

The imbalances created in various markets will set in train price and quantity adjustments which, over time, will generate a new equilibrium (in the absence of further disturbances[a]).

Expansion of the black coal industry triggers two major channels of adjustment:

1. The impact of increased export receipts (demand effects);
2. Increased demand for labour, capital and inputs by the black coal industry (supply effects).

Demand effects

The initial increase in coal export receipts generates an export surplus which increases national income. Typically, this income 'bonus' will be spent on a combination of consumption and investment goods and services. To the extent this extra spending falls on non-traded goods and services (for example, financial services, construction, transport, entertainment), the prices of these services can rise (relative to the price of tradeables) which encourages additional supply, drawing resources from the tradeable goods sector.

Additional demand for goods and services that are traded internationally, and which face intense international competition, does not result in higher prices for these goods and services. Indeed, *relative* to the prices of non-traded goods, the price of tradeables (expressed in $A) falls. This relative price change is referred to as real exchange rate appreciation. Real appreciation thus increases domestic demand for tradeables but reduces their domestic supply— the net result is higher imports and lower exports.

As explained in Box L.3, the real exchange rate is the ratio of the price of tradeable goods (in $A) and the price of non-traded goods. It changes as a result of nominal exchange rate changes and/or price changes. Thus real appreciation can be brought about by nominal appreciation of the currency (which directly reduces the $A price of traded goods relative to non-traded goods) or an increase in domestic costs (which increases the price of non-traded goods relative to the price of tradeables), or some combination of the two. Whichever transmission mechanism operates, however, the ultimate real effect is the same — stronger growth of the non-traded goods sector and slower growth in the traded goods sector.

Box L.5: **Structural implications of black coal industry expansion** (continued)

Overall, the real appreciation leads to a reduction in *net* exports (exports *minus* imports) which balances the initial export surplus. The black coal industry will not be immune to the real appreciation — its expansion will be somewhat moderated, but overall, trade expands in the economy.

In Table L.13, which summarises the impact of coal expansion on major industries, it can be seen that relative to base case projections (non-traded) service sectors tend to expand while industries that are most exposed to international market forces, including agriculture and import-competing manufacturing industries, contract.

Supply effects

With the productivity improvement, the black coal industry can expand output using its existing level of inputs. With lower unit costs, and higher rates of return, coal producers have an incentive to invest and expand production still further. To do this they must employ more labour and capital.

Financial capital can be obtained from abroad without draining other sectors (although higher net capital inflow will augment the real appreciation effect described above), but labour must be obtained from other sectors of the economy. This tends to push up wages. Higher wages squeeze industries that must remain internationally competitive — import-competing and non-coal export industries. In other words, the demand effects which lead to contraction of the traded goods sector typically will be reinforced by supply effects.

The fortunes of some industries are tied closely to the black coal industry. Industries which supply inputs to coal will benefit from its expansion. Industries which use coal as a major intermediate input will gain if increased coal supply leads to lower prices.

Summary

Structural adjustment following black coal industry expansion is an inevitable consequence of that expansion. Importantly, the adjustment occurs in the context of, indeed to a large extent because of, higher national income. As a result of expansion of coal exports, output of agricultural and other mining industries grows more slowly. Growth of import-competing industries is similarly affected, while non-traded service industries experience stronger growth.

a What follows is a very brief and non-technical summary of what has become known as the 'Gregory thesis' or 'Dutch Disease'. Refinements and extensions are omitted here. The interested reader is referred to Corden (1984) and Cook and Sieper (1984) for excellent summaries of the large Australian literature.

L.5.4 Qualifications and sensitivity analysis

The results assume that there are no domestic impediments to realising expanded export potential. The MONASH-Coal model assumes that port and other transport and handling services respond to increased demand, but if there were significant impediments to increased services in some regions, for example, the estimated expansion could be moderated.

The results also abstract from any transitional adjustment costs incurred. Although under this high productivity growth scenario, job losses in the industry are estimated to slow down, change in work practices will inevitably involve adjustment costs. These transitional costs will moderate the extent of any gains estimated by the model. Nonetheless, such costs occur only in the short term, whereas the benefits of sustained improvements in productivity continue indefinitely.

Importantly, for reasons explained in Attachment L5, the results in Scenario 3 assume that thermal coal prices do not change significantly in response to changes in the level of Australian exports. Put another way, demand for Australian thermal coal is assumed to be highly responsive to changes in price (a 1 per cent fall/increase in its price is assumed to lead to a 20 per cent increase/decrease in quantity demanded, that is, the elasticity of demand is assumed to be -20). If Australian exports expand, a very small fall in thermal coal prices will be sufficient to induce a large expansion in demand for Australian exports.

Demand for Australian coking coal is assumed to be somewhat less responsive to price changes. As explained in Attachment L5, the elasticity of demand for coking coal is assumed to be -10. Thus, a 1 per cent fall/increase in price induces a 10 per cent expansion/contraction in the quantity demanded. The lower export demand elasticity reflects Australia's larger share of the world coking coal market.

Based on these assumptions about demand for Australian coking and thermal coal, an increase in export capacity by Australia broadly translates into increased exports and export income because export prices fall only slightly. If foreign demand were less responsive to changes in coal prices, prices would need to fall by a larger amount in order to encourage increased demand. Lower coal prices would also dampen Australia's export response. In other words, in this situation, an improvement in productivity would increase export *capacity* (for any export price), but the expansion in capacity would not be matched by an expansion in actual exports or export receipts.

In order to gauge the sensitivity of the results to changes in the export demand elasticities, Scenario 3 was re-run with elasticities of demand of -10 for thermal coal and -5 for coking coal. In other words, the responsiveness of foreign buyers to a change in the price of coal was halved. The results for the black coal industry under these market assumptions are presented in Table L.14.

Table L.14: **Scenario 3 (sensitivity analysis): impact on the black coal industry**

	Coking coal		*Thermal coal*	
	Average annual percentage change 1997–98 to 2009–10	*Percentage deviation from base case in 2009–10*	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case in 2009–10*
Export volume	4.1	32	6.2	58
Domestic sales volume	-1.6	0	1.5	2
Output volume	3.8	30	4.6	37
Employment (hours)	-5.4	-3	-4.2	4
Real investment	-2.8	22	-1.8	21
Primary factor use per unit of output	-4.8	-24	-5.1	-24

Source: MONASH-Coal simulations.

Export and output performance in the black coal industry is estimated to improve relative to the base case despite lower (albeit still elastic) export demand elasticities. Industry investment is also higher than in the base case, though the level of employment is virtually unchanged.

The economy overall gains — real GDP growth is estimated to be 0.38 per cent higher in 2009–10 than in the base case, just 0.05 per cent lower than the gain estimated in Scenario 3 with higher demand elasticities. Because of the effect of lower coal prices on the terms of trade, real private consumption is 0.6 per cent higher than base case projections, compared with 0.9 per cent in Scenario 3. In addition, because expansion of the black coal industry is moderated, real appreciation (or loss of competitiveness) is also less than in Scenario 3. This reduces the contractionary impact on other export and import-competing industries, and moderates the expansion of service industries.

The impact of lower export demand elasticities is also captured reasonably well by Scenario 4a which is discussed below. Results for that scenario similarly

indicate that gains are achievable for the black coal industry and the economy following productivity improvements even with an induced reduction in coal export prices.

On the whole, the Commission considers that international demand for black coal *is* sensitive to price changes. In other words, expansion of Australian exports is *not* expected to lead to large reductions in world coal prices which choke off that expansion. In particular, there is evidence that world market conditions are becoming increasingly competitive due to the emergence of new suppliers and markets, as well as recent developments in several Asian economies. On this basis, the Commission considers that Scenario 3 provides a reasonable representation of international market conditions.

L.6 Scenario 4a: accelerated productivity growth leading to lower coal prices

As explained above, the Commission considers that Scenario 3 provides a reasonable representation of the international market for coal, and thus provides a good indication of the potential effects of accelerated productivity improvements in the Australian black coal industry. However, there is a range of views about the influence of changes in the level of Australian coal exports on foreign demand and export prices. For example, one participant has argued that demand for Australian coal is totally unresponsive to price changes (see Chapter 2).

In this simulation, Scenario 3 is modified to illustrate a situation where foreign buyers are in a position to capture more of the benefit of the productivity improvement than would occur in competitive markets by negotiating a lower price for Australian coal. Specifically, in Scenario 4a, the black coal industry expands output using its existing labour and capital, but the lower price that results discourages further investment and expansion of the industry (relative to the base case). Moreover, without additional investment there is no additional employment generated relative to the base case.

As discussed in Chapter 2, the Commission considers that foreign buying strategies appear to be consistent with an objective of long-run cost minimisation, suggesting that, all else constant, price is indeed an important determinant of the quantity of Australian coal sold. In particular, new markets are emerging for Australian coal exports in India, the Republic of Korea, Taiwan and Europe, for example, thus reducing Australia's reliance on traditional markets.

Nonetheless, if, for example, coal buyers were to exhibit some degree of buying power in future, Scenario 4a provides a reasonable approximation of such behaviour. The modelling results indicate that there are still gains for the black coal industry, and the community overall, from cost reductions.

L.6.1 Impact on the black coal industry

The results for the black coal industry are summarised in Table L.15. Output and exports are still estimated to increase, but only to the extent that productivity gains allow increased output from existing inputs.

Table L.15: **Scenario 4a: impact on the black coal industry**

	Coking coal		*Thermal coal*	
	Average annual percentage change 1997–98 to 2009–10	*Percentage deviation from base case in 2009–10*	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case in 2009–10*
Export volume	4.1	32	5.7	49
Domestic sales volume	-1.6	0	1.4	1
Output volume	3.9	31	4.2	31
Employment (hours)	-5.2	0	-4.5	0
Real investment	-2.7	0	-2.1	0
Primary factor use per unit of output	-4.8	-24	-5.1	-24

Source: MONASH-Coal simulations.

Thermal coal exports are estimated to be about 50 per cent higher in 2009–10 than in the base case. Coking coal exports are estimated to be around 30 per cent higher in 2009–10 than in the base case. Employment and investment growth, for the reasons outlined above, are the same as in the base case. Royalty collections are estimated to be about $150 million higher in 2009–10 than in the base case.

L.6.2 Economy-wide effects

Table L.16 summarises the macroeconomic effects. Annual GDP and real consumption are both estimated to rise (relative to the base case) by 0.3 per cent and 0.5 per cent respectively, compared with increases of 0.4 per cent and

0.9 per cent (relative to the base case) in Scenario 3. As expected, lower coal prices moderate the extent of national income and consumption gains.

Table L.16: **Scenario 4a: economy-wide impact**

Macro variables	*Percentage deviation from base case 2009–10*
Real GDP	0.3
Real investment	0.4
Real private consumption	0.5
Export volumes	0.4
Import volumes	0.6
Traditional exports	4.3
Employment (hours)	0.0
Real wage (producer)	0.4
Terms of trade	0.2
Competitiveness index	-0.8

Source: MONASH-Coal simulations.

L.6.3 Impact on other industries

The implications for the structure of the economy are summarised in Table L.17. Because the black coal industry in this scenario does not draw resources from other sectors, the pressure for other industries to contract is eased. But higher export receipts and national income still lead to expansion of service industries at the expense of export and import-competing industries — the real exchange rate still appreciates albeit to a smaller extent.

Industries that use coal as a major input (the iron and steel industry in particular) benefit from lower coal prices.[2] Growth in some service sectors, including construction (which gained from black coal industry investment following the productivity growth modelled in Scenario 3), is moderated.

[2] This assumes that coal producers do not engage in price discrimination — that is, charge a higher price to domestic consumers than foreign buyers. If coal production is reasonably competitive, the price received by producers from exports and domestic sales will be broadly the same. This assumption is used in MONASH-Coal.

Table L.17: **Scenario 4a: impact on real output of major industries**

	Industry sector	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case 2009–10*
1	Agriculture, forestry and fishing	2.8	-0.8
2	Mining (including coal)	3.5	8.2
	Black coal — coking	*3.9*	*31.0*
	Black coal — thermal	*4.2*	*31.0*
3	Food, beverages and tobacco	2.9	-0.7
4	Textiles, clothing, footwear	2.0	-0.8
5	Wood and furniture	2.8	0.1
6	Paper, paper products	3.6	-0.1
7	Chemicals	4.9	-0.4
8	Non-metallic construction	3.0	0.2
9	Basic metal products	3.9	-0.8
	Iron and steel	*1.2*	*0.2*
10	Transport equipment	4.3	-0.4
11	Electronic equipment	5.8	-0.7
12	Leather, rubber, etc.	4.0	-0.7
13	Electricity, gas and water	2.9	0.2
	Electricity	*3.2*	*0.3*
14	Construction	3.1	0.5
15	Wholesale and retail trade	2.7	0.2
16	Transport and storage	4.1	0.5
17	Communications	6.8	0.4
18	Finance, business services	5.6	0.4
19	Ownership of dwellings	2.9	0.3
20	Public administration	1.8	0.0
21	Health, education, welfare	2.8	0.1
22	Hospitality, etc.	3.8	-0.3

Source: MONASH-Coal simulations.

L.7 Scenario 4b: accelerated productivity growth leading to significantly lower coal prices

This scenario is similar to Scenario 4a, but now it is assumed that buyers of Australian coal exports bargain down the price of coal by the *full* amount of the cost reductions assumed in Scenario 3.

In the Commission's view this is an unrealistic scenario as it implies that whatever the price of coal, high or low, the quantity demanded by overseas buyers will not change. The scenario has been modelled by CoPS to illustrate that, even under these extreme assumptions, real national income can increase as a result of more efficient resource use in the economy.

Not surprisingly, however, as shown by the results in Table L.18, potential gains for the black coal industry from accelerated productivity improvements are whittled away. Export volumes and output in 2009–10 are estimated to be virtually the same as in the base case, but lower coal prices translate into much lower export receipts.

Table L.18: **Scenario 4b: impact on the black coal industry**

	Coking coal		*Thermal coal*	
	Average annual percentage change 1997–98 to 2009–10	*Percentage deviation from base case in 2009–10*	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case in 2009–10*
Export volume	1.6	-1	2.4	2
Domestic sales volume	-1.6	1	1.3	0
Output volume	1.5	-1	2.0	1
Employment (hours)	-8.4	-35	-7.6	-32
Real investment	-4.6	-21	-3.8	-19
Primary factor use per unit of output	-4.8	-24	-5.1	-24

Source: MONASH-Coal simulations.

Black coal industry employees do not fare well in this scenario because the negative impact of assumed labour-saving productivity change on employment is not offset by increased output growth. As a result, black coal industry employment in 2009–10 is estimated to be around 30 per cent lower than in the base case.

Annual royalty revenue is estimated to be around $60 million lower in 2009–10 than in the base case.

L.7.1 Economy-wide effects

The economy-wide effects of much lower coal prices, coupled with large productivity improvements, are summarised in Table L.19. Real GDP is still expected to be higher than in the base case but the gain, as might be expected, is much lower. The estimated fall in the terms of trade which reflects the induced fall in coal prices, is estimated to eliminate gains for domestic consumers.

Table L.19: **Scenario 4b: economy-wide impact**

Macro variables	*Percentage deviation from base case 2009–10*
Real GDP	0.2
Real investment	-0.2
Real private consumption	0.0
Export volumes	1.2
Import volumes	0.1
Traditional exports	1.1
Employment (hours)	0.0
Real wage (producer)	0.1
Terms of trade	-0.9
Competitiveness index	0.2

Source: MONASH-Coal simulations.

Nonetheless, the aggregate results indicate that national output can grow, despite falling coal prices, because more efficient use of inputs by the black coal industry allows other industries to draw on resources formerly employed in that industry. As in all scenarios, however, transitional adjustment costs will moderate the extent of gains in the short term. These structural shifts are summarised in Table L.20.

L.7.2 Impact on other industries

Output in all major industry classifications (except for the construction industry) expands in this scenario. Poorer performance of the construction industry is due to lower investment in the economy and the black coal industry in particular. Industries that contracted due to strong expansion of the black coal

industry (in Scenarios 3 and, to a lesser extent, in Scenario 4a), the export and import-competing industries, now expand relative to the base case.

Table L.20: **Scenario 4b: impact on real output of major industries**

	Industry sector	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case 2009–10*
1	Agriculture, forestry and fishing	2.9	0.2
2	Mining (including coal)	3.1	3.0
	Black coal — coking	*1.5*	*-0.8*
	Black coal — thermal	*2.0*	*1.4*
3	Food, beverages and tobacco	3.0	0.2
4	Textiles, clothing, footwear	2.1	0.3
5	Wood and furniture	2.8	0.1
6	Paper, paper products	3.6	0.2
7	Chemicals	5.0	0.4
8	Non-metallic construction	3.0	0.1
9	Basic metal products	4.0	0.6
	Iron and steel	*1.2*	*0.7*
10	Transport equipment	4.4	0.3
11	Electronic equipment	5.9	0.5
12	Leather, rubber, etc.	4.1	0.5
13	Electricity, gas and water	2.9	0.2
	Electricity	*3.2*	*0.2*
14	Construction	3.0	-0.2
15	Wholesale and retail trade	2.7	0.1
16	Transport and storage	4.1	0.3
17	Communications	6.7	0.1
18	Finance, business services	5.6	0.2
19	Ownership of dwellings	2.9	0.1
20	Public administration	1.8	0.0
21	Health, education, welfare	2.8	0.0
22	Hospitality, etc.	3.8	0.1

Source: MONASH-Coal simulations.

These industries benefit from improvements in coal productivity because the black coal industry, whose response to the productivity change is constrained by falling coal prices, releases labour. In addition, there is a small real depreciation, or improvement in competitiveness, due to the fall in coal export income. Industries that use coal as an input, especially the iron and steel industry, also benefit from lower coal prices.

L.8 Scenario 5a: accelerated productivity change in coal and best practice productivity in rail transport of coal

In the base case it is assumed that rail charges are reduced gradually to remove all excess charges for rail freight of coal (that is, the price component exceeding cost) by 2005–06. This projection reflects announced policy to remove rail 'royalties' as well as the expected impact of national competition reforms under way in NSW and Queensland (see Chapters 7, 10 and Attachments L3, L6).

Scenario 5a assumes that further rail freight reductions occur as the result of improved productivity. Specifically, rail freight rates for coal are assumed to fall by 20 per cent relative to the base case, closing the estimated gap between current levels of operating efficiency and best practice. The improvement is assumed to occur over five years beginning in 1998–99, in tandem with accelerated productivity improvements in the mines (as modelled in Scenario 3). When fully implemented, the productivity improvement delivers a reduction in rail charges to the black coal industry of around $150 million per year.

L.8.1 Impact on the black coal industry

The modelling results are reported in Table L.21. The impact of lower rail costs for the black coal industry is positive. Exports, output, employment, and investment are all higher than if the black coal industry alone were to accelerate productivity growth.

For example, thermal coal exports in this scenario are estimated to be 92 per cent higher in 2009–10 relative to the base case, compared with 78 per cent in Scenario 3. Coking coal exports are estimated to be 53 per cent higher than in the base case, compared with 46 per cent in Scenario 3.

L.8.2 Economy-wide effects

Larger expansion of black coal industry exports and output, not surprisingly, generates additional economy-wide gains. National income is also boosted indirectly in this scenario by lower rail freight rates for other users of rail

services, especially agriculture and other mining industries. By 2009–10, GDP is estimated to be 0.6 per cent above the base case projection, compared with 0.4 per cent in Scenario 3. In other words, a 20 per cent reduction in rail costs to coal producers is estimated to generate an increase in national income of around 0.2 per cent.

Similarly, real investment, real private consumption and real wages are all estimated to be higher in this scenario than in Scenario 3, and significantly higher than in the base case (see Table L.22).

L.8.3 Impact on other industries

With expansion of the black coal industry larger than in Scenario 3, the impact on other industries is also more pronounced.

Appreciation of the real exchange rate, or loss of competitiveness, is stronger, reflecting larger income gains. The black coal industry's demand for labour is also higher than in Scenario 3. For the reasons explored in Boxes L.4 and L.5, relative to growth in the base case, these forces lead to slower growth in export and import-competing industries and relatively stronger growth in non-traded, service industries (see Table L.23). However, the impact of real exchange rate appreciation on agricultural and mining exporters is moderated by lower rail freight rates.

Table L.21: **Scenario 5a: impact on the black coal industry**

	Coking coal		*Thermal coal*	
	Average annual percentage change 1997–98 to 2009–10	*Percentage deviation from base case in 2009–10*	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case in 2009–10*
Export volume	5.4	53	7.9	92
Domestic sales volume	-1.6	0	1.6	4
Output volume	5.1	51	5.8	58
Employment (hours)	-3.8	19	-2.6	27
Real investment	-1.6	16	-0.5	21
Primary factor use per unit of output	-4.8	-24	-5.2	-24

Source: MONASH-Coal simulations.

Table L.22: **Scenario 5a: economy-wide impact**

Macro variables	*Percentage deviation from base case 2009–10*
Real GDP	0.6
Real investment	0.9
Real private consumption	1.0
Export volumes	0.2
Import volumes	1.2
Traditional exports	7.0
Employment (hours)	0.0
Real wage (producer)	0.7
Terms of trade	0.8
Competitiveness index	-1.7

Source: MONASH-Coal simulations.

L.9 Scenario 5b: accelerated productivity change in coal and accelerated reductions in excess rail freight charges

Scenario 5b assumes that excess or monopoly charges for rail freight of coal, that is, charges (excluding rail royalties) in excess of the cost of providing rail services, are removed by 2001–02. (As with Scenario 5a, rail freight reductions have been modelled along with productivity improvements at the mine.)

In the base case, it is assumed that these excess charges are removed by 2005–06, reflecting the impact of reforms already under way. However, as discussed in Chapter 7, the Commission considers that there is scope both to hasten and to deepen the reform process in NSW and Queensland.

It is difficult to quantify excess freight charges due to difficulties in estimating costs (see Chapter 7, Section 7.6). For reasons explained in Attachment L6, the Commission has assumed that, on average, excess freight charges (excluding rail ‘royalties’) currently are around $2/tonne of coal railed.

Table L.23: **Scenario 5a: impact on real output of major industries**

	Industry sector	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case 2009–10*
1	Agriculture, forestry and fishing	2.7	-1.3
2	Mining (including coal)	4.0	14.1
	Black coal — coking	*5.1*	*51.0*
	Black coal — thermal	*5.8*	*57.9*
3	Food, beverages and tobacco	2.8	-1.3
4	Textiles, clothing, footwear	1.9	-1.6
5	Wood and furniture	2.8	0.0
6	Paper, paper products	3.6	-0.2
7	Chemicals	4.9	-1.0
8	Non-metallic construction	3.0	0.4
9	Basic metal products	3.8	-1.9
	Iron and steel	*1.2*	*-0.1*
10	Transport equipment	4.2	-1.0
11	Electronic equipment	5.7	-1.4
12	Leather, rubber, etc.	3.9	-1.5
13	Electricity, gas and water	2.9	0.2
	Electricity	*3.2*	*0.4*
14	Construction	3.1	1.0
15	Wholesale and retail trade	2.8	0.4
16	Transport and storage	4.1	0.5
17	Communications	6.8	0.7
18	Finance, business services	5.6	0.5
19	Ownership of dwellings	2.9	0.7
20	Public administration	1.8	0.0
21	Health, education, welfare	2.9	0.2
22	Hospitality, etc.	3.8	-0.7

Source: MONASH-Coal simulations.

L.9.1 Impact on the black coal industry

In Scenario 5b it is assumed that removal of the $2/tonne excess charge is achieved by 2001–02, four years earlier than in the base case. This represents a one-off benefit for the coal industry compared with the base case. Nonetheless, the results indicate that, in cumulative terms, additional thermal and coking coal exports of around 10 million tonnes, with a value of around $500 million, could be achieved between 1999–2000 and 2005–06.

There would be scope for further rail freight reductions if excess rail charges were not reduced to the extent assumed in the base case. For example, if it were assumed in the base case that monopoly rents did not phase to zero by 2005–06, but remained at around $2/tonne for the entire period modelled, the gains to the coal industry from their early removal would be larger than estimated in Scenario 5b. Indeed, if this were the case, the benefits to the industry would be around twice the level estimated in Scenario 5a above (which models a rail freight rate reduction of around $1/tonne). In other words, if rail freight rates were assumed to be around $2/tonne lower than in each year of the base case, coal exports could be around 20 per cent higher in 2009–10 than otherwise.

L.9.2 Economy-wide effects

For the economy as a whole there are virtually no additional gains under this scenario compared with Scenario 3 which models productivity gains in coal mines. The economy-wide results are thus the same as for Scenario 3 (see Table L.12). This occurs because the assumed reduction in rail freight rates (which is not due to productivity improvements) is modelled as a revenue-neutral tax change. This approach is required to reflect the fact that forgone ‘monopoly’ rail revenue must be made up by the government sector either by increasing taxes or by reducing expenditure. As modelled, monopoly rail revenue forgone is assumed to be balanced by an increase in income tax.

L.9.3 Impact on other industries

Due to induced expansion of the black coal industry and black coal exports, there is a small real appreciation effect (the competitiveness index is estimated to be 0.02 per cent below the base case projection in 2009–10) which leads to a negligible contraction of import-competing and export industries. Because the changes are so small (only affecting industry output growth estimates at the second-decimal place) they are not reported.

Table L.24: **Scenario 5b: impact on the black coal industry**

	Coking coal		*Thermal coal*	
	Average annual percentage change 1997–98 to 2009–10	*Percentage deviation from base case in 2009–10*	*Average annual percentage change 1997–98 to 2009–10*	*Percentage deviation from base case in 2009–10*
Export volume	5.0	46	7.4	80
Domestic sales volume	-1.6	0	1.5	3
Output volume	4.7	44	5.3	50
Employment (hours)	-4.2	12	-3.0	20
Real investment	-1.9	10	-0.9	16
Primary factor use per unit of output	-4.8	-24	-5.2	-24

Source: MONASH-Coal simulations.

L.10 State and Territory results

CoPS has disaggregated the results presented in Scenario 3 to show the impact of productivity improvements by State. Table L.25 reports the impact of accelerated productivity change in the black coal industry (Scenario 3) and productivity deterioration (Scenario 2) on employment and output by State. More detailed discussion of these regional effects is provided in Attachment L7.

Not surprisingly, relative to base case projections, NSW and Queensland benefit from expansion of the sector, while States which are export-oriented, Western Australia in particular, are estimated to experience somewhat slower growth. Conversely, if the coal sector contracts, NSW and Queensland are adversely affected, while other States perform slightly better.

Table L.25: **Output and employment by State and Territory in the base case, Scenario 2 and Scenario 3** (average annual percentage change 1997–98 to 2009–10)

	Base case	*Scenario 2*	*Scenario 3*
Real Gross State Product			
NSW	2.85	2.79	2.92
Vic	2.62	2.64	2.61
Qld	3.56	3.44	3.71
SA	2.64	2.65	2.63
WA	3.59	3.63	3.53
Tas	2.32	2.34	2.30
ACT	3.19	3.17	3.22
NT	3.95	3.99	3.89
Employment (hours)			
NSW	1.63	1.60	1.65
Vic	1.48	1.50	1.47
Qld	2.37	2.33	2.42
SA	1.52	1.54	1.51
WA	2.32	2.35	2.27
Tas	1.23	1.24	1.20
ACT	2.11	2.11	2.12
NT	2.62	2.64	2.59

Source: MONASH-Coal simulations.

L.11 Summary

The modelling results under the various scenarios highlight the important contribution of the black coal industry to the economy, as well as the extent (and implications) of the industry's exposure to international competition. Confirming intuition, the modelling indicates that under reasonable assumptions about world markets, (and conservative assumptions about aggregate employment), productivity improvements can benefit the black coal industry and the community at large. Table L.26 summarises estimated export, output and employment outcomes for the black coal industry, relative to current levels, under each scenario. These conclusions are conditioned by a wide array of base

case projections. Should these (especially for exports) prove too optimistic, or pessimistic, this would not undermine the story captured in Table L.26.

Table L.27 summarises the estimated impact on real GDP, real private consumption, real investment and economy-wide real wages in each scenario. The black coal industry and its employees generally gain from productivity growth in the industry where such improvements encourage higher output and investment. Only if productivity improvements directly induce a large fall in the coal export price (as in Scenario 4b), is employment estimated to fall significantly relative to the base case.

In all the scenarios modelled, GDP is estimated to increase as the result of productivity improvements. However, if coal prices fall by the full amount of cost reductions (as in Scenario 4b), the modelling suggests that an induced decline in the terms of trade could eliminate gains in real private consumption.

Under the accelerated productivity scenario (Scenario 3), GDP is estimated to be 0.4 per cent higher in 2009–10 than it would be with trend productivity growth. A gain in real GDP of that order would be worth around $3 billion in 2009–10 (in terms of today's dollars). Even if significant falls in coal prices are assumed (Scenario 4b), GDP can increase because other industries in the economy benefit from more efficient resource use by the black coal industry. Conversely, with no further productivity improvements after 1997–98, GDP in 2009–10 is estimated to be 0.3 per cent *lower* than in Scenario 1.

Under the assumptions of the model, the gains and losses in GDP under the different productivity assumptions translate into gains and losses in consumer welfare, as measured by real private consumption. However, the impact of induced changes in the terms of trade on the purchasing power of income also affects estimates of real private consumption.

The more rapidly the black coal industry improves its productivity and expands exports and output, the more pronounced will be the impact on other industries in the economy. This restructuring occurs in the context of, and largely as a result of, increased national income. It should also be noted that modelling has been conducted specifically to illustrate the potential effects of substantial productivity improvements in the black coal industry. It ignores the scope for large productivity improvements (over and above the rates which are incorporated in the base case) in other parts of the economy. To the extent that other industries accelerate their productivity growth, another set of structural adjustments would ensue.

Table L.26: **Performance of the coal industry 1997–98 to 2009–10 under Scenarios 1 to 5**

	Thermal coal			*Coking coal*		
	Export volume	*Output volume*	*Employ-ment (hours)*	*Export volume*	*Output volume*	*Employ-ment (hours)*
	Percentage change 1997–98 to 2009–10					
Steady productivity (Scenario 1)	+30	+24	-44	+23	+21	-47
No productivity change (Scenario 2)	-52	-37	-54	-22	-22	-54
Accelerated productivity (Scenario 3)	+130	+84	-33	+80	+73	-40
Accelerated productivity, moderately lower coal prices (Scenario 4a)	+92	+62	-44	+62	+58	-47
Accelerated productivity, significantly lower coal prices (Scenario 4b)	+33	+25	-62	+21	+20	-65
Accelerated productivity in coal and rail (Scenario 5a)	+146	+95	-28	+88	+82	-37
Accelerated productivity in coal; early removal of excess rail charges (Scenario 5b)	+134	+86	-33	+80	+74	-40

Source: MONASH-Coal simulations.

Under the assumptions used, Australian workers receive a large part of any income gain as higher real wages. In the long run, aggregate employment is assumed not to respond to productivity improvements, though there are employment gains in the short run, explained in Appendix M. But with permanent changes in productivity, lasting increases in employment could be achieved if the increase in real wages which flows from productivity change is moderated somewhat. The main point remains, however, that with significant productivity improvements in the black coal industry, there are potentially substantial national gains available for distribution throughout the community.

Table L.27: **Economy-wide impact of Scenarios 1 to 5** (percentage deviations from base case 2009–10)

	Real GDP	*Real private consumption*	*Real investment*	*Real wage*
Steady productivity growth (Scenario 1)	0	0	0	0
No further productivity growth (Scenario 2)	-0.3	-0.7	-0.6	-0.3
Accelerated productivity change (Scenario 3)	0.4	0.9	0.7	0.6
Accelerated productivity change and moderately lower coal prices (Scenario 4a)	0.3	0.5	0.4	0.4
Accelerated productivity change and significantly lower coal prices (Scenario 4b)	0.2	0.0	-0.2	0.1
Accelerated productivity in coal and rail (Scenario 5a)	0.6	1.0	0.9	0.7
Accelerated productivity in coal; early removal of excess rail charges (Scenario 5b)	0.4	0.9	0.7	0.6

Source: MONASH-Coal simulations.

L1 COAL EXPORT PROJECTIONS

This attachment details and explains the coal export volume and export price projections used in the base case simulation of the MONASH-Coal model. These projections have implications for productivity changes in the base case and for each of the scenarios. These are discussed in Attachment L4.

L1.1 Export volumes

Table L1.1 contains annual projections for coking and thermal coal export volumes used in the base case (Scenario 1). These estimates are based primarily on ABARE forecasts of world coal demand and supply and of Australia's capacity to respond. The projections for thermal coal exports link ABARE medium-term forecasts for the years 1997–98 to 2002–03 to various long-term forecasts for the years 2003–4 to 2009–10. Base case projections for coking coal combine ABARE forecasts for the years 1997–98 to 2002–03 with conservative projections of growth for the period 2003–04 to 2009–10. The basis for the projections is discussed below.

Thermal coal

ABARE (1998a) medium-term forecasts were combined with ABARE's relatively conservative February Quarter (1997) long-term forecasts (ABARE 1997a). The results were compared with those of the US Energy Information Administration (EIA 1997). Table L1.1 summarises the export volume projections used in the base case simulation in MONASH-Coal.

According to ABARE (1997b and 1998a), the world market for thermal coal is expected to grow relatively strongly because of the growing demand for energy in Asia, and because coal is a relatively low cost fuel and coal-fired power technologies are well established. But with the recent currency and asset price devaluations in Asia, the growth in the demand for energy is likely to be more subdued. This will be reflected in a slow-down in the growth of Australian thermal coal exports in the medium term. More efficient use of coal in electricity generation (which is already evident in Japan) could further moderate export demand. In the longer term, the cost competitiveness of coal-fired power stations and the increasing demand for energy in developing countries suggest that developing countries will find it easier to finance new power projects.

Table L1.1: **Projections of Australian exports of thermal and coking coal** (Mt)

Year	*Thermal*	*Coking*[a]
1997–98	74.2	82.6
1998–99	75.4	84.1
1999–00	79.3	86.9
2000–01	83.0	89.6
2001–02	86.1	91.7
2002–03	88.4	93.9
2003–04	90.1	95.5
2004–05	91.2	96.5
2005–06	92.3	97.4
2006–07	93.4	98.4
2007–08	94.5	99.4
2008–09	95.6	100.4
2009–10	96.8	101.4
Average annual % change	**2.2**	**1.7**

a ABARE forecasts treat coking and non-coking metallurgical coals as a single category.
Source: Commission estimates.

Thermal coal is an abundant resource and the efficiency with which it is extracted, prepared and transported is improving constantly. Over the medium and long term, the outlook is for continued strong competition from low-cost suppliers in Indonesia, South Africa, Venezuela, Colombia and China.

Australia is expected to increase its share of world thermal coal trade from 22 per cent in 1996 to 23 per cent in 2003 (ABARE 1998a). However, achieving these export volumes (at lower real export prices, as discussed below) requires that Australian producers at least maintain their competitive position relative to other suppliers. The implications of this assumption for the local coal industry and its employees are discussed in Attachment L4.

Coking coal

The Commission used ABARE (1998a) medium term forecasts for coking coal exports for the period until 2002–03 and conservative growth estimates from ABARE (1997a) and EIA (1997) for the period 2003–04 to 2009–10.

ABARE (1997b and 1998a) forecasts that the world coking market will grow relatively slowly in the medium-term. This reflects slow growth in blast furnace steel production worldwide. Most growth in blast furnace steel production is likely to be in developing countries. Another reason for the relatively slow growth of coking coal exports to developed country markets is the widespread adoption of electric arc furnace technologies. These do not use coking coal directly but may use thermal coal indirectly through electricity consumption.

Pulverised coal injection (PCI) coals are weak coking coals or thermal coals that have no coking properties. Their consumption is expected to grow relative to coking coal consumption. Since PCI coals have been classified as coking coals in the export forecasts (Table L1.1), the substitution from coking coals to PCI coals is captured within the coking coal forecasts. ABARE estimates that 1 tonne of PCI coal can be substituted for around 1.4 tonnes of coking coal (ABARE 1998a).

The medium and long term impacts of the Asian currency devaluations are likely to be similar to those for thermal coal. Australian exports of coking coal seem likely to grow slightly. This reflects Australia's dominant supplier status in the regional coking coal market, a position which is unlikely to be threatened in the foreseeable future.

L1.2 Export prices

The base case projections for prices of thermal and coking coal faced by Australian exporters in nominal and real terms are set out in Table L1.2. Nominal projections are based on ABARE forecasts. They are deflated using a projection of the GDP deflator from MONASH-Coal.

While $US coal prices have fallen significantly in recent months, Australian coal producers have been shielded to some extent by depreciation of the $A against the $US. Thus the Australian dollar prices assumed in the base case are consistent with prices currently being received by Australian coal producers.

ABARE price projections (1998a) are used in the base case until 2002–03 and conservative estimates of price changes thereafter. Over the medium term, the weakened demand for thermal coal, the strong competition in the thermal coal market and the competition from alternative fuels used in electricity generation, should continue to depress thermal coal nominal prices. In the longer term, thermal coal nominal prices may strengthen as a result of strengthening demand for electricity in Asia. Thermal coal real prices are expected to continue to decline.

Table L1.2: **Nominal and real base case price projections for thermal and coking coal 1997–98 to 2009–10**

	Thermal		*Coking*		
Year	*nominal*	*real*	*nominal*	*real*	*nominal exchange rate*[a]
	$A/tonne	*$A/tonne*	*$A/tonne*	*$A/tonne*	*$A/$US*
1997–98	48.44	41.60	67.43	57.91	0.680
1998–99	45.50	37.75	64.98	53.91	0.684
1999–00	46.62	37.66	65.97	53.30	0.700
2000–01	45.71	35.68	65.25	50.93	0.710
2001–02	45.22	34.14	65.06	49.11	0.724
2002–03	44.83	32.79	64.54	47.21	0.730
2003–04	46.05	32.67	65.18	46.25	0.730
2004–05	47.30	32.55	65.84	45.31	0.730
2005–06	48.59	32.43	66.49	44.38	0.730
2006–07	49.91	32.34	67.16	43.52	0.730
2007–08	51.27	32.26	67.83	42.68	0.730
2008–09	52.67	32.20	68.51	41.89	0.730
2009–10	54.10	32.15	69.19	41.12	0.730
Annual % change	**0.9**	**-2.0**	**0.2**	**-2.6**	**na**

na Not applicable.
a $A/$US nominal exchange rate based on ABARE estimates.
Sources: Commission estimates based on ABARE (1998a), EIA (1997) and the IEA (1997).

Coking coal price projections in the base case use ABARE (1998a) estimates until 2002–03 and very conservative projections from ABARE (1997b) and the International Energy Agency (IEA) (1997) for the long term. Coking coal nominal prices are expected to remain relatively flat over the medium and long term, despite the shortage of high quality coking coals in the medium term. This is because of the expected uptake by the world steel industry of new technologies and the slower growth in some Asian economies. Real coking coal prices are expected to fall over the projection period.

L2 ELECTRICITY AND STEEL PROJECTIONS

L2.1 Domestic electricity generation trends

Approximately 80 per cent of Australian black coal used domestically is consumed by the electricity generating industry. This industry is, therefore, an important determinant of the outlook for black coal producers selling in the domestic market. A number of changes in the electricity generating industry have the potential to affect the Australian black coal industry. A substantial proportion of new generating capacity is likely to be gas-fired, although coal will continue to be the dominant fuel input in electricity generation, especially in generating baseload power.

Natural gas as a substitute

One change in electricity generation affecting the coal industry is the ability of electricity generators to substitute to gas as a fuel input. This is governed by construction and generation costs as well as the availability and reliability of gas supply.

Coal-fired plants have a much larger minimum efficient scale than gas turbines (GTs) and often produce lower thermal efficiencies (Table L2.1). Therefore, gas generation can be installed in smaller increments in capacity and brought on line more quickly than black coal-fired electricity generation. Gas, therefore, may be able to take advantage of some emerging opportunities.

Table L2.1: **Approximate scale and efficiency of generating technologies, 1998**

Generating technology	*Capacity range*	*Thermal efficiency*
	MW	*%*
Integrated gasification combined cycle	300–1000+	45–48
Combined cycle gas turbine	100–2000+	57–58
Coal-fired	600–2000+	38–40

Source: ABARE 1998a.

Despite considerably lower operating costs for coal-fired plants (Table L2.2), new entrants are preferring to invest in new gas-fired power stations. This, in

part, reflects anticipated greenhouse gas emission constraints following the recent agreement signed at the Third Conference of Parties to the UN Framework Convention on Climate Change (the 'Kyoto summit'). However, technological developments have meant that some coal-fired plants can now provide intermediate load power, previously the domain of gas-fired plants.[1]

Table L2.2: **Relative capital and operating costs of different generation plant, 1994**

Generating unit	*Total capital cost*	*Short run marginal cost*
	$ per kW	*$ per MWh*
Black coal-fired	1200	9–15
Gas turbines	500–600[a]	25–40[b]
Hydro	2000	20–30

a The capital cost of oil-fired gas turbines is $500/kW; for gas-fired it is $600/kW.

b The marginal cost for baseload combined-cycle gas turbines is $25–30/Mwh, while for peaking turbines it is $35–40/MWh.

Source: IC 1995a.

The ability of natural gas to substitute for coal in electricity generation also depends on its availability. Total known recoverable reserves of Australian natural gas are approximately 100 000 petajoules (PJ) (AGA 1996). If all of Australia's electricity was generated from these reserves, they would be depleted in a little over six years, based on current electricity consumption of 16 000 PJ a year (and would require the construction of a pipeline from western oilfields to eastern power stations).

The National Electricity Market

Another change in the electricity generating industry that could affect the black coal industry is the introduction of the National Electricity Market (NEM) and the subsequent ability of Victorian brown coal-fired electricity to substitute for NSW black coal-fired electricity.

It is expected that more competitive supply arrangements in, and pricing of, electricity will reduce the need for excess capacity. ACIL Economics and Policy (1997b) argues that low (variable) cost brown coal-fired electricity will displace black coal fired-generation during periods of lower demand. Particularly between midnight and 6am when pool prices in the NEM will be low, an excess

[1] However, based on current and projected capital costs and running costs of coal and gas-fired plant, gas probably will remain the main input into peak load and a large part of intermediate power generation.

of baseload generation may be expected to result in an inability of NSW to be dispatched ('fired-up'). According to ACIL (1997b):

> Black coal suppliers interested in competing against Victorian brown coal (in overnight power markets) will be obliged to consider innovative, flexible, (lower) coal pricing for 'midnight coal'. This price pressure may be required simply to defend existing market shares, and would certainly be intensified if the capacity of the interconnection between NSW and Victoria were to be increased. (p. 15).

However, a number of factors limit the export of Victorian brown coal-fired electricity into NSW. According to ACIL, it is unlikely that new brown coal-fired plants will be installed. It is likely that increasing Victorian electricity demand will constrain power available for export to other States. While brown coal-fired plants could supply at low marginal cost, in peak demand there may be little capacity available to take market share from NSW generators. In fact, ACIL (1997b) has estimated that, from 1999, NSW generators will be net exporters into Victoria (noting that Victorian generators are exporting into South Australia).

Although initial regulatory limitations on electricity trading between NSW and Victoria were removed in July 1997, the interconnection linking State electricity grids is of relatively modest capacity. The current capacity from Victoria to NSW represents approximately 10 per cent of typical peak demand in NSW, although this will vary considerably depending on temperature and systems conditions (Transgrid & VPX, undated).

In 1993–94, Victoria exported 385 GWh of electricity to NSW. Victorian exports to NSW amounted to less than 1 per cent of both total Victorian electricity generated and total NSW electricity consumed. However, Pacific Power has noted that since May 1997, Victorian generators have exported the equivalent of approximately 10 per cent of NSW annual output (sub. 39). The capital cost of upgrading the NSW-Victorian interconnection by 400 MW (4 per cent of NSW peak demand) is estimated at $40 million (IC 1995a) which is an additional constraint to transmission capacity.

Projections

ABARE (1997g) projects the sectoral pattern of energy consumption to remain broadly similar to that of the past two decades, with electricity generation maintaining its share of total energy consumption over the period (around 26 per cent). In the MONASH-Coal base case projections, electricity output grows slightly faster than the economy as a whole, due to high growth prospects for electricity-intensive industries such as basic metal products.

However, changes in the pattern of fuel consumption are expected within the electricity generating sector. ABARE (1997g) expects coal to continue to be the major fuel used in electricity generation. However, the role of natural gas is forecast to increase substantially, with black coal expected to lose market share. By 2009–10, natural gas is projected to account for 21 per cent of fuel inputs for thermal electricity generation, compared with 9 per cent in 1995–96.[2] Black coal's share is expected to fall from 59 per cent to 52 per cent over the same period, despite over 1 per cent average annual growth in the volume of thermal coal used in electricity generation (Table L2.3).[3]

Table L2.3: **Projected fuel input volumes for thermal electricity generation in Australia, 1995–96 to 2009–10**

Fuel		*1995–96*	*1999–2000*	*2004–05*	*2009–10*
Black coal	1995–96=100	100.0	102.2	106.9	114.5
	Share of total (%)	58.9	53.6	51.4	52.2
Brown coal	1995–96=100	100.0	106.6	107.0	106.8
	Share of total (%)	30.2	28.6	26.3	25.0
Natural gas	1995–96=100	100.0	206.5	282.6	306.5
	Share of total (%)	8.8	16.2	20.4	21.0
Petroleum	1995–96=100	100.0	80.7	109.8	109.5
	Share of total (%)	2.1	1.5	1.9	1.8
Total	**1995–96=100**	**100.0**	**112.3**	**122.5**	**129.0**

Source: Commission estimates based on ABARE 1997g.

The increase in the share of natural gas used to generate electricity reflects the expectation that a substantial proportion of *new* electricity generating capacity will be gas-fired (ABARE 1997g). These projections rely on assumptions based, in part, on factors such as the environmental advantages of natural gas; lower

2 Since at least 1993, ABARE has revised upward its forecasts for natural gas use in thermal electricity generation. In 1995, ABARE forecast natural gas use in thermal electricity to be 14 per cent by 2009–10.

3 ABARE does not present explicitly the assumptions upon which these forecasts are based. The forecasts are based on information collected in a biennial fuel and electricity survey of energy users (as well as other available information, including that from energy suppliers). The projections are therefore based implicitly on fuel consumers' own expectations about factors which will influence their energy use, such as greenhouse gas emission targets. These forecasts were published before the Third Conference of Parties to the UN Framework Convention on Climate Change.

set-up costs, shorter lead times and higher efficiencies for gas-fired generating plant; and electricity market reforms.

In the base case, electricity generation output is expected to grow at an average of 3.1 per cent each year (Table L2.4). At the same time, domestic sales of thermal black coal are projected to grow by only 1.3 per cent a year. This difference reflects the issues discussed above. That is, changes in the domestic economy will lead to a decrease in the domestic demand for coal per unit of electricity output.

Table L2.4: **Base case projections for electricity generation**

Year	*Australian electricity generation, annual percentage growth rates*
1998–99	4.5
1999–00	3.5
2000–01	2.8
2001–02	2.7
2002–03	4.0
2003–04	3.5
2004–05	2.1
2005–06	3.1
2006–07	2.6
2007–08	3.0
2008–09	3.0
2009–10	3.0
Average annual growth, 1998–99 to 2009–10	**3.1**

Sources: ABARE (unpublished data) and MONASH-Coal model.

L2.2 International electricity generation

Over 50 per cent of the total value of Australian thermal coal production is exported. Therefore, developments in electricity generation in foreign markets will have a significant impact on the Australian black coal industry. World electricity production is expected to almost double by the year 2020 (ABARE 1998a). The International Energy Agency (IEA) projects rapid growth in non-OECD electricity consumption — at an annual average rate in excess of 5 per cent over the period to 2010. OECD electricity consumption is expected to grow at around 2 per cent per year over the same period. Coal is expected to

remain the major fuel input, with world coal-fired power generation expected to grow at an average annual rate of 3 per cent (Table L2.5).[4]

Table L2.5 **Projected fuel input volumes for world electricity generating capacity, 1995 and 2020**

Fuel	*Installed capacity 1995*	*Predicted capacity 2020*	*Average annual growth*
	GW	*GW*	*%*
Coal	870	1836	3.0
Gas	435	1296	4.5
Oil	435	648	1.6
Hydro	667	1026	1.7
Nuclear	348	378	0.3
Other	145	216	1.6
Total	**2900**	**5400**	**2.5**

Source: ABARE 1998a.

ABARE's forecast for Australian exports of black coal (see Attachment L1) assumes that industrial production growth in Asian countries will result in increased thermal coal consumption in electricity generation. In recent years, demand in Asia for reliable supply of competitively priced electricity has been strong and growing. ABARE forecasts electricity consumption in the Asian region to grow by around 5.3 per cent per year (ABARE 1997a). The recent financial crises in some Asian economies may slow this demand growth over part of the projection period.

Power generation systems in Japan, China and south Asia are dominated by coal. While the IEA (1997) expects this to continue to be the case, restructuring and deregulation of the power generation sector combined with increasing prevalence of private capital may promote the use of gas in many regions. As in the Australian market, increased competition in electricity generation and distribution will place downward pressure on thermal coal prices.

Over half of Australia's thermal coal exports are to Japan, most of which is used in electricity generation. However, diversifying away from coal as an energy source may be difficult in Japan given that natural gas requires the construction of expensive import handling facilities and sites for nuclear power are difficult

[4] These forecasts were published before the Third Conference of Parties to the UN Framework Convention on Climate Change, at which an international agreement on greenhouse gas reductions was signed.

to find and lack public acceptance. In 1996 alone, a number of new Japanese coal-fired power stations came on line and coal used by Japanese public and independent power producers grew 7.1 per cent that year.

The Republic of Korea and Taiwan are other major destinations for Australian thermal coal. The IEA (1997) expects these countries and Japan to have new coal-fired power stations in operation by 1999 that will increase their total capacity by 38 per cent (assuming no power station closures). An acceleration in the construction of independent power projects is expected in Asia, with many expected to be coal-fired power stations (ABARE 1998a).

Unlike in Australia, it is therefore expected that the share of coal in Asia's fuel mix will increase over the medium term. The high relative cost and the less certain supply of gas is expected to constrain the competitiveness of gas-fired power stations (IEA 1994, IEA 1997 and ABARE 1998a). The IEA expects Japanese electricity generation to grow at an average rate of 1.3 per cent per year to 2010, with that generated from coal to grow at the same rate (IEA 1997). These factors will affect Australian exports of thermal coal. Details of coal export projections are contained in Attachment L1.

L2.3 Domestic steel production

Almost all coking coal is transformed into coke and used in blast furnaces for the production of pig-iron which is subsequently converted to steel. Hence, the demand for coking coal is derived from the demand for steel. However, technological developments in steel production that by-pass the blast furnace, such as electric arc furnaces (EAF), and more efficient blast furnace use of coal, through the introduction of pulverised coal injection (PCI) technology, can be expected to weaken the relationship between steel and coking coal demand.

Australian steel production is estimated to have declined marginally in 1996–97. In the immediate future, the decision to close blast furnaces in Newcastle in 1999 will be partly offset by the upgrading of Port Kembla and Rooty Hill steel making capacity. However, expanded EAF capacity focussed on providing steel to the domestic market may reduce local opportunities for black coal in steel production (ABARE 1997a and 1997b).

ABARE expects the volume of Australian steel production to fall on average by approximately 1 per cent per year to 2003 (ABARE 1998a). However, a change in the composition of steel exports toward higher value-added products is expected to increase the value of steel production. MONASH-Coal base case forecasts incorporate growth in domestic steel production averaging 1.2 per cent per year over the period to 2010 (see Table L2.6). Domestic sales of coking coal

are projected, in the base case, to fall by 1.6 per cent a year, reflecting increased use of EAF and PCI technology.

However, domestic steel production accounts for only 7 per cent of the value of coking coal output; the remainder is exported. Therefore, developments in foreign steel industries will have a greater effect on the Australian coking coal industry.

Table L2.6: **Base case projections for steel production**

Year	*Australian steel production projections, annual percentage growth rates*
1998–99	5.0
1999–00	-14.1
2000–01	0.5
2001–02	-5.8
2002–03	8.1
2003–04	7.5
2004–05	1.5
2005–06	0.1
2006–07	3.0
2007–08	3.2
2008–09	3.4
2009–10	3.5
Average annual growth, 1998–99 to 2009–10	**1.2**

Sources: ABARE (unpublished data) and MONASH-Coal model.

L2.4 International steel production

Demand for steel is expected to increase broadly in line with global economic growth and industrial production. Recent financial crises in parts of Asia are expected to result in a short-term slowing of world, blast furnace steel production growth (ABARE 1997c and 1998a).

OECD steel consumption is projected to remain relatively stable over the period to 2003. More relevant to Australia, total Asian steel production is forecast by ABARE to grow on average by 2.1 per cent per year to 2005.[5] Japan is forecast

[5] Forecast as at February 1998. Previous forecasts were for growth averaging 3.3 per cent each year.

to decrease steel production by 0.3 per cent per year and India is forecast to increase steel production by 5 per cent per year. These two countries are Australia's largest coking coal destinations, accounting for over half of coking coal exports.

As in the domestic market, technological change in world steel production is affecting coking coal demand. In 2010, 44 per cent of world steel production is expected to use EAF technology, up from 34 per cent in 1995 (ABARE 1998a). Despite the introduction of EAF, Asian blast furnace steel production is still expected to grow at similar rates to total steel production (ABARE 1998a). However, both Japan and India are increasing their use of PCI facilities in blast furnaces, thereby reducing their coking coal requirements. Presently, one tonne of PCI coal replaces about 1.4 tonnes of coking coal (IEA 1997). In recent years, increasing amounts of thermal coal have been used in PCI blast furnaces, further reducing coking coal requirements.

These factors result in modest export prospects for Australian coking coal. Attachment L1 contains more detail regarding coking coal exports.

L2.5 Summary

Electricity

Domestically, increasing competition in the electricity industry will be reflected in the fuel supply market and will be particularly severe on high-cost and inefficient coal producers. The NEM, increased competition in foreign electricity generation and competition from natural gas and brown coal (to the extent that it is possible) may change the nature of electricity markets such that black coal producers will need to respond by developing innovative pricing and supply arrangements.

Steel

The main driver of change in the steel industry with respect to coal is technological development. Growth in the Asian economies will result in increased steel production, although this will be somewhat dampened in the short to medium term following the recent financial crises in some economies. Increasing use of EAF and PCI facilities will partially offset growth in demand for coking coal.

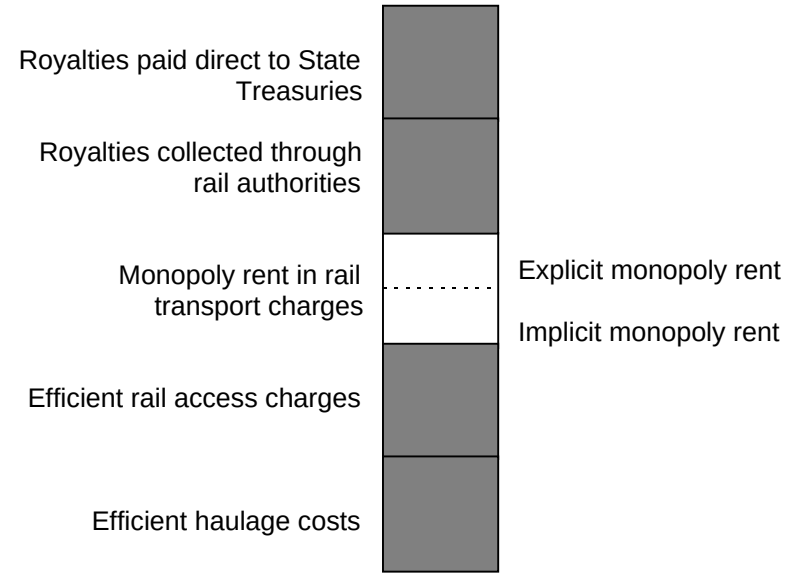
L3 ROYALTY ARRANGEMENTS

This attachment outlines the basis for estimates of future coal royalties which are included in the base case scenario.

L3.1 Current and future royalty arrangements

Current and future coal royalty arrangements in NSW and Queensland are discussed in Chapter 10. A conceptual disaggregation of current royalty and rail charges is presented in Figure L3.1.

Figure L3.1: **Conceptual decomposition of current royalty and rail charges in coal haulage**[a]



a Not to scale.

The impact of expected changes to royalty arrangements on future royalty rates and payments is examined below. Expected changes to monopoly rents in rail transport charges are discussed in Attachment L6.

L3.1.1 New South Wales

NSW imposes a $1.70 per tonne specific royalty on all coal produced as well as an additional $0.50 per tonne 'super' royalty on coal mined from newer, open cut mines.

NSW also collects royalties through the rail system in the form of excess charges for rail access. According to the NSW Government, this amounted to $1.20 per tonne in 1996–97. It is anticipated that this charge will be phased out over four years (by 25 per cent per year) and eliminated by 1 July 2000.

L3.1.2 Queensland

In Queensland, royalties for black coal exports are related to the value of production. Until 1994, coal exports were charged a royalty of 5 per cent and 4 per cent for open cut and underground mines respectively.

An *ad valorem* royalty of 7 per cent of the free on rail value of coal production was introduced in 1994 to apply to coal exports from new mines and mine expansions. This single rate is gradually replacing the two-rate system for existing mines, the changeover being linked to termination of existing rail contracts, as explained below.

Royalties are also collected on coal sold onto the domestic market. Until 1993, this was applied at a specific rate of 5 cents per tonne. The 7 per cent *ad valorem* royalty applying to export coal is also gradually being applied to domestic coal, phasing in at the rate of one per cent per year, over seven years.

As well as output-related royalties, the Queensland Government receives royalties which are collected through Queensland Rail (QR). QR charges for transport of black coal exceed the costs of providing rail transport. Since 1993–94, a portion of this excess charge has been remitted to Queensland Treasury as a coal royalty ($3.05 per tonne in 1995–96).

As existing rail contracts have expired, the royalty collected through QR has been removed and the mines converted to the new 7 per cent *ad valorem* royalty. In mid-1997 those mines still under existing contracts were offered the opportunity to terminate those contracts. It is expected that these contracts will be renegotiated by mid-1998, at which time the royalty charged by QR will cease (sub. 12, p. 10). The mines concerned will continue to pay the *ad valorem* royalty of 5 per cent for open cut mines and 4 per cent for underground mines, in addition to a special royalty, which is negotiated on a mine by mine basis, until 2000. From 2000, the 7 per cent *ad valorem* royalty will apply to these mines and the special royalty will cease.

L3.2 Future royalty rates and revenue

Estimates of future royalties have been incorporated in the MONASH-Coal database so that the impact of various productivity changes on royalty revenue can be quantified.

Drawing on available information about expected changes in royalty charges in NSW and Queensland, Table L3.1 summarises projections for royalty collections, apportioned between thermal and coking coal. These estimates allow MONASH-Coal to keep account of the effect of changes in productivity and black coal industry output on royalty collections. Estimates are expressed as *ad valorem* equivalent rates applied to the free on rail value of black coal.

Due to the phasing out of royalties collected through rail authorities and special royalties, effective royalty rates are anticipated to decline after 1999–00 in the absence of policy changes.

Table L3.1: **Estimated NSW and Queensland black coal royalty rates** (*ad valorem* % equivalents)

	Coking		*Thermal*	
Year	*Paid direct to State Treasuries*[a]	*Collected through rail authorities*[b]	*Paid direct to State Treasuries*[a]	*Collected through rail authorities*[b]
1997–98	6.6	1.9	7.1	2.5
1998–99	7.6	0.3	7.9	0.7
1999–00	7.4	0.1	7.4	0.3
2000–01	5.9	0.0	5.8	0.0
2001–02 to 2009–10	5.8	0.0	5.7	0.0

a Percentage of free on rail value of coal production.
b Percentage of free on rail value of coal railed.
Source: Commission estimates.

The impact of this decline on revenue is projected to be moderated somewhat by modest increases in coal output over the projection period (see Table L3.2).

Table L3.2: **Base case (Scenario 1): estimates for NSW and Queensland black coal royalties (including royalties collected through rail authorities)** ($ million)

Year	*Total*
1997–98	649
1998–99	665
1999–00	679
2000–01	546
2001–02	563
2002–03	572
2003–04	583
2004–05	599
2005–06	617
2006–07	625
2007–08	634
2008–09	645
2009–10	652

Source: Commission estimates.

L3 ROYALTY ARRANGEMENTS

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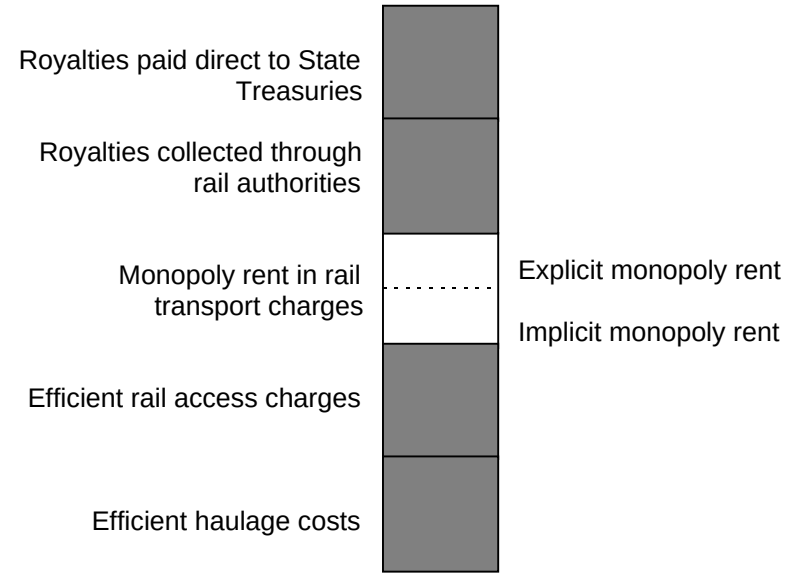

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NSW also collects royalties through the rail system in the form of excess charges for rail access. According to the NSW Government, this amounted to $1.20 per tonne in 1996–97. It is anticipated that this charge will be phased out over four years (by 25 per cent per year) and eliminated by 1 July 2000.

L3.1.2 Queensland

In Queensland, royalties for black coal exports are related to the value of production. Until 1994, coal exports were charged a royalty of 5 per cent and 4 per cent for open cut and underground mines respectively.

An *ad valorem* royalty of 7 per cent of the free on rail value of coal production was introduced in 1994 to apply to coal exports from new mines and mine expansions. This single rate is gradually replacing the two-rate system for existing mines, the changeover being linked to termination of existing rail contracts, as explained below.

Royalties are also collected on coal sold onto the domestic market. Until 1993, this was applied at a specific rate of 5 cents per tonne. The 7 per cent *ad valorem* royalty applying to export coal is also gradually being applied to domestic coal, phasing in at the rate of one per cent per year, over seven years.

As well as output-related royalties, the Queensland Government receives royalties which are collected through Queensland Rail (QR). QR charges for transport of black coal exceed the costs of providing rail transport. Since 1993–94, a portion of this excess charge has been remitted to Queensland Treasury as a coal royalty ($3.05 per tonne in 1995–96).

As existing rail contracts have expired, the royalty collected through QR has been removed and the mines converted to the new 7 per cent *ad valorem* royalty. In mid-1997 those mines still under existing contracts were offered the opportunity to terminate those contracts. It is expected that these contracts will be renegotiated by mid-1998, at which time the royalty charged by QR will cease (sub. 12, p. 10). The mines concerned will continue to pay the *ad valorem* royalty of 5 per cent for open cut mines and 4 per cent for underground mines, in addition to a special royalty, which is negotiated on a mine by mine basis, until 2000. From 2000, the 7 per cent *ad valorem* royalty will apply to these mines and the special royalty will cease.

L3.2 Future royalty rates and revenue

Estimates of future royalties have been incorporated in the MONASH-Coal database so that the impact of various productivity changes on royalty revenue can be quantified.

Drawing on available information about expected changes in royalty charges in NSW and Queensland, Table L3.1 summarises projections for royalty collections, apportioned between thermal and coking coal. These estimates allow MONASH-Coal to keep account of the effect of changes in productivity and black coal industry output on royalty collections. Estimates are expressed as *ad valorem* equivalent rates applied to the free on rail value of black coal.

Due to the phasing out of royalties collected through rail authorities and special royalties, effective royalty rates are anticipated to decline after 1999–00 in the absence of policy changes.

Table L3.1: **Estimated NSW and Queensland black coal royalty rates** (*ad valorem* % equivalents)

	Coking		*Thermal*	
Year	*Paid direct to State Treasuries*[a]	*Collected through rail authorities*[b]	*Paid direct to State Treasuries*[a]	*Collected through rail authorities*[b]
1997–98	6.6	1.9	7.1	2.5
1998–99	7.6	0.3	7.9	0.7
1999–00	7.4	0.1	7.4	0.3
2000–01	5.9	0.0	5.8	0.0
2001–02 to 2009–10	5.8	0.0	5.7	0.0

a Percentage of free on rail value of coal production.
b Percentage of free on rail value of coal railed.
Source: Commission estimates.

The impact of this decline on revenue is projected to be moderated somewhat by modest increases in coal output over the projection period (see Table L3.2).

Table L3.2: **Base case (Scenario 1): estimates for NSW and Queensland black coal royalties (including royalties collected through rail authorities)** ($ million)

Year	*Total*
1997–98	649
1998–99	665
1999–00	679
2000–01	546
2001–02	563
2002–03	572
2003–04	583
2004–05	599
2005–06	617
2006–07	625
2007–08	634
2008–09	645
2009–10	652

Source: Commission estimates.

L4 MODELLING CHANGES IN PRODUCTIVITY AND COSTS

This attachment analyses past productivity trends of the Australian black coal industry. It also explains productivity changes assumed for the MONASH-Coal simulations. The analysis suggests that labour productivity has improved largely as a result of an increase in the capital-labour ratio but that this had only a modest impact on the industry's competitiveness. The growth in total factor productivity in the base case is expected to be broadly similar as in recent years, though the scope for substituting capital for labour will decline.

L4.1 Recent trends in labour productivity

Over the past decade labour productivity in the Australian black coal industry has nearly doubled, from 5.2 kt per employee in 1986 to 9.6 kt per employee in 1996 (Table L4.1).[1] This is equivalent to increasing labour productivity by 6 per cent a year. Part of this productivity improvement was achieved by: reducing employment (the number of persons employed fell by over 2 per cent a year); and increasing output (raw coal production rose by between 3 and 4 per cent a year).

Over the past decade, production has become more concentrated in open cut mines as new open cut mines are commissioned and old underground mines decommissioned. The impact of the gradual shift from underground to open cut operations can be observed in Table L4.2. In 1986, open cut mines accounted for 67 per cent of all raw coal mined. By 1996, this had risen to 71 per cent. Between 1986 and 1996 open cut mines accounted for over 77 per cent of the increase in raw coal production. The greatest labour productivity improvements in open cut mines took place after 1990 and were largely the result of increased output rather than reductions in employment.

[1] As a partial measure, labour productivity provides a limited picture of productivity changes. In addition, if the number of hours worked increased over the decade, growth in labour productivity, measured in terms of output per hour of labour input, will be less than shown in Table L4.1.

Table L4.1: **Recent trends in employment, output and labour productivity in Australian black coal mines, 1986 to 1996**

Year	*Employment*[a]	*Output*	*Labour productivity*
	persons	*'000 t of raw coal*	*'000 t/person*[b]
1986	32 998	170 031	na
1990	29 730	201 368	6.77
1996	26 169	249 934	na
Average annual growth rate (per cent)			
1986 to 1990	-2.58	4.31	6.76
1990 to 1996	-2.10	3.67	5.97
1986 to 1996	-2.29	3.89	6.37

a Employment includes administrative, clerical, coal mine and coal preparation staff, whether employed directly or by contractor. Queensland numbers also include certain off-site staff directly involved in the operations of the coal mine.

b Thousands of tonnes of saleable coal per employee. The JCB and QCB data do not distinguish employment on the basis of hours worked.

Source: JCB and QCB (1997).

The introduction of new capital-intensive technologies in underground mines (that is, longwall equipment) and the closure of uneconomic underground mines is also evident in Table L4.2. Over the decade 1986 to 1996, labour productivity in underground mines rose by approximately 7.4 per cent per year, almost twice the rate for open cut mines (3.9 per cent per year). However, the rate of labour productivity increase in underground mines was higher in the five years to 1990, when it was 8.7 per cent per year. The source of much of the increase in underground mines appears to be reductions in employment rather than increases in output. Between 1986 and 1996, employment in underground mines fell by approximately 4.2 per cent per year whereas output rose by 2.9 per cent per year.

A more detailed examination of the performance across mines reveals that labour productivity actually fell among the least productive mines. According to Table L4.3, the labour productivity of the twenty least productive mines (ranked on the basis of labour productivity in 1995–96) *fell* by 3.6 per cent per year between 1991–92 and 1995–96. In contrast, the labour productivity of the middle twenty mines rose by 5.8 per cent a year. This growth was achieved by reducing labour requirements and increasing output. However, the level of labour productivity of this sample was still less than one-half that of the twenty most productive mines in Australia.

Table L4.2: **Recent trends in employment, output and labour productivity in underground and open cut black coal mines, 1986 to 1996[a]**

	Employment		*Output*		*Labour productivity*[b]	
Year	*UG*	*OC*	*UG*	*OC*	*UG*	*OC*
	persons	*persons*	*'000 t of raw coal*	*'000 t of raw coal*	*'000 t/person*	*'000 t/person*
1986	17 468	12 921	52 737	110 540	3.02	8.56
1990	14 005	13 837	59 008	134 403	4.21	9.71
1996	11 373	13 604	70 139	170 869	6.17	12.56
Average annual growth rate (per cent)						
1986 to 1990	-5.3	1.7	2.8	5.0	8.7	3.2
1990 to 1996	-3.4	-0.3	2.9	4.1	6.6	4.4
1986 to 1996	-4.2	0.5	2.9	4.5	7.4	3.9

a NSW and Queensland black coal mines only. Compare with Table L4.1 which is for all States/Territories. UG is underground, OC is open cut.

b Thousands of tonnes of saleable coal per employee. The JCB and QCB data do not distinguish employment on the basis of hours worked.

Source: JCB and QCB (1996)

Table L4.3: **Recent trends in employment, output and labour productivity among selected mines, 1991–92 to 1995–96[a]**

	1991–92	*1995–96*	*Average annual rate of growth (per cent)*
Top 20 mines[b]			
Employment (persons)	3 722	4 228	3.24
Output ('000 t raw)	54 583.2	73 797.9	7.83
Labour productivity ('000 t/p)	14.67	17.45	4.45
Middle 20 mines			
Employment (persons)	4 152	4 061	-0.55
Output ('000 t raw)	25 715.7	31 488.3	5.19
Labour productivity ('000 t/p)	6.19	7.75	5.78
Bottom 20 mines			
Employment (persons)	3 670	3 670	0.00
Output ('000 t raw)	15 776.3	13 636.2	-3.58
Labour productivity ('000 t/p)	4.30	3.72	-3.58

a Based on a sample of 111 NSW and Queensland black coal mines.

b In 1995–96, average labour productivity of the top 10 mines was 24.3 kt of raw coal per person.

Source: Barlow Jonker (1997).

A similar analysis of the regional patterns of productivity changes suggests that while the most productive mines are predominantly located in Queensland, the most rapid improvements to labour productivity took place in NSW. Improvements in NSW labour productivity were achieved by reducing employment and increasing output. Improvements in labour productivity in Queensland were achieved through increased output while maintaining employment (Table L4.4).

Table L4.4: **Recent trends in employment, output and labour productivity among Queensland and NSW mines, 1986 to 1996**

				Avg. annual rate of growth	
	1986	*1990*	*1996*	*1986–90*	*1990–96*
				%	*%*
Queensland mines					
Employment (persons)	10 629	10 588	10 843	-0.1	0.4
Output ('000 t raw)	82 967	98 982	124 344	4.5	3.9
Labour productivity ('000 t/p)	7.81	9.35	11.47	4.6	3.5
NSW mines					
Employment (persons)	19 760	17 254	14 134	-3.3	-3.3
Output ('000 t raw)	80 310	94 429	116 664	4.1	3.6
Labour productivity ('000 t/p)	4.06	5.47	8.25	7.7	7.1

Source: JCB and QCB (1997).

In summary, there are several reasons for the growth in labour productivity since 1986. They include:

- the commissioning of new capital-intensive open cut mines whose labour productivity is higher than the industry average;
- the decommissioning of older labour-intensive underground mines whose labour productivity is below the industry average;
- continued investment in capital equipment in existing open cut and underground mines, such as switching from continuous miner to longwall equipment in underground mines; and
- an underlying trend in technological change at the industry level and improved work arrangements.

Each factor has the effect of raising labour productivity by raising the capital-intensity (the capital-labour ratio) of the black coal industry. While the highest

levels of labour productivity were evident in open cut mines and in Queensland, the most rapidly improving mines were underground and in NSW.

L4.2 Recent trends in costs and total factor productivity

The cost competitiveness of the Australian black coal industry is influenced by a number of factors. The most important are the cost of inputs (such as materials, energy, capital, labour and other intermediate services), the combined productivity of those inputs (that is, total factor productivity or TFP), and the productivity and cost of margin services (such as rail transport and port handling). The industry's competitiveness is influenced also by new investment in existing and new mines. Drawing on available evidence, this section examines the influence of each factor on the black coal industry's competitiveness.

Table L4.5: **Average annual reductions in costs and export prices, 1986–87 to 1995–96**

	Thermal coal [a]			*Coking coal* [a]		
Year	*Nominal price*	*Real price*	*Change in marginal cost*[b,c]	*Nominal price*	*Real price*	*Change in marginal cost*[b,c]
	A$ t, fob	*A$ t, fob*	*per t*	*A$ t, fob*	*A$ t, fob*	*per t*
1986	45.8	56.8	na	63.3	78.5	na
1990	49.1	47.6	na	61.8	59.9	na
1996	49.3	43.8	na	61.3	54.4	na
Average annual growth rate (per cent)						
1986 to 1990	1.7	-4.3	-5.1	-0.6	-6.5	-7.1
1990 to 1996	0.0	-1.7	-2.3	-0.2	-1.9	-2.8
1986 to 1996	0.8	-2.8	-3.6	-0.4	-4.0	-4.7

na Not applicable.

a Nominal values obtained from ABARE. Real values obtained using the MONASH-Coal GDP deflator.

b The change in the marginal cost is defined as the percentage shift in the industry's export supply curve, where the curve is log-linear with an own-price elasticity of 5. The export demand elasticities are given in Attachment L5.

c Various assumptions of the export supply elasticity were tested. As the export supply elasticity approaches 1, the change in the marginal cost almost doubles from that shown. As the export elasticity approaches infinity, the change in the marginal cost approaches the change in the real price.

Source: Commission estimates based on unpublished ABARE data.

An improvement in the competitiveness of the black coal industry can be represented by a downward shift of the industry's export supply curve.[2] Using historic data and assumptions about the industry's export demand and export supply responses, Table L4.5 reports the average annual reductions in the industry's export prices as well as an indication of the shifts in the industry's export supply curve necessary to match observed price and quantity changes. According to the data underlying Table L4.5, between 1986–87 and 1995–96 the real price per tonne of Australian coal fell between 2.8 and 4 per cent per year.

Table L4.6 summarises how some non-capital input costs have changed over the same period.

Table L4.6: **Changes in the real cost of non-capital inputs to black coal production, 1986–87 to 1995–96**[a]

	Labour costs[b]		*Material costs*[c]		*Total non-capital costs*[d]	
Year	*UG*	*OC*	*UG*	*OC*	*UG*	*OC*
Average annual percentage growth rate						
1986–87 to 1990–91	3.7	3.7	-2.6	-1.1	-0.5	0.5
1990–91 to 1995–96	1.7	1.7	0.2	0.2	0.7	0.7
1986–87 to 1995–96	2.7	2.7	-1.5	-0.8	-0.2	0.3

a Since the data include the brown coal mining sector, figures should be regarded as indicative only.
b Average wages and salaries per employee. Includes severance, termination, redundancy payments, overtime earnings penalty payments and shift allowances, all paid leave, leave loadings and bonuses. Contract labour not included. Percentage changes were deflated by the MONASH-Coal GDP deflator.
c Other includes such non-capital materials as distillate and lubricants, explosives, mechanical spare parts, washplant compounds, electricity, roof supports, and mechanical spare parts. Does not include off-site contract services. Percentage changes were deflated by the MONASH-Coal GDP deflator.
d Total is the share-weighted sum of changes in costs. Labour share is 0.42 and other share is 0.58.
Source: Commission estimates based on ABS (1989, 1991, 1993, 1995, 1997a, 1997b).

The data in Table L4.6 do not include changes in the costs of off-site contract labour and various services. As such, the cost index is only partial. The results suggest that the industry's non-capital input costs, when measured in real terms, changed little between 1986–87 and 1995–96. Labour costs tended to rise in real terms (especially in the period 1986–87 to 1990–91), but material costs tended to fall over the same period.

[2] The discussion should be concerned ideally with the combined domestic and export supply curves. However, data limitations restrict the discussion to the export demand curve. Given that nearly all of coking and the majority of thermal coal production is exported, the result of the following analysis should not be compromised.

If real input costs did not contribute to the industry's improved competitiveness, then the industry's export capacity must have improved as a result of TFP growth and/or new capital investment.[3]

Table L4.7: **Average annual change in total, labour and capital productivity** (%)

	NSW mines	*Queensland mines*
Before 1990–91		
Total productivity[a]	0.3	0.3
Labour productivity	7.7	4.6
Capital productivity[b]	-4.5	-2.5
After 1990–91		
Total productivity[c]	1.0	1.0
Labour productivity	7.1	3.5
Capital productivity[b]	-3.4	-1.2

a 1984–85 to 1988–89 for total factor productivity.

b Calculated using the formula $KP = TFP - S_L*LP$, where KP is capital productivity growth, TFP is TFP growth, LP is labour productivity growth and S_L the share of labour in total costs. Assumes no productivity improvement in materials or fuels.

c 1989–90 to 1994–95 for total factor productivity.

Sources: Commission estimates based on IC (1997a) and JCB and QCB (1997) data.

There are several ways in which the industry can raise its TFP growth. One way is for each mine to adopt better work and management practices and new technologies. Another, is by closing uneconomic mines and replacing their capacity with more efficient operations.

Available measures of TFP growth suggest that the mining sector's productivity grew by 0.3 per cent per year before 1990–91 and by 1 per cent per year after 1990–91. TFP growth is defined as the share-weighted sum of the productivity improvements to labour, capital and other inputs. Assuming that the trend in the TFP growth was the same for both the mining sector as a whole as for the coal mining industry, and given that labour productivity measures are widely

[3] Shifts in the export supply curve could also occur as the result of reducing input costs such as royalties, rail and port charges and other inputs not included in the above cost index.

available, it is possible to obtain the pattern of capital productivity growth since 1986–87.[4] These estimates are reported in Table L4.7.

The TFP growth in the mining sector (and, by assumption, the black coal industry) was below that achieved by the economy as a whole. The average TFP growth for all Australian industries for the period 1984–85 to 1988–89 was 0.7 per cent per year, and for the period 1989–90 to 1994–95 was 1.2 per cent per year. Since labour productivity growth was relatively high and TFP growth low, capital productivity growth must have been negative.

The negative productivity growth of capital is consistent with declining rates of return to capital, since for a given set of prices, declining productivity levels would lower returns to investors. The NSW Minerals Council (1997) survey of NSW black coal mines shows that, between 1987 and 1996, returns to shareholders' funds (including abnormals and extraordinary items) were on average 3.6 per cent a year or less than half of the 11.8 per cent a year for the mining sector as a whole. The high growth in labour productivity and the declining productivity of capital further demonstrates how capital was substituted for labour throughout the late 1980s and early 1990s.

Table L4.8 summarises major factors underlying the apparent shift in the industry's export supply curve between 1986–87 and 1995–96. Since 1986–87, the Australian black coal industry has been able to achieve significant improvements in its competitiveness. Part of this improvement has been obtained by investing in new capital and substituting capital for labour. This had the effect of raising labour productivity and reducing capital productivity (where rates of return to investors have been below levels elsewhere in the mining sector).

Changes in non-capital costs do not appear to have affected the competitiveness of the industry adversely, although this conclusion is limited by the partial nature of the measure. Concurrent with capital expansion, the Australian black coal industry increased its capacity significantly, apparently accounting for much of the observed expansion in exports. Some improvements in rail and port handling also may have had an impact.

[4] It is likely that these TFP growth rates are optimistic since anecdotal evidence suggests that productivity growth in other mining industries was higher than in the Australian black coal industry (sub. 3, sub. 14 and sub. 22).

Table L4.8: **Summary of the black coal industry's performance between 1986–87 and 1995–96** (%)

Year	*Average annual percentage growth rate*[a]
Before 1990–91	
Change in input costs	approx. 0.0
plus changes to TFP	approx. 0.3
plus changes to other factors[b]	approx. 5.8
equal the observed shift in industry export supply	approx. 6.1
After 1990–91	
Change in input costs	approx. -0.7
plus changes to TFP	approx. 1.0
plus changes to other factors[b]	approx. 2.2
equal the observed shift in industry export supply	approx. 2.5

a A negative annual growth rate indicates a decline in competitiveness, and a positive is an improvement in competitiveness.

b 'Other' factors include mostly new investment, improvements in rail and port services, and reductions in the costs of other inputs not otherwise included above.

Source: Commission estimates.

L4.3 Modelling costs and total factor productivity in the base case

Scenario 1 represents the base case simulation of the MONASH-Coal model. In the context of this inquiry, it represents the most likely state of the economy and the Australian black coal industry, were the black coal industry to operate on a business as usual basis and not undertake significant reforms to its work and management practices.

ABARE's projections of export volumes and prices assume that the Australian black coal industry is able to increase slightly its share of world coal trade. This requires Australian producers to continue lowering their real unit costs as they did between 1986–87 and 1995–96. This section provides the Commission's assumptions regarding the industry's productivity improvements in the base case simulation. The implications for the productivity improvements necessary to meet the projections of export prices and volumes are shown in Table L4.9.

Table L4.9: **Projections of average annual reductions in costs and export prices, 1997–98 to 2009–10[a]**

Year	*Thermal coal* [a]			*Coking coal* [a]		
	Nominal price	*Real price*	*Change in marginal cost*[b,c]	*Nominal price*	*Real price*	*Change in marginal cost*[b,c]
	A$ t, fob	*A$ t, fob*	*per t*	*A$ t, fob*	*A$ t, fob*	*per t*
1997–98	48.4	41.6	na	67.4	78.5	na
2003–04	46.1	32.7	na	65.8	59.9	na
2009–10	54.1	32.2	na	69.2	54.4	na
Average annual percentage change						
1997–98 to 2003–04	-0.8	-3.9	-4.5	-0.6	-4.4	-4.1
2003–04 to 2009–10	2.7	-0.3	-0.5	1.0	-1.6	-2.2
1997–98 to 2009–10	0.9	-2.0	-2.5	0.2	-2.6	-3.1

na Not available.
a See notes to Table L4.5 on the method used to obtain estimates of the change in the marginal cost.
Sources: Commission estimates based on Tables L1.1 and L1.2.

Throughout the projection period, the industry's costs must decrease by an average of between 2.5 and 3.1 per cent year to meet the projection export prices and volumes. On the basis of past TFP growth trends, a growth of TFP of approximately 1.2 per cent per year seems achievable for the industry because of increased pressure on black coal producers to improve competitiveness. Export supply also is likely to expand as the result of input cost reductions, continued capital growth, and reforms in rail and port services.

It is likely that there will be less scope for continuing to substitute capital for labour because:

- opportunities to continue investing in longwall equipment in underground mines are declining; and
- low and declining rates of return will reduce the incentive to continue investing in new capital equipment.

On the basis of past productivity trends discussed in Section L4.1, the Commission assumes that labour productivity growth will decline from 6 per cent a year (the average achieved in recent history) to approximately 3 per cent a year. Labour productivity growth is assumed to be 6 per cent per year between 1989–99 and 2002–03. The rate of labour productivity growth is expected to fall until it reaches 3 per cent per year in 2005–06, remaining at that level until 2009–10.

Given that TFP growth is assumed to be 1.2 per cent per year, this implies that, as labour productivity declines from 6.0 per cent per year to 3.0 per cent per year, capital productivity growth gradually improves from -2.5 per cent per year to -0.7 per cent per year. The improved productivity performance in the base case is consistent with rates of return to capital improving (Table L4.10).

Table L4.10: **Projected TFP growth in the base case, 1998–99 to 2009–10**

	1998–99 to 2004–05	*2004–05 to 2009–10*
	per cent per annum	*per cent per annum*
Total factor productivity	1.2	1.2
Labour productivity	gradually declining from 6.0 to 3.0	3.0
Capital productivity[a]	gradually improving from -2.5 to -0.7	-0.7

a Calculated using the formula $KP = TP - S_L*LP$, where KP is capital productivity growth, TFP is TFP growth, LP is labour productivity growth and S_L the share of labour in total costs. Assumes no productivity improvement in materials or fuels.

Source: Commission estimates.

These two assumptions were included in the MONASH-Coal base case simulation (Scenario 1). The 1.2 per cent TFP growth is assumed to occur only among the primary factors, labour and capital, since preliminary studies of the productive efficiency of Australian black coal mines suggest that use of material inputs are relatively efficient (Swan Consultants 1994 and sub. 22). Given that labour and capital (the primary factors) comprise approximately 40 per cent of all industry costs, their productivity would need to increase by 2.9 per cent per year to achieve a 1.2 per cent TFP growth.

Table L4.11 shows the actual primary factor-saving technical change parameters used in the base case simulation. These differ slightly from those implied in Table L4.10 because MONASH-Coal requires a uniform change in all industries' unit requirements for primary factors to reconcile (at the macroeconomic level) movements in real GDP and aggregate factor inputs.

Table L4.11: **Projected primary factor-saving technical shocks employed in MONASH-Coal in the base case, 1998–99 to 2009–10** (per cent per annum)

	Coking coal	*Thermal coal*
Primary factor-saving technical change	2.55	2.94

Source: CoPS estimates.

L4.4 Modelling the changes in productivity

The results of Scenarios 2 to 5 are used to compare potential states of the Australian economy and the Australian black coal industry with the base case simulation (Scenario 1). Scenario 2 assumes that there are no productivity improvements in the Australian black coal industry beyond 1997–98, except for the economy-wide productivity improvements that MONASH-Coal applies to all industries. Scenario 3 assumes that productivity growth in the industry is accelerated as better work and management practices are introduced. Scenarios 4a and 4b use the same productivity assumptions as in Scenario 3, but employ differing assumptions regarding the responses of overseas buyers to changes in Australian coal prices. Scenarios 5a and 5b employ the same assumptions in productivity improvements as in Scenario 3, but also makes additional assumptions about productivity improvements and freight rate reductions by the rail sector.

According to benchmarking studies of the productivity performance of Australian black coal mines, the TFP levels of the average Australian open cut and underground black coal mines are consistently less than the identified better practice mines (Swan Consultants 1994 and sub. 22). On the other hand, dragline operations in Queensland were identified as being best-practice. The size of the productivity gap varied across the mines and mining technologies. The findings suggest that the average Australian black coal mine must increase its TFP level at the mine face by over 30 per cent to match international better practice. The productivity improvements are greatest for NSW truck and shovel mines.

Table L4.12 shows the assumed primary factor-saving technical change for Scenarios 2 to 5. The 30 percentage point primary factor productivity improvement is assumed to occur for Scenarios 3 to 5 over a period of five years. This improvement was spread over the 5 years between 1998–99 and 2002–03, or at 5.38 per cent per year since the productivity growth rate is cumulative. Since the benefits of productivity improvements are assumed to cease after 2002–03, the actual productivity bonus to the industry's primary factors in 2009–10 is approximately 24 per cent.

Scenario 2 illustrates the primary factor-saving technical change in the case where the Australian black coal industry was not able to improve its TFP growth. The slight negative TFP growth reflects the impact of other downstream industries (such as electricity generation and steel mills) continuing to save on the use of the amount of coal input for every unit of their output.

Table L4.12: **Assumed primary factor-saving technical change, by scenario, annual average for period 1998–99 to 2009–10** (per cent per annum)

	Coking coal	*Thermal coal*
Scenario 1	2.55	2.94
Scenario 2	-0.09	-0.09
Scenarios 3, 4a, 4b	4.78	5.18
Scenarios 5a, 5b	4.78	5.18

Source: CoPS estimates.

L5 EXPORT DEMAND ELASTICITIES

This attachment discusses the basis for the export demand elasticities for coking and thermal coal used in the MONASH-Coal model. Conceptual issues are discussed and evidence is provided for the relative magnitude of demand elasticities for coking and thermal coal used in the model.

L5.1 Market structure

The own price elasticity of demand represents the percentage change in the quantity of a good demanded in response to a percentage change in its price. In the MONASH-Coal model, export demand elasticities are used to predict the increase in the demand for Australian exports as a consequence of a decrease in Australia's free on board (fob) prices. Export elasticities are used to model the behaviour of foreign buyers. It is important to use a proper estimate of the export demand elasticities because black coal exports constitute a relatively large share of the total value of Australian exports. Any change in the price of Australian coal may have a significant effect on Australia's total exports.

A number of factors can potentially influence the magnitude of export demand elasticities for black coal. The most important is the structure of the international market for coal. If Australian coal exports face little competition from other coal and energy producers and there are a large number of coal buyers, then Australian coal prices may have a significant impact on world coal prices. In that event, the export demand elasticity used in the MONASH-Coal model would need to be relatively small.

If there are a large number of coal suppliers and buyers, the international market for coal will be competitive. Australian producers will have little influence over world coal prices. In this case, the export demand elasticities used in the MONASH-Coal model would need to be relatively large.

If there are a large number of coal suppliers but relatively few buyers of coal in the international market-place, Australian coal prices will have little impact world coal prices. Accordingly, the MONASH-Coal model would require a relatively large export demand elasticity.

Finally, if Australian coal exports face little competition from other coal producers and there are only a few coal buyers, then world coal prices may be affected by decisions made by both Australian coal producers and the coal buyers. The export demand elasticity used in the MONASH-Coal model would

need to be relatively small. The extent to which Australian coal producers would be able to influence prices would depend on the relative bargaining strengths of both parties.

L5.2 Econometric evidence

There are few studies that have directly estimated the Australian export demand elasticities for thermal and coking coal, although there are several studies that have attempted to measure the related concept — the foreign import demand elasticity. The foreign import demand elasticity is the price responsiveness in overseas countries to changes in the cost insurance freight (cif) price of Australian coal imports. Foreign import demand elasticities can be used to calculate the Australian export demand elasticity, since the Australian export demand curve for coal is (approximately) equal to the sum of the foreign country import demand curves across all countries importing Australian coal.[1] See ABARE 1991 and 1998b for an introduction to the Australian literature on import demand elasticities.

ABARE (1991) estimated the foreign import demand elasticities for Australia's key export markets — Western Europe and Japan. The authors argued that there was sufficient diversity between coal types (on the basis of specific coal characteristics, such as the calorific value, volatility, swelling properties, ash and sulphur content, and on the basis of security of supply) to use an Armington framework to estimate export demand elasticities for Australian black coal.[2] Foreign country import demand elasticities estimated are presented in Table L5.1.

[1] Calculation of export demand elasticities from import demand elasticities is complicated by the fact that export demand curves are denominated in the exporting country's fob price while import demand curves are denominated in the importing country's cif price.

[2] An Armington framework allows a country's imports to be treated as imperfect substitutes for domestically-produced goods. An Armington elasticity is defined as the proportionate change in the ratio of imports to domestically-produced goods, relative to the proportionate change in the ratio of domestic to import prices. A high Armington elasticity implies a high degree of substitutability between the domestic and foreign goods.

Table L5.1: **Foreign country import demand elasticities for Australian black coal, 1979 to 1988, average annual estimates**

Market	*Coal type*	*Aggregate import demand elasticity*[a]
Western Europe	Thermal	-1.21 to -1.31
	Coking	-0.30 to -0.40
Japan	Thermal	-0.40 to -0.79
	Coking	-0.13 to -0.37

a The aggregate import demand elasticity is reported as a range and depends on the assumed value of ε (a country's import demand elasticity for coal). Each foreign country's import demand elasticity is calculated as e+Sε, where *e* is the partial import demand elasticity facing Australia in that country, *S* is the share of that country's coal imports from Australia, and ε is the import demand elasticity in that country for all coal imports.

Source: ABARE (1991, p. 29).

There are two patterns that emerge from the analysis. The import demand elasticities for thermal coal are greater than for coking coal, and greater for Western Europe than they are for Japan. Even if an aggregate export demand elasticity were to be calculated from these import demand elasticities, there are several reasons why the elasticities in Table L5.1 are too small for the purpose of the modelling exercise.

The international thermal coal market is best characterised as comprising a large number of suppliers and customers. Thermal coal is a relatively homogeneous product whose principal pricing characteristic is its energy content (ABARE 1998b, p. 3). Australian thermal coal exports are currently facing increased competitive pressure from suppliers from other countries such as the United States, China and Indonesia.[3] While not all collieries from these regions supply the same export markets as Australian producers, they are contributing directly and indirectly to the increasingly competitive international spot market for coal.

The thermal coal market is also subject to competition from a number of other energy sources such as natural gas. The electricity industries in many countries are also subject to deregulation that is likely to result in greater competition in their input markets (ABARE 1998b).

The world coking coal industry is concentrated in both suppliers and buyers, with Australian exports accounting for 41 per cent of world seaborne trade.

3 More tightly specified open tenders for coal issued by buyers indicates substitution between coals is likely to increase (IEA 1997).

However, a number of factors prevent Australian coal producers from significantly influencing world coking coal prices. The first factor is the ability of Canadian and US coking coal producers to expand production and to switch coal between the European and Asian markets. This supply responsiveness has been facilitated by the Japanese steel mills which have encouraged the coal industries in each country through direct investments and coal purchasing practices.

The second factor limiting the pricing power of Australian producers is the emergence of new technologies in steel-making, such as electric arc furnaces (EAF) and pulverised coal injection (PCI) which enable steel makers to substitute between different coal types and energy sources. This means that coking coal producers increasingly are competing with thermal coal producers and suppliers of natural gas.

Third, while transport costs confer a cost advantage on Australian producers in supplying Asian markets, North American supply to Asia serves as a cap on the maximum price achievable by Australian producers.

Finally, the potential for large domestic coke and coking coal producers, such as China, to develop export capacity imposes a constraint on the pricing power of Australian producers in the longer term (see Chapter 2).

Econometric techniques often can provide estimates that differ from those implied by theory. Econometric models that do not account for shifts of the supply curve, can yield elasticities that are smaller than simultaneous demand and supply models (Orcutt 1950). Also, long term coal price contracts tend to reduce price and quantity variation. In the presence of limited variation in the data, econometric techniques risk reporting an absence of any statistically significant relationship. This can suggest that the underlying export demand elasticities are close to zero.

A characteristic feature of both thermal and coking coal elasticities in Table L5.1 is that they are estimated using quarterly and annual data. As average annual estimates, they do not include distributed lag terms to account for the potential long-run opportunities to switch between coal types and undertake capital investment. The estimates in Table L5.1 are more likely to reflect short-run estimates than long-run estimates.

Both steel mills and thermal coal plants have more scope to respond to such effects in the long-run (particularly since the time horizon of the modelling exercise covers a period of twelve years to 2009–10) by revising coal contracts, adjusting coal blends, seeking alternative energy sources and undertaking new investments. The elasticities given in Table L5.1 need to be adjusted to long-run elasticities for the purpose of the MONASH-Coal model.

L5.3 Commission estimates

Given the increasing competition among coal suppliers world-wide and improved substitution between coal types, it seems appropriate that the export elasticity of demand be re-estimated using the following formula. It expresses Australian export demand elasticity for coking and thermal coal as a function of the share of Australia in the demands and supplies of coal in other countries:

$$\eta_{da} = \eta_{d.} (D_w/Q_a) - \varepsilon_{sc} (S_c/Q_a)$$

where η_{da} = total export demand elasticity for Australian coal, $\eta_{d.}$ = average elasticity of demand of other countries, ε_{sc} = average elasticity of supply of other countries, D_w = other countries' demand, Q_a = Australian production, and S_c = other countries' supply (IAC 1976).

A proxy for $\eta_{d.}$ can be estimated from the Armington elasticities of demand for each of Australia's importing regions estimated by ABARE (1991) using the formula:

$$\eta_{d.} = \Sigma_i (X_{ij}/X_j) \eta_{ijj}$$

where η_{ijj} = the Armington elasticity of demand for a commodity from Australia (country *j*) with respect to a change in price of country *j* in country *i*, X_{ij} = the quantity of coal from Australia (country *j*) consumed in country *i*, and X_j = the total amount of coal exported from country *j*.

A number of studies of energy demand have found that long-run elasticities tend to be between 50 per cent and 200 per cent larger than short-run elasticities (see Dahl 1994 for an overview). For the purpose of the black coal modelling exercise, the long-run elasticities of demand ($\eta_{d.}$) were assumed to be 50 per cent larger than the short-run estimates in ABARE 1991. These long-run elasticities were used to estimate the total export demand elasticity for Australia (η_{da}) for the period 1990 to 1995 (see Table L5.3).

The assumed size of the market in which Australian coal producers compete determines the formula's demand and supply shares, and they in turn, determine the size of the export demand elasticity. If Australian coal producers directly or indirectly compete with North American and European coal mines, then the appropriate demand and supply shares depend on world demand and production. In this case, Australia's export demand elasticity is likely to be large. If Australian coal producers compete with coal producers from the Asian, Pacific and Indian Ocean regions, then the appropriate demand and supply shares depend on regional demand and production. Australia's export demand

elasticity will be smaller. Table L5.2 summarises some of the market shares for Australian thermal and coking coal exports for a number of markets.

Table L5.2: **Shares of Australian coal exports in seaborne coal trade, 1995 and 1996** (per cent)

	Australian exports as a share of:			
	World trade	*Japanese imports*	*Rest of Asia imports*	*Rest of world imports*
Coking coal	41	48	69	25
Thermal coal	22	57	32	6

Source: IEA (1997).

The Australian market share is 41 per cent for world seaborne coking coal trade and 22 per cent for world seaborne thermal coal trade. The contribution of Australian coking and thermal coal exports to Japan and the rest of Asia is greater than for the world as a whole. However, Australia's market shares of the rest of the world's coking coal imports are considerably smaller.

Table L5.3 summarises Australia's share of world and non-European production.

Since the export demand elasticities in the MONASH model do not distinguish between individual importing countries, the elasticities were calculated for various scenarios, each reflecting different assumptions about the relevant coking and thermal coal markets.

Table L5.3: **Shares of Australian coal production in world and regional production, 1995** (per cent)

	Australian production as a share of	
	World production	*Non-European production*
Coking coal	14	16
Thermal coal	3	4

Source: IEA (1997).

The revised elasticity estimates are given in Table L5.4. There are four estimates, reflecting the potential competitors to Australian coal producers. They are:

- all of the world's coal producers;

- all of the world's exporters (that is, not those supplying foreign domestic suppliers);
- all producers in the Asian, Pacific and Indian Ocean regions; and
- all exporters in the Asian, Pacific and Indian Ocean regions (but not producers supplying foreign domestic suppliers).

There is considerable variation among these estimates between the scenarios.

Both the Commission's estimates and those of ABARE (1991) suggest that the quantity response to changes in the price of coking coal is lower than that for thermal coal. The very elastic demand for thermal coal reflects Australia's relatively small share of world production of thermal coal, whereas the less elastic demand for coking coal reflects Australia's relatively large share of world production of coking coal.

Table L5.4: **Australia's total elasticity of export demand for coking and thermal coal, under different scenarios, 1990 to 1995**

	Production[a]	*Seaborne trade*[a]
Coking[b]		
World	-6.8 to -13.8	-2.0 to -4.0
Asia-Pacific & Indian Ocean	-5.7 to -11.5	-1.8 to -3.5
Thermal[b]		
World	-55.3 to -94.2	-6.5 to -10.9
Asia-Pacific & Indian Ocean	-50.3 to -85.7	-5.9 to -9.9

a Shares based on Australia's share in world production, and the share of Australia's exports in world seaborne trade respectively.

b ε_{sc} was assumed to vary between 0.75 and 1.5. $\eta_{d.}$ was derived from estimates in ABARE (1991) by taking a weighted average of the Western European and Japanese import demand elasticities. This average elasticity, η_{ijj}, was inflated by 50 per cent to account for long-run response. $\eta_{d.}$ for coking coal varied between -0.29 and -0.59. $\eta_{d.}$ for thermal coal varied between -0.95 and -1.4.

Source: Commission estimates.

L5.4 Conclusions

The discussion in Section L5.2 argued that, for the purpose of the simulations, the elasticities should capture the long-run responses of overseas buyers in an economic climate where competition for thermal coal was increasing. For

coking coal, the discussion emphasised that the elasticities ought to capture the increasing share of steel production using PCI and EAF technologies and the supply responsiveness of Canadian and US producers.

The econometric evidence presented above suggests that there are differences in demand elasticities for coking and thermal coal. The long-run elasticities are in the order of -1.8 to -13.8 for coking coal and -5.9 to -94.2 for thermal coal. The wide range of these estimates reflects the sensitivity of the elasticities to assumptions of what constitutes the market in which Australian coal producers compete.

These results are consistent with anecdotal observations of Australia's market share in thermal and coking coals. The elasticity of demand for Australian thermal coal is likely to be high given the low share of Australian coal in the world market for thermal coal. The relatively large share of Australian coking coal in the world market explains the relatively smaller elasticity of demand.

For the purpose of Scenarios 2 to 5, the Commission chose elasticities of -10 for coking coal and -20 for thermal coal. The coking coal estimate is at the 'high end' of the range of possible elasticities because of the Commission's view that Australian coking coal producers have little direct influence on international coking coal prices. The estimate for the thermal coal was set at -20 because in MONASH-Coal the upper limit of the demand elasticities is effectively -20 since actual quantity responses are constrained by the supply response of the industry.

To account for possible concerns regarding the size of the assumed export demand elasticities, sensitivity analysis was undertaken for Scenario 3. The elasticities for coking and thermal coal were set at -5 and -10 respectively. The results of the sensitivity analysis are reported in Appendix L. In addition, Scenarios 4a and 4b model the impact of productivity improvements where foreign buyers are assumed to influence prices of Australian black coal exports.

L6 MONOPOLY RENTS AND PRODUCTIVITY IN RAIL TRANSPORT

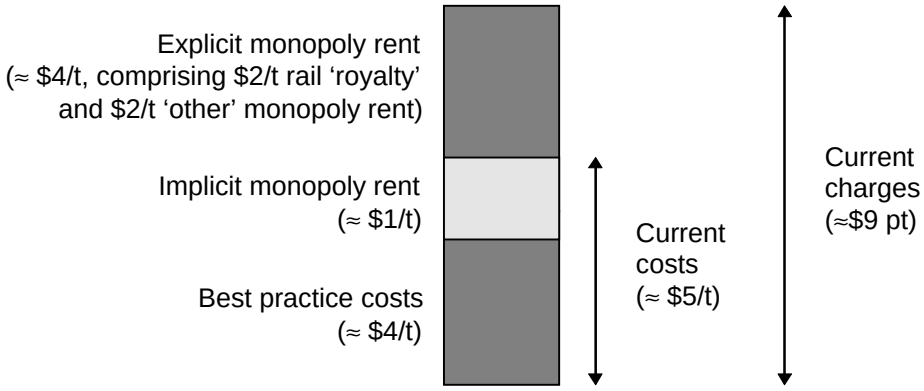
This attachment identifies various elements of rail charges, including explicit monopoly rents and the costs of providing rail services.

L6.1 Monopoly rents

A number of studies (Easton Business Consultants 1988, Freebairn and Trace 1988, IAC 1988, Easton 1996) have noted that charges for coal rail freight services have been higher than the costs of providing those services, indicating the existence of monopoly profits or rents. Monopoly rents in the rail industry are often referred to as *excess charges* or *de facto royalties*. They may comprise excess charges for either or both rail access and haulage.

Figure L6.1 provides a conceptual disaggregation of various elements of charges for rail transport of black coal as well as estimates of each component. These estimates reflect the weighted average rail freight rate per tonne of coal railed in both NSW and Queensland in 1996–97 (see Chapter 7, Table 7.2). In this attachment, the term *explicit monopoly rent* refers to charges for rail services in excess of the current cost (including a return on capital employed) of providing rail services. *Implicit monopoly rent* describes the cost of providing rail services that is in excess of best practice costs.

Figure L6.1: **Disaggregation of average rail charges per tonne of coal railed**[a] (weighted average of NSW and Queensland)



a Not to scale.

L6.2 Modelling rail freight reductions

Two rail freight reduction scenarios have been modelled. Scenario 5a models productivity improvements in rail freight of coal. Scenario 5b models a reduction in coal rail freight rates due to an acceleration of the implementation of competitive access regimes in rail. In reality, increased competitive pressures are likely to drive rail freight rate reductions from both sources simultaneously.

In order to model productivity improvements in rail services to the black coal industry (Scenario 5a), explicit monopoly charges for rail are excluded from estimated rail freight rates. This ensures that the assumed reduction in rail freight rates models a cost reduction and not merely a transfer from rail providers to coal producers. Reductions in freight rates which reflect a reduction in monopoly rents are modelled as a revenue-neutral tax switch (Scenario 5b). In effect, the 'tax' levied on coal rail freight is replaced by an increase in economy-wide taxes. Although, in practice, other taxes might not be increased, to the extent that rail 'monopoly' revenue declines, this implies either a reduction in public sector spending or increased taxation.

From the point of view of the black coal industry, a reduction in rail freight rates delivers benefits whatever its source.[1] However, from an economy-wide perspective, a reduction in explicit monopoly rents largely represents a transfer of income. At best, it might generate marginal gains in national welfare, assuming that taxation through the rail system is a relatively inefficient form of revenue-raising. On the other hand, productivity improvements in rail transport ensure that national income gains are in line with more efficient resource use in the rail industry.

Estimating future rail freight rates in New South Wales and Queensland

As Figure L6.1 indicates, it is estimated that around $4 of the average rail charge per tonne of coal railed represents 'explicit monopoly rent'. As discussed in Chapter 10 and Attachment L3, in both NSW and Queensland, part of this $4 of explicit monopoly rents is acknowledged as a *de facto* royalty. In NSW, a royalty component (of around $1.20/tonne) is incorporated in rail access charges. This royalty will be phased out by 2000–01 (see Attachment L3) and the base case royalty estimates reflect this. In Queensland, about $3/tonne of coal railed has been paid to the Queensland Government by Queensland Rail (QR) as a royalty. The Queensland Government initially

[1] It is possible, of course, that lower *de facto* taxation of the coal industry via rail freight rates is replaced by some other form of tax on the industry (a higher royalty, for example). In this case, net benefits to the coal industry (and the economy) will depend on the relative efficiency of the new tax.

announced that this excess charge for rail freight services would be phased out by 2000. However, early renegotiation of remaining Treasury-negotiated freight contracts will mean that rail royalties are phased out by 1998.[2] In the base case, it is assumed that this $3/tonne rail 'royalty' is phased out by 1998–99 (see Attachment L3).

Studies by Easton (1996 and sub. 7) suggest that other explicit monopoly rents exist in freight charges in Queensland and NSW. This view is supported by the NSW Minerals Council (subs. 52 and DR60) and the Queensland Mining Council (sub. 24). On the other hand, QR and the Queensland Government, for example, consider that all 'monopoly' rents are captured by the rail 'royalty' which is being phased out (subs. 12, DR 61 and DR66).

Based on cost estimates prepared by Easton (1996), explicit monopoly rents (net of rail royalties) in 1995–96 are estimated by the Commission to have been around $2.50/tonne and $3/tonne in NSW and Queensland, respectively. Due to the impact of competition reforms under way in each State, it is assumed that these rents have since fallen to around an Australia-wide average of $2/tonne of coal railed. Moreover, in the base case, this $2/tonne rent is assumed to decline gradually to zero by 2005–06. In other words, in the base case, average rail freight rates for coal are assumed to fall by around $2/tonne (over and above removal of rail 'royalties') between 1997–98 and 2005–06. This implies that average rail freight rates for coal will equal the cost of providing rail services of around $5/tonne (including a return to capital) by 2005–06, and all monopoly rents will have been eliminated.

This assumed reduction in explicit monopoly rents (and freight rates) inevitably leads to falls in estimated rail revenues. In 1995–96, total revenue from explicit monopoly rents (excluding rail royalties) was estimated to be around $390 million. For the base case, this component of rail royalties is estimated to fall to about $310 million in 1997–98, $200 million in 2001–02, and zero by 2005–06.

As noted, the Commission's assessment of excess freight charges is based on cost estimates prepared by Easton (1996). Cost estimates are inherently subjective. They hinge on assumptions about asset valuation and appropriate rates of return (see Chapter 7, Section 7.6). Easton uses historical costs to calculate depreciation and assumes a required rate of return of 8.25 per cent. If the NSW and Queensland Governments consider current costs to be higher (and explicit monopoly rents lower) than estimated by the Commission, the extent of

[2] However, as discussed in Chapter 10 and Attachment L3, mines that opt to renegotiate their rail contracts will be subject to a special royalty until 2000. This special royalty has been incorporated in estimates of output-related royalties in the base case.

freight rate reductions assumed by the Commission in the base case may be optimistic (see Chapter 7, Section 7.5). If actual rail freight rates are higher than estimated, base case export and output projections, which are imposed on the model in Scenario 1, will not be affected, though black coal industry profitability could be lower than projected.

Scenarios 5a and 5b: scope for productivity improvements and rail freight rate reductions

As discussed in Chapter 7, the gap between Australian coal rail freight operations and comparable best practice overseas operations is estimated to be around 20 per cent. In Scenario 5a, it is assumed that this productivity gap is closed. Productivity improvements and the ensuing freight rate reduction are phased in over five years, beginning in 1998–99. This parallels accelerated productivity improvements within mines which are modelled in Scenario 3 and delivers additional cost savings to the coal industry of around $1/tonne of coal railed (assuming a cost base of around $5/tonne), or around $150 million per year.

Scenario 5b models early removal of estimated explicit monopoly rents in rail by 2001–02 instead of 2005–06 as assumed in the base case. In other words, average rail freight rates (Australia-wide) for coal fall to around $5/tonne by 2001–02. This scenario is designed to illustrate potential benefits to the coal industry of expeditious introduction of effective, competitive access regimes for rail services. As for Scenario 5a, lower freight rates are modelled together with productivity improvements in the mines (Scenario 3). In addition, for reasons explained above, freight rate reductions in this scenario are modelled as a revenue-neutral tax change.

As already noted, if the Commission's estimates of explicit monopoly rents are higher than State government assessments of these charges, or if reductions in explicit monopoly rents do not occur as projected in the base case, the estimated reductions in freight rates in the base case may be somewhat optimistic. This would imply scope for freight reductions additional to those modelled, either through productivity improvements or removal of monopoly rents. For example, if current freight rates (net of rail royalties) reflect actual costs (that is, costs of around $7/tonne) and do not contain any monopoly rent, a 20 per cent productivity improvement would yield a larger cost saving than $1/tonne (around $1.40/tonne). Alternatively, if monopoly rents exist, but are not phased out by 2005–06 as assumed in the base case, there would be scope for larger cost savings to accrue to the coal industry.

L7 REGIONAL EFFECTS OF PRODUCTIVITY CHANGE

L7.1 Introduction

Differences in labour productivity growth between regions can significantly affect the proportion of coal produced by different States. In this attachment the share of black coal output produced by Queensland and NSW is projected to 2010. It is shown that the result largely depends on expected relative productivity changes.

Output and employment details are available for Australian black coal mining over the period 1987 to 1996. This includes production and employment by State and by mine type (underground and open cut).[1] Table L7.1 summarises this information.

This attachment combines this disaggregated historical information, MONASH-Coal estimates of future aggregate black coal output and employment change and labour productivity assumptions to present possible regional and technological scenarios of future output and employment (and hence, labour productivity) in Australian black coal mining.

L7.2 History

Over the decade to 1996, Australian production of black coal grew at over 3 per cent each year, on average, while employment fell by nearly 2 per cent a year. This has resulted in labour productivity gains averaging over 5 per cent each year (Table L7.1).

[1] Sources for this information include the Joint Coal Board, Queensland Coal Board, the Australian Coal Report and the ABS. The main source of historical information used in this attachment (and in the productivity attachment L4) is JCB and QCB (1997).

Table L7.1: **Output, employment and labour productivity in Australian black coal mining, 1987 to 1996**[a]

		1987	*1996*	*Average annual percentage change*
Saleable production	*Mt*	138.4	190.0	3.59
Employment	*'000 persons*	29.5	25.0	-1.83
Labour productivity	*kt/person*	4.7	7.6	5.52

a NSW and Queensland only. All other States accounted for less than 5 per cent of total Australian production in 1996.

Source: JCB and QCB (1997).

In aggregate, black coal production is shared evenly between Queensland and NSW. However, thermal coal production occurs mainly in NSW and coking coal production mainly in Queensland, although this disparity is closing (Table L7.2). Over the decade to 1996, thermal coal production has grown faster in Queensland while coking coal has grown slightly faster in NSW. The MONASH-Coal Model represents black coal as coking and thermal coal separately.

Table L7.2: **Saleable production by coal type and State, 1996**[a] (Mt)

	Thermal	*Coking*	*Total*
NSW	63.5	30.8	94.3
Queensland	40.7	55.0	95.7
Total	**104.2**	**85.8**	**190.0**

a Coking coal production = coking coal exports + increase in stocks + consumption by iron & steel and metallurgical industries + increase in domestic iron and steel industry stocks. Thermal coal = Total - coking coal.

Source: Australian Coal Report (1997).

Output

Total output of underground mines in Queensland has grown faster than any other, albeit from a very low base. NSW open cut mines have been the next fastest growing, and now account for one quarter of total production. Open cut mining in Queensland accounts for the largest share of total output — 44 per cent in 1996. NSW underground mines have shown the slowest growth in output — less than 1 per cent, on average, each year since 1987 (Table L7.3).

Table L7.3: **Saleable coal production by State and mine type**

		1987	*1996*	*Average annual growth 1987 to 1996*	*1996 share*
		kt	*kt*	*%*	*%*
NSW	Underground	43 511	46 999	0.86	25
	Open cut	26 368	47 303	6.71	25
Queensland	Underground	3 747	11 364	13.12	6
	Open cut	64 745	84 333	2.98	44
Total		**138 371**	**189 999**	**3.59**	**100**

Source: JCB and QCB (1997).

Employment

Nearly all of the losses in employment in the black coal industry over the last decade have occurred in NSW underground mining. Employment in NSW open cut mines and Queensland underground mines has actually increased over the period. Despite employment falls over the period to 1996, NSW underground and Queensland open cut mining account for 70 per cent of total black coal employment (Table L7.4).

Table L7.4: **Average employment, by State and mine type**

		1987	*1996*	*Average annual growth 1987 to 1996*	*1996 share*
		persons	*persons*	*%*	*%*
NSW	Underground	14 926	8 999	-5.47	36
	Open cut	4 298	5 135	2.00	21
Queensland	Underground	1 676	2 374	3.94	10
	Open cut	8 605	8 469	-0.18	34
Total		**29 505**	**24 977**	**-1.83**	**100**

Source: JCB and QCB (1997).

Labour productivity

Labour productivity, measured as output per employee, is highest in Queensland open cut mining at nearly 10 000 tonnes of saleable coal per employee. However, the fastest labour productivity growth has occurred in underground mining, although accounting for a smaller share of total output.

Table L7.5: **Output per employee, by State and mine type**

		1987	*1996*	*Average annual growth 1987 to 1996*
		kt/employee	*kt/employee*	*%*
NSW	Underground	2.92	5.22	6.69
	Open cut	6.13	9.21	4.62
Queensland	Underground	2.24	4.79	8.83
	Open cut	7.52	9.96	3.16
Total		**4.69**	**7.61**	**5.52**

Source: JCB and QCB (1997).

L7.3 Projections

Scenario 3 estimates provide a picture of aggregate coking and thermal output and employment in 2009–10, if accelerated productivity improvement is achieved in the industry (see Appendix L). Table L7.6 outlines the relevant estimated growth rates.

Table L7.6: **Scenario 3 estimated average annual change, 1997–98 to 2009–10** (%)

Coal type	*Production*	*Employment*
Coking	4.68	-4.26
Thermal	5.33	-3.20
Total[a]	**5.04**	**-3.64**

a Weighted geometric average based on relative contribution of coking and thermal to total output.
Source: MONASH-Coal estimates (Scenario 3).

In this accelerated productivity scenario, production is projected to grow more strongly than observed historically (5.03 per cent compared with 3.59 per cent) and employment is projected to fall more quickly (-3.64 compared to -1.83), although employment reductions are less severe than in the base case.

These estimated growth rates were applied to 1996 output and employment data to obtain aggregate 2010 results. That is, total coking and thermal black coal output and employment in 2010 were estimated from 1996 values using annual projected growth rates from Scenario 3. Estimates for each State and mine type were then derived from these aggregates on the basis of observed historical

trends and assumptions regarding future labour productivity change.[2] Two different sets of assumptions were used. These are presented as Regional Scenarios A and B.

Regional Scenario A

Regional estimates are presented in Chapter 11 and Appendix L. These estimates are derived assuming that the share of total black coal production remains unchanged from its current even distribution between Queensland and NSW. This is achieved by assuming that labour productivity converges by 2010. That is, labour productivity in NSW open cut mining is assumed to achieve at least the same level as that in Queensland open cut mining by 2010.[3] It is further assumed that labour productivity in Queensland underground mining achieves levels at least as high as labour productivity in NSW underground mining by 2010.[4]

Table L7.5 demonstrates that Queensland underground mines currently have, on average, the lowest levels of labour productivity and that NSW open cut labour productivity is lower than Queensland open cut mines. That is, there is greater scope for productivity improvement in these mines (in aggregate).

Table L7.7 presents regionally disaggregated estimates of black coal production, based on the assumption of labour productivity convergence discussed above.

Although the distribution of black coal production between the two States remains unchanged in total, the share produced by open cut mines in NSW increases. Output from open cut mines is expected to increase from 69 per cent to 75 per cent of combined NSW and Queensland production by 2010.[5]

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[2] Linear programming is used to find a solution to the problem of equating the sum of the regional results with the aggregates given by MONASH-Coal while simultaneously satisfying the constraints imposed by assumption. There are many solutions to the problem. Those presented here are not necessarily any more likely than others, but are the closest to observed history that also satisfy the constraints. The solutions presented are *possibilities* and demonstrate that the regional results presented in Chapter 11 and Appendix L are feasible.

[3] Not the 1996 level, but that level which is necessary for a possible solution to exist, based on historical growth rates.

[4] These constraints are binding. By 2010 labour productivity levels are equal (Table L7.9).

[5] There are adequate identified *in situ* reserves for projected 2010 output levels to be maintained for hundreds of years.

Table L7.7: **Saleable production, historical and estimated** (%)

State	*Mine type*	*Average annual growth 1987 to 1996*	*1996 share*	*Average annual growth 1996 to 2010*	*2010 share*
NSW	Underground	0.86	25	0.88	14
	Open cut	6.71	25	7.84	36
Queensland	Underground	13.12	6	9.48	11
	Open cut	2.98	44	4.14	39
Total		**3.59**	**100**	**5.04**[a]	**100**

Source: MONASH-Coal estimates (Scenario 3).

NSW open cut output is projected to grow faster than Queensland to achieve the assumed convergence in labour productivity. It is able to do this with slower employment reductions (Table L7.8).

Table L7.8: **Average employment, historical and estimated**

State	*Mine type*	*1996*	*Average annual growth 1987 to 1996*	*2010*	*Average annual growth 1996 to 2010*
		persons	*%*	*persons*	*%*
NSW	Underground	8 999	-5.47	3 570	-6.39
	Open cut	5 135	2.00	4 096	-1.60
Queensland	Underground	2 374	3.94	2 715	0.96
	Open cut	8 469	-0.18	4 478	-4.45
Total		**24 977**	**-1.83**	**14 859**	**-3.64**[a]

Source: MONASH-Coal estimates (Scenario 3).

Note that over half of the total employment loss is estimated to occur in NSW underground mining, which is currently the largest employer. However, this is not as great as observed historically, where, over the decade to 1996, employment losses in NSW underground mining *exceeded* the fall in total black coal employment (Table L7.4). It is also not as great as it would have been without accelerated productivity growth.

By 2010, Queensland open cut mining is estimated to have become the largest employer, followed by NSW open cut mining. In total, open cut mining is estimated to increase its share of total employment in the black coal industry to 58 per cent by 2010.

These output and employment projections result in labour productivity outcomes presented in Table L7.9, remembering that labour productivity in Queensland underground mining is constrained to be at least that of NSW in 2010 and NSW open cut labour productivity is constrained to be at least that of Queensland (productivity convergence).

Table L7.9: **Labour productivity, historical and estimated**

State	*Mine type*	*1996*	*Average annual growth 1987 to 1996*	*2010*	*Average annual growth 1996 to 2010*
		kt/person	*%*	*kt/person*	*%*
NSW	Underground	5.22	6.69	14.88	7.76
	Open cut	9.21	4.62	33.23	9.60
Queensland	Underground	4.79	8.83	14.88	8.44
	Open cut	9.96	3.16	33.23	8.99
Total		**7.61**	**5.52**	**25.47**	**9.01**

Source: MONASH-Coal estimates (Scenario 3).

Regional Scenario B

In Regional Scenario A labour productivity levels are projected to converge. This may not be the case. For example, there may be greater scope for productivity improvement in both open cut and underground mining in NSW than in Queensland. Therefore, if it is assumed that NSW labour productivity in 2010 is at least that of Queensland in both underground and open cut mining (and the labour productivity convergence assumption is dropped), regional distributions of output and employment will differ from Regional Scenario A (Table L7.10).

In this scenario, NSW's share of total output grows to 65 per cent, due to significant growth in open cut mining. Queensland's share in both open cut and underground mining falls. This was not the case in Regional Scenario A, where Queensland underground mining's share of total output grew. Total open cut mining's share of output grows to 83 per cent, greater than in Regional Scenario A.

Table L7.10: **Saleable production, historical and estimated** (%)

State	*Mine type*	*Average annual growth 1987 to 1996*	*1996 share*	*Average annual growth 1996 to 2010*	*2010 share*
NSW	Underground	0.86	25	0.78	14
	Open cut	6.71	25	10.57	51
Queensland	Underground	13.12	6	1.14	4
	Open cut	2.98	44	2.53	32
Total		**3.59**	**100**	**5.04**[a]	**100**

Source: MONASH-Coal estimates (Scenario 3).

Output grows faster in NSW than Queensland, although Queensland employment falls faster (Table L7.11). Open cut mining in NSW continues its historical trend of employment growth.

Table L7.11: **Average employment, historical and estimated**

State	*Mine type*	*1996*	*Average annual growth 1987 to 1996*	*2010*	*Average annual growth 1996 to 2010*
		persons	*%*	*persons*	*%*
NSW	Underground	8 999	-5.47	3 881	-5.83
	Open cut	5 135	2.00	6 171	1.32
Queensland	Underground	2 374	3.94	986	-6.08
	Open cut	8 469	-0.18	3 821	-5.53
Total		**24 977**	**-1.83**	**14 859**	**-3.64**[a]

Source: MONASH-Coal estimates (Scenario 3).

Combining the above output and employment results in the following labour productivity outcomes (Table L7.13), remembering that labour productivity in NSW is constrained to be at least as great as in Queensland.[6]

6 Note that this constraint is binding.

Table L7.12: **Labour productivity, historical and estimated**

State	*Mine type*	*1996*	*Average annual growth 1987 to 1996*	*2010*	*Average annual growth 1996 to 2010*
		'000t/person	*%*	*'000t/person*	*%*
NSW	Underground	5.22	6.69	13.50	7.02
	Open cut	9.21	4.62	31.30	9.13
Queensland	Underground	4.79	8.83	13.50	7.68
	Open cut	9.96	3.16	31.30	8.52
Total		**7.61**	**5.52**	**25.47**	**9.01**

Source: MONASH-Coal estimates (Scenario 3).

L7.4 Summary

When MONASH-Coal aggregate estimates and past trends are used to determine the regional distribution of black coal production and employment, assumptions regarding future relative labour productivity change greatly affect the regional result.

Under the two scenarios presented in this attachment, the outcome for underground mining output in NSW is the same (Table L7.13). However, depending on relative labour productivity improvements, underground mining in Queensland could either increase its share of total output (at the expense of Queensland open cut mining) or lose output share (to NSW open cut mining). In both scenarios, open cut mining's output share is projected to increase in NSW and decrease in Queensland.

Table L7.13: **Saleable production shares, historical and estimated**

State	*Mine type*	*Actual 1996*	*Estimated 2010*	
			Regional Scenario A	*Regional Scenario B*
		%	*%*	*%*
NSW	Underground	25	14	14
	Open cut	25	36	51
Queensland	Underground	6	11	4
	Open cut	44	39	32
Total		**100**	**100**	**100**

Regional results discussed in Chapter 11 and Appendix L assume that each State's share in aggregate black coal output remains unchanged. That is, total output is distributed evenly between Queensland and NSW in 2009–10. Regional Scenario A is a possible representation of this.

This analysis demonstrates the importance of productivity change to the future structure of the industry. It is important to note that relative productivity change different from that presented *may* result in a different industry structure.

L8 REFEREES' REPORTS ON ECONOMIC MODELLING OF BLACK COAL

This attachment summarises external referees' comments on economic modelling which was commissioned by the Productivity Commission for the inquiry. Copies of the referees' written reports are available from the Commission on request.

L8.1 Summary of the referees' reports

The Productivity Commission used the MONASH model of the Australian economy to assess the potential quantitative impact of productivity improvement on the black coal industry, other industries and the economy as a whole. Two external referees (see Box L8.1) were appointed in early 1998 to comment, *inter alia*, on the choice of model and major assumptions underlying the modelling work. They were each required to prepare a written report as well as make an oral presentation at a public workshop held at the Productivity Commission in Melbourne in late January 1998.

Box L8.1: **About the referees**

Dr Rod Tyers is a Reader in the Department of Economics at the Australian National University. He completed his doctorate in economics at Harvard University in 1978 and his research since has focussed on international trade, agriculture and development. He is the author of four books, 48 articles and 28 chapters in edited collections.

Mr David Vincent is Chief Economist with the Centre for International Economics, a private company which conducts economic analysis for Australian and international clients. He has extensive experience in analysing economic policy issues in agriculture, mining, water resources, manufacturing and service industries, as well as wide-ranging expertise in application of modelling techniques.

On the whole, both referees endorsed the modelling undertaken. For example, Dr Rod Tyers concluded that "the analysis thus conducted is of a very high analytical quality and it is spelled out in both the CoPS and the draft IC documentation quite clearly…". Mr David Vincent reported that "The analysis in the paper is sound … The results seem plausible and internally consistent". Nonetheless, several suggestions were made with a view to improving both the

modelling and the documentation. Box L8.2 provides a summary of major suggestions, and the Commission's response.

Box L8.2: **Summary of referees' comments and the Commission's response**

Dr Rod Tyers:

- *asked why the Commission did not construct a detailed, disaggregated model of the Australian black coal industry as this could offer more insights into the scope for, and impact of, productivity improvements.* While the Commission agrees that construction of a detailed industry model could have provided further insights, the Commission was constrained by both time and resources. Use of the MONASH model, customised to provide some, albeit limited, disaggregation of the industry was, as Dr Tyers observed, "relatively cost-effective";
- *suggested that it would be interesting to model the impact of changing external circumstances — for example, the impact of global emission controls.* The base case coal export projections reflect ABARE's view about likely developments in world coal markets. ABARE forecasts thus encapsulate views about the likely impact of trade liberalisation, changing technologies, global environmental treaties etc. on world demand for, and supply of, coal. Of course, circumstances can change. If, for example, world demand for coal were to drop sharply, the Australian coal industry would receive lower prices. This would not undermine the case for productivity change — indeed, it would strengthen it — though the *level* of exports in all scenarios would be lower than currently suggested;
- *recommended that the Commission should conduct sensitivity analysis in order to gauge the impact on the results of lower export demand elasticities for Australian coal. This, he suggested, was especially relevant if the supply elasticity of coal in the model was large.* The Commission has conducted sensitivity analysis with respect to Scenario 3. The results are reported in Appendix L;
- *recommended that the modelling address labour market adjustment issues.* Labour market adjustment is discussed in Chapter 6 of the report. The modelling suggests that with improved productivity and higher output, fewer jobs would be lost in the black coal industry than would be the case without productivity change. Overall, therefore, productivity improvements should ease labour market dislocation. However, *within* the industry, productivity improvement may lead to changes in demand for certain job types as well as changes in demand for labour across mining regions. These effects are not captured by the modelling which does not differentiate regions or job types. A specialised model of the Australian black coal industry could provide further insight. However, as already noted, the Commission did not pursue this option due to time and resource constraints.

Box L8.2: **Summary of referees' comments and the Commission's response** (continued)

Mr David Vincent:

- *suggested that Scenario 3 could be made more interesting, and realistic, by linking assumed productivity improvements more closely with potential changes in work practices.* The Commission agrees that more specific modelling of changes in work practices might have provided additional insights, but it was considered that estimation of the productivity gains flowing from removal of individual work arrangements could be arbitrary. While broad estimates of the gap between average Australian black coal productivity performance and best practice are available, the impact of individual work arrangements on productivity is difficult to quantify. Hence, the Commission modelled an across-the-board productivity improvement reflecting the potential impact of improving a wide range of work arrangements identified in Chapter 5;
- *questioned the logic underlying Scenarios 4a and 4b*. These scenarios model varying degrees of market power exercised by foreign coal buyers. In Scenario 4a, it is assumed that foreign buyers 'siphon off' additional profits flowing from the productivity improvement. Mr Vincent suggested that the scenario was unrealistic because it presupposes that foreign buyers know the rate of return on capital invested in the Australian industry. While this may be so, the Commission considers that the scenario captures reasonably well a situation in which foreign buyers might be able to exercise limited buying power. Scenario 4b models a scenario where foreign buyers capture *all* of the benefit of the productivity improvement by reducing their demand for coal. In effect, this scenario models a situation where foreign demand is totally unresponsive to lower prices. Although the Commission does not consider that this scenario presents a realistic view of world coal markets, it was modelled to demonstrate that, even with such an extreme assumption, productivity improvements can deliver GDP gains;
- *observed that the labour market closure of the model was very pessimistic and urged the Commission, in a separate exercise, to investigate the determinants of labour market supply and, in particular, its responsiveness to changes in economic efficiency.* The Commission agrees that the labour market closure, which implies that economy-wide employment does not expand in response to higher real wages driven by productivity improvements, is very pessimistic. A major reason for adopting this closure is that it is conservative, reflecting an observed 'stickiness' in unemployment. The Commission agrees with Mr Vincent's suggestion that this matter be analysed further.

M ISSUES IN MODELLING PRODUCTIVITY CHANGE

Appendix L presents estimates of the impact of various productivity changes on the black coal industry and the rest of the economy. These estimates are sensitive to assumptions about how industries, governments and individuals respond to productivity changes in the black coal industry. This appendix discusses the major assumptions underlying the modelling of the black coal industry and the results presented in Appendix L.

M.1 Issues in assessing the impact of changes in productivity

Major issues considered include:

- the criteria used to evaluate the impact of productivity changes;
- measuring changes in national economic welfare;
- government responses to changes in revenue;
- terms of trade effects;
- adjustment in the labour market and long-run employment growth;
- how investment and capital stocks adjust;
- the nature of the productivity shock and the implications for factor demands; and
- sectoral adjustments and adjustment costs.

M.2 Criteria to evaluate the impact of productivity changes

At issue here is how to choose appropriate measures to assess the impact of productivity changes in the black coal industry on the community.

It is important to use measures that capture the economy-wide effects of policy changes, rather than the effects of changes on a particular industry or sector of the economy. Partial equilibrium analysis will not provide an adequate indication of the economy-wide effects of productivity change, although it may capture some important effects.

Thus, it is useful to use a measure that represents the net effects on the community as a whole, though such measures should be viewed in conjunction

with more disaggregated information, as discussed below. The ideal measure is economic welfare, which is related to the net benefits derived from consumption of goods and services. While economic welfare is not measured directly, under certain conditions, changes in real private consumption may provide a good approximation of changes in economic welfare.

Another measure is GDP, while this provides a good indication of changes in overall economic activity, it is not a good indicator of economic welfare. An increase in GDP does not necessarily translate into a similar increase in domestic consumption.

Changes in real private consumption are a reasonable measure of changes in aggregate economic welfare, provided the full costs of generating the additional consumption are taken into account. For example, in the case of a productivity improvement, more income can be produced using existing resources. However, not all of this measured income and consumption gain necessarily represents a gain in welfare.

First, it is possible that some employees and management incurred costs in implementing productivity improvements. These might include the costs of additional effort, or non-pecuniary benefits given up by employees. Strictly speaking, such costs should be subtracted from the measured change in real consumption in order to indicate the impact on economic welfare. However, because of estimation difficulties (and also the possibility that productivity changes generate non-pecuniary benefits), no adjustments are made to the results presented in Appendix L. Nonetheless, this qualification should be borne in mind.

The productivity improvement also might encourage additional investment and employment which, in turn, would generate additional income and real consumption. But the measured increase in real private consumption in any year would not reflect a *net* welfare gain unless the full cost of these additional resources were taken into account. In the MONASH analysis, all additional capital (relative to the base case) is assumed to be supplied by foreigners, and after-tax income earned by these investors is excluded from estimates of real consumption. Moreover, by the end of the forecast period (2009–10), employment is assumed to return to the level projected in the base case. In other words, the full cost of additional (foreign-owned) capital is accounted for, and in the long run, there is no additional aggregate labour effort (see Sections M.3 and M.5). Subject to the caveat about the real costs of implementing productivity changes, these assumptions make real consumption an appropriate aggregate measure of economic welfare.

However, aggregate real consumption does not take into account the welfare effects of income redistribution. While productivity improvements, by generating higher national income and aggregate real consumption, have the *potential* to make everyone better off, restructuring of the economy will affect the distribution of income and this may impinge unevenly on the welfare of individuals. Aggregate measures, while providing the best criteria for assessing the economy-wide net benefits (or costs) of any change, nonetheless mask the impact of redistribution on economic welfare.

It is useful, therefore, to examine the impact of productivity improvements using a range of measures — in particular, those that provide some insight into the adjustments throughout the economy.

The Commission chose the MONASH model to quantify the impacts on the economy of changes in productivity performance of the Australian black coal industry because, in addition to aggregate measures such as real GDP and real consumption, it provides a high level of industry disaggregation.

M.3 Changes in real consumption and ownership of the capital stock

As discussed in Section M.2, changes in real consumption are used as an indicator of the net welfare gains to Australians arising from changes in productivity performance in the black coal industry. Ownership of returns to the existing capital stock and to net additions to the capital stock must be accounted for to ensure that real consumption provides an accurate measure of welfare.

With a productivity improvement, more income (GDP) can be produced with existing capital and labour. But this increase in the value of output is not 'owned' entirely by domestic residents and real consumption must be adjusted to reflect this. This effect, which has not been incorporated in the model, will have a moderating effect on the estimated gain in real private consumption (and economic welfare), particularly in the short term.

In addition, in evaluating the impact of a productivity change over time, it is important to take into account any consequences for current and future consumption arising from the way in which current consumption and investment are financed.

An increase in current consumption could be financed by borrowing rather than through an increase in current income. If this were the case, initial changes in real consumption would overstate the increase in economic welfare because they would not take into account the future reduction in consumption when borrowings have to be repaid.

In the case of a productivity improvement in the black coal industry, for example, the initial increase in profitability in coal will attract additional investment into that industry. The financing of this extra investment will have implications for the time profile of real consumption.

One possibility is that Australians finance the investment through domestic savings. In this case, real consumption is comparatively lower in earlier periods when they save and invest. In later periods, however, Australians reap the rewards of investment as higher consumption.

Alternatively, Australia could borrow on international capital markets or use direct foreign investment (equity) to finance the additional investment.[1] In this case, consumption will be higher in earlier periods, compared with domestically financed investment, but relatively lower in later periods. Real consumption is lower in later periods because the income generated by the foreign-owned capital accrues to foreign investors as dividends or as interest and loan repayments.

The second financing option was adopted in this study because it provides a way of keeping track of the ownership of incremental capital (and the after-tax profits which accrue to overseas investors) and allows changes in real consumption to be proportional to changes in current income. Thus, in any given year, the change in real consumption can be interpreted as the change in aggregate economic welfare in that year.

M.4 Government responses to changes in revenue; real consumption and the government sector

In the base case scenario, it was assumed that royalty collections (including rail-related royalties) by the NSW and Queensland Governments would decline in real terms over the forecast period. This assumption embodies announced policies by both governments to reduce and/or modify their royalty arrangements. These changes are explained in detail in Attachment L3. While small changes in royalty revenue are consistent with changes in the share of public consumption over the forecast period, there are implications for State government revenues.

[1] This implies that the marginal propensity to save by households is zero. This is probably an extreme assumption but the saving propensity is quite low currently. The assumption leads to a slight overestimation of immediate consumption gains and underestimation of consumption in later periods.

When evaluating the impact of shocks relative to the base case scenario, the MONASH analysis assumes that aggregate *public* consumption maintains its base case level. This means that changes in real private consumption measure changes in aggregate economic welfare, *provided* there is no change in the government sector deficit or surplus position.[2] However, in order to maintain real public consumption, without changing the government deficit or surplus position, tax revenues must be kept constant. This implies that any reduction in revenue from some taxes must be offset by raising other taxes, and vice versa.

In the deviation scenarios (Scenarios 2–5), there are no assumed changes to royalty or other indirect tax *rates*, though royalty revenues rise or fall in line with expansion or contraction of the industry. In addition, higher (lower) labour income and profits and higher (lower) spending generate higher (lower) indirect and direct tax revenues. Given the assumption of constant real public consumption (relative to the base case), and no change in the government deficit, induced changes in revenue will affect estimated current real private consumption through changes in income tax rates.

M.5 The black coal industry and the terms of trade

If productivity changes in the black coal industry directly affect the export price of coal or, indirectly, the prices of other internationally traded commodities, the impact on GDP, and the purchasing power of national income, will be affected.

The extent of Australia's influence on world or regional coal prices is discussed in detail in Attachment L5.

The issue addressed here is the indirect terms of trade effects following black coal industry contraction or expansion. This occurs because induced changes in the volume of exports of other major export industries (for example, wool) and their prices on world markets affect the terms of trade.

As explained in Box L.5 (Appendix L), a productivity improvement in the black coal industry tends to squeeze export and import-competing industries via real exchange rate appreciation. The resulting increase in the demand for imports by Australians is assumed not to affect the *foreign* price of imports because Australian import demands are a relatively small proportion of world sales.

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[2] If public consumption is maintained by increasing the deficit (or reducing the surplus), for example, this represents a claim on future consumption and measured current private consumption will overestimate the net welfare gain. If the government surplus increases (or the deficit is reduced), this represents an increase in current savings. In this case, measured current private consumption will underestimate the welfare gain.

On the other hand, the MONASH model assumes that the world price of some commodities depends on the level of Australian exports. This assumption is incorporated in most models of the Australian economy and can be justified on the grounds that some commodities exported from Australia have attributes that differentiate them from those produced by other countries. Induced *contraction* of these export industries, as a result of black coal industry expansion, tends to *increase* their export prices. If the resulting increase in prices of these commodities dominates any fall in coal prices (appropriately weighted to reflect export shares), the terms of trade will improve, amplifying the benefits of a coal productivity improvement.

Thus, in Scenario 3 (the high productivity scenario), black coal industry expansion generates a terms of trade improvement because the increase in export prices of some major commodities dominates a small decline in the coal export price. When the fall in the coal price is assumed to be larger, however, as in Scenario 4b, the terms of trade decline. This occurs for two reasons. First, because of the direct impact on the export price of coal, and second, with black coal industry expansion moderated because of lower coal prices, the real exchange rate effect, which squeezes other export industries, is also smaller. Contraction of the latter industries is smaller and, consequently, so too is the increase in their export prices.

M.6 Labour and capital markets

M.6.1 Labour market

In the results presented in Appendix L, it was assumed that, in the long run, aggregate employment did not deviate from the rate of growth forecast in the base case. In other words, a productivity improvement in the black coal industry was assumed to have no impact on the level of employment in the economy by 2009–10, the last year of the period examined. Ultimately, the gain from higher productivity was distributed to workers in the form of higher real wages.

Underlying this closure of the model is an assumption about the operation of the Australian labour market — namely, that higher real wages, in the long run, do not encourage additional labour supply. In effect, a 'natural' rate of unemployment is invariant both to demand and supply shocks.

The 'natural' rate of unemployment, or NAIRU,[3] is defined usually as the rate of unemployment consistent with steady (non-accelerating) inflation.

[3] Non-accelerating inflation rate of unemployment.

Essentially, it is the mirror image of the equilibrium rate of employment in the economy, given factor supplies and productivity. Any attempt to reduce unemployment via monetary or fiscal policies (which indirectly reduce the real wage and push workers off their labour supply curve) will have only temporary effects. In the long run, workers will restore the real wage, at the natural rate of employment, output and unemployment.

In theory, the natural rates of unemployment and employment are sensitive to supply (real) shocks which affect the productive capacity of the economy and the supply of and/or demand for labour. But here the conjecture is that, in line with observed stickiness of the unemployment rate (sometimes called 'hysteresis'), even supply shocks do not generate employment growth in the long run.

This is a pessimistic view of the Australian labour market, suggesting that even permanent improvements in the productive capacity of the economy will not reduce unemployment. It is possible, however, that long-run labour supply is responsive to increases in real wages. In this case, a productivity improvement can generate sustained increases in both employment and real wages, though the real wage increase will moderate as employment expands. If employment increases permanently, GDP will increase in the long-run beyond the results presented in Appendix L.

M.6.2 Capital market

For capital, one approach is to assume that the supply of capital is fixed in each industry and that rates of return adjust in response to changes in industries' prospects. This is consistent with a short-run view because it takes time to invest and adjust the quantity of capital.

Alternatively, the rate of return in an industry can be predetermined, reflecting a view that, over time, rates of return (adjusted for risk) in the economy, and internationally (reflecting the international mobility of capital), will tend to equalise. In this case, the quantity of capital in the economy and in each industry adjusts in response to changes in their prospects.

If the level of capital in the economy increases in response to productivity improvements in the black coal industry, GDP increases to a greater extent.

In the MONASH analysis, it is assumed that, in the short run, the level of capital is fixed in each industry. Consequently, in the short run, rates of return vary. In the long run, however, the capital stock adjusts and rates of return resume their normal levels. This is consistent with internationally mobile capital in the long run.

Given the MONASH assumptions about short and long-run adjustment in the labour and capital markets, a productivity improvement in the black coal industry generates greater capital intensity in the economy over time. While this increases GDP, a smaller increase in real wages coupled with employment growth would deliver even greater benefits.

M.7 The nature of the productivity shock

The productivity shock imposed on the model in Scenario 3 is 'neutral' in the sense that capital and labour productivity each improve (or deteriorate) by the same percentage amount. This means that the relative factor intensity of the black coal industry does not change compared with the base case.

This means that additional output in the Australian black coal industry is produced using capital and labour in the same proportions as before the change, although less of each factor is required to produce each unit of coal. If the induced increase in coal output is large enough, additional capital and labour will be employed by the industry.

It is possible that a productivity change will be biased towards one factor. For example, if the productivity change 'saves' capital relative to labour, the production process becomes more labour-intensive and expansion of the industry would generate a comparatively stronger demand for labour.

It is difficult to estimate the extent of any net bias of feasible productivity changes in the black coal industry given the wide range of existing work and management practices which impinge on both labour and capital productivity. Essentially, this is why the Commission chose to model a neutral productivity change.

However, there is evidence that work and management practices historically, have promoted the adoption of capital-intensive techniques, and investment in capital-intensive sites, increasing the capital intensity of the industry overall. Removal of such practices could moderate this trend, encouraging relatively more intensive use of labour in the black coal industry.

M.8 Sectoral adjustment and adjustment costs

Expansion (or contraction) of one industry, particularly a major industry such as coal, will induce adjustment and restructuring throughout the economy. As explained in Box L.5 (Appendix L), in the case of a productivity improvement in coal (and assuming no significant fall in the export price), the initial export

surplus arising from increased coal exports will, via real exchange rate appreciation, squeeze other producers of tradeables in the economy — that is, export and import-competing industries. In addition, increased demand for labour by the black coal industry will tend to raise labour costs throughout the economy. This also will squeeze industries which cannot pass on higher costs — namely, industries exposed to foreign competition.

On the other hand, some industries, along with the black coal industry itself, will benefit from black coal industry expansion. Service industries generally benefit from higher national income, consumption and investment, while service industries that supply inputs to the black coal industry fare especially well.

These adjustments imply that growth, job opportunities and profitability in some industries will be lower relative to the base case scenario, and higher in others. Importantly, however, no broad industry sector is projected to experience negative growth (in terms of annual average output growth relative to current output levels), even with a very large expansion of the Australian black coal industry. But these industries will offer fewer job opportunities relative to the base case. Balancing this loss of opportunities, employment opportunities will open up in other industries. In order to gauge net welfare effects, any adjustment costs associated with the restructuring should be subtracted from the real consumption gains estimated in the productivity growth scenarios.

If productivity in the black coal industry is lower than in the base case (as in Scenario 2), job losses in that industry are estimated to be higher. This means that workers formerly employed in coal will need to find jobs elsewhere in the economy. In this no productivity growth scenario, new jobs will be created in other (mainly export and import-competing) industries, but displaced workers will incur adjustment costs. These costs should be added to the welfare losses estimated in Scenario 2.

It should be noted that, in reality, the structural adjustments following productivity change in the black coal industry will occur in the context of a dynamic economy. To the extent that other industries accelerate their productivity growth (relative to base case productivity growth), another set of structural adjustments would be set in train and combine with those ensuing from changes in black coal industry productivity. In short, in a dynamic economy, productivity changes and other shocks generate continual and pervasive structural adjustment and associated costs.

BENCHMARKING CONSULTANCY

The terms of reference for this inquiry requested the Commission to report on benchmarks of productivity performance of Australian black coal mines compared with best practice in comparable international black coal mines and in analogous Australian metalliferous mines.

After calling for expressions of interest, and considering proposals from eleven firms, the Commission contracted Tasman Asia Pacific (Tasman) to undertake a benchmarking study. The Executive Summary of Tasman's final report is reproduced on the following pages. A copy of the full report has been sent to those who made submissions to the inquiry and is available on request from the Commission's Melbourne office, or on the Commission's website at http://www.pc.gov.au.

During the course of the inquiry the Commission held two separate workshops at which work in progress on the Tasman study was considered. The Commission engaged John Daly, a Director of ACIL Consulting, to open discussion at each workshop and to comment on the work in progress. A copy of Mr Daly's comments follows the Tasman Executive Summary.

Workshop participants also raised the following points as possible further qualifications to the Tasman findings:

- for those mines where both dragline and truck and shovel operations were benchmarked, the disparity in performance between the two operations may be explained by mines assigning the primary role of overburden removal to the dragline and a secondary, or supporting role, to the truck and shovel operation;
- the ratio of overburden to coal can influence the measured performance of truck and shovel operations where coal is transported on better formed roads and over longer distances than overburden; and
- it is not realistic to expect the *average* performance of a large sample of Australian black coal mines, which includes a number of acknowledged poorly performing mines, to compare favourably with a small sample of *better performing* United States black coal mines.

TASMAN
ASIA
PACIFIC

BENCHMARKING THE PRODUCTIVITY OF AUSTRALIA'S BLACK COAL INDUSTRY

TASMAN ASIA PACIFIC Pty Ltd

June 1998

EXECUTIVE SUMMARY

In October 1997 the Industry Commission contracted Tasman Asia Pacific to undertake a benchmarking study of the productivity performance of Australia's black coal mines. Tasman's brief was to benchmark mines in Australia's black coal industry against world best practice coal mines and best practice Australian metalliferous mines. The Commission will use this benchmarking in its current inquiry into the international competitiveness of the Australian black coal industry.

This report builds on earlier benchmarking work undertaken by Tasman. It benchmarks 44 separate mine operations in 1996 and 1997 — 22 truck and shovel, 13 dragline and 9 longwall operations.

Data used in this benchmarking study is based on information collected from a Tasman survey. The Australian mines invited to participate in the study were selected from a Barlow Jonker (1997) database. This database provides labour productivity and mine cost data separately for dragline, truck and shovel and longwall operations. Mines selected provided a representative coverage of mines exhibiting high, medium and low labour productivity. Tasman also aimed for representative coverage according to company ownership, location and mine technology. The black coal mines selected in the United States included a number that were nominated by industry experts as better practice operations as well as mines that were affiliates of Australian mining companies. Responses were received from 20 Australian black coal mines, eight United States coal mines and four Australian metalliferous mines. Black coal production from the responding Australian coal mines is equal to nearly 40 per cent of Australia's raw black coal production.

Tasman's benchmarking is based on total factor productivity measures (which measures total output relative to *all* inputs used) and supported by partial productivity measures to identify the drivers of productivity differences between mines.

The benchmarking analysis focuses on the main components of the mining process. However, it does not cover all mine inputs nor does it cover development work (eg setting up mine offices, developing access roads). The main items excluded from all three mining technologies are washeries, mine overheads, many maintenance activities and some materials used in production.

These elements have been excluded because:

- the data is often not supplied on a consistent basis by mines (eg mine office overheads and materials);
- the data vary considerably from year to year (eg due to the extent of major equipment overhauls in maintenance activities); and
- differences in inputs largely reflect geological or environmental factors (eg the yield of coal impacts on washeries input).

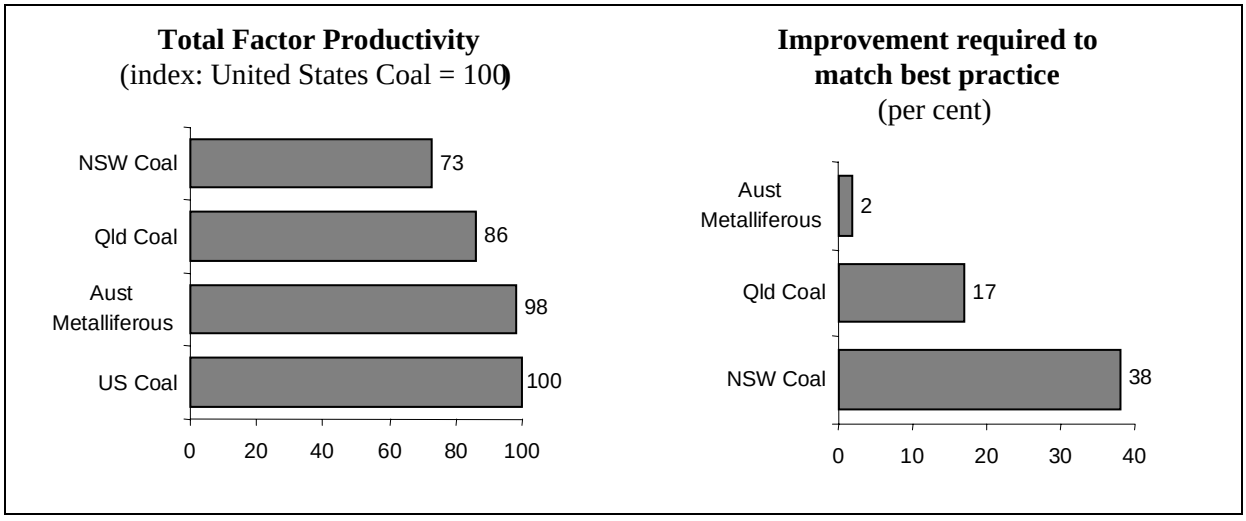
The analysis presented in this report has benefited from comments received from participants at the January 1998 and June 1998 benchmarking workshops that were conducted by the Productivity Commission in the course of its public inquiry process.

TRUCK AND SHOVEL PRODUCTIVITY BENCHMARKS

Truck and shovel mines remove both overburden and coal or other minerals primarily with trucks and shovels.

Tasman's benchmarking results indicate that in 1996–1997, the total factor productivity of the participating NSW and Queensland truck and shovel coal operations was, on average, well below best practice (Figure 1).

Figure 1: **Total factor productivity of truck and shovel operations**



Source: Survey undertaken by Tasman Asia Pacific (1998).

To match the best practice productivity levels of United States coal mines, participating NSW and Queensland coal mines needed, on average, to increase their productivity by 38 and 17 per cent respectively. Average productivity increases of 35 and 14 per cent, respectively, were required for these mines to match the average productivity of the Australian metalliferous mines covered by the survey. As a whole, the Australian coal mines in our sample needed to increase productivity by about 30 per cent to match the performance of the United States coal mines and Australian metalliferous mines.

A number of factors influenced these productivity outcomes. Geological conditions, such as thinner and more numerous coal seams in the NSW mine category explain some of the measured productivity gap. Of much more importance, however, were over-staffing, over-capitalisation of equipment and poor work practices. These were reflected in low relative labour and truck productivity in our sample of NSW and Queensland coal mines. For example, labour and truck productivity both needed to increase by around 70 per cent in the NSW coal mines to match the performance of our sample of United States coal mines. Queensland coal mines in our survey sample, on average, needed a corresponding 40 per cent increase.

However, a number of Australian truck and shovel operations are at the frontier of efficient operation — achieving productivity levels more than 50 per cent higher than many other Australia mines. Table 1 and Table 2 outline differences in key characteristics of the frontier and moderately performing Australian truck and shovel operations included in our sample. These characteristics indicate ways for the poorer performing mines to improve efficiency.

Table 1 indicates that over-staffing and over-capitalisation are common causes of lower productivity. Often the moderate performing mines have more equipment than they need — resulting in low equipment utilisation and productivity and requiring additional staff. In such mines, excess staff are also often apparent in areas such as operating non-core equipment (eg water and lube trucks) and in general duties.

Table 1: **Resourcing and work practices of typical best practice and moderately performing Australian truck and shovel coal mines**

	Best practice mine	*Moderately performing mine*
Total productivity	100	60
Resource levels		
Staffing levels: ratio of labour hours worked to equipment hours worked	1.5	2.1
Work time in shifts: time excluding leaving and joining shifts, meal and other breaks (per cent)	92	85
Utilisation of truck fleet: hours operated as a percentage of total available hours	45	40
Utilisation of major digging equipment: hours operated as a percentage of total available hours	50	40
Work practices		
Hot seat changes	✓	✓
Meal breaks in the field	✓	✗
Staggered meal breaks	✓	✗
Operators move between equipment within shifts	✓	rarely
Haulage equipment fuelled in breaks	✓	✗
Clean-up equipment does not impede production	✓	✗

Source: Survey undertaken by Tasman Asia Pacific (1998).

Work practices are more efficient in the high performing mines in the sample. For example, staff in efficient mines use effective hot-seat changes, take meal breaks on machines, stagger meal breaks to ensure that core equipment continues to operate, move between pieces of equipment within shifts where necessary, fuel haulage equipment during breaks and ensure clean-up equipment does not impede production. Generally the poorer performing mines in the sample implement only a few of these good practices.

Table 2: **Key attributes of typical best practice and moderately performing Australian truck and shovel coal mines**

	Best practice mine	*Moderately performing mine*
Efficient truck loading practices: incidence of double-sided or other efficient truck loading method (per cent)	>50	0
Spotting time of trucks under shovels (seconds)	35	65
Truck loads per shovel per 8-hour shift	185	135
Industrial disputes: days lost per thousand hours worked	0	20
Safety: lost time injuries per million man hours	20	50

Source: Survey undertaken by Tasman Asia Pacific (1998).

Highly productive truck and shovel operations often use efficient shovel techniques such as double-sided loading of trucks. This was supported by our survey findings, albeit based on a relatively small sample of mines (Table 2). While double-sided loading imposes an extra dimension of care to maintain safety standards, it allows substantially more excavation per shift and improves truck productivity. For example, based on our sample, spotting times under trucks (the time from assigning away the previous truck to dumping the first load in the next truck) are often around 35 seconds with double-sided loading compared to 65 seconds with single-sided loading. This 30 second per truck lost digging and transportation time is significant given the frequency of truck loading.

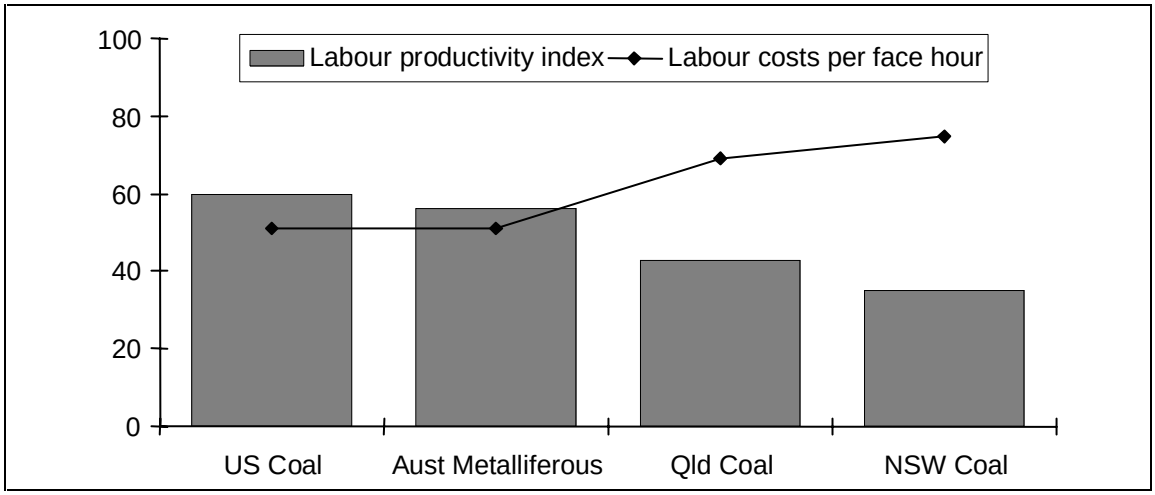
Better performing mines in the survey sample invariably had fewer industrial disputes and also seemed to have a better safety record.

PRODUCTIVITY AND COST OF TRUCK AND SHOVEL OPERATIONS

Our analysis of mines in the sample showed that the cost of material extraction and transport to stockpiles in NSW and Queensland truck and shovel operations was around 50 per cent higher than the United States coal mines and 30 per cent higher than the Australian metalliferous mines. Most of this was due to low productivity while about 30 per cent of the cost difference between the United States and NSW mines was due to high unit costs — especially of labour.

As shown in Figure 2, the average cost per face hour worked in the sample mines was considerably higher in the NSW and Queensland coal mine categories than in the Australian metalliferous and United States coal mine categories. These higher labour costs are in sharp contrast to the poor labour productivity achieved in these mines.

Figure 2: **Labour productivity and cost in truck and shovel operations** (index: United States Coal = 60 and $A costs)



Source: Survey undertaken by Tasman Asia Pacific (1998).

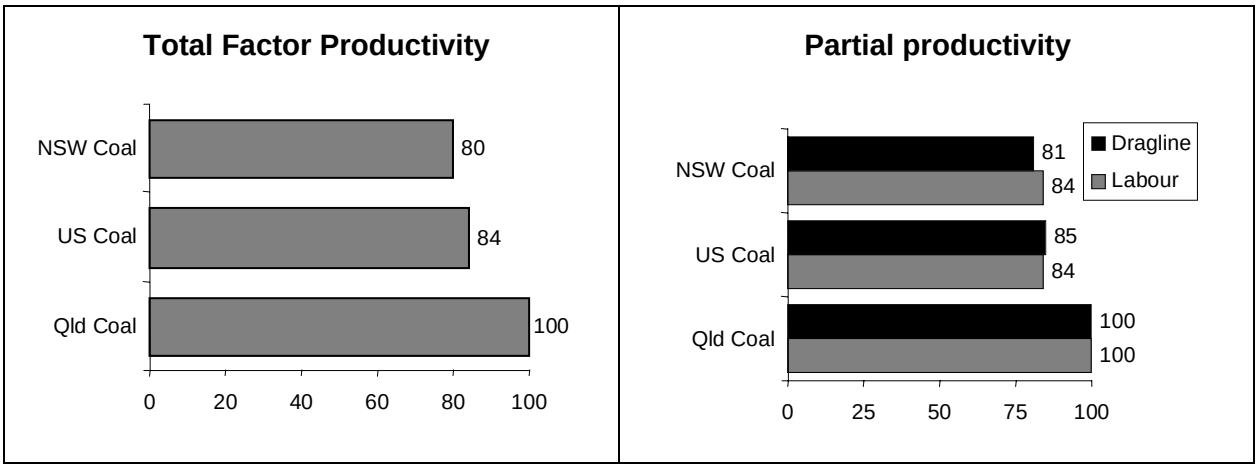
DRAGLINE BENCHMARKS

Tasman's estimates of dragline productivity focused on overburden removal in 13 open cut black coal mines located in NSW, Queensland and the United States. The results of this benchmarking see Queensland mines in the sample as the most efficient performers in 1996–1997 (Figure 3). NSW and United States producers in the sample needed to improve total productivity by an average of 25 and 19 per cent, respectively, to equal the Queensland mines' performance. On average, the productivity of the participating Australian dragline operations was about 13 per cent higher than the United States operations.

High dragline and labour productivity helped the sample of Queensland mines achieve this best practice result. Several factors contributed to the observed differences in productivity, across the sample, including:

- high dragline capacity utilisation coupled with operational efficiency of draglines in Queensland mines;
- low dragline operational productivity in New South Wales mines; and
- low blasting requirements in Queensland mines due to the geology of the overburden.

Figure 3: **Total factor productivity and key partial productivity of dragline operations** (index: Queensland = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

Table 3 shows that the Queensland mine category achieved the highest operational efficiency, achieving 47 full dragline bucket equivalents per hour. This compared to 44 in the United States mines category and only 37 for sample mines included in the NSW category. The sample mines in the NSW category were not making effective use of their relatively large draglines. The main problem related to the average number of swings per hour. It appears that a number of these NSW mines achieved high dragline bucket factors.

Based on our sample, labour productivity in Queensland dragline operations exceeded that in NSW and United States mines by about 20 per cent. Much of this difference stemmed from the greater operational efficiency of the Queensland draglines and fewer staff being required for drilling and blasting activities. Work practices appeared to be generally good throughout the Australian and United States dragline mines.

Despite the good productivity performance of many of the Australian dragline operations in the sample, they achieved cost levels well above their United States counterparts. For example, total costs of removing overburden in participating Queensland mines were 23 per cent higher than in participating United States mines, even though productivity was 19 per cent higher in the Queensland mines — which helps to reduce costs. The higher input costs in the Australian sample mines were largely due to the high cost of labour and explosives.

While the number of responses was relatively small, our analysis suggests that a number

of Australian open-cut mines that have problems with over-staffing and inefficient work practices in their truck and shovel operations are able to achieve much higher relative productivity in their less labour-intensive dragline operations.

Table 3: **Productivity performance of dragline operations**

	Dragline output per hour (bcms)	*Bucket factor* (per cent)	*Swings per hour* (number)	*Bucket capacity* (loose cubic metres)	*Equivalent dragline bucketfuls* (number per hour)
Queensland coal	1 901	92	51	41	47
United States coal	2 074	88	50	47	44
NSW coal	1 910	95	39	51	37

Source: Survey undertaken by Tasman Asia Pacific (1998).

LONGWALL OPERATIONS

We have compared the performance of seven Australian longwall mines against two United States mines. Due to the fewer number of participating mines, these findings may not be as representative of the relative performance of the Australian industry as were the results of the truck and shovel and dragline surveys. This benchmarking analysis focuses on longwall operations, and excludes development work.

Our total factor productivity analysis indicates that the Australian longwall mines studied achieved productivity levels, on average, 20 per cent behind that achieved by longwall operations in the United States (Figure 4). Alternatively, the participating Australian longwall mines needed to improve productivity by an average of around 25 per cent to match the performance of the participating United States mines.

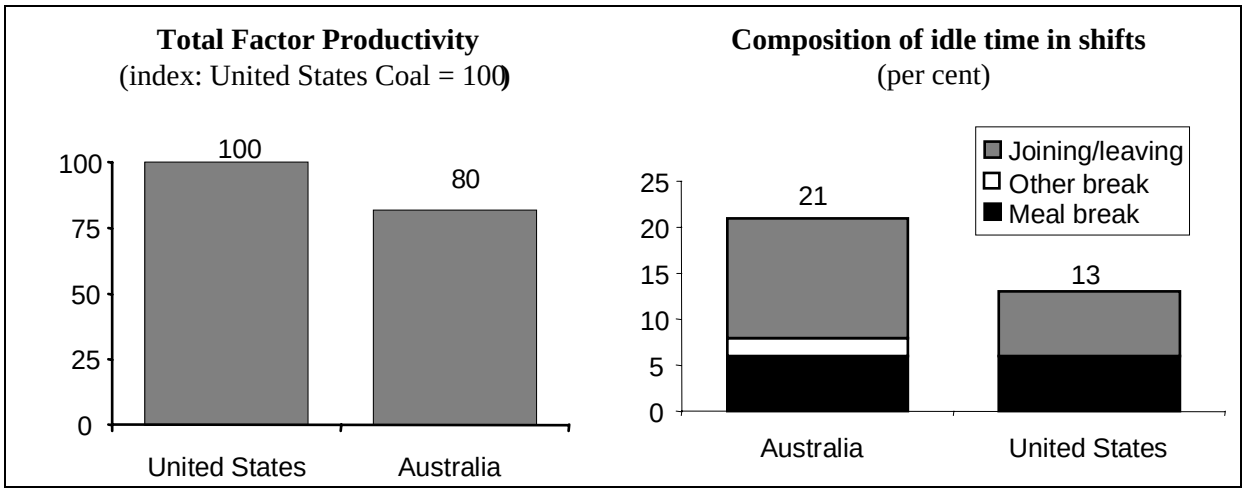
This lesser productivity performance mainly stemmed from:

- higher idle times in shifts in the participating Australian longwall mines;
- low utilisation of shearers in these Australian longwall mines; and
- geological differences.

The relatively high idle time in longwall shifts in the participating Australian mines was mainly due to longer times in joining and leaving shifts (Figure 4). Together with extra crib breaks, this reduced labour productivity in these Australian longwalls by about 10 per cent compared to the two United States mines. Other causes of lower labour productivity in these Australian longwalls related to operating conditions, installed

equipment and, most likely, an element of over-staffing.

Figure 4: **Total factor productivity and extent of idle time in shifts of Australian and United States longwall mines**



Source: Survey undertaken by Tasman Asia Pacific (1998).

Low shearer productivity in our sample mines resulted from lower utilisation in Australian longwalls. Some of this was due to planning — with spare capacity brought in to allow quicker longwall transitions. This was successful to a point, although there was evidence that a number of participating Australian mines took much longer to achieve target production on new longwalls than the United States mines. There was also apparent over-capitalisation of face-conveyor capacity in a few of the participating Australian longwall mines.

Longwall production costs were higher in the seven Australian mines, on average, than in their United States counterparts. Most of this reflected the productivity differential, although labour costs were also higher in these Australian mines compared to the United States mines.

While the sample of longwalls was small, it was again evident that Australian mines can attain or approach world's best practice productivity performance. One of the Australian mines was only about 10 per cent below the best practice United States mine, which is an acknowledged efficient operator. This was over a period that was not particularly favourable for the Australian mine.

MAJOR FINDINGS

The results of Tasman's black coal mine benchmarking indicate a very mixed productivity performance by Australian black coal mines in our sample. In each of three main technologies examined — truck and shovel, dragline and longwall — Australia can boast a number of mines that are at or very close to world best practice performance levels. Based on our sample, the problem for the Australian coal industry is the large number of moderate and poorly performing mines. However, this suggests that the better practice Australian mines often provide excellent benchmarks for the many, less-efficient Australian mines.

This is especially the case for Australia's truck and shovel mines, which needed to improve productivity by an average of around 30 per cent to match better practice United States coal mines and Australian metalliferous mines. A large proportion of Australian truck and shovel operations in our sample needed to improve total productivity by over 50 per cent to match their "best practice" neighbours. The poor productivity mines typically suffered from over-staffing, over-capitalisation and poor work practices.

Despite the smaller sample, a similar story emerged from the analysis of longwall mines. The analysis suggests that Australia has outstanding longwall mines but also many moderate performers. To approach best practice, the poorer performing Australian longwall mines need to decrease the extent of idle time in shifts, increase equipment utilisation and decrease the time taken to achieve full production on new longwalls.

In contrast, Queensland's dragline operations, as a sample group, were identified as best practice, operating at productivity levels around 20 to 25 per cent higher than similar mines in the United States and NSW samples. This good productivity performance was consistently achieved in the Queensland operations and appeared due to good engineering, management and labour practices.

In summary, the sample of mines included in the benchmarking study, suggests that the performance of mines in the Australian black coal industry is mixed. The varying levels of performance are now mainly due to problems at the company or mine level rather than industry level.

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BENCHMARKING PERFORMANCE IN THE BLACK COAL INDUSTRY — DISCUSSION OPENER — PRODUCTIVITY COMMISSION SEMINARS

Tasman Asia Pacific's report for the Commission *Benchmarking the Productivity of Australia's Black Coal Industry,* like its precursor *The scope for productivity improvement in Australia's open cut black coal industry,* commissioned by Rio Tinto, is at once an indictment of the industry's performance in 1996 — at least in the truck and shovel segment — and a pointer to identifying the improvement opportunities that clearly do exist.

The purpose of this paper, which was presented at the Commission's two seminars on benchmarking, was to provide an introductory comment and critique on the benchmarking work.

Productivity is not an easy concept — unless it's constrained to apply to a single operation with unchanging technology. Tasman defines it as "a measure of the physical output produced from the use of a given quantity of inputs". The only way to hold the denominator in this ratio constant and measure the numerator consistently — against changing or different circumstances, different technologies and different scales — is to derive indexes which comprehend all outputs and inputs, their values and costs, and weight them appropriately. The ratio indicates "total factor productivity".

There is still a question as to whether the measures used in this analysis are sufficiently comprehensive of coal mining activities to be fully representative of them. In particular, the exclusion of most maintenance activities and the exclusion of development work in longwall mining would appear to detract from the TFP concept. Alternatively, the benchmarking work undertaken by Tasman might better be described as addressing various sub-sets of mining activities: "truck and shovel operations", "dragline operations" and "longwall operations".

In concept, TFP attempts to measure output physically (what the mine does — or what it did at a certain time), with the *levels* of resource endowments (and ease of mining), technology employed, scale economies, and the mix and relative prices of all the various inputs held constant. This is what TFP relies on; it can do so rigorously using index number theory if the factor cost shares are not too different. Doing it thoughtfully and carefully is the hard part.

It is always important to remember that productivity — TFP or partial — is not an end in itself (though TFP can get very close to economic performance and competitiveness). Productivity measures are diagnostics. They can help, by

"looking over the fence", to indicate how an operation might be able to "get more for less".

Partial productivity figures (and less than comprehensive TFP figures) are interesting in highlighting differences, and useful in understanding or inferring reasons for differences in TFP. However, all the pertinent circumstances need to be taken into account before it would be sensible to act on the basis of partial productivity indicators. South African mines, for example, have much higher physical inputs of labour than competitors here and in the US — exactly as one would expect with lower unit labour costs and a profit maximising objective. The Tasman report explains that large wage differences preclude the suitability of Indonesia, South Africa and Chile from TFP comparisons with Australia. Also, Tasman's results suggest that the US coal mines in the survey have got it right by over-providing shovel capacity (rather than wrong as the partial indicator might imply), because they achieve much better haulage performances.

TFP is also limited to some extent. For example, when exchange rates move significantly, as they have recently, it would be surprising if the ideal composition of inputs in different countries were not to change. One would expect, for instance, increased emphasis on imported vehicle and equipment maintenance in Indonesia (and Australia), and on substituting local inputs like maintenance in place of foreign capital imports. On the other hand, relatively low real costs of capital at the moment would tend to induce capital spending. Just what the implications of such price changes are for TFP analysis over time is a question that might appropriately be addressed.

The other thing to recall is that, as Tasman cautions, this work is confined to certain activities on the mine side of the mine gate. Competitiveness is so critically dependent as well on the cost of getting the final product to market — notably the price (ie the terms and conditions) of rail access and haulage, port services and ocean transport. This is something the Productivity Commission is well aware of — though many will be inclined to hope that the final report devotes more attention to the contestability of the terms of rail access.

It would not be prudent to make too much of the precision of the Tasman results — especially given the relatively small sample sizes (with quite disparate observations) and possibly inconsistently measured or misunderstood data. None of these comments should be taken to imply that the Tasman work is in any way unreliable, rather that it might be wise to round off many of the numbers and put something of a (subjective) margin of error around them — and this is also Tasman's view. The consultants have, in a couple of places, calculated the rough implications on the TFP estimates of different values for partial figures — and that approach is commended.

Perhaps the most pressing question relates to the appropriateness of using total material excavated and transported as the measure of total output. No question, it is more realistic in terms of measuring the activity undertaken at a coal mine than just counting coal produced. For example, if I read the averages data correctly, say in truck and shovel, the selected mining costs per tonne of coal produced are $2 or $3 in Queensland and about $10 in NSW. That's a huge disparity. When the big difference in strip ratios (overburden to coal) is taken into account, the disparity in costs is substantially reduced (and NSW doesn't look nearly as bad). Even so, total costs incurred at the mines are considerably higher than these figures — emphasising again the importance of being concerned about how comprehensive is the TFP measure adopted.

As previously mentioned, maintenance is a topic that also engenders some unease in relation to Tasman's indicators. The scale of the maintenance function at an open cut coal mine — elsewhere as here — is always impressive. And yet its coverage in the analysis is implicit and maintenance staff, where identified, are excluded. The report provides some figures on the relative scale of the maintenance function — though it is not clear what size is a "typical" mine.

Maintenance is, in effect, subordinated to the object of mining coal. However, this begs the question: isn't mining overburden in the same category? It isn't an end in itself, but rather, like maintenance, just a necessary means to accessing the coal. If the activity were out-sourced (as it sometimes is) would it be treated differently? And would it matter?

In relation to truck and shovel, Tasman has analysed 22 mines in all, including 5 US coal mines and 4 Australian hard rock mines. The reported ratio of coal, in total material excavated, in NSW mines is a low 10%, compared with 30% for Queensland and 40% for the US. While the identities of the participating coal mines are properly protected, one might guess that Queensland includes Blair Athol and maybe NSW includes some of the deeper open cuts. The question has been raised as to how representative all this is, given the relatively small total tonnage surveyed. Again the issue is: to what extent does it matter? Significantly, if the NSW overburden removal task was indeed smaller, the productivity result for NSW mines would be even worse.

One might also question the quality of the data on replacement cost of equipment items. And what exchange rate was used to convert the US capital costs to $A? Do taxes on these capital items affect the figures?

Irrespective of these queries, however, the Tasman's findings reflect an unsatisfactory situation. The Tasman results suggest Australian truck/shovel mines lag far behind their US counterparts in productivity and mining costs; equipment is clearly over-manned; truck utilisation is poor; turnaround times are slow; and idle time is excessive.

As to the reasons for these deficiencies, the Tasman study proposes that many of them are due to work practices and working arrangements. Some of these links are self evident — and material presented elsewhere in the Commission's report tends to confirm that often asserted relationship.

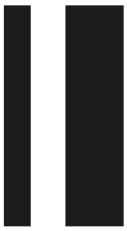
Not all the results reported by Tasman are bad: in draglines, the surveyed Queensland mines established best practice. Also, in some of the categories where the average productivity performance of Australian mines appeared to be wanting, some individual mines ranked much more highly.

However, as noted above, the report card overall is poor. Specific diagnostics, and prescriptions for improvement, necessarily demand attention to the partial indicators — and some of those reported in the study are particularly impressive: in longwalls, the finding that Australian miners, compared with their US counterparts, spend 30 minutes extra joining and leaving shifts is indicative of important differences, if not immediately of possible remedies. It is also instructive that safety appears to be a key productivity indicator: the lost time injury rate of 20 per million man hours at best practice mines compares with a rate of 50 at moderately performing mines.

The partial figures also lend credence to assessments of the scope for improvement: for instance, it is revealing that truckloads per shovel per 8 hour shift vary between 185 at best practice and 135 for moderately performing mines. Some of these indicators provide reassurance that Tasman's TFP estimates — which must be preferred for general assessment purposes — are reasonably reliable.

Ultimately, the quality and usefulness of the productivity comparisons, as Tasman is the first to acknowledge, is dependent on the selection of benchmarking partners whose operations are reasonably similar and on co-operation between them over time to ensure consistency of terminology, classification and measurement. Some of the better performing Australian mines might be very useful benchmarking partners for the poorer performers.

JOHN DALEY
Director
June 1998



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BENCHMARKING THE PRODUCTIVITY OF AUSTRALIA'S BLACK COAL INDUSTRY

TASMAN ASIA PACIFIC Pty Ltd

June 1998

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Tasman Asia Pacific Pty Ltd specialises in the quantitative analysis of policy issues, performance measurement and the provision of management advice to industry and government both in Australia and overseas.

CONTENTS

EXECUTIVE SUMMARY vi

CONTENTS i

LIST OF TABLES iv

LIST OF FIGURES v

LIST OF FIGURES (CONTINUED) vi

LIST OF BOXES vi

EXECUTIVE SUMMARY vii

TRUCK AND SHOVEL PRODUCTIVITY BENCHMARKS viii

PRODUCTIVITY AND COST OF TRUCK AND SHOVEL OPERATIONS xi

DRAGLINE BENCHMARKS xii

LONGWALL OPERATIONS xv

MAJOR FINDINGS xvi

1. INTRODUCTION 1

1.1 STUDY BACKGROUND 1

1.2 THE AUSTRALIAN BLACK COAL INDUSTRY — A SNAPSHOT 1

1.3 MINING TECHNOLOGIES 2

1.4 OUTLINE OF THE REPORT 3

2. BENCHMARKING METHODOLOGY 5

2.1 SELECTING MINES FOR BENCHMARKING 5

2.2 PRODUCTIVITY PERFORMANCE MEASURES 7

3. OPEN CUT TRUCK AND SHOVEL OPERATIONS 9

3.1 THE CHARACTERISTICS OF THE BENCHMARKED OPERATIONS 9

3.2 MINE OUTPUTS AND INPUTS 10

3.3 TRUCK AND SHOVEL OPERATIONS — TOTAL PRODUCTIVITY BENCHMARKS 12
3.3.1 Variation in productivity within mine categories 13

3.4 FACTORS CONTRIBUTING TO PRODUCTIVITY DIFFERENCES 16
3.4.1 Efficiency of the labour force 17
3.4.2 Efficiency of truck operations 23
3.4.3 Efficiency of excavation equipment 26

3.5 THE LINK BETWEEN PRODUCTIVITY AND COST 31
3.5.1 High unit labour costs contribute to the high costs of operation 32

3.6 OTHER FACTORS 34
3.6.1 Incidence of industrial disputes 35
3.6.2 Safety 35
3.6.3 Equipment maintenance 37

3.7 ATTRIBUTES OF FRONTIER VERSUS MODERATELY PERFORMING MINES 39

3.8 SUMMARY OF TRUCK AND SHOVEL ANALYSIS 41

4 DRAGLINE OPERATIONS 43

4.1 KEY CHARACTERISTICS OF THE BENCHMARKED MINES 43

4.2 DRAGLINE TFP 44
4.2.1 Mine outputs and inputs 44
4.2.2 Dragline operations — total productivity benchmarks 45

4.3 FACTORS CONTRIBUTING TO DIFFERENCES IN DRAGLINE PRODUCTIVITY 48
4.3.1 Efficiency of dragline operations 49
4.3.2 Labour Productivity 52

4.4 THE LINK BETWEEN PRODUCTIVITY AND COST 55

4.5 SUMMARY OF DRAGLINE ANALYSIS 56

5. LONGWALL MINING OPERATIONS 58

5.1 KEY CHARACTERISTICS OF THE BENCHMARKED LONGWALL MINES 58

5.2 FRAMEWORK FOR MEASURING LONGWALL PRODUCTIVITY 59

5.3 LONGWALL OUTPUTS 60

5.4 INPUTS USED IN LONGWALL OPERATIONS 61

5.5 TOTAL PRODUCTIVITY OF LONGWALL OPERATIONS 63
5.5.1 Efficiency of the labour force 65
5.5.2 Equipment productivity 70
5.5.3 Maintenance 71

5.6 LONGWALL PRODUCTIVITY AND COST 72

5.7 SUMMARY OF LONGWALL ANALYSIS 73

APPENDIX 1: PRODUCTIVITY PERFORMANCE MEASURES 75

APPENDIX 2: ESTIMATION OF TRUCK AND SHOVEL OUTPUTS AND INPUTS 77

A2.1 TRUCK AND SHOVEL OUTPUTS 77

A2.2 INPUTS USED IN TRUCK AND SHOVEL OPERATIONS 79

APPENDIX 3: ESTIMATION OF DRAGLINE OUTPUTS AND INPUTS 84

A3.1 DRAGLINE OUTPUTS 84

A3.2 INPUTS USED IN DRAGLINE OPERATIONS 85

REFERENCES 88

LIST OF TABLES

No. Title

2.1 Characteristics of mines invited to participate in study 7
3.1 Key geological characteristics of mines with truck and shovel operations 9
3.2 Scope for productivity improvement using local mines as benchmarks 15
3.3 Partial productivity indicators of truck and shovel 15
3.4 Key labour operating practices 21
3.5 Inherent truck productivity 23
3.6 Key truck haul statistics for truck and shovel mines 24
3.7 Inherent truck productivity 27
3.8 Shovel loading practices 28
3.9 Shovel loading performance 29
3.10 Cost per tonne of mineral and waste removed, truck and shovel mine categories 31
3.11 Incidence of industrial disputation 34
3.12 Typical costs of operating shovels 36
3.13 Typical costs of operating trucks 37
4.1 Characteristics of dragline operations: average per mine 41
4.2 Total productivity of dragline operations 44
4.3 Comparing the productivity of dragline and truck and shovel operations of mines 45
4.4 Partial productivity indicators of dragline operations 46
4.5 Productivity performance of dragline operations 48
4.6 Capacity utilisation and improvements needed to match best practice dragline performance 49
4.7 Typical costs of operating draglines 49
4.8 Number and composition of workers in typical shift 51
5.1 Characteristics of mines invited to participate in study 56
5.2 Assumed maximum working life for equipment in longwall mines 60
5.3 Cost shares in longwall operations: weighted average per mine 60
5.4 Partial productivity indicators of longwall operations 63
5.5 Cost of labour in longwall operations: average per worker 65
5.6 Incidence of industrial disputation in longwall mines 67

LIST OF FIGURES

No. Title

3.**Error! Bookmark not defined.**Average output and input — truck and shovel mines 11
3.2 Total factor productivity of truck and shovel operations 12
3.3 Variation in total productivity within truck and shovel mine categories 13
3.4 Labour productivity of truck and shovel mines 16
3.5 Staffing of equipment in truck and shovel mines 18
3.6 Composition of idle time in shifts at truck and shovel mines 20
3.7 Truck productivity 22
3.8 Truck utilisation in truck and shovel mines 23
3.9 Excavation equipment productivity 25
3.10 Utilisation of digging equipment in truck and shovel mines 26
3.11 Percentage of mines predominantly using single-sided loading techniques 28
3.12 Total factor productivity and cost per tonne, truck and shovel operations: Australian and United States coal operations 30
3.13 Labour productivity and cost in truck and shovel operations 32
3.14 Breakdown of labour cost per face hour worked, truck and shovel operations 33
3.15 Open-cut mine safety 35
4.1 Average output and input — dragline mines 43
4.2 Total productivity of dragline operations 44
4.3 Productivity of draglines 47
4.4 Dragline utilisation 48
4.5 Labour productivity in dragline operations 50
4.6 Percentage of idle time in shifts 52
4.7 Total factor productivity and cost per BCM in dragline operations 54
5.1 Average output of longwall mines 58
5.2 Average inputs used in longwall mines 61
5.3 Total productivity of longwall mines 62
5.4 Labour productivity of longwall mines 63
5.5 Composition of idle time in shifts at longwall mines 64
5.6 Labour productivity and cost in dragline operations 66

5.7 Longwall mine safety 68

LIST OF FIGURES (CONTINUED)

No. Title

5.8 Maintenance labour productivity of longwall mines 70

5.9 Total factor productivity and cost per tonne, Australian and United States longwall operations 71

LIST OF BOXES

No. Title

3.**Error! Bookmark not defined.**Truck and shovel staffing profile: "frontier" and moderately performing mines 19

3.2 Key attributes of frontier and moderately performing mines 38

5.1 Longwall and development production 57

5.2 Longwall mines benchmark model.....59

5.3 Utilisation and availability of shearers 69

EXECUTIVE SUMMARY

In October 1997 the Industry Commission contracted Tasman Asia Pacific to undertake a benchmarking study of the productivity performance of Australia's black coal mines. Tasman's brief was to benchmark mines in Australia's black coal industry against world best practice coal mines and best practice Australian metalliferous mines. The Commission will use this benchmarking in its current inquiry into the international competitiveness of the Australian black coal industry.

This report builds on earlier benchmarking work undertaken by Tasman. It benchmarks 44 separate mine operations in 1996 and 1997 — 22 truck and shovel, 13 dragline and 9 longwall operations.

Data used in this benchmarking study is based on information collected from a Tasman survey. The Australian mines invited to participate in the study were selected from a Barlow Jonker (1997) database. This database provides labour productivity and mine cost data separately for dragline, truck and shovel and longwall operations. Mines selected provided a representative coverage of mines exhibiting high, medium and low labour productivity. Tasman also aimed for representative coverage according to company ownership, location and mine technology. The black coal mines selected in the United States included a number that were nominated by industry experts as better practice operations as well as mines that were affiliates of Australian mining companies. Responses were received from 20 Australian black coal mines, eight United States coal mines and four Australian metalliferous mines. Black coal production from the responding Australian coal mines is equal to nearly 40 per cent of Australia's raw black coal production.

Tasman's benchmarking is based on total factor productivity measures (which measures total output relative to *all* inputs used) and supported by partial productivity measures to identify the drivers of productivity differences between mines.

The benchmarking analysis focuses on the main components of the mining process. However, it does not cover all mines inputs nor does it cover development work (eg setting up mine offices, developing access roads). The main items excluded from all three mining technologies are washeries, mine overheads, many maintenance activities and some materials used in production.

These elements have been excluded because:

- the data is often not supplied on a consistent basis by mines (eg mine office overheads and materials);
- the data vary considerably from year to year (eg due to the extent of major equipment overhauls in maintenance activities); and
- differences in inputs largely reflect geological or environmental factors (eg the yield of coal impacts on washeries input).

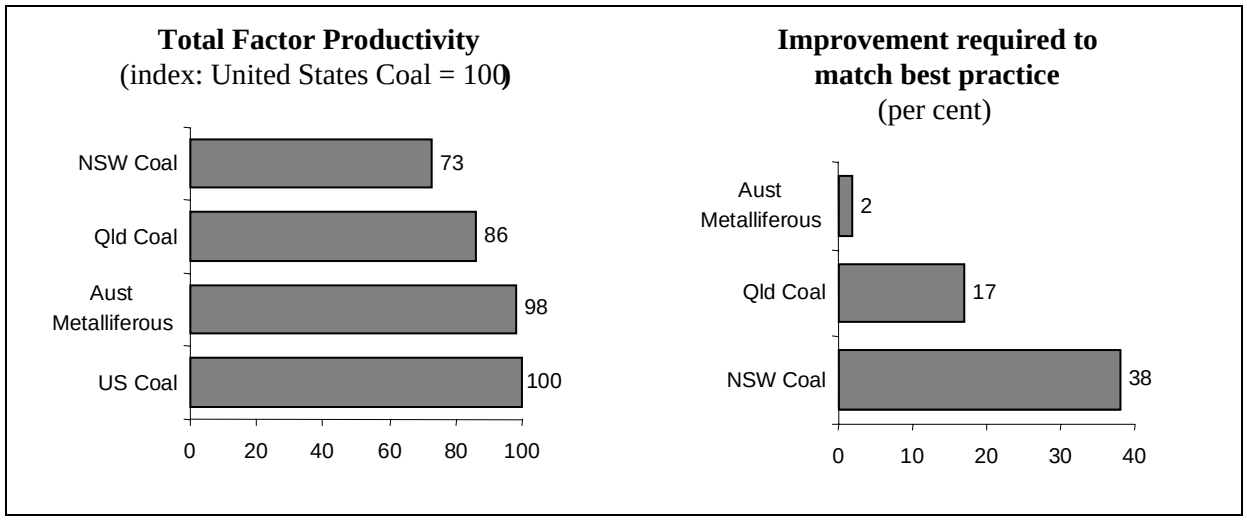
The analysis presented in this report has benefited from comments received from participants at the January 1998 and June 1998 benchmarking workshops that were conducted by the Productivity Commission in the course of its public inquiry process.

TRUCK AND SHOVEL PRODUCTIVITY BENCHMARKS

Truck and shovel mines remove both overburden and coal or other minerals primarily with trucks and shovels.

Tasman's benchmarking results indicate that in 1996–1997, the total factor productivity of the participating NSW and Queensland truck and shovel coal operations was, on average, well below best practice (Figure 1).

Figure 1: **Total factor productivity of truck and shovel operations**



Source: Survey undertaken by Tasman Asia Pacific (1998).

To match the best practice productivity levels of United States coal mines, participating NSW and Queensland coal mines needed, on average, to increase their productivity by 38 and 17 per cent respectively. Average productivity increases of 35 and 14 per cent, respectively, were required for these mines to match the average productivity of the Australian metalliferous mines covered by the survey. As a whole, the Australian coal mines in our sample needed to increase productivity by about 30 per cent to match the performance of the United States coal mines and Australian metalliferous mines.

A number of factors influenced these productivity outcomes. Geological conditions, such as thinner and more numerous coal seams in the NSW mine category explain some of the measured productivity gap. Of much more importance, however, were over-staffing, over-capitalisation of equipment and poor work practices. These were reflected in low relative labour and truck productivity in our sample of NSW and Queensland coal mines. For example, labour and truck productivity both needed to increase by around 70 per cent in the NSW coal mines to match the performance of our sample of United States coal mines. Queensland coal mines in our survey sample, on average, needed a corresponding 40 per cent increase.

Table 1: **Resourcing and work practices of typical best practice and moderately performing Australian truck and shovel coal mines**

	Best practice mine	*Moderately performing mine*
Total productivity	100	60
Resource levels		
Staffing levels: ratio of labour hours worked to equipment hours worked	1.5	2.1
Work time in shifts: time excluding leaving and joining shifts, meal and other breaks (per cent)	92	85
Utilisation of truck fleet: hours operated as a percentage of total available hours	45	40
Utilisation of major digging equipment: hours operated as a percentage of total available hours	50	40
Work practices		
Hot seat changes	✓	✓
Meal breaks in the field	✓	✗
Staggered meal breaks	✓	✗
Operators move between equipment within shifts	✓	rarely
Haulage equipment fuelled in breaks	✓	✗
Clean-up equipment does not impede production	✓	✗

Source: Survey undertaken by Tasman Asia Pacific (1998).

However, a number of Australian truck and shovel operations are at the frontier of efficient operation — achieving productivity levels more than 50 per cent higher than many other Australia mines. Table 1 and Table 2 outline differences in key characteristics of the frontier and moderately performing Australian truck and shovel operations included in our sample. These characteristics indicate ways for the poorer performing mines to improve efficiency.

Table 1 indicates that over-staffing and over-capitalisation are common causes of lower productivity. Often the moderate performing mines have more equipment than they need — resulting in low equipment utilisation and productivity and requiring additional staff. In such mines, excess staff are also often apparent in areas such as operating non-core equipment (eg water and lube trucks) and in general duties.

Work practices are more efficient in the high performing mines in the sample. For example, staff in efficient mines use effective hot-seat changes, take meal breaks on machines, stagger meal breaks to ensure that core equipment continues to operate, move between pieces of equipment within shifts where necessary, fuel haulage equipment during breaks and ensure clean-up equipment does not impede production. Generally the poorer performing mines in the sample implement only a few of these good practices.

Table 2: **Key attributes of typical best practice and moderately performing Australian truck and shovel coal mines**

	Best practice mine	*Moderately performing mine*
Efficient truck loading practices: incidence of double-sided or other efficient truck loading method (per cent)	>50	0
Spotting time of trucks under shovels (seconds)	35	65
Truck loads per shovel per 8-hour shift	185	135
Industrial disputes: days lost per thousand hours worked	0	20
Safety: lost time injuries per million man hours	20	50

Source: Survey undertaken by Tasman Asia Pacific (1998).

Highly productive truck and shovel operations often use efficient shovel techniques such as double-sided loading of trucks. This was supported by our survey findings, albeit based on a relatively small sample of mines (Table 2). While double-sided loading imposes an extra dimension of care to maintain safety standards it allows substantially more excavation per shift and improves truck productivity. For example, based on our sample, spotting times under trucks (the time from assigning away the previous truck to dumping the first load in the next truck) are often around 35 seconds with double-sided loading compared to 65 seconds with

single-sided loading. This 30 second per truck lost digging and transportation time is significant given the frequency of truck loading.

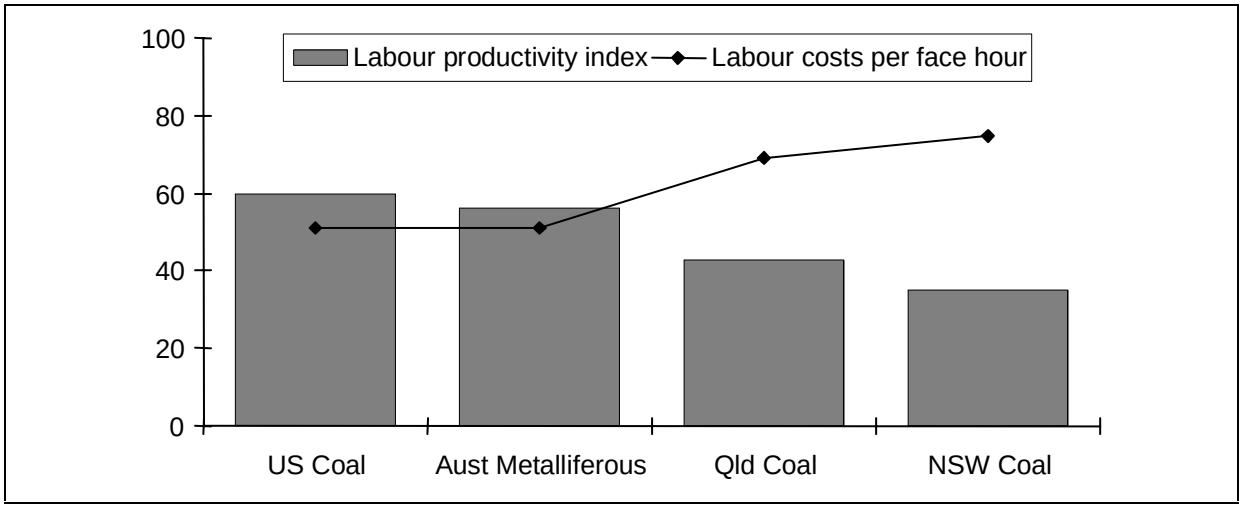
Better performing mines in the survey sample invariably have fewer industrial disputes and also seem to have a better safety record.

PRODUCTIVITY AND COST OF TRUCK AND SHOVEL OPERATIONS

Our analysis of mines in the sample showed that the cost of material extraction and transport to stockpiles in NSW and Queensland truck and shovel operations was around 50 per cent higher than the United States coal mines and 30 per cent higher than the Australian metalliferous mines. Most of this was due to low productivity while about 30 per cent of the cost difference between the United States and NSW mines was due to high unit costs — especially of labour.

As shown in Figure 2, the average cost per face hour worked in the sample mines was considerably higher in the NSW and Queensland coal mine categories than in the Australian metalliferous and United States coal mine categories. These higher labour costs are in sharp contrast to the poor labour productivity achieved in these mines.

Figure 2: **Labour productivity and cost in truck and shovel operations**
(index: United States Coal = 60 and $A costs)

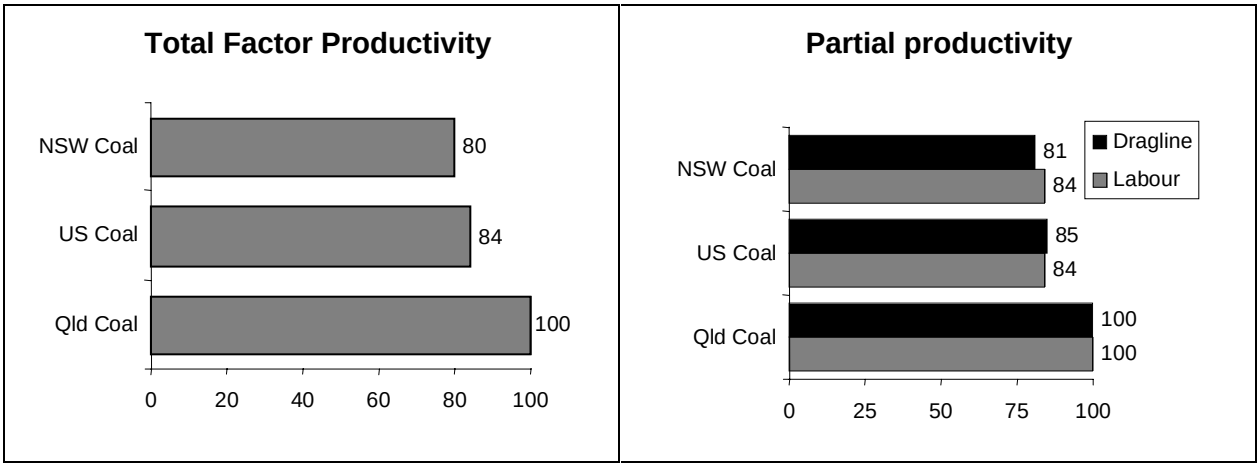


Source: Survey undertaken by Tasman Asia Pacific (1998).

DRAGLINE BENCHMARKS

Tasman's estimates of dragline productivity focused on overburden removal in 13 open cut black coal mines located in NSW, Queensland and the United States. The results of this benchmarking see Queensland mines in the sample as the most efficient performers in 1996–1997 (Figure 3). NSW and United States producers in the sample needed to improve total productivity by an average of 25 and 19 per cent, respectively, to equal the Queensland mines' performance. On average, the productivity of the participating Australian dragline operations was about 13 per cent higher than the United States operations.

Figure 3: **Total factor productivity and key partial productivity of dragline operations** (index: Queensland = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

High dragline and labour productivity helped the sample of Queensland mines achieve this best practice result. Several factors contributed to the observed differences in productivity, across the sample, including:

- high dragline capacity utilisation coupled with operational efficiency of draglines in Queensland mines;
- low dragline operational productivity in New South Wales mines; and
- low blasting requirements in Queensland mines due to the geology of the overburden.

Table 3 shows that the Queensland mine category achieved the highest operational efficiency, achieving 47 full dragline bucket equivalents per hour. This compared to 44 in the United States mines category and only 37 for sample mines included in the NSW category. The sample mines in the NSW category were not making effective use of their relatively large

draglines. The main problem related to the average number of swings per hour. It appears that a number of these NSW mines achieved high dragline bucket factors.

Table 3: **Productivity performance of dragline operations**

	Dragline output per hour (bcms)	*Bucket factor* (per cent)	*Swings per hour* (number)	*Bucket capacity* (loose cubic metres)	*Equivalent dragline bucketfuls* (number per hour)
Queensland coal	1 901	92	51	41	47
United States coal	2 074	88	50	47	44
NSW coal	1 910	95	39	51	37

Source: Survey undertaken by Tasman Asia Pacific (1998).

Based on our sample, labour productivity in Queensland dragline operations exceeded that in NSW and United States mines by about 20 per cent. Much of this difference stemmed from the greater operational efficiency of the Queensland draglines and fewer staff being required for drilling and blasting activities. Work practices appeared to be generally good throughout the Australian and United States dragline mines.

Despite the good productivity performance of many of the Australian dragline operations in the sample, they achieved cost levels well above their United States counterparts. For example, total costs of removing overburden in participating Queensland mines were 23 per cent higher than in participating United States mines, even though productivity was 19 per cent higher in the Queensland mines — which helps to reduce costs. The higher input costs in the Australian sample mines were largely due to the high cost of labour and explosives.

While the number of responses was relatively small, our analysis suggests that a number of Australian open-cut mines that have problems with over-staffing and inefficient work practices in their truck and shovel operations are able to achieve much higher relative productivity in their less labour-intensive dragline operations.

LONGWALL OPERATIONS

We have compared the performance of seven Australian longwall mines against two United States mines. Due to the fewer number of participating mines, these findings may not be as representative of the relative performance of the Australian industry as were the results of the truck and shovel and dragline surveys. This benchmarking analysis focuses on longwall operations, and excludes development work.

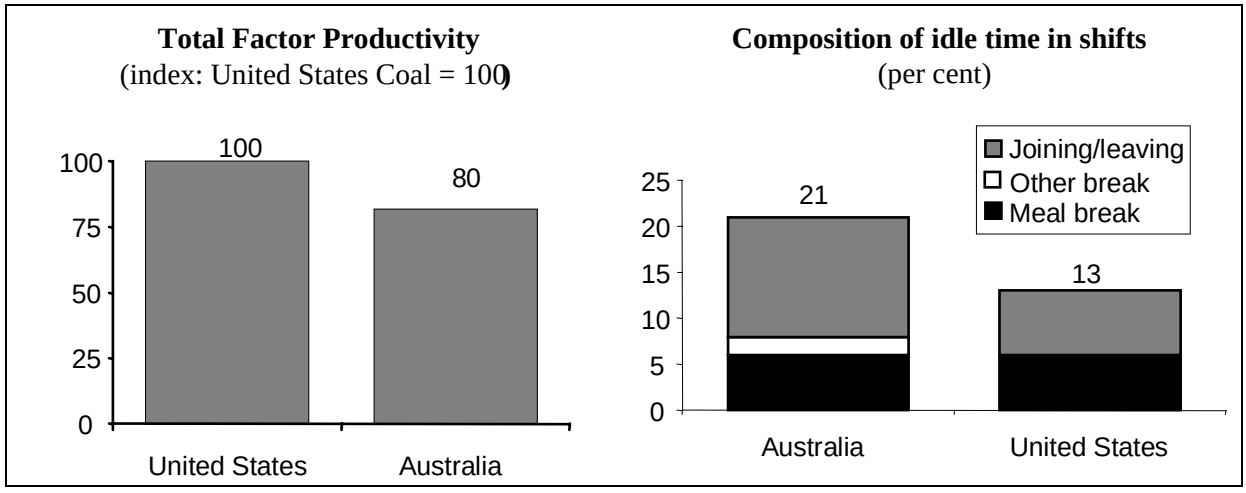
Our total factor productivity analysis indicates that the Australian longwall mines studied achieved productivity levels, on average, 20 per cent behind that achieved by longwall operations in the United States (Figure 4). Alternatively, the participating Australian longwall mines needed to improve productivity by an average of around 25 per cent to match the performance of the participating United States mines.

This lesser productivity performance mainly stemmed from:

- higher idle times in shifts in the participating Australian longwall mines;
- low utilisation of shearers in these Australian longwall mines; and
- geological differences.

The relatively high idle time in longwall shifts in the participating Australian mines was mainly due to longer times in joining and leaving shifts (Figure 4). Together with extra crib breaks, this reduced labour productivity in these Australian longwalls by about 10 per cent compared to the two United States mines. Other causes of lower labour productivity in these Australian longwalls related to operating conditions, installed equipment and, most likely, an element of over-staffing.

Figure 4: **Total factor productivity and extent of idle time in shifts of Australian and United States longwall mines**



Source: Survey undertaken by Tasman Asia Pacific (1998).

Low shearer productivity in our sample mines resulted from lower utilisation in Australian longwalls. Some of this was due to planning — with spare capacity brought in to allow quicker longwall transitions. This was successful to a point, although there was evidence that a number of participating Australian mines took much longer to achieve target production on

new longwalls than the United States mines. There was also apparent over-capitalisation of face-conveyor capacity in a few of the participating Australian longwall mines.

Longwall production costs were higher in the seven Australian mines, on average, than in their United States counterparts. Most of this reflected the productivity differential, although labour costs were also higher in these Australian mines compared to the United States mines.

While the sample of longwalls was small, it was again evident that Australian mines can attain or approach world's best practice productivity performance. One of the Australian mines was only about 10 per cent below the best practice United States mine, which is an acknowledged efficient operator. This was over a period that was not particularly favourable for the Australian mine.

MAJOR FINDINGS

The results of Tasman's black coal mine benchmarking indicate a very mixed productivity performance by Australian black coal mines in our sample. In each of three main technologies examined — truck and shovel, dragline and longwall — Australia can boast a number of mines that are at or very close to world best practice performance levels. Based on our sample, the problem for the Australian coal industry is the large number of moderate and poorly performing mines. However, this suggests that the better practice Australian mines often provide excellent benchmarks for the many, less-efficient Australian mines.

This is especially the case for Australia's truck and shovel mines, which needed to improve productivity by an average of around 30 per cent to match better practice United States coal mines and Australian metalliferous mines. A large proportion of Australian truck and shovel operations in our sample needed to improve total productivity by over 50 per cent to match their "best practice" neighbours. The poor productivity mines typically suffered from over-staffing, over-capitalisation and poor work practices.

Despite the smaller sample, a similar story emerged from the analysis of longwall mines. The analysis suggests that Australia has outstanding longwall mines but also many moderate performers. To approach best practice, the poorer performing Australian longwall mines need to decrease the extent of idle time in shifts, increase equipment utilisation and decrease the time taken to achieve full production on new longwalls.

In contrast, Queensland's dragline operations, as a sample group, were identified as best

practice, operating at productivity levels around 20 to 25 per cent higher than similar mines in the United States and NSW samples. This good productivity performance was consistently achieved in the Queensland operations and appeared due to good engineering, management and labour practices.

In summary, the sample of mines included in the benchmarking study, suggests that the performance of mines in the Australian black coal industry is mixed. The varying levels of performance are now mainly due to problems at the company or mine level rather than industry level.

1. INTRODUCTION

1.1 STUDY BACKGROUND

In July 1997, the Treasurer requested that the Industry Commission inquire into the international competitiveness of the Australian black coal industry. Part 3(a) of the terms of reference for the inquiry requested that the Commission report on:

> Sound, objectively determined benchmarks of productivity performance for Australian black coal mines, best practice in comparable international black coal mines and best practice in analogous Australian metalliferous mines, identifying the reasons for differences in productivity performance between the specified groups. Components investigated should include management, labour, machine performance and mine geology.

Tasman Asia Pacific (Tasman) has considerable experience in benchmarking the coal industry both domestically and internationally. Tasman staff have undertaken a number of coal benchmarking studies including Swan Consultants (Canberra) (1994) and Tasman Asia Pacific (1997).

This benchmarking report addresses the requirements of Part 3(a) of the terms of reference for the Productivity Commission's Coal Inquiry.

The analysis presented in this report has benefited from comments received from participants at the January 1998 and June 1998 benchmarking workshops that were conducted by the Productivity Commission in the course of its public inquiry process.

1.2 THE AUSTRALIAN BLACK COAL INDUSTRY — A SNAPSHOT

The black coal industry plays a significant role in the Australian economy. The industry is a major contributor to Australia's gross domestic product, exports and employment.

New South Wales and Queensland are Australia's major producers of black coal. Approximately 95 per cent of Australia's saleable coal is extracted from mines in these two states. The industry employs over 20,000 people. Australia's black coal is currently mined by both underground and open cut methods. Underground mining methods are chosen when the coal seams are covered by extensive amounts of overburden. Longwall mining is the major

removal technology used underground. Two alternative methods are used in open cut mining, these are truck and shovel, and dragline. The removal method used in open cut mines is generally determined by the extent of overburden and inter-burden between the coal seams being mined.

The electricity generation industry is the major domestic user of black coal — consuming just under 80 per cent of the 56 million tonnes used domestically. Thus, indirectly, coal is an important input for all Australian industries. The iron and steel industry is another major domestic user. In 1995–96, 138 million tonnes of black coal were exported. These exports generated $7.8 million of export income. Black coal is Australia's largest single export commodity. It represents around eight per cent of total exports. Japan is the largest single destination of these exports.

Australia produces around five per cent of the world's total production of black coal. However, it is the largest producer of black coal for export — one-third of all black coal export tonnes are from Australia.

Currently, the United States, South Africa and Canada are Australia's main competitor countries. However, in recent years a number of Asian countries, such as China and Indonesia, have become more competitive in the world market. Unless the industry can find ways of improving its viability, increased international competition will put downward pressure on Australia's returns from black coal. Productivity improvements are one way of improving viability.

1.3 MINING TECHNOLOGIES

Coal is recovered using both open cut and underground technologies.

The process of recovering coal in an open cut mine involves several processes. Topsoil and vegetation are sometimes removed with bulldozers and scrapers exposing the material overlaying the coal seam. This is known as the overburden.

Overburden can be removed in one of three ways. First, cast blasting can be used to "throw" a portion of it into a previously mined strip. Second, draglines can be used to remove the overburden and place it on the spoil pile. Depending on pit configuration, this can involve handling the overburden more than once. Thus, overburden removed is typically classified into "prime" overburden and re-handled overburden. Finally, shovels and trucks can be used

to remove overburden and interburden.

Once the overburden is removed the coal seam may be blasted and the coal recovered using a truck and shovel operation.

Underground coal mining operations use two technologies — longwall operations and bord and pillar. In underground longwall mines a shaft is sunk from the mine surface to the coal seam. This shaft must have a gradient low enough to allow miners and machines to access the coal face.

In longwall mines, once the coal seam is reached a shaft is driven either side of the coal seam which is to be mined. The coal face is then created by joining the shafts. All these tunnels are supported by roof bolts. Once the coal face has been created the longwall equipment is put in place. Moveable hydraulic chocks are put in place along the coal face. These chocks support the roof while mining takes place. The coal is cut by a shearer which is placed in front of the roof supports. Once the coal is cut, the shearer loads the coal onto an armoured face conveyor. The armoured face conveyor removes the mined coal from the coal face and places it in the stage loader. The stage loader then places the coal on a gate conveyor which transports the coal to the trunk conveyor. The trunk conveyor transports the coal to the surface.

As the coal face is mined, the equipment in the longwall is advanced. This leaves the previously mined area unsupported and the rock which previously overlaid the coal collapses, filling the void. Longwalls can differ in dimensions but typically the coal seams mined can be between one to three metres thick. The coal can be mined in blocks of over a kilometre in length and they can be several hundred metres wide.

Because the technologies used to mine the coal are so vastly different, the productivity analysis was conducted for each mining technology included in the analysis.

1.4 OUTLINE OF THE REPORT

This report uses total factor productivity and partial productivity indicators to compare the performance of coal/ore and overburden removal. It benchmarks open-cut and underground mines. In the open cut side of the industry two removal methods have been benchmarked — truck and shovel, and dragline. The longwall mining technique has been benchmarked in the underground mines. In addition to presenting productivity benchmarks, the report also

discusses the main reasons for any identified productivity differences. The following chapter outlines the methodology used in this analysis. Chapters 3 and 4, respectively, present the findings for the two open-cut methods, truck and shovel and dragline. Chapter 5 presents the longwall benchmarking analysis.

2. BENCHMARKING METHODOLOGY

A large amount of data is required to produce sound and objectively determined benchmarks of black coal mine productivity performance. Much of this data is commercially sensitive and not publicly available. Tasman developed a questionnaire and sought the required data from individual mines. A separate questionnaire was produced for each of the three mine technologies investigated.

In addition to operating and financial data, the questionnaires sought information about geological characteristics of mines. The questionnaires collected information on factors such as rock hardness and seam thickness. These factors affect explosives requirements and the digging and loading components of the mining cycle. The collection of this data has allowed Tasman to take into account how many geological characteristics can effect mine performance. While not all geological differences are accounted for, these generally have relatively minor influences on total productivity compared to factors under the control of management such as staffing levels, work practices and equipment capacity and usage.

2.1 SELECTING MINES FOR BENCHMARKING

One of the prime objectives of the study is to make the sample of Australian coal operations as representative as possible of the productivity of the industry. To achieve this we selected mines on the basis of analysis of a detailed database of Australian coal operations provided by Barlow Jonker (1997). This database provides labour productivity and mine cost data separately for dragline, truck and shovel and longwall operations.

Using the Barlow Jonker database, we selected mines to provide a representative coverage of mines exhibiting:

- high labour productivity;
- medium labour productivity; and
- low labour productivity.

On request of Tasman, the Barlow Jonker database defined labour productivity as total movements of coal and overburden per mine employee. Mine employees were defined to

exclude maintenance, office and washeries staff. As explained later, these operations are usually excluded from our analysis, as they are difficult to benchmark accurately. We stratified the sample by labour productivity performance as this was considered to be more reliable than the cost estimates which were more significantly affected by mine operating conditions as well as input prices.

In selecting the Australian mines to be invited to participate in the study, we also aimed for a representative coverage according to company ownership, location and mine technology.

The international mines invited to participate in the study were all in the United States. Many other countries that were nominated as having efficient mines had wage rates much lower than those in Australia so were not suitable comparisons for a total productivity analysis. This was mainly because these low-wage countries had much larger relative work forces and different operating practices. These countries included Indonesia, South Africa and Chile.

The black coal mines selected in the United States included a number that were nominated by industry experts as better practice mines. However, this was not universally the case as we also needed to choose mines that were affiliates of Australian mining companies to increase the prospects of receiving data. The rationale for selecting better practice international comparisons rather than average international comparisons is to show the scope for improvement in the Australian industry and ways of achieving that improvement. This is the primary objective of benchmarking.

We also included a number of domestic metalliferous mines as their mining techniques are comparable to the truck and shovel operations at black coal mines. These included better practice Australian metalliferous mines. We excluded one metalliferous mine that responded as it had abnormally low equipment utilisation in that year. We did not exclude any other responding mines.

To achieve a broad sample, we requested data for 52 separate mine operations. Many of the open-cut mines were asked to provide data on both truck and shovel and dragline operations. Taking this into account, we asked for information from 35 separate mines.

We received survey responses from 44 mine operations as shown in Table 2.1. These returns have been provided by 32 separate mines (ie 12 mines provided information on both truck and shovel and dragline operations). In total, our survey presently covers about 38 per cent of total run-of-mine coal produced in Australia. Our truck and shovel sample represents about 45

per cent of total run-of-mine coal produced in Australian open-cut mines. Similarly, the seven participating Australian longwall mines produced around 27 per cent of all Australian raw longwall coal in 1996/97.

Table 2.1: **Characteristics of mine operations responding to the survey**

Mine type and location	*NSW*	*Queensland*	*WA*	*United States*	*Total*
Truck and shovel coal	6	6	0	6	18
Truck and shovel metalliferous	0	0	4	0	4
Dragline	3	5	0	5	13
Longwall	5	2	0	2	9
Total	14	13	4	13	44

Source: Survey undertaken by Tasman Asia Pacific (1998).

A similar number of responses were received from NSW, Queensland and United States mine operations.

Twenty-two of the 44 mine operations included in this analysis use truck and shovel technologies. Another thirteen cover dragline operations. Twelve of the thirteen mines that provided data on dragline operations also provided data on their truck and shovel operations. Nine longwall mines provided data for benchmarking.

It appears that for the open-cut operations we have achieved our objective of obtaining a representative coverage of Australian productivity performance. However, the lower response means that we are unsure whether this is the case for the longwall industry.

2.2 PRODUCTIVITY PERFORMANCE MEASURES

The analysis in this report uses total factor productivity and partial productivity measures. As the name suggests, total factor productivity takes into account a broad range of mine outputs and inputs to provide an overall measure of relative mine performance. Partial productivity measures are then used to validate the total factor productivity analysis and to explain reasons for differences in total productivity between mines.

Appendix 1 provides a technical explanation of the productivity analysis used in this study.

The benchmarking analysis focuses on the main components of the mining process. However,

it does not cover all mines inputs nor does it cover development work (eg setting up mine offices, developing access roads). The main items excluded from all three mining technologies are washeries, mine overheads, many maintenance activities and some materials used in production.

These elements have been excluded because:

- the data is often not supplied on a consistent basis by mines (eg mine office overheads and materials);
- the data vary considerably from year to year (eg due to the extent of major equipment overhauls in maintenance activities); and
- differences in inputs largely reflect geological or environmental factors (eg the yield of coal impacts on washeries input).

However, in many cases the relative productivity of mine operations is consistent throughout the various activities it undertakes. For example, an efficient truck and shovel operation typically has lean staffing levels, good work practices and high equipment utilisation and thus achieves high productivity in the mining activities we have measured. Such operations typically apply the same principles to the activities we have not covered in our analysis. For example they also have efficient maintenance, site office and washeries activities. On this basis, it is likely that our analysis is often representative of the broader efficiency of mine operations.

3. OPEN CUT TRUCK AND SHOVEL OPERATIONS

This chapter reports the productivity benchmarking results for 22 coal and metalliferous mines which use truck and shovel mining technologies. These mines remove both overburden and coal or minerals with trucks and shovels. Many of these mines use front-end loaders and excavators as well as, or in place of, shovels.

3.1 THE CHARACTERISTICS OF THE BENCHMARKED OPERATIONS

Although the technologies for extraction and removal are similar for truck and shovel coal and metalliferous mines, they use different removal techniques. Coal mines remove coal and overburden (waste) separately while metalliferous mines remove waste and ore together. Metalliferous mines subsequently crush the rock and extract the ore. Thus for coal mines, the extent of overburden removed and the number and thickness of coal seams have an important influence on costs per tonne of coal removed. The latter two factors also affect productivity. For example, a mine that is working a large number of thin seams requires more extensive use of bulldozers and, in general, front-end loaders than a mine working fewer thick seams.

The key geological characteristics of the 22 participating truck and shovel mines are summarised in Table 3.1

Table 3.1: **Key geological characteristics of participating mines with truck and shovel operations**

	Australia metalliferous	*United States coal*	*Queensland coal*	*NSW coal*
Number of seams (average)	nr	1.7	3.5	8.0
Seam thickness (metres)	nr	39.0	9.2	1.9
Powder factor: kg explosives per tonne moved	0.19	0.22	0.20	0.20
Proportion of coal and ore in total material excavated (%)	27	40	30	10
Average size: million tonnes of coal and waste moved	53	29	26	48
Average size: million tonnes of coal/ore moved	14	11	8	5

nr No response.

Source: Survey undertaken by Tasman Asia Pacific (1998).

The table illustrates that, on average, the NSW coal mines face the most difficult conditions of the four coal mining locations examined in the sample. NSW mines generally operate on multiple, thin seams whereas the United States mines generally have very few, broad seams. On average, the NSW mines operated eight seams of about two metres thickness while the United States mines had one or two seams of about 40 metres thickness. The Queensland coal mines generally had three to four seams, averaging about nine metres thick.

The similarity of powder factors (ie kilograms of explosives used per tonne of overburden and coal/ore removed) suggests that there was little difference in the average overburden hardness encountered by the four mine categories. However, powder factors are also influenced by other variables. For example, differences in the average energy per kilogram of explosives and the amount of shatter required for shovel operations.

The NSW mines had to remove more waste, on average, to uncover coal deposits. While this does not have a major influence on productivity as measured in this study, it does impact on costs per unit of coal produced. Thus, NSW mines would need to be relatively efficient to achieve rates of return on capital of the other mine categories. Our analysis will show that, on average, this is not the case.

Productivity is a physical measure. It measures the volume of output produced per unit of the volume of inputs used. To calculate the productivity of truck and shovel operations the level of output produced must be compared to the level of inputs used to produce these outputs. The following section details the output and input indexes for the mines in the four truck and shovel operation categories. Appendix 2 presents more detailed information on the approach and data used by Tasman to estimate these aggregate output and input levels. These indexes are used in the total factor productivity calculations reported in Section 3.3.

3.2 MINE OUTPUTS AND INPUTS

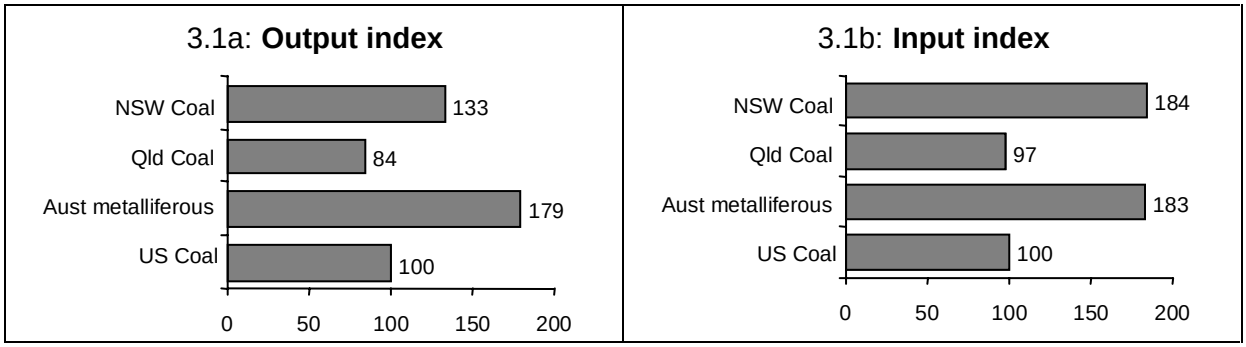
Truck and shovel mining operations involve two broad functions or physical outputs. These outputs are:

1. the excavation of minerals and waste (such as overburden); and
2. the transportation of minerals and waste to stockpiles and processing plants.

Tasman has developed an output measure which incorporates these physical outputs (Appendix 2). Figure 3.1a presents the average mine output index for the four mine categories. The index shows that Australian metalliferous operations had the highest average physical output. The average physical output of the United States and Queensland coal operations was considerably lower.

Productivity analysis also requires information on inputs. Inputs from the sample mines were broken down into 11 categories (Appendix 2). As might be expected, equipment and labour inputs comprised the largest shares of the costs of excavating and moving materials by truck and shovel technologies within mines. Figure 3.1b, shows that, on average, the sample mines in the NSW coal mine category had the highest level of input use of the four mine categories. However, the average level of inputs used by the sample mines in the Australian metalliferous mine category was only marginally lower. In contrast, participating United States and Queensland coal operations had, on average, a more moderate level of input use.

Figure 3.1: **Average output and input — truck and shovel mines**
(index: United States Coal = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

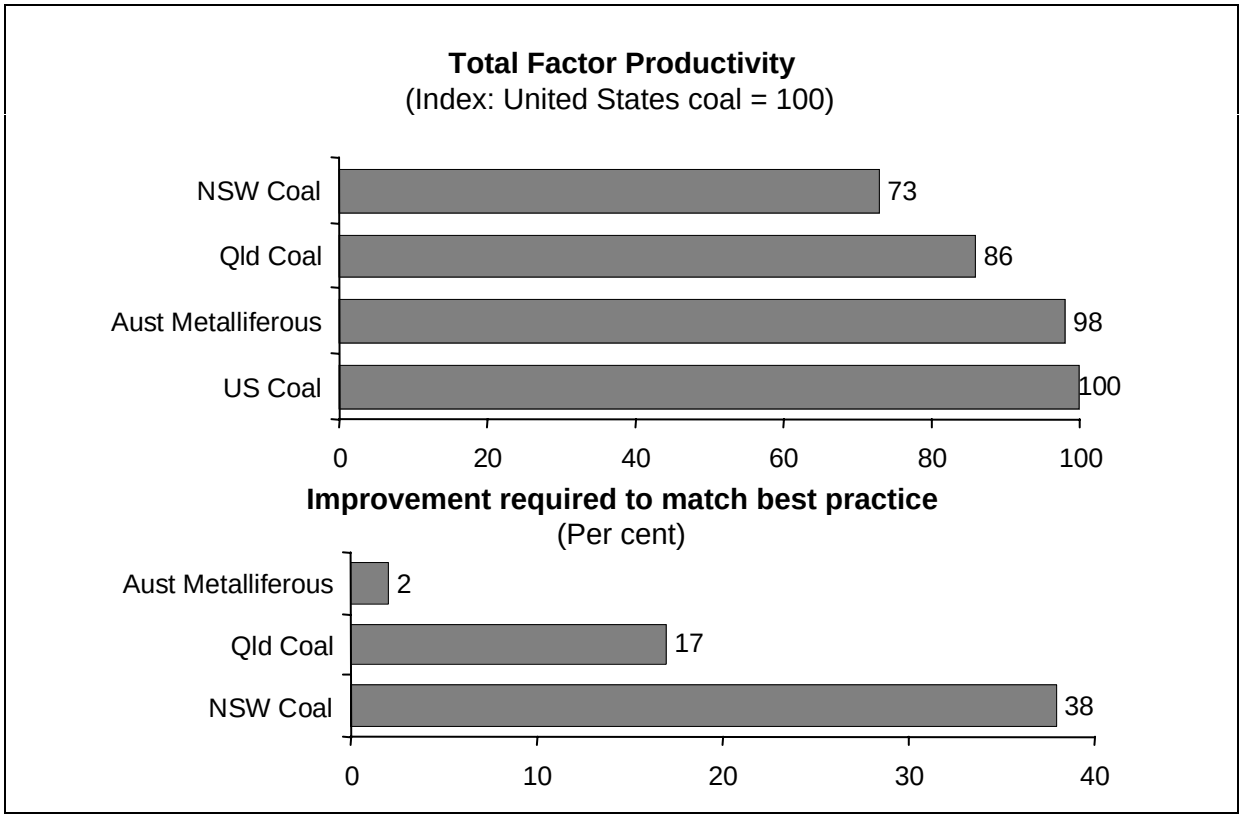
Section 3.3 reports productivity estimates Tasman has derived from these output and input data.

3.3 TRUCK AND SHOVEL OPERATIONS — TOTAL PRODUCTIVITY BENCHMARKS

The total factor productivity of each mine category can be found by dividing the index of total outputs reported in Figure 3.1a by the index of input use reported in Figure 3.1b. This productivity measure is also expressed as an index with the best mine category given a value

of 100. Figure 3.2 reports the results of these calculations. The Figure also indicates the extent of the productivity improvement required by the various mine categories to match best practice United States coal mines.

Figure 3.2: **Total factor productivity of truck and shovel operations**



Source: Survey undertaken by Tasman Asia Pacific (1998).

The total factor productivity results for the sample mines show that the average Australian black coal productivity performance was well below that of better practice United States coal mines. As a whole, the Australian coal mines in the sample need to increase productivity by about 30 per cent to match the performance of the United States coal mines.

However, as reported in Figure 3.2, the difference in performance of the sample mines was more marked in NSW:

- NSW coal mines needed to increase productivity by 38 per cent on average to match United States coal mines; and
- Queensland coal mines needed to increase productivity by 17 per cent on average to match United States coal mines.

The estimates also reveal that the productivity performance of the Australian coal mines in the sample was well below Australian metalliferous mines. Once again the performance of NSW coal mines in the sample was below Queensland's coal mines productivity:

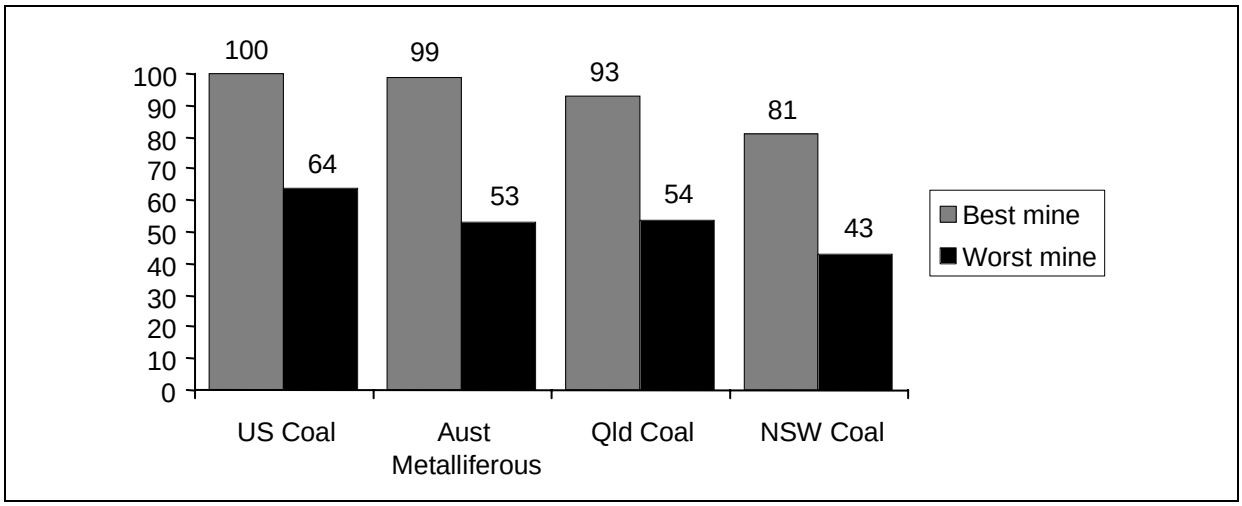
- NSW coal mines needed to increase productivity by 35 per cent on average to match Australian metalliferous mines; and
- Queensland coal mines needed to increase productivity by 14 per cent on average to match Australian metalliferous mines.

As a group, the NSW coal mines in the sample needed to increase productivity by an average of 18 per cent to match the Queensland coal mine sample. However, as the following section shows there is considerable variation of productivity performance within all mine categories, particularly NSW and Queensland coal producers.

3.3.1 Variation in productivity within mine categories

The data reported in the previous section is based on average results for each mine category. This approach facilitates reporting of the results and protects the identity of individual participating mines. However, there is considerable variation in the productivity performance within mine categories. This is illustrated in Figure 3.3, which shows the highest and lowest total factor productivity scores of mines in the NSW, Queensland and United States black coal samples and the Australian metalliferous sample.

Figure 3.3: **Variation in total productivity within truck and shovel mine categories** (index: best mine = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

Some of the major observations from this analysis of sample mines are that:

- each of the four categories had considerable variation between best and worst productivity performers;
- the NSW coal category has the greatest variation in productivity performance and the United States coal category the least; and
- the best performer in all categories is close to the best individual performing mine.

As discussed in Chapter 2, we deliberately selected representative Australian coal mines. That is, we selected an equal number of expected high, moderate and low efficiency Australian mines so that the total productivity analysis would indicate the average scope for productivity improvement across the industry. Metalliferous mines in the sample were generally expected to be high performers although they showed considerable variation in practice. United States coal mines participating in this analysis included known high performers and as a group, would be expected to represent above the United States industry average.

Thus, based on this sample, it is arguable that the Australian coal industry needs to increase its productivity by around 30 per cent on average to match the Australian metalliferous industry. However, the gap between average Australian and United States truck and shovel coal performance would be somewhat less than 30 per cent.

The main value of benchmarking is to indicate an achievable target for productivity improvement and demonstrate ways to achieve that target. Figure 3.3 shows that a number of Australian mines in the sample have achieved close to world best practice performance and thus provide excellent benchmarks for similar Australian operations.

To further illustrate this point, Table 3.2 reports the best practice (or frontier) mines from each sample category and compares their total factor productivity scores with the average performance of the remaining mines. This shows that the scope for productivity improvement of many mines is very large. Most notably, many mines in the NSW sample needed to improve productivity by around 70 per cent to match the performance of their NSW peers. In this instance, the best performing NSW mines had the most difficult mining conditions of all participating mines.

Table 3.2: **Scope for productivity improvement using local participating mines as benchmarks**

	United States Coal	*Australia Metalliferous*	*Queensland Coal*	*NSW Coal*
TFP scores of frontier mines	100	99	93	81
Average TFP scores of other mines in category	77	68	63	47
Scope for improvement of other mines in category (%)	31	46	47	74

Source: Survey undertaken by Tasman Asia Pacific (1998).

Thus, domestic comparisons alone are sufficient to indicate an industry which can benefit greatly by more operators achieving the productivity levels of the relatively efficient operators.

3.4 FACTORS CONTRIBUTING TO PRODUCTIVITY DIFFERENCES

A range of factors could contribute to the productivity differences discussed above. We now examine these factors by looking at partial productivity and other measures of mine performance. Partial productivity measures are calculated by dividing the output index by the physical inputs used in each input category. To aid analysis and presentation, these partial productivity indicators have been indexed so that United States coal mines equal 100 for each input class (Table 3.3).

Table 3.3: **Partial productivity indicators of truck and shovel operations** (index: United States coal = 100)

	United States coal	*Australia metalliferous*	*Queensland coal*	*NSW coal*	*Average share of costs (%)*
Labour	100	93	71	59	38
Trucks	100	80	70	60	17
Explosives	100	116	104	89	13
Diesel	100	87	91	92	11
Shovels	100	146	146	118	7
Dozers	100	126	80	108	4
Loaders	100	44	44	23	3
Other equipment	100	116	49	64	3
Electricity	100	115	276	142	2
Contracting out	100	nr	nr	83	1
Drills	100	90	99	91	1

na Not applicable as negligible contracting out indicated in survey forms.
Source: Survey undertaken by Tasman Asia Pacific (1998).

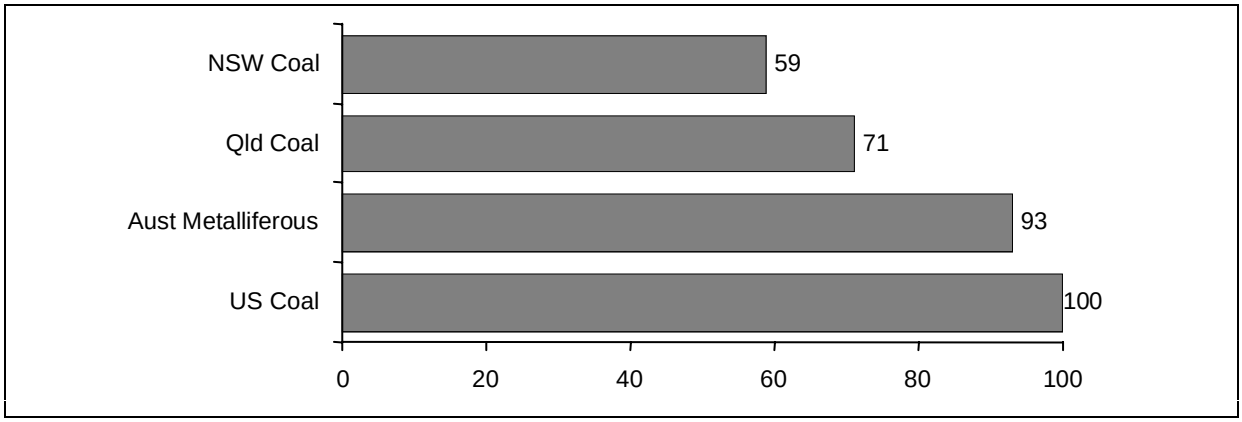
The main cost items are labour, trucking, explosives and diesel. Excavation costs — the combination of shovel, loader and excavator costs — are also significant. Differences in the productivity of these major items explain most of the differences in overall productivity between mine categories.

Indeed it can be readily seen that the main problems for the Australian truck and shovel coal operators in the sample involve labour productivity and truck productivity. These are considered in the following section, along with excavation equipment (shovel, loader and excavator) performance.

3.4.1 Efficiency of the labour force

Labour is a major input to coal and metalliferous mines. Labour averaged 38 per cent of total costs (excluding materials and overheads) across all mines in the survey (Table 3.3). Because of its significant share of costs, labour inputs (hours worked) obtained a high weighting in the calculation of total factor productivity. Thus, labour inputs have a major influence on both the productivity and cost of mine operations.

Figure 3.4: **Labour productivity of truck and shovel mines[a]**
(index: United States coal = 100)



a Labour productivity equals output index divided by total hours worked.
Source: Survey undertaken by Tasman Asia Pacific (1998).

Figure 3.4, above, summarises labour productivity performance for the sample mines in the four mine categories. As reported in Table 3.3, this measure was calculated by dividing the output index by the number of labour hours worked. United States coal mines under this partial measure can be considered as best practice, as this category has the highest labour productivity. Figure 3.4 also shows that NSW and Queensland black coal mines in the sample

typically had relatively poor labour productivity. Based on these estimates, NSW coal mines, on average, needed a 70 per cent increase in labour productivity to match United States coal mines. Similarly, Queensland coal mines needed an average increase in labour productivity of around 40 per cent to match the labour productivity of the best practice United States coal mines.

Figure 3.4 also shows that the sample of Australian coal mines had much lower labour productivity than the mines in the Australian metalliferous category. On average the sample mines in the NSW and Queensland coal mine categories needed to increase labour productivity by 57 per cent and 30 per cent, respectively, to match Australian metalliferous mines.

Given these productivity gaps it follows that, on average, the sample coal mines in NSW category had a much poorer labour productivity performance than coal mines in the Queensland category. Mines in the NSW coal category needed to increase labour productivity by 21 per cent, on average, to match sample mines in the Queensland coal category. However, as noted earlier, there is considerable variation of productivity performance within the four mine categories, particularly the NSW coal category.

The main influences on labour productivity include:

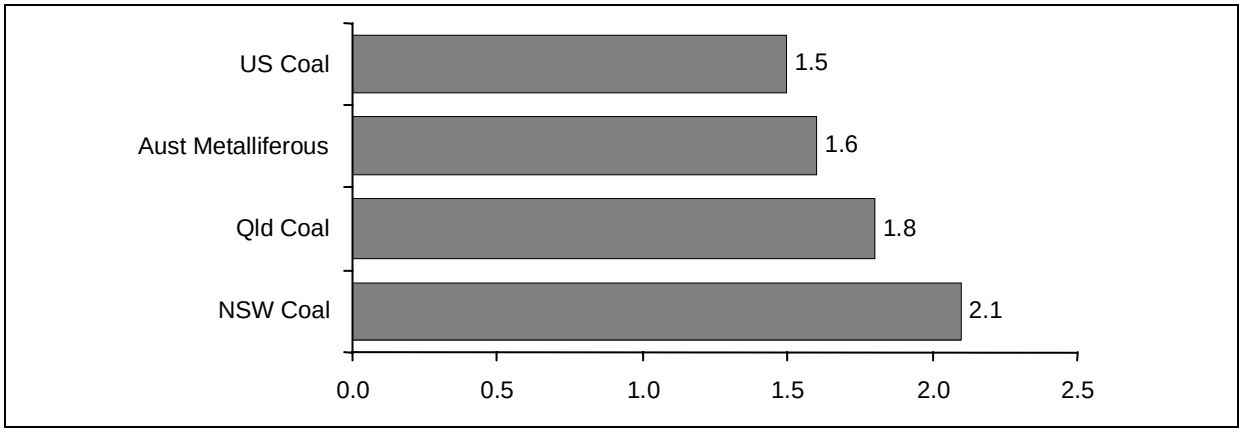
- staffing levels;
- the amount of idle time in shifts;
- equipment operating practices; and
- labour practices.

These factors are examined in detail in the next section.

- *Influence of staffing levels on labour productivity*

Based on the sample, over-staffing appears to be a major cause of poor labour productivity in Australia's black coal mines truck and shovel operations. Compared to the sample mines in the Australian metalliferous category and the United States coal mine category, there are too many workers per individual piece of equipment operated in the participating Australian coal mines. This can be seen from Figure 3.5, which shows the level of mine staff relative to the operating hours of truck and shovel equipment. In this context, labour includes all equipment operators, supervisors, shot-firers, cleaners and staff on general duties. But it excludes maintenance and administrative staff.

Figure 3.5: **Staffing of equipment in truck and shovel mines[a]**



a Ratio equals average hours worked divided by equipment hours operated.
Source: Survey undertaken by Tasman Asia Pacific (1998).

On average participating NSW black coal mines had 2.1 employees for every piece of equipment operated, representing around 40 per cent more employees than used by Australian metalliferous mines. Similarly, participating mines in the Queensland coal mine category employed 1.8 employees for every piece of equipment operated. As noted above, the ratios reported here should not be interpreted strictly as the number of operators per machine. For example, a proportion of the 2.1 operators per piece of equipment in the NSW mines involves non-equipment workers such as supervisors, cleaners and shot-firers. The extent of equipment idle time (ie hours equipment is manned but not operating) also affects this ratio.

There appears to be a strong negative correlation between over-staffing and productivity in the sample mines. The mine categories with the highest overall productivity — the United States black coal mines and Australian metalliferous mines — had the lowest average staffing per machine hour operated. Further, the sample mines with the worst overall performance — NSW and Queensland black coal mine categories — had the highest average staffing per machine hour operated.

To examine how over-staffing occurs, both in terms of too many workers per average piece of equipment and associated with over-capitalisation of equipment, Box 3.1 compares a likely staffing profile of an efficient Australian "frontier' mine in the sample, with that of a less efficient mine, such as many of the sample mines in the NSW category. The staffing assumes three eight-hour shifts per day, five days per week (for coal operations) moving around 30 million tonnes of coal and waste per year.

Box 3.1: **Truck and shovel staffing profile: Australian "frontier" and moderately performing mines**

	Australian Frontier mine	*Moderately performing mine*
Equipment crew		
Trucks	10	13
Shovels	2	3
Loader/excavators	2	2
Dozers	3	4
Drills	2	2
Other equipment:		
• graders	1	2
• water trucks	1	2
• fuel trucks	1	1
• other	1	1
Non-equipment workers		
Supervisors	1	1
Shot-firers	1	2
Bath house cleaners	0	1
General duties staff	0	2
Average workers per shift (total of equipment and non-equip. staff per shift)	23	35
Average hours per shift (including extra time paid for travel)	8	8
No. of shifts per year	251	251
Number of days mine operated per week	5	5

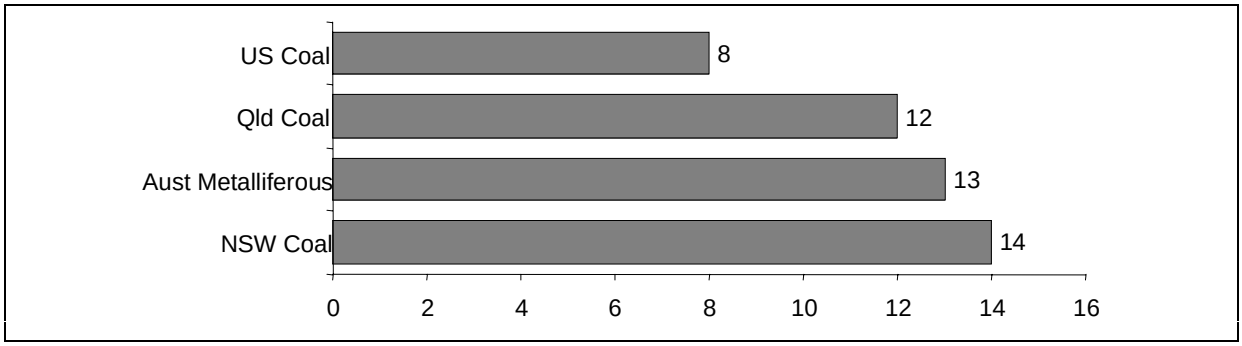
In the less productive mines, over-staffing is often observed throughout the various truck and shovel activities but is particularly evident in the truck fleet (more trucks than needed to do the job), operating other equipment (often due to lack of flexibility in moving between equipment within shifts) and in general duties roles. Box 3.1 shows that to move about 30 million tonnes of material, the less productive mine has 50 per cent higher staffing than the best practice mine. This is equivalent to 50 per cent higher labour productivity in the best practice mine.

- *Other influences on labour productivity*

The amount of work-at-face time in an average shift is another factor that can contribute to labour productivity differentials between mine categories. Time is scheduled for joining, leaving, meal breaks and sometimes other breaks. The greater the extent of this idle time, the lower the amount of actual work time and the lower the productivity of labour.

Figure 3.6 shows that the United States mines in the sample had an extremely low amount of idle time, or high amount of work time, per average shift compared to the sample mines in the other mine categories examined. This helps explain some of the difference in labour productivity performance compared to the United States black coal mine category. The United States mines invariably had just a 30 minute meal break and were reasonably efficient in leaving and joining shifts. A number of the Australian sample mines had additional breaks within shifts that added to the idle time.

Figure 3.6: **Composition of idle time in shifts at truck and shovel mines** (per cent of total shift time)



Source: Survey undertaken by Tasman Asia Pacific (1998).

It is usually more productive for shift changes to take place in the field (ie "hot seat changes") rather than at centralised mustering points. Our survey data (Table 3.4) indicates that the sample Australian coal mines have a higher incidence of hot seat changes than the United States mines and the Australian metalliferous mines.

However, based on our sample, Australian mines do not appear to take as many breaks at their machines as do the United States mines. This has a two-fold impact on productivity. Firstly, taking breaks on machines saves travel time to central meal areas. Secondly, trucks can remain evenly spaced in the cycle — whereas centralised meal breaks create a congestion of trucking on resumption that impedes productivity.

Table 3.4: **Key labour operating practices in truck and shovel operations**

	Australia metalliferous	*United States coal*	*Queensland coal*	*NSW coal*
Common shift type	12 hour – 7 day	12 hour – 7 day	8 hour – 5 day	8 hour – 5 day
Hot seat change (%)	25	33	83	50
Meals in the field (%)	0	50	17	33
Staggered meal breaks	Never	Often	Mixed	Rarely

Operate multiple equipment	Often	Often	Often	Mixed
Haulage equipment fuelled in break	No response	Sometimes	Rarely	Rarely
Clean-up operations not impeding production	Sometimes	Often	Rarely	Rarely

Source: Survey undertaken by Tasman Asia Pacific (1998).

Further, Australian coal mines do not appear to stagger meal breaks as often as United States coal mines. Staggering meal breaks allows major pieces of equipment such as shovels, and some trucks, to continue to operate throughout the shift. Staggering meal breaks requires staff to operate multiple pieces of equipment within shifts. Operating multiple pieces of equipment also occurs for other purposes and is common in nearly all participating mines. The only exceptions were a few NSW coal mines in the sample.

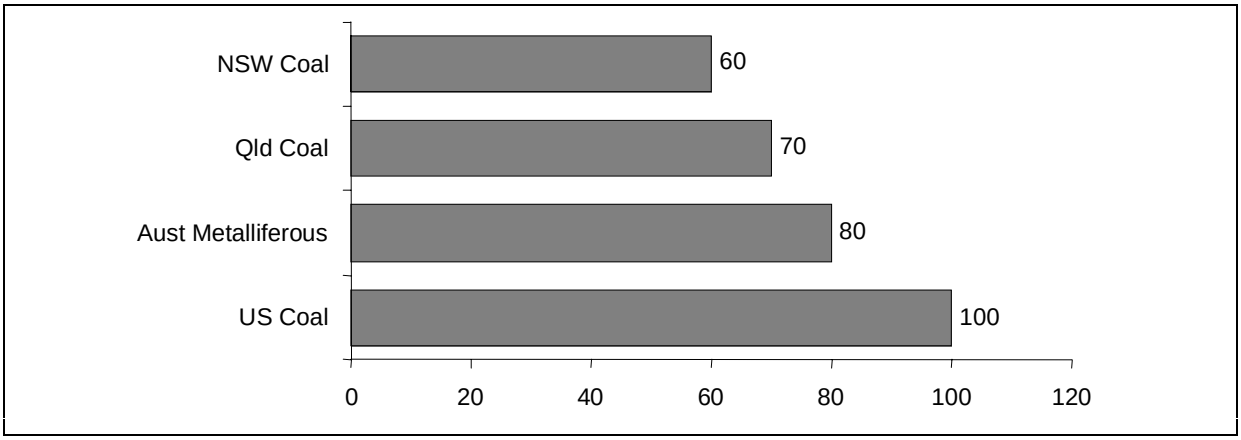
The use of clean-up equipment in Australian coal mines surveyed also appears to halt production more often than in United States coal mines and Australian metalliferous mines. The United States coal mines and Australian metalliferous mines nearly always ensure that the clean-up of ore and waste does not interfere with the core excavation and transportation tasks at the mine. However, shovels and trucks in Australian coal mines often must wait for equipment to tidy up coal and waste spills. Again this impairs production both directly in idle waiting time and indirectly in reconfiguring efficient truck cycling.

In summary, the analysis of this sample of mines suggests that compared to domestic metalliferous mines and United States black coal mines, labour productivity in truck and shovel operations is very poor in NSW and Queensland black coal mines. This poor labour productivity is a contributor to the low total productivity of truck and shovel operations in NSW and Queensland black coal mines. Over-staffing appears to be an important contributor to these results. There are a number of other labour practices that can be tightened up in many Australian coal mines that would improve productivity. These include a greater incidence of breaks at machines rather than at central locations, a greater transfer between machines, particularly to allow core equipment to operate as much as possible within shifts, and ensuring clean-up equipment does not disrupt production.

3.4.2 Efficiency of truck operations

Truck costs comprise a large share of total costs (excluding overheads and materials) averaging nearly 20 per cent for all mines examined. Thus, low truck productivity has a substantial negative impact on total productivity.

Figure 3.7: **Truck productivity[a]** (index: United States Coal = 100)

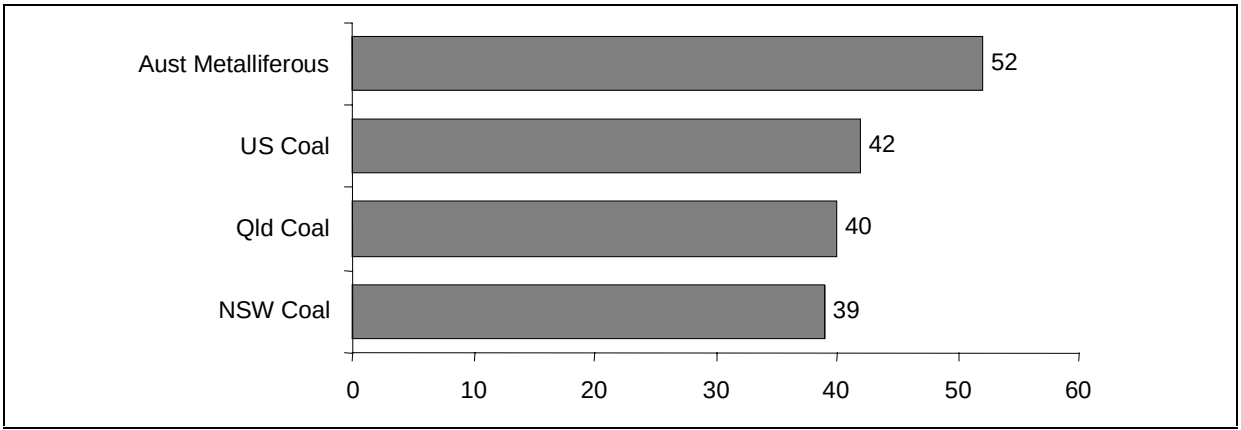


a Truck productivity equals output index divided by total truck capacity, standardised to make US coal = 100.
Source: Survey undertaken by Tasman Asia Pacific (1998).

The partial productivity measures reported in Figure 3.7 for the sample mines indicate that the truck productivity of NSW and Queensland black coal mines was well below that achieved in United States coal mines and domestic metalliferous mines. This productivity difference was particularly large in sample mines in NSW and to a lesser extent in Queensland. The mines in the NSW coal mine category achieved only 60 per cent of the truck productivity of the participating United States coal mines. The sample mines in the Queensland coal mine category achieved 70 per cent of the truck productivity of the United States coal mines.

Low truck productivity in sample NSW mines was partially due to low truck utilisation (Figure 3.8). For example, the utilisation of trucks in Australian metalliferous mines was around 30 per cent greater, on average, than in the NSW coal mine category.

Figure 3.8: **Truck utilisation in truck and shovel mines[a]**



a Hours worked as a percentage of available hours.
Source: Survey undertaken by Tasman Asia Pacific (1998).

The capacity utilisation of trucks is given by the following formula:

$$Truck\ utilisation = \frac{Average\ truck\ hours\ of\ operation}{8{,}760}$$

Low truck productivity in sample NSW and Queensland black coal mines has required excessive numbers of trucks to fulfil the trucking task. This over-trucking represents a significant over-capitalisation in Australian (especially NSW) black coal mines in the sample, and additional employment costs to operate this excessive number of poorly utilised trucks.

Table 3.5: **Inherent truck productivity**

	Truck productivity (1)	*Truck utilisation (per cent) (2)*	*Operating productivity (3)=100*(1)/(2)*	*Indexed operating productivity (4)=(3) indexed*
Australia metalliferous	80	52	154	64
United States coal	100	42	241	100
Queensland Coal	70	40	172	72
NSW Coal	60	39	153	64

Source: Survey undertaken by Tasman Asia Pacific (1998).

Truck productivity can be broken down between truck utilisation (proportion of hours trucks are operated per year) and the inherent operating productivity (productivity per hour operated). Table 3.5 above shows that the inherent operating productivity of truck operations at the participating Australian coal mines was much lower than the average participating United States coal mines. Indeed, our sample indicates that the operating productivity of the

United States truck fleets was 39 and 56 per cent higher than the Queensland and NSW truck fleets respectively. It is somewhat surprising that, on an hour-operated basis, the productivity of participating Australian metalliferous mines' truck fleets was no higher than those of the average participating NSW coal mines.

The greater operating productivity of the participating United States mines was partly due to higher average truck travel speeds (Table 3.6). Average truck speed is calculated by "average kilometres travelled per truck operating hour". The participating mines in the NSW coal mine category had the lowest average travel speed of participating mines in all mine categories over the total truck cycle distance (ie out and back), although this was partly due to the shorter average travel distances. Mines with relatively short-distance hauls may achieve slower average truck speeds than mines with longer hauls — mainly due to a greater proportion of a truck's time being spent queuing, dumping and manoeuvring slowly in the loading and dumping areas. Other factors that may affect average travel speeds include the gradient of the terrain, the quality of roads, climatic conditions, the specification and standard of the truck fleet and workforce behaviour.

Table 3.6: **Key truck haul statistics for truck and shovel mines**

	Distance (km)	*Speed*[a] (km/hr)	*Total cycle time* (minutes)	*Trips per hour* (number)
US coal	8.5	31	16	3.7
Aust metalliferous	8.2	27	18	3.3
Qld coal	7.1	27	16	3.7
NSW coal	4.8	19	15	3.9

a Average travel speed = number of kilometres travelled per truck operating hour.
Source: Survey undertaken by Tasman Asia Pacific (1998).

Most mines achieve truck factors close to 100 per cent. That is, trucks are filled very close to their maximum rated capacity on every haul. This was the case for participating NSW and United States coal mines and the Australian metalliferous mine. These mines achieved average truck factors of between 97 and 100 per cent. However, the average truck factor for the Queensland mines in the sample was only 91 per cent. This was largely due to loading constraints at a few mines such as tyres not being able to cope with maximum loads on long hauls.

Work practices and other operating factors can also bear significantly on average operating speeds and thus truck productivity. As mentioned in the previous section, these include a

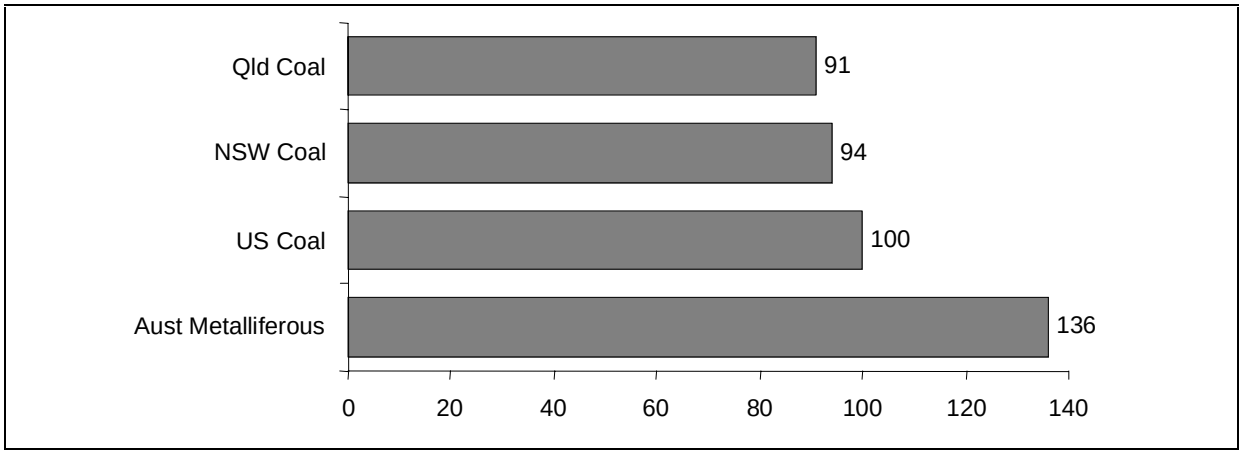
greater incidence of meal breaks in the field rather than at central locations and less disruption to truck cycles from clean-up equipment. Another factor influencing truck productivity is shovel-loading practices. This is discussed in the next section.

3.4.3 Efficiency of excavation equipment

Open cut black coal and metalliferous mines use a variety of excavation tools to dig coal or ore and overburden. These tools include electric shovels, hydraulic shovels, front-end loaders and excavators. The same excavation tools, while similar across mines, are not always used for the same purpose. For example, shovels are often used in metalliferous mines to remove ore but are mainly used to remove overburden from coal mines. Loaders are used in metalliferous mines and coal mines to load mined minerals, but are also used for digging in coal mines, particularly when there are multiple coal seams that require more careful digging of overburden. However, geology is not the sole dictator of the tool used. In some cases where digging conditions are similar, one mine may use a shovel where another may use a loader.

For these reasons, Tasman has combined shovels, loaders and excavators in its analysis of the partial productivity of excavation equipment. This is achieved by dividing total movements by the capacity of shovels, loaders and excavators combined. The ensuing excavation equipment productivity results are presented in Figure 3.9.

Figure 3.9: **Excavation equipment productivity[a]**
(index: United States Coal = 100)

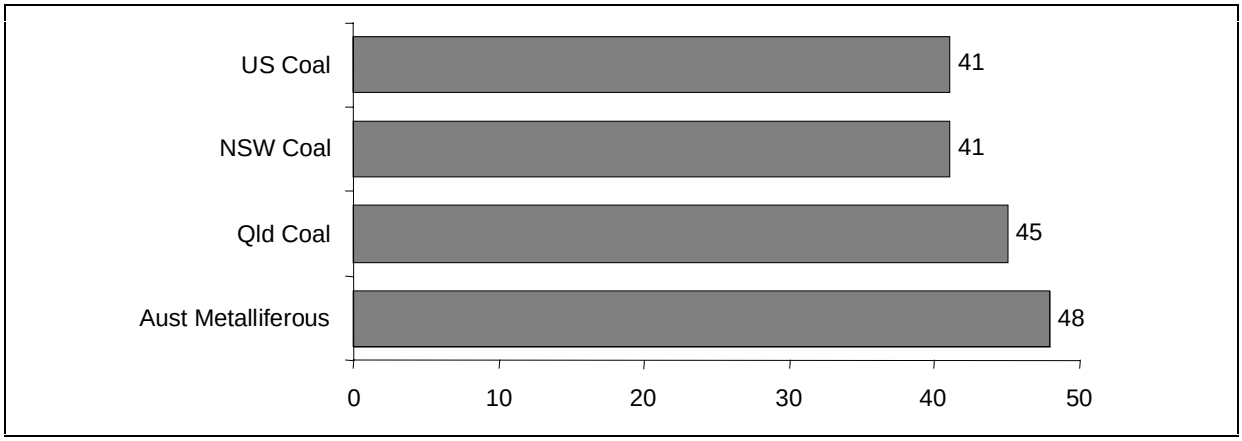


a Excavation equipment productivity equals output index divided by total shovel, loader and excavator capacity.
Source: Survey undertaken by Tasman Asia Pacific (1998).

These sample data indicate that Australian metalliferous mines are, on average, clearly the most efficient in their use of excavation equipment. The other mine categories have reasonably similar productivity of all excavation equipment. However, Queensland coal mines exhibited the lowest productivity of excavation equipment as a whole.

The good excavation equipment productivity for the Australian metalliferous mines was partially due to high utilisation levels (Figure 3.10). Similarly, participating Queensland coal mines had very good utilisation rates for their excavation equipment, contributing to their overall partial productivity measure for excavation equipment. Conversely, participating NSW and United States coal mines had the lowest utilisation rates.

Figure 3.10: **Utilisation of excavation equipment in truck and shovel mines[a]**



a Hours worked as a percentage of available hours.
Source: Survey undertaken by Tasman Asia Pacific (1998).

While high utilisation explains some of the difference in excavation equipment productivity between mines, there were also substantial differences in the inherent (or per-hour operated) productivity of the excavation fleets in the various mine categories surveyed. Table 3.7 shows that the same rankings are apparent in inherent productivity as in total excavation equipment productivity. However, the Queensland mines sampled are relatively unproductive on an hour-worked basis, needing to increase performance by nearly 40 per cent to achieve the average performance of the participating Australian metalliferous mines.

Some of the productivity shortfalls of excavation equipment can be explained by geological conditions. For example, the number and thickness of coal seams appeared to contribute to relatively poor productivity of excavation equipment in the Queensland black coal mines. NSW mines in the sample performed quite well in this regard given the multiple, thin seams

common to most of its mines. It appears that many of the NSW coal mines surveyed over-truck their shovels while the converse was true for the participating United States coal mines.

Table 3.7: **Inherent excavation productivity**

	Excavation equipment productivity (see Fig 3.9) (1)	*Excavation equipment utilisation (see Fig 3.10) (per cent) (2)*	*Operating productivity* *(3)=100*(1)/(2)*	*Indexed operating productivity* *(4)=(3) indexed*
Australia metalliferous	136	48	282	115
United States coal	100	41	246	100
NSW Coal	94	41	229	93
Queensland Coal	91	45	204	83

Source: Survey undertaken by Tasman Asia Pacific (1998).

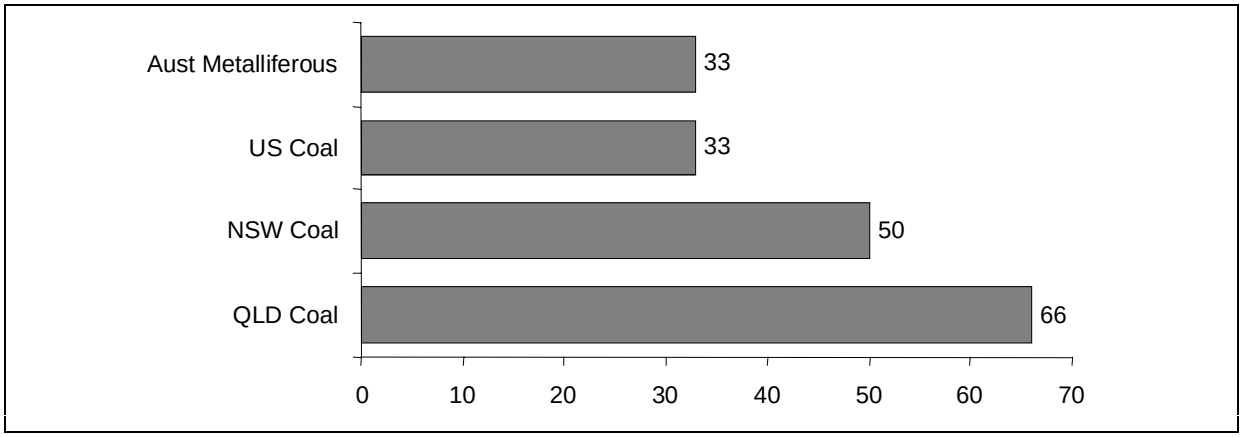
Loading methods also have a major influence on digging equipment productivity. It is generally accepted that double-sided loading is a very efficient loading technique as it reduces the amount of time a shovel has to wait for a truck to position itself. With double-sided loading, shovels swing from rock face to trucks and back continually throughout a shift. Lost time is mostly due to repositioning the shovel on the face. Double-sided loading is not always possible, especially if the rock face is too narrow to fit the manoeuvring of trucks on both sides. In such cases, modified drive-by loading may sometimes be used. In this case trucks do not fully reverse into the face, instead they use a more side-on approach which allows quicker total entry and exit times. Another specialist loading method sometimes used is rear loading.

The standard loading technique in Australian coal mines is single-sided loading. This involves trucks waiting for the previous truck to be assigned away from a shovel, reversing into the face, being loaded and then leaving. This is a less productive method as shovels (and sometimes other trucks) must wait for the positioning process to be completed. Double-sided loading is more dangerous than single-sided loading as it is possible for the shovel to swing around and hit the other truck. However, many mines around the world are apparently able to use this method safely. Our evidence is that more productive mines are generally safer. More productive mines usually use some type of specialist loading technique.

Figure 3.11 shows that Australian coal mines in the sample are much more reliant on single-sided loading methods than the United States coal mines or the Australian metalliferous mines. Our survey data shows that only about one-third of United States coal mines and Australian

metalliferous mines rely almost exclusively on single-sided loading whereas about 50 per cent of NSW coal mines and 66 per cent of Queensland coal mines rely on this method.

Figure 3.11: **Percentage of participating mines predominantly using single-sided loading techniques**



Source: Survey undertaken by Tasman Asia Pacific (1998).

As indicated by Table 3.8, the metalliferous mines sampled used a number of specialist loading methods including rear loading. The United States coal mines extensively used both double-sided loading and modified drive-by techniques. Queensland coal producers mainly used single-sided loading while the NSW mines either relied almost exclusively on single-sided loading or almost exclusively on double-sided loading. Not surprisingly, there appears to be a very strong relationship between the use of double-sided or modified drive-by loading and total productivity scores. Most of the productive mines employ these techniques.

Table 3.8: **Shovel loading practices of participating mines**

	Common loading methods
Australia metalliferous	Mixed — includes specialised methods
United States Coal	Much double-sided and modified drive-by loading
NSW Coal	Two extremes — either solely single sided or mainly double sided
Queensland Coal	Mixed but mainly single sided

Source: Survey undertaken by Tasman Asia Pacific (1998).

It appears that the relatively low incidence of double-sided loading in Australia is partly due to physical conditions and partly because management and staff have not been able to agree on how to manage the safety risks of implementing double-sided loading.

We also collected data on excavation equipment performance, including:

- truck spotting time (time between assigning previous truck away to dumping first bucket load in current truck);
- shovel factor (average proportion of rated bucket capacity filled per shovel load); and
- number of truck loads per shift.

There were not enough responses to these questions to provide meaningful averages across the four mine categories. However, it is possible to distinguish the achievements of good performers compared to other mines (Table 3.9). This comparison assumes the use of a common shovel of around 30 to 35 metres loose cubic metres capacity, and common 200 tonne rated capacity trucks.

Table 3.9: **Shovel loading performance**

	Shovel swing factor (seconds)	*Truck spotting time (seconds)*	*Truck loads per shift*
Frontier mine	35	35	185
Moderate performing mine	35	65	135

Source: Survey undertaken by Tasman Asia Pacific (1998).

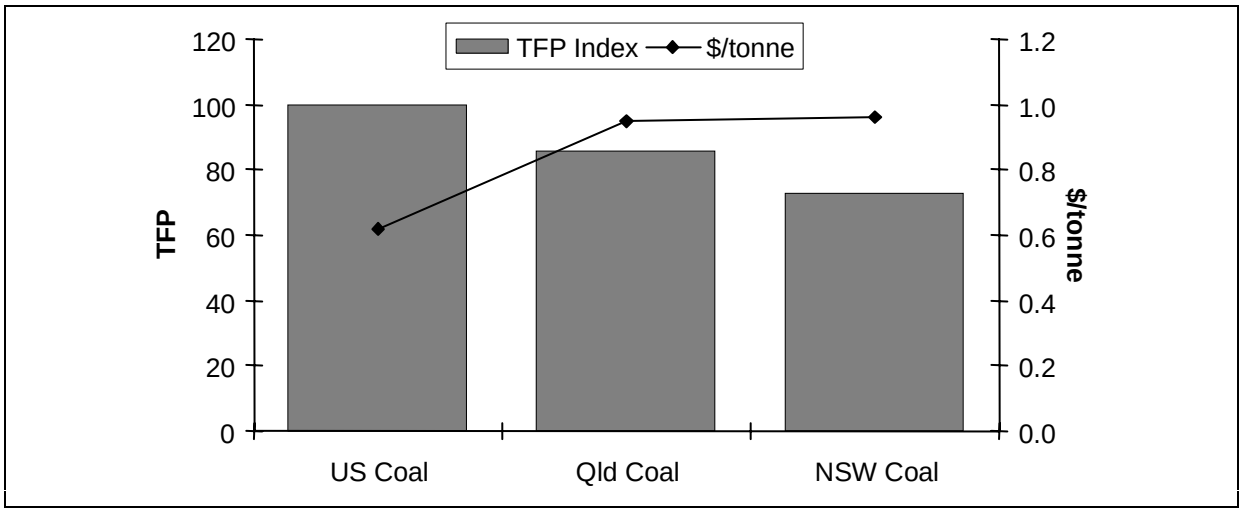
All mines surveyed have very similar swing times on the shovels. However, the better mines in the sample, that use more efficient loading techniques, have truck spotting times around half those of the less efficient shovel operators. That is, the elapsed time between assigning away the previous truck and dumping the first load in the new truck is around 35 seconds when using double-sided loading (ie the same as the swing time) but around 65 seconds for some mines using single-sided loading techniques. As a result of this efficiency and fewer disruptions to production within shifts, the better performing shovels can average around 185 truck loads per shift compared to around 135 truck loads in the less efficient mines.

3.5 THE LINK BETWEEN PRODUCTIVITY AND COST

Lower costs, improved competitiveness and expanded coal exports are the expected outcomes of improved productivity in the Australian coal industry. As shown in Figure 3.12, the productivity advantages enjoyed by United States mines surveyed contribute significantly to their much lower unit costs (ie costs per tonne of material moved). Notice however, that the

cost difference between the participating United States and NSW mines is much greater than the difference in productivity. In total, about 30 per cent of the cost difference between these mines was due to high unit costs.

Figure 3.12: **Total factor productivity and cost per tonne, truck and shovel operations: Australian and United States coal operations**
(index: United States Coal = 100, cost $A)



Source: Survey undertaken by Tasman Asia Pacific (1998).

Table 3.10 presents more detail on sampled mine's relative cost to mine and move a tonne of excavated material — coal/ore, overburden, interburden and other waste. The table also highlights the cost impost currently faced by the sample mines in the Australian black coal mine categories. Clearly, there is a need to improve productivity and/or reduce input prices if Australian coal producers are to approach the cost levels of United States coal producers. However, it is important to keep the scope of these costs in context. Firstly, they relate to material extraction and movement within the mine, so exclude some mine processes that are difficult to measure accurately, such as washeries. They also exclude maintenance, overheads and some materials costs. They refer to costs per total movements (ie including overburden) rather than per tonne of saleable coal or ore produced. Finally, they do not include ex-mine costs such as rail, port and shipping costs. The costs covered are those related to the input categories listed in Box A2.3.

Costs for United States mines have been converted to Australian currency using purchasing power parity estimates (OECD 1998). These equate to an exchange rate of about 76 US cents to the Australian dollar in 1996 and 1997. We have used purchasing power parity

estimates as these best eliminate differences in price levels between countries. It is often argued that the alternative, official exchange rates, do not adequately reflect the comparative purchasing power of local currencies in their own markets (OECD 1998).

Table 3.10: **Cost per tonne of mineral and waste removed, truck and shovel mine categories**

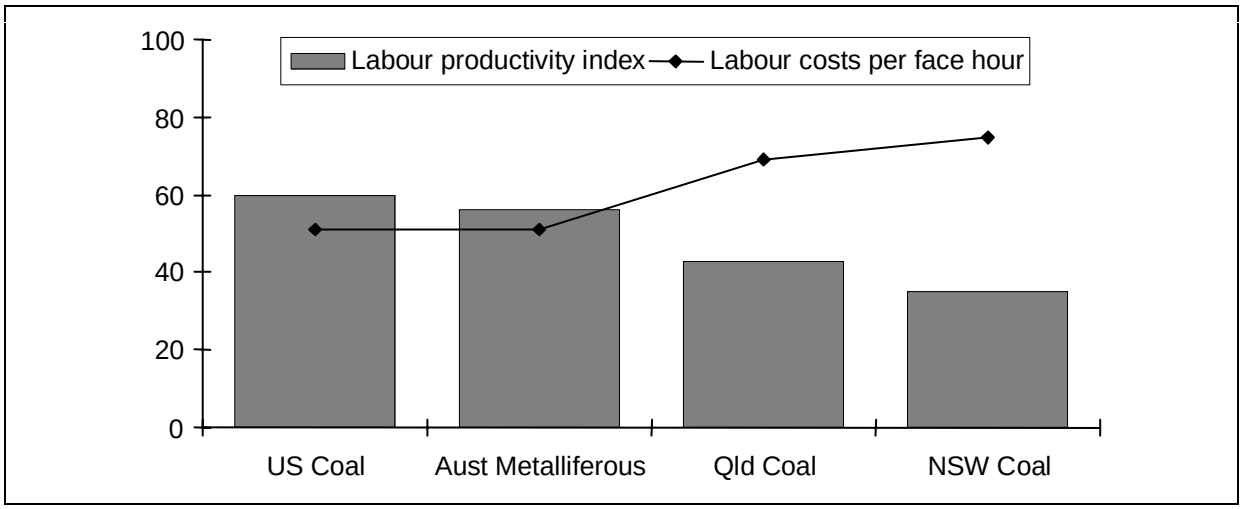
	Cost per tonne of mineral and waste removed ($A)	*Amount NSW coal costs exceed other mines' costs* (per cent)	*Amount Queensland coal costs exceed other mines' costs* (per cent)
United States coal	0.62	55	48
Australia metalliferous	0.71	35	29
Queensland coal	0.92	4	na
NSW coal	0.96	na	–4

na not applicable.
Source: Survey undertaken by Tasman Asia Pacific (1998).

3.5.1 High unit labour costs contribute to the high costs of operation

Workers in the surveyed NSW and Queensland black coal mines are paid significantly more than their counterparts in the sample domestic metalliferous mines and United States coal mines. These higher labour costs are in sharp contrast to the low productivity achieved in these mines. As shown in Figure 3.13, the average labour cost per face hour worked was considerably higher in the NSW and Queensland coal mine categories than in the Australian metalliferous and United States coal mine categories. The labour cost per face hour worked is calculated by summing the labour cost per hour at shift (including base wage, overtime, bonuses and on-costs) and the cost of leave taken for every hour worked then dividing this sum by the proportion of productive work time per hour (ie non-idle time).

Figure 3.13: **Labour productivity and cost in truck and shovel operations** (index: United States Coal = 60 and $A costs)



Source: Survey undertaken by Tasman Asia Pacific (1998).

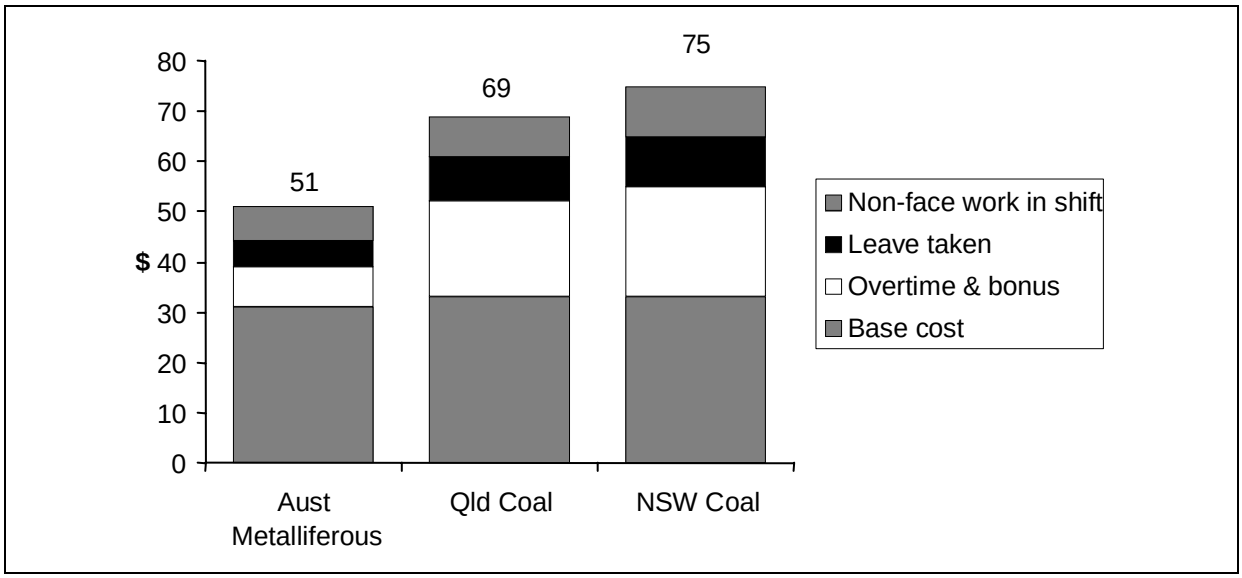
The disparity between labour productivity and labour cost per face hour was particularly wide in the sample mines in the NSW coal mine category. Labour costs per face hour were, on average, 50 per cent higher in these NSW black coal mines than in the sample United States coal and Australian metalliferous mines. Conversely, the labour productivity of these United States coal and Australian metalliferous mines, as measured by the Output Index divided by labour hour worked, was nearly 60 per cent higher than the average for the NSW coal mines.

On a mine-by-mine basis, our sample did not indicate a clear relationship between labour costs per face hour worked and labour productivity in Australian black coal mines. Similarly, we did not find a clear relationship between labour costs per shift hour worked and labour productivity in Australian black coal mines Thus, there was no strong evidence of a broad linkage of pay to productivity in the Australian coal industry. Despite the substantial difference between average labour costs per face hour worked in surveyed Australian black coal mines and domestic metalliferous mines, the base rates of pay were fairly similar across these mine categories. Figure 3.14 shows that, compared to domestic metalliferous mines, the sample mines in the Queensland and NSW categories had higher earnings from overtime and bonuses, took more leave and worked fewer face hours per shift. For example, the higher labour cost in the NSW black coal mines surveyed were due to:

- high earnings from overtime and bonuses in NSW (comprising 60 per cent of the cost differential);

- greater leave taken per hour worked in NSW (nearly 20 per cent); and
- less face work per shift in NSW (15 per cent).

Figure 3.14: **Breakdown of labour cost per face hour worked, truck and shovel operations** ($ per hour)



Source: Survey undertaken by Tasman (1998).

High costs associated with overtime in sampled NSW coal mines generally stem from the relatively short ordinary time hours (35 hour week) and high overtime premiums. The leave taken in these mines includes five to six weeks annual leave and generous long service leave arrangements. These long service leave arrangements apply after eight years of service even if service with the company in non-continuous.

3.6 OTHER FACTORS

This section examines three other factors that affect the productivity of truck and shovel operations, namely:

- the incidence of industrial disputes;
- safety; and
- equipment maintenance.

3.6.1 Incidence of industrial disputes

The Australian coal industry has a very high level of industrial disputation. A report by the National Institute of Labour Studies (1997) indicated that the rate of industrial disputation in coal mines was 45 times the rate of other Australian industry in 1996. Our survey results are consistent with these findings for the coal industry (Table 3.11). For example, we found that there were around 8,200 days of industrial disputes per thousand employees in the Australian coal industry. This was similar to the 7,700 respective days reported in NILS (1997).

Table 3.11: **Incidence of industrial disputation** (average per mine)

	Number of disputes	*Man hours lost per dispute*	*Hours lost in dispute per thousand hours worked*	*Days lost per thousand employees*
Australia metalliferous	0.3	80	0.2	48
United States coal	0.0	0	0.0	0
NSW Coal	6.7	4,748	34.0	7,512
Queensland Coal	9.3	15,700	42.0	8,943

Source: Survey undertaken by Tasman Asia Pacific (1998).

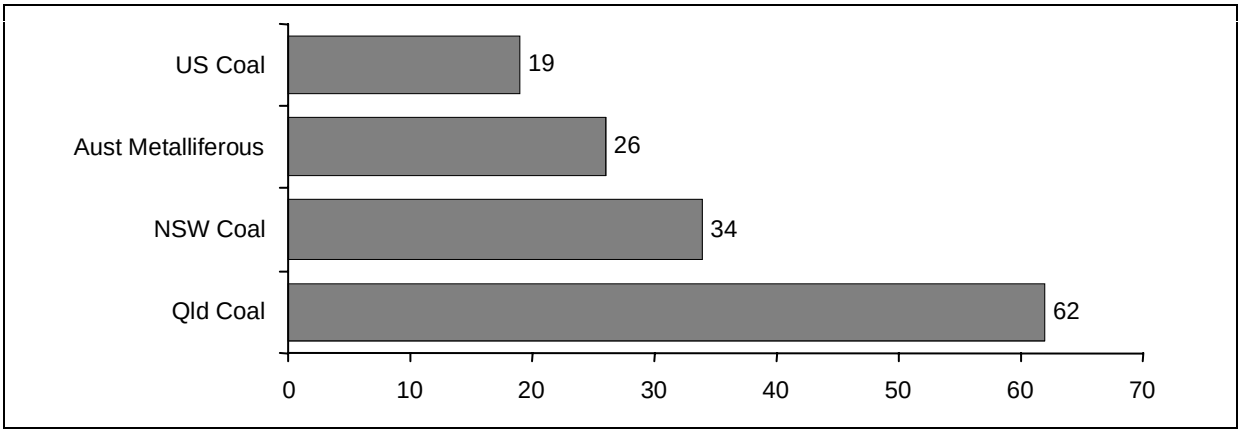
There is a great disparity in the incidence of industrial disputation in the Australian coal industry compared to the United States coal industry and Australian metalliferous mines. Our survey data shows that none of the United States mines had any industrial disputes at all in 1996–97 while the Australian metalliferous mines had an extremely low level.

There appears to be a strong inverse relationship between productivity and the level of industrial disputation. All the better performing mines in our sample had a lower level of disputation while many of the lower productivity mines had many, extended disputes.

3.6.2 Safety

Worker safety is a major concern for the coal industry. While longwall mines are more dangerous than open-cut operations, there is still a relatively high injury rate compared to most other occupations. Our survey results provide a broad indication of the relative safety record within the four mine categories (Figure 3.15). The figure reports lost time injuries per million person hours worked. Lost time injuries are defined to be injuries that prevent a worker from attending the next scheduled shift.

Figure 3.15: **Open-cut mine safety:** (lost time injuries per million person hours)



Source: Survey undertaken by Tasman Asia Pacific (1998).

Figure 3.15 indicates that the participating Australian mines, especially those in Queensland, had a higher injury rate than in participating United States coal mines and Australian metalliferous mines. While this data can only be interpreted very broadly, it suggests that, if anything, there is a positive relationship between productivity and safety. That is, that the more productive mines have better safety records.

3.6.3 Equipment maintenance

The total factor productivity analysis undertaken for participating truck and shovel operations does not include maintenance activities. We excluded maintenance activities because previous data we have collected has proven to be inconsistent between mines. As maintenance is a fairly major cost item for these operations, this can introduce a significant error into the total productivity estimates. While maintenance costs are recorded much more accurately in most mines now compared to three to five years ago, there are still problems associated with the 'lumpy' nature of maintenance work and related expenditures. For example, major engine and other overhauls or refurbishments are often recorded in maintenance systems on an operating rather than capital basis. That is, major maintenance work is reported in the year it occurs rather than distributed (or amortised) over a longer period. Thus, reported maintenance costs of equipment that have undergone major overhaul are much larger than maintenance costs in normal years — making consistent analysis very difficult.

To highlight the importance of maintenance costs in the operation of major equipment in truck and shovel equipment, Tables 3.12 and 3.13 indicate the total cost for participating mines of

operating typical mid-size shovels and trucks. These are broken down to capital costs, maintenance (spares, maintenance labour and other maintenance), operator labour and power.

Table 3.12: **Typical costs of operating shovels** (A$'000)

Cost item	*Australia metalliferous*	*United States coal*	*Queensland coal*	*NSW coal*
Capital cost	800	800	800	800
Spares	600	500	300	230
Maintenance labour	300	200	400	250
Other maintenance	150	0	200	370
Operator labour	230	180	415	350
Power	200	180	140	130
Total	2,280	1,830	2,255	2,130

Source: Survey undertaken by Tasman Asia Pacific (1998).

Table 3.12 indicates that maintenance costs represent about 40 per cent of the cost of operating mid-size shovels in truck and shovel mines. This is similar in magnitude to capital costs. Labour costs represent about 15 per cent of total costs and power costs the remaining five per cent. Maintenance labour typically represents about one-third to one-half of total maintenance costs and is a greater cost item than operator labour.

Given the variation in maintenance costs reported, often related to the different types of maintenance undertaken (eg major overhauls versus routine services), it was not possible to identify any difference in maintenance efficiency between mines or the relationship between maintenance activities and productivity.

Survey data presented in Table 3.13 indicates that maintenance cost shares are typically lower for trucks than shovels — representing about 30 per cent of total costs. Capital costs often comprise about 40 per cent of costs, operator labour around 20 per cent and diesel 10 per cent. More than twice as much is often spent on operator labour compared to maintenance labour. Again, it was not possible to identify any difference in maintenance efficiency between mines or the relationship between maintenance activities and productivity.

Table 3.13: **Typical costs of operating trucks** (A$'000)

Cost item	*Australia metalliferous*	*United States coal*	*Queensland coal*	*NSW coal*
Capital cost	300	300	300	300
Spares	130	170	110	120
Maintenance labour	40	70	60	90
Other maintenance	0	0	90	60
Operator labour	120	120	180	200
Diesel	100	125	90	65
Total	690	785	830	835

Source: Survey undertaken by Tasman Asia Pacific (1998).

3.7 ATTRIBUTES OF FRONTIER VERSUS MODERATELY PERFORMING MINES

Section 3.3.1 reported that a number of Australian truck and shovel coal operations which participated in this benchmarking study are at or close to world's best practice and that these operations provide meaningful benchmarks for the many lesser performing Australian coal operations.

This section compares attributes of such frontier Australian truck and shovel mines compared to moderately performing Australian operations. As such, it indicates ways for the poorer performing mines to improve efficiency. It also provides some mid-level performance targets (Box 3.2).

Efficient mines use their resources intensively. This is especially the case for the labour force and trucking and shovel fleets. It is generally believed that better performing mines over-truck. However, our analysis suggested that the more productive mines generally have high productivity of excavation equipment as well as trucks. Over-staffing and over-capitalisation are common causes of lower productivity. Often the moderate performing mines in the sample have more equipment than they need (especially trucks) — requiring additional staff. In such mines, excess staff are also often apparent in areas such as operating non-core equipment and in general duties.

Box 3.2: **Key attributes of Australian frontier and moderately performing mines**

	Best practice mine	*Moderately performing mine*
Total productivity	100	60
Resource levels		
Staffing levels: ratio of labour hours worked to equipment hours worked	1.5	2.1
Work time in shifts: time excluding leaving and joining shifts, meal and other breaks (per cent)	92	85
Utilisation of truck fleet:	45	40
Utilisation of major digging equipment	50	40
Work practices		
Hot seat changes	✓	✓
Meal breaks in the field	✓	✗
Staggered meal breaks	✓	✗
Operators move between equipment within shifts	✓	Rarely
Haulage equipment fuelled in breaks	✓	✗
Clean-up equipment does not impede production	✓	✗
Other indicators		
Efficient truck loading practices: incidence of double-sided or some other efficient truck loading method (per cent)	>50	0
Spotting time of trucks under shovels (seconds)	35	65
Truck loads per shovel per 8-hour shift	185	135
Industrial disputes: days lost per thousand hours worked	0	20
Safety: lost time injuries per million man hours	20	50

Source: Survey undertaken by Tasman Asia Pacific (1998).

Work practices are also more efficient in the high performing mines in the sample. For example, staff in efficient mines use effective hot-seat changes, take meal breaks on machines, stagger meal breaks to ensure that core equipment continues to operate, move between pieces of equipment within shifts where necessary, fuel haulage equipment during breaks and ensure clean-up equipment does not impede production. Generally the poorer performing mines implement only a few of these good practices.

Highly productive truck and shovel operations usually use efficient shovel techniques such as double-sided loading of trucks. While this imposes an extra dimension of care to maintain

safety standards it allows substantially more excavation per shift and improves truck productivity. For example, limited responses to our sample suggested that spotting times under trucks are often around 35 seconds with double-sided loading compared to 65 seconds with single-sided loading. This 30 second per truck lost digging and transportation time is significant given the frequency of truck loading (eg 30 seconds times 135 trucks per shovel per shift times 750 shifts per year times three shovels equals 2,500 lost production hours per year).

As noted earlier, the better performing mines in the sample invariably have fewer industrial disputes and also seem to have a better safety record.

3.8 SUMMARY OF TRUCK AND SHOVEL ANALYSIS

The analysis presented above shows that the productivity of the surveyed NSW and Queensland truck and shovel coal mines in 1996–97 was well below that of domestic metalliferous mines and United States coal mines. For example, to match the productivity of the United States coal mines, the mines in the NSW and Queensland coal mine categories would, on average, have needed to increase their productivity by 38 and 17 per cent, respectively. Similarly, these mines needed to increase productivity by an average of 35 and 14 per cent, respectively, to match the productivity of the Australian metalliferous mine category.

Several factors contributed to this difference in productivity. These included:

- excessive labour inputs in NSW and Queensland coal mines;
- low truck utilisation in NSW and Queensland coal mines;
- less productive shovel loading practices in many NSW and Queensland coal mines;
- inefficient work practices; and
- geological differences.

From our analysis of sampled mines it appears that low labour and truck productivity in NSW and Queensland coal mines, compared to United States coal mines and domestic metalliferous mines, were the major causes of this total factor productivity difference. Relatively low productivity of excavation equipment also contributed to these differentials compared to domestic metalliferous mines.

Over-staffing was a major contributor to the poor labour productivity in the participating mines in the NSW and Queensland black coal mine categories. This stemmed from both excessive numbers of equipment (eg over-capitalisation of the truck fleet) and too many operators of non-core equipment and in general duties. Many good work practices are not as widespread in the Australian coal mines surveyed as they are in participating United States coal mines and domestic metalliferous mines.

Low truck productivity in these NSW and Queensland black coal operations stemmed from reasonably low utilisation together with poorer work and truck loading practices. The latter involved a greater reliance on single-sided loading rather than more efficient methods such as double-sided or modified drive-by loading.

A number of NSW and Queensland truck and shovel coal operations surveyed are at or close to world's best practice and can provide meaningful benchmarks for the many lesser performing Australian coal operations. Comparison of such domestic 'frontier' mines with lesser performing Australian operations clearly shows the scope for general improvement of the Australian industry from utilising resources more intensively, improving work practices and improving the industrial relations climate.

4 DRAGLINE OPERATIONS

Draglines are used solely for removing overburden to uncover coal seams. This chapter benchmarks the removal of overburden using draglines. It reports productivity performance results for 13 Australian and United States open cut coal mines which use dragline mining equipment as the primary overburden removal method.

4.1 KEY CHARACTERISTICS OF THE BENCHMARKED MINES

The dragline operations analysed, comprised five coal mines from Queensland, three from NSW and five from the United States. All but one of these mines also provided data on truck and shovel operations. As with the truck and shovel operations, results are aggregated by location (ie for Queensland, NSW and United States coal mines).

Table 4.1 summarises the key characteristics of the participating mines. It shows that the average size of mines varied between the mining categories examined. In particular, the Queensland mines moved much more overburden than the United States mines. Our analysis does not indicate much correlation exists between productivity and size of operations, although some of the smaller operations had relatively low productivity.

Table 4.1: **Characteristics of dragline operations: average per mine**

	Prime overburden moved (million bcm)	*Re-handled overburden moved (million bcm)*	*Total overburden moved (million bcm)*	*Re-handle factor (re-handled/ prime over burden per cent)*	*Powder factor (kg explosives per bcm)*
Queensland coal	27	10	37	0.38	0.26
United States coal	14	6	20	0.45	0.38
NSW coal	20	5	25	0.27	0.38

Source: Survey undertaken by Tasman Asia Pacific (1998).

The three mine categories also varied in the proportion of re-handled overburden. For example, participating mines in the United States category had an average re-handle factor nearly double that of the NSW mine category. Re-handling overburden can either help or hinder the productivity of a dragline, depending on the circumstances. In some instances,

productivity will decrease because of the need for the dragline to move to re-handle the overburden. Thus a dragline with a high re-handle factor may spend a greater proportion of its time re-positioning and creating work-benches rather than digging. However, draglines with low re-handle factors may also spend significant amounts of time building work-benches. Further, re-handling may increase the productivity of a dragline by "short-swinging".

The high proportion of sandstone and other dense materials in the NSW mines overburden disadvantages these mines. These materials require greater amounts of blasting to achieve a satisfactory degree of shatter for digging by the dragline. This higher level of blasting is reflected in the high average powder factor of the NSW mines compared to the Queensland operations. The United States mines in the study also had a relatively high powder factor.

4.2 DRAGLINE TFP

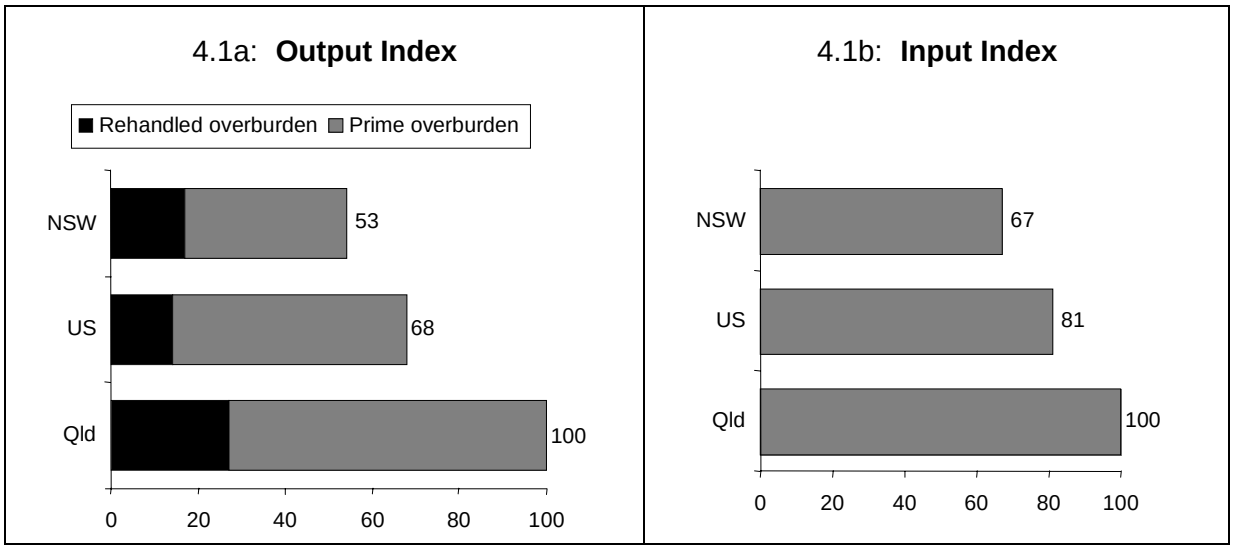
The calculation of a TFP index for our 13 dragline mines requires data on mine output and the inputs used to produce this output. This section provides information on the methods used by Tasman to estimate these data and presents TFP estimates for the three mine categories discussed above. The following section considers the factors which contribute to differences in the three mine categories' productivity.

4.2.1 Mine outputs and inputs

The sole purpose of dragline operations is to move overburden. Overburden removed is typically classified into "prime" overburden and re-handled overburden. For the purpose of calculating total productivity, Tasman has defined the dragline output to be the sum of prime and re-handled overburden expressed in banked cubic metres.

Following the methodology outlined in Appendix 3 (Box A3.1) and used in the benchmarking of truck and shovel operations, Tasman has calculated an output index from these quantities. This index has been derived by dividing the overburden moved in each mine by the overburden moved in Queensland, with each quotient then multiplied by 100. This method produces an output index with Queensland equal to 100. Figure 4.1 presents the resulting output index.

Figure 4.1: **Average output and input — dragline mines**
(index: Queensland = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

Dragline productivity analysis also requires information on inputs. Mine inputs were broken down into eight categories (Appendix 3). Dragline, explosives and labour inputs comprised the largest shares of the costs of excavating material by dragline technologies. Figure 4.1b, shows that, on average, the Queensland category had the highest level of input use of the three mine categories. The average level of inputs used by the United States mines was substantially higher than those used by NSW mines.

Section 4.3 reports productivity estimates Tasman has derived from these output and input data.

4.2.2 Dragline operations — total productivity benchmarks

Tasman has estimated the productivity of coal mine dragline operations by dividing mine output (total movements in banked cubic metres) by the index of input use derived in Section 4.2.1. These TFP estimates were then expressed as an index with the Queensland mines given a value of one hundred. Table 4.2 and Figure 4.2 present the results of this analysis for the three mine categories and summarise, in index form, the quantities of output and inputs used.

These estimates indicate that the participating mines making up the Queensland mine category had the highest total productivity of the three categories examined. The productivity

performance of participating NSW mines in 1996–1997 was well below that of the Queensland mines. The mines making up the NSW coal mine category needed to increase productivity by an average of 25 per cent to match the Queensland mines.

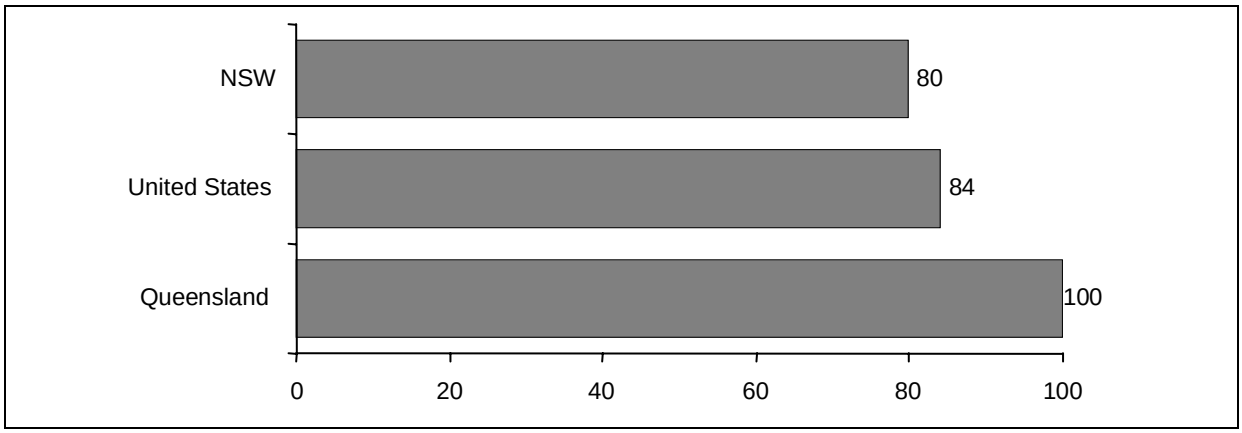
Table 4.2: **Total productivity of dragline operations** (index: Queensland = 100)

	Output (index: Queensland = 100)	*Input use* (index: Queensland = 100)	*Productivity index* (index: Queensland = 100)
Queensland	100	100	100
United States	68	81	84
NSW	53	67	80

Source: Survey undertaken by Tasman Asia Pacific (1998).

The productivity performance of the participating mines in the United States category was slightly superior to the performance of the NSW mine category. NSW coal mines needed to increase productivity by five per cent to match United States mines. On average, the productivity of the Australian dragline operations was around 13 per cent higher than the participating United States mines.

Figure 4.2: **Total productivity of dragline operations** (index: Queensland = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

There was some variation in productivity performance within categories, particularly for mines in the Queensland and United States categories. Thus, although the reported averages reflect typical productivity performance in those regions, they also disguise variations between mines within regions. Because of the limited number of mines in these categories Tasman, for confidentiality reasons, has not presented details of the best and worst performers. However,

the variations in dragline productivity performance were not as great as those reported for truck and shovel operations in Chapter 3. For example, there was around 30 per cent difference in productivity between the best and worst performing dragline operation in each of the three categories (Queensland, NSW and the United States).

As discussed earlier, many open-cut mines provided data on both their dragline and truck and shovel operations. Analysis of these mines shows that dragline operations of Australian mines were, in a relative sense, about 10 to 15 per cent more productive than truck and shovel operations at the same mine (Table 4.3). Conversely, dragline operations of United States coal mines were on average about 15 per cent relatively less productive than truck and shovel operations at the same mine.

Table 4.3: **Comparing the productivity of dragline and truck and shovel operations of mines**

	Dragline TFP (average TFP per mine)	*Truck & shovel TFP (average TFP per mine)*	*Difference in TFP (per cent)*
Queensland coal	91	80	14
United States coal	75	88	–15
NSW coal	67	60	11

Source: Survey undertaken by Tasman Asia Pacific (1998).

While the number of responses was relatively small, it does appear that a number of Australian open-cut mines that have problems with over-staffing and inefficient work practices in their truck and shovel operations are able to achieve much higher relative productivity in the less labour-intensive dragline operations. One possible explanation for this dichotomy in productivity performance is that some mines have a primary focus on dragline operations and thus achieve relatively greater efficiency in those operations. This is reinforced by our observation that a number of participating open-cut mines that do not have draglines, and thus focus solely on truck and shovel operations, are amongst the better performing truck and shovel mines.

4.3 FACTORS CONTRIBUTING TO DIFFERENCES IN DRAGLINE PRODUCTIVITY

An examination of a range of partial productivity measures helps identify broad reasons for the

differences in observed total productivity. These partial measures can be calculated by dividing total overburden moved by draglines by the physical inputs used in each input category. Table 4.4 presents these measures in index form — Queensland mines equal 100 for each input class. The partial productivity measures are listed according to their importance in average cost shares. This focuses attention on the more important input categories — mainly draglines, explosives and labour.

Table 4.4: **Partial productivity indicators of dragline operations** (index: Queensland Coal = 100)

	Qld	*US*	*NSW*	*Average share of costs* (%)
Dragline productivity ('000 bcms per loose cubic metre of dragline capacity)	100	85	81	38
Explosives productivity ('000 bcms per kg explosives)	100	70	69	21
Labour productivity (bcms per labour hour worked)	100	84	84	21
Electricity productivity ('000 bcms per megawatt hour)	100	107	110	12
Dozer productivity ('000 bcms per kilowatt of dozer capacity)	100	95	120	4
Diesel productivity (bcms per litre of fuel used)	100	34	139	3
Drill productivity ('000 bcms per centimetre of drill capacity)	100	47	45	2
Other equipment productivity ('000 bcms per kilowatt of other equipment capacity)	100	57	15	<1

Source: Survey undertaken by Tasman Asia Pacific (1998).

This partial analysis indicates that participating Queensland mines ranked highly on all partial productivity indicators. However, for three partial indicators — electricity, dozers and diesel — the participating NSW mines' productivity exceeded Queensland's performance. These inputs form a reasonably small proportion of total dragline input costs.

The partial productivity analysis of the sample indicates that the Queensland mines' superior average performance was partially due to mine geology. For example, the material types in Queensland's overburden needed less blasting compared to those facing participating mines in NSW and the United States. As explosives are 20 per cent of the total input costs a geological advantage of this type is an important explanator of the observed total productivity differences.

Other factors also contributed to Queensland's superior performance. The partial productivity indicators suggest that a significant portion of Queensland's productivity advantage results from better dragline and labour practices. The following sub-sections consider influences

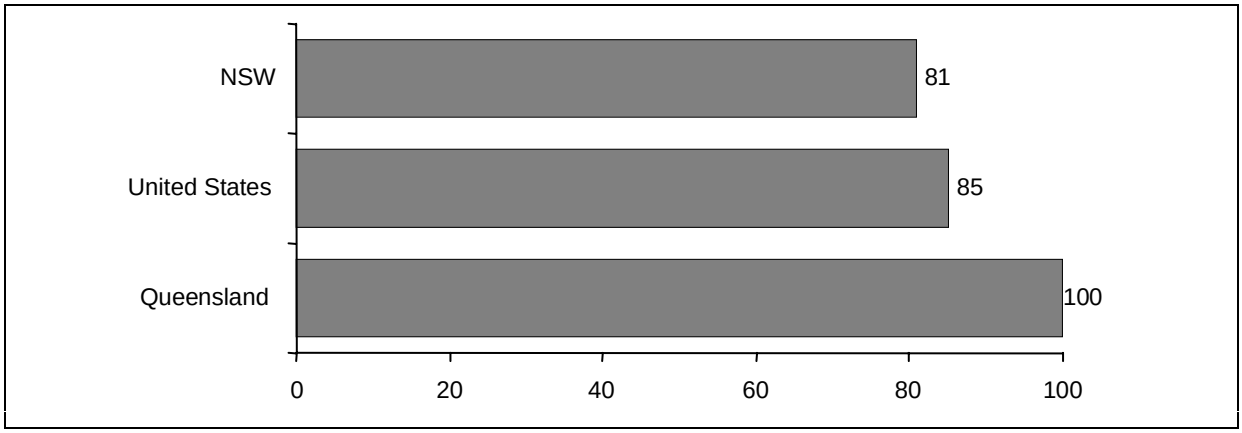
which impact on dragline and labour productivity.

4.3.1 Efficiency of dragline operations

Dragline capital costs comprise a large share of total costs (excluding overheads and materials) of dragline operations, averaging nearly 40 per cent for all mines examined. Thus, productivity of the draglines themselves has a major influence on total productivity.

The partial productivity measures reported in Figure 4.3 indicate that the productivity of draglines in Queensland mines was much higher than in the United States and NSW mines. The NSW mine category needed to increase dragline productivity by about 25 per cent to match that of the Queensland mine category. United States mines needed to increase dragline productivity a corresponding 17 per cent.

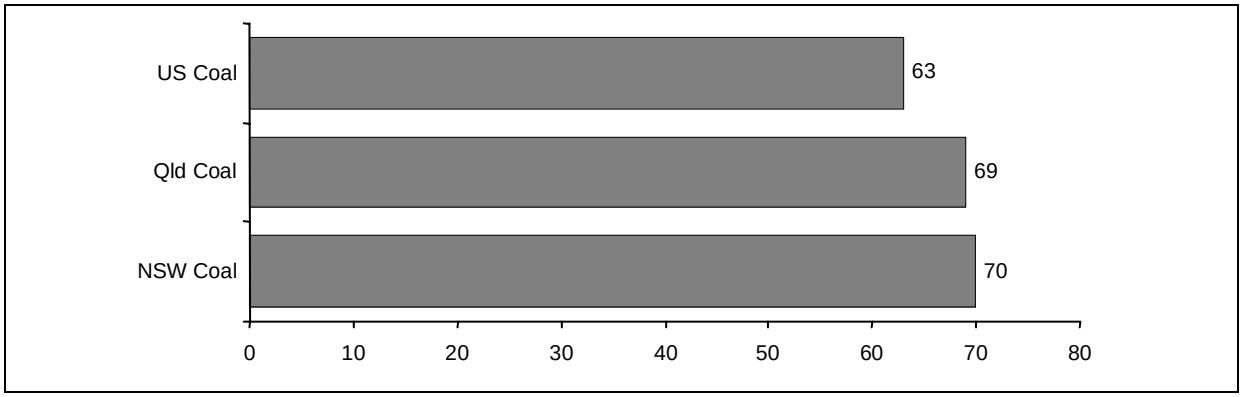
Figure 4.3: **Productivity of draglines[a]** (index: Queensland = 100)



a Dragline productivity equals output index divided by total dragline capacity.
Source: Survey undertaken by Tasman Asia Pacific (1998).

Analysis of the survey data indicates that low productivity of United States dragline operations relative to Queensland operations was partially due to lower dragline utilisation (Figure 4.4). This explained about half the observed difference in dragline productivity between these two categories.

Figure 4.4: **Dragline utilisation** (per cent)



a Hours worked as a percentage of available hours.
Source: Survey undertaken by Tasman Asia Pacific (1998).

However, the moderate dragline productivity of NSW mines was not due to relatively low utilisation. Rather it reflected lower operating productivity. Table 4.5 indicates that participating NSW mines only averaged 37 full bucket equivalents compared to 44 for the United States mines and 47 for the Queensland mines in the sample. Thus these NSW mines were not making effective use of their relatively large draglines. The main problem related to the number of swings per hour. It appears that a number of the NSW mines achieved high dragline bucket factors.

Table 4.5: **Productivity performance of dragline operations**[a]

	Dragline output per hour (bcms)	*Bucket factor (per cent)*	*Swings per hour (number)*	*Bucket capacity (loose cubic metres)*	*Full bucket equivalents (number per hour)*
Queensland coal	1,901	92	51	41	47
United States coal	2,074	88	50	47	44
NSW coal	1,910	95	39	51	37

a The total hourly output per dragline was estimated using the following formula:
*Output per hour = Total mine output / (dragline hours worked * number of draglines)*
Source: Survey undertaken by Tasman Asia Pacific (1998).

The participating Queensland mines had moderately higher operational efficiency (full bucket equivalents) than the United States mines surveyed. Together, with high utilisation, this explained the difference in dragline productivity between these mine categories (Table 4.6).

Table 4.6: **Capacity utilisation and improvements needed to match best practice dragline performance**

	Improvement needed to match Queensland dragline performance in:			
	Utilisation (%)	*Full bucket equivalents per hour* (%)	*Full bucket equivalents per year* (%)	*Dragline productivity* (%)
United States	10	7	17	17
NSW	–2	26	23	23

Source: Survey undertaken by Tasman Asia Pacific (1998).

Table 4.6 also shows that participating NSW mines needed to increase dragline productivity by 23 per cent to match Queensland productivity levels, on average. NSW mines had two per cent higher utilisation of draglines so needed to increase operational efficiency by about 26 per cent to match the Queensland mines in the sample.

Draglines accounted for about 40 per cent of costs for the NSW and other mine categories. Thus, the 23 per cent improvement in dragline productivity required by the participating NSW operators to match the average of participating Queensland operators would translate into around a ten per cent improvement in total factor productivity. This would have reduced the gap between the NSW and Queensland operators from around 25 to 15 per cent.

As with the truck and shovel analysis, maintenance costs have been excluded for the dragline analysis because they can be very misleading — especially when some mines include major overhauls and others do not. While there is a very large range in maintenance costs reported in our survey, Table 4.7 shows 'typical' values for the mine categories.

Table 4.7: **Typical costs of operating draglines** (A$'000)

Cost item	*Queensland*	*United States*	*NSW*
Capital cost	3,500	3,500	3,500
Spares	1,000	800	900
Maintenance labour	600	400	500
Other maintenance	700	600	1,000
Operator labour	1,300	1,000	1,100
Power	600	700	1,000
Total	7,700	7,000	8,000

Source: Survey undertaken by Tasman Asia Pacific (1998).

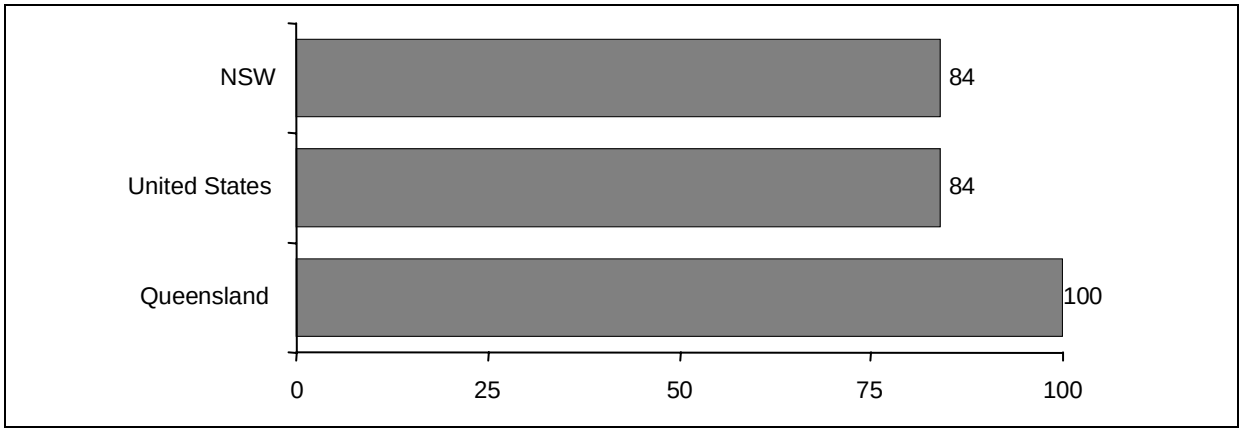
Table 4.7 indicates that participating mines' maintenance costs typically represent about 30 per cent of total costs of operating draglines. Capital costs often comprise about 45 per cent of dragline costs, operator labour around 15 per cent and electricity 10 per cent. This indicates

that while draglines are not labour intensive, they still have considerable operator wage cost. It was not possible to identify any difference in maintenance efficiency between mines or the relationship between maintenance activities and productivity.

4.3.2 Labour Productivity

Labour accounts for around 20 per cent of dragline input costs (excluding materials and overheads). On average, participating mines in the Queensland category had the highest labour productivity (Figure 4.5).

Figure 4.5: **Labour productivity in dragline operations**
(index: Queensland = 100)



a Labour productivity equals output index divided by labour hours worked.
Source: Survey undertaken by Tasman Asia Pacific (1998).

The average labour productivity performances of the participating NSW and United States mines was very similar and needed to increase by about 20 per cent to match the best practice Queensland category. This moderate labour productivity performance comprised about one-quarter of the 25 per cent total productivity shortfall of the NSW mines compared to the Queensland mine category.

Table 4.8 shows the staffing of a typical, efficient Australian dragline operation using a single dragline. While over-staffing has not been identified as a major problem for Australian dragline mines, some mines have additional dozer, drill and general duties staff.

As reflected in the example in Table 4.8 below, virtually all dragline mines in the sample operate year-round (ie 24 hours per day, seven days per week, only having Christmas Day off). The participating Australian mines typically operate three eight-hour shifts per day whilst most of the United States dragline operations have two 12 hour shifts.

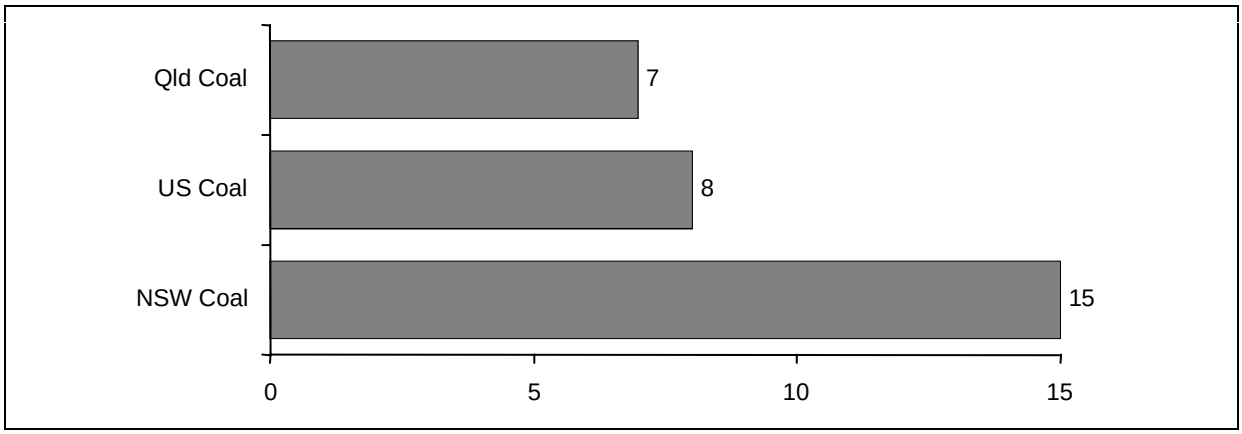
Most of the Australian and United States dragline operations sampled appeared to have good work practices in their dragline operations. For example, meal breaks were taken in the field and hot seat changes were employed on major equipment for virtually all dragline operations in Queensland, NSW and the United States. Further, there was usually no cost to production of meal breaks as staff staggered these breaks to continue operating draglines.

Table 4.8: **Number and composition of workers in typical shifts for an efficient Australian dragline operation**

	Morning shift	*Afternoon shift*	*Night shift*
Equipment crew			
Draglines	1	1	1
Dozers	2	2	2
Drills	1	1	
Non-equipment workers			
Supervisors	1		
Shot-firers	1	1	1
General duties staff			
Gardeners			
Other — dragline oiler	1	1	1
Average workers per shift	7	7	7
Average hours per shift (paid)	8.5	8.5	8.5
No. of shifts per year	364	364	364
Number of days mine operated per week	7		

The Queensland and United States mines surveyed generally had very low idle time, or high work time, in shifts (Figure 4.6).

Figure 4.6: **Percentage of idle time in shifts**



a Labour productivity equals output index divided by labour hours worked.
Source: Survey undertaken by Tasman Asia Pacific (1998).

Many of the Queensland dragline operations scheduled continuous shifts — that is, there were no breaks within the eight-hour shifts. Other mines in Queensland typically had 30 minute meal breaks and 15 minutes at shift change. The United States mines typically had similar breaks, but in 12 hour shifts. A few of the NSW mines had considerable additional breaks (to meal breaks) which substantially increased the extent of idle time in shifts.

Australian dragline workers in participating mines typically had more generous leave provisions than their United States counterparts. This increases the relative cost of labour in the Australian operations. Dragline staff in these Australian mines typically take one day's leave for every three days worked. The ratio in the United States mines is around double that (ie one day leave taken for every six days worked). Participating United States mines often have a formula whereby leave provisions are more generous the longer a worker is employed at a mine. However, many mine workers in the United States are paid leave for their birthday.

Work practice appeared to be generally good throughout the Australian and United States dragline mines surveyed. An influence on labour productivity in NSW and United States mines was the use of bulldozers. One United States mine used dozers very intensively (to reduce re-handle) while the NSW mines, on average, did not use dozers very extensively.

Much of the differences in labour productivity are due to differences in equipment productivity — with dozer operations affecting labour productivity as significantly as dragline operations. This is because of the relative labour intensity of dozers compared to draglines — at least when measured on the basis of output moved per unit of labour input. Thus the better labour

productivity of participating Queensland dragline operations stems form a combination of higher dragline productivity, lesser use of dozers and fewer staff required for drilling and blasting.

4.4 THE LINK BETWEEN PRODUCTIVITY AND COST

Consistent with its poorer total factor productivity performance, NSW dragline operations exhibited high unit costs. For example, unit costs of NSW dragline operations were:

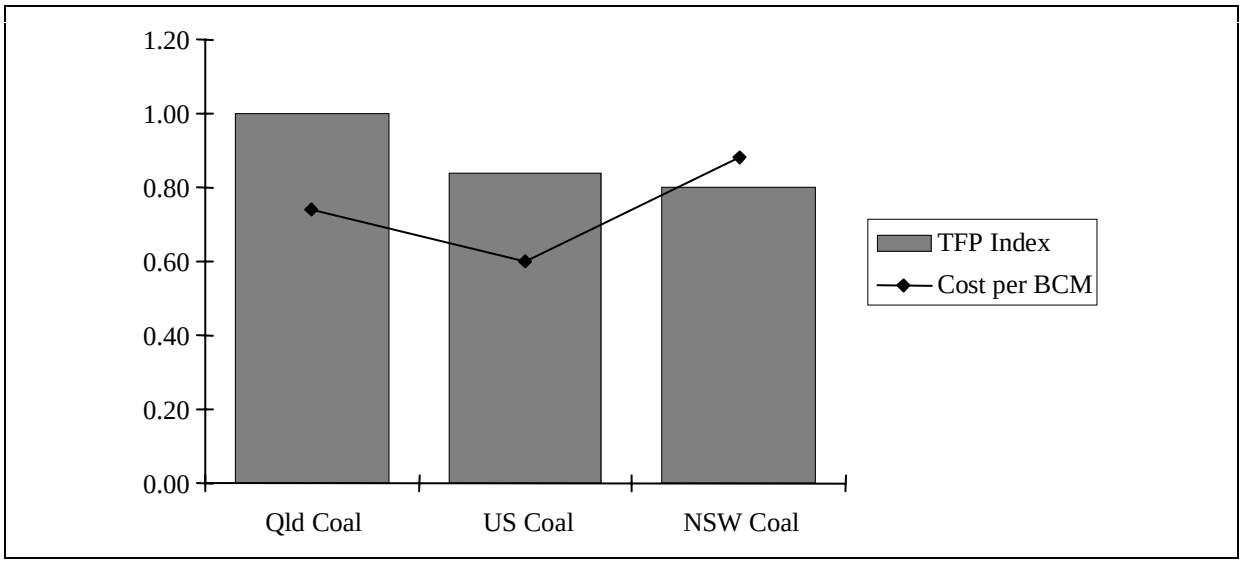
- 19 per cent higher than Queensland coal operations; and
- 47 per cent higher than United States coal operations.

Compared to Queensland dragline operations these higher costs can be explained almost entirely by differences in productivity. However, when compared to the United States operations, NSW dragline mines higher unit costs stem mainly from higher labour and explosives costs.

The costs we have reported are those relating to the inputs listed in Box A3.1. Again, costs for United States mines have been converted to Australian currency using purchasing power parity estimates (OECD 1998). These equate to an exchange rate of about 76 US cents to the Australian dollar in 1996 and 1997.

Despite their good productivity performance, many participating Queensland dragline operations achieved costs well above their United States counterparts. For example, the cost per banked cubic metre of overburden moved by the Queensland draglines was 23 per cent higher than in the United States mine category. This was despite a 19 per cent productivity advantage enjoyed by the Queensland operations (Figure 4.7).

Figure 4.7: **Total factor productivity and cost per BCM in dragline operations** (index: Queensland Coal = 100 and $A costs)



4.5 SUMMARY OF DRAGLINE ANALYSIS

Tasman's benchmarking of the productivity of NSW and Queensland black coal dragline operations with similar operations in the United States has found that the participating Queensland operations had the highest total factor productivity and can be considered as operating at best practice. Queensland mines recorded total productivity levels 19 and 25 per cent higher, on average, than the United States and NSW operations.

Several factors contributed to the difference in productivity, including:

- high dragline capacity utilisation coupled with operational efficiency in Queensland mines;
- low dragline operational efficiency in New South Wales mines; and
- low blasting requirements in Queensland mines due to the geology of the overburden.

Dragline productivity was a major influence on total factor productivity for the sampled mines. Dragline productivity was highest in the Queensland mines. These mines were best able to utilise dragline capacity when operating, and operated draglines more hours per year, on average, than United States mines in particular.

Based on our sample, labour productivity in Queensland dragline operations exceeded that in NSW and United States mines by about 20 per cent. Much of this difference stemmed from the greater operational efficiency of the Queensland draglines and fewer staff being required

for drilling and blasting activities. Work practices appeared to be generally good throughout the Australian and United States dragline mines.

Despite their good productivity performance, many Australian dragline operations achieved cost levels above their United States counterparts. For example, total costs of removing overburden in Queensland mines were 23 per cent higher than in participating United States mines, even though productivity was 19 per cent higher in Queensland — which helps to reduce costs. The higher input costs in the Australian mines is largely attributable to the higher cost of labour and explosives.

5. LONGWALL MINING OPERATIONS

In very simple terms, a longwall is created by driving a shaft either side of the seam to be mined. The face is then created by joining the two shafts and the longwall equipment is installed. A shearer cuts the coal which is transported via conveyors and loaders to the surface and then to stockpiles.

This chapter benchmarks the removal of coal using longwall mining techniques. It reports productivity performance results for seven Australian and two United States collieries. However, given the small sample, the analysis should only be interpreted as a broad indication of the possible improvement in Australian longwall mines.

5.1 KEY CHARACTERISTICS OF THE BENCHMARKED LONGWALL MINES

Key mine characteristics were broadly similar between the Australian and United States mines (Table 5.1). The main difference between the mines was the longer average length of the United States longwalls. The United States mines also had slightly higher seams and mined more longwalls per year, on average. However, the United States collieries were mining at a greater depth underground than the average Australian operations.

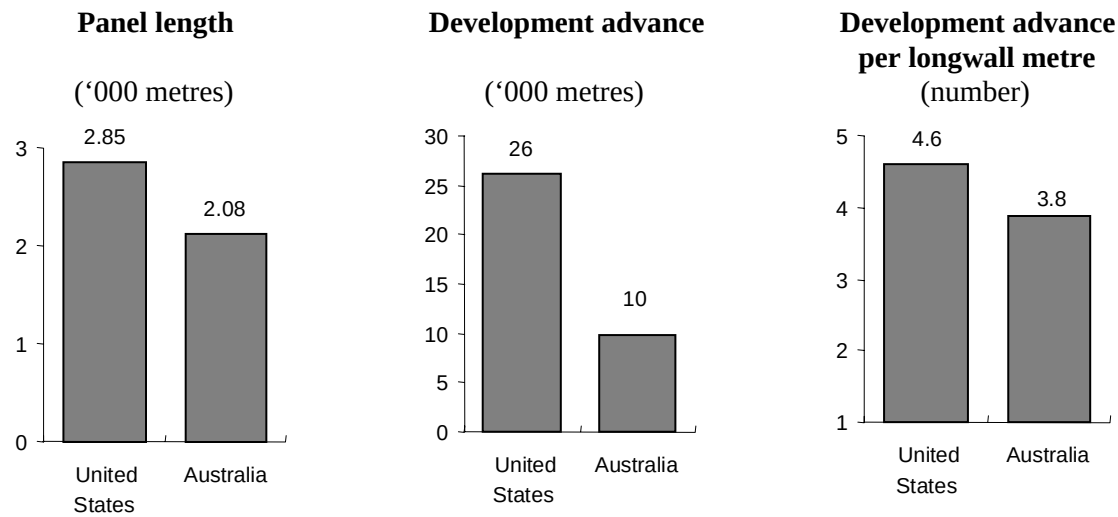
Table 5.1: **Characteristics of participating longwall mines**

Mine type and location	*Australia*	*United States*
Number of mines surveyed	7	2
ROM Coal ('000 tonnes)	1,972	3,930
Panel length (metres)	2,074	2,850
Seam height (metres)	2.5	3.1
Panels mined per year (number)	1.5	2.0
Depth underground (kilometres)	2.66	3.75

Source: Survey undertaken by Tasman Asia Pacific (1998).

While we focus on the longwall coal mining operations of the respondent mines, it is notable that the United States mines undertook slightly more development work than the participating Australian mines (Box 5.1).

Box 5.1: **Longwall and development production**



5.2 FRAMEWORK FOR MEASURING LONGWALL PRODUCTIVITY

In past work (Swan Consultants (Canberra) 1994), longwall operations were taken to include the development work as well as the coal mined from the longwall face. However, advice from mine engineers is that development work would be better treated as an input rather than as an output. Further advice is that the rate of development work is significantly influenced by geological conditions as it is therefore very difficult to benchmark accurately. For this reason, we have excluded development work associated with the construction of the longwall. Similarly, coal mined during development has been excluded from the analysis.

Modelling a longwall operation is also complicated by the time and cost involved in moving from one panel to another and in undertaking major maintenance. Ideally we would like to benchmark longwall operations which operate on only one face and which undertook no major maintenance operations.

However, the mines included in the analysis do not all operate on only one face. To allow valid benchmarks to be developed for longwall operations, the Tasman longwall survey form asks for data on the number of longwalls mined, the longwall move duration, etc. Where more than one longwall is mined, this information can be used to adjust the derived benchmarks for the number of longwalls mined.

Thus, in order to ensure meaningful productivity results we have limited our analysis to the

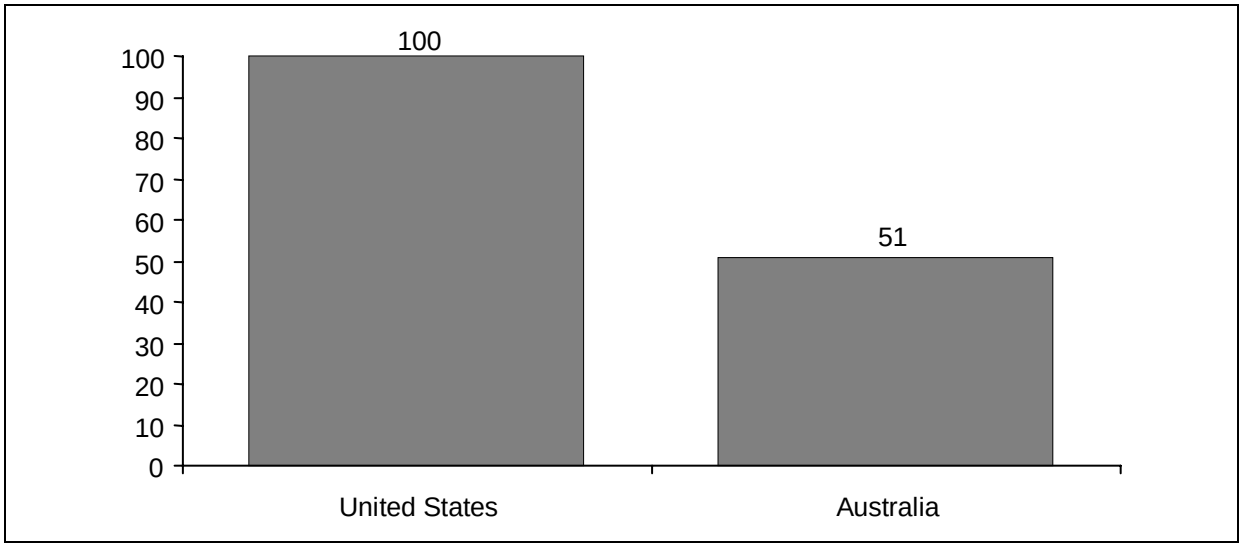
core mining operations of longwalls — namely shearing, roof support and transportation of the coal via the face conveyor to the stage loader. Labour associated with the operation and maintenance of this equipment is included, as are power and oils and other solubles.

Because the operating characteristics of the mines are broadly similar, and our analysis focuses on core longwall mining operations, our estimated productivity gaps are likely to reflect differences in management and work practices and thus indicate the potential for improvement in various mines.

5.3 LONGWALL OUTPUTS

Run-of-mine coal produced by the longwall is the sole output of the longwall productivity model. Similar to the open-cut models, we have calculated an output index from these quantities. This index has been derived by dividing the longwall coal in each category by the longwall coal produced in the United States, with each quotient then multiplied by 100. This method produces an output index with United States equal to 100. As shown in Figure 5.1, the United States mines have higher average output than the Australian mines.

Figure 5.1: **Average output of longwall mines** (index: United States Coal = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

As mentioned above, we have not included coal produced during development as an output.

To calculate the productivity of longwall operations, the level of output produced must be

compared to the level of inputs used to produce these outputs. An aggregate input measure for longwall operations is provided in the following section.

5.4 INPUTS USED IN LONGWALL OPERATIONS

Longwall inputs have been broken down into the nine categories shown in Box 5.2. All of these, except for contractors and consumables, have been specified in physical units. Contractors and consumables have been specified in constant dollars, adjusted for purchasing power rather than exchange rates for United States operations. As with the open cut operations, we have excluded overheads and materials because of difficulties in obtaining consistent data from mines. Maintenance labour was included as this was considered to be sufficiently reliable to warrant benchmarking comparison.

Box 5.2: **Longwall mines benchmark model**

Input	*Comments*	*Unit of measurement*
Labour	Includes all mine workers and maintenance workers but exclude office workers. Input calculated as the number of workers times typical hours worked per week times 52 weeks	Hours worked
Electricity	Electricity used by machinery operating the longwall and conveyors	Megawatt hours
Shearer & armoured face conveyor	Specific input in terms of engine capacity where available, otherwise in capacity of material moved	Kilowatts
Roof supports	Support capacity of the roof supports. Calculated as the number of supports times the capacity of the supports in tonnes	Tonnes
Contractors	Use dollar expenditure adjusted for purchasing power	Constant dollar
Consumables	Includes hydraulic fuels, solubles and other oils.	Constant dollar
Maintenance	Labour component of maintenance activities.	Hours worked

The cost, apart from capital inputs, of using each input was obtained from the survey forms. The cost of using capital equipment was calculated using the methodology outlined in

Appendix 2 (Box A2.1). The methodology requires data on the expected life of each piece of equipment and its replacement cost. The expected life of equipment was specified in terms of operating hours or years and is given in Table 5.2. For equipment where assets lives were specified in units other than years, the life in years was calculated by dividing the assumed working lives by the quantity of operations undertaken during the year. The replacement cost of each piece of equipment was then derived from the survey.

Table 5.2: **Assumed maximum working life for equipment in longwall mines**

Equipment type	*Assumed working life*
Longwall (shear, armoured face conveyor)	10 million tonnes
Roof supports	25 million tonnes
Conveyors	10 years

With the exception of capital input costs, the survey questionnaire sent to participating mines was the source of information on the inputs used by the three mine categories. In all cases the survey questionnaire specified the quantity of inputs in physical units. In many cases, mines employed several pieces of equipment of varying capacity. In these cases, Tasman assumed a linear relationship applied between the name plate capacity of the machine and its physical ability to work. Thus total capacity was found by multiplying the rated capacity of each machine times the number of machines in each capacity range and then summing these products.

Table 5.3 summarises the cost data derived from the survey and the capital cost calculations outlined above in terms of cost shares.

Table 5.3: **Cost shares in longwall operations: weighted average per mine** (per cent)

	Equipment	*Operator labour*	*Maintenance labour*	*Electricity*	*Oils*	*Total*
United States	45	29	14	9	3	100
Australia	38	37	17	6	3	100
Total	40	34	16	7	3	100

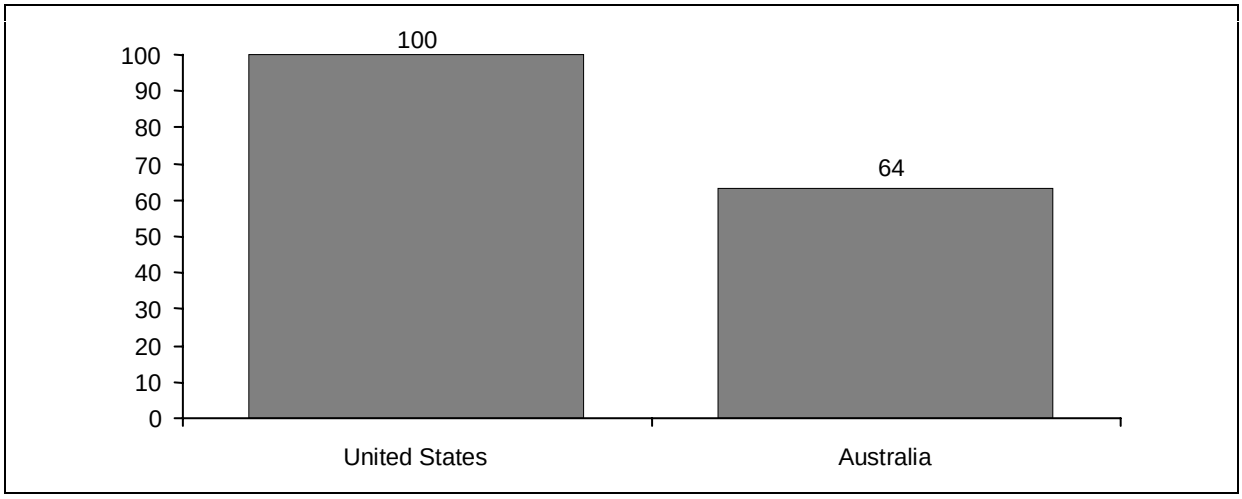
Source: Survey undertaken by Tasman Asia Pacific (1998).

The Australian longwall operations had lower equipment cost shares but higher labour cost shares than the United States mines. This mainly reflects higher staffing levels and unit costs

in the Australian mines.

Following the methodology used in the truck and shovel analysis and outlined in Appendix 1 and Appendix 2, Tasman developed an aggregate longwall input index. The methodology weights together differences in inputs used in different mines where the weights used are input cost shares. Figure 5.2 presents information on the average level of input use by mine category.

Figure 5.2: **Average inputs used in longwall mines**
(index: United States = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

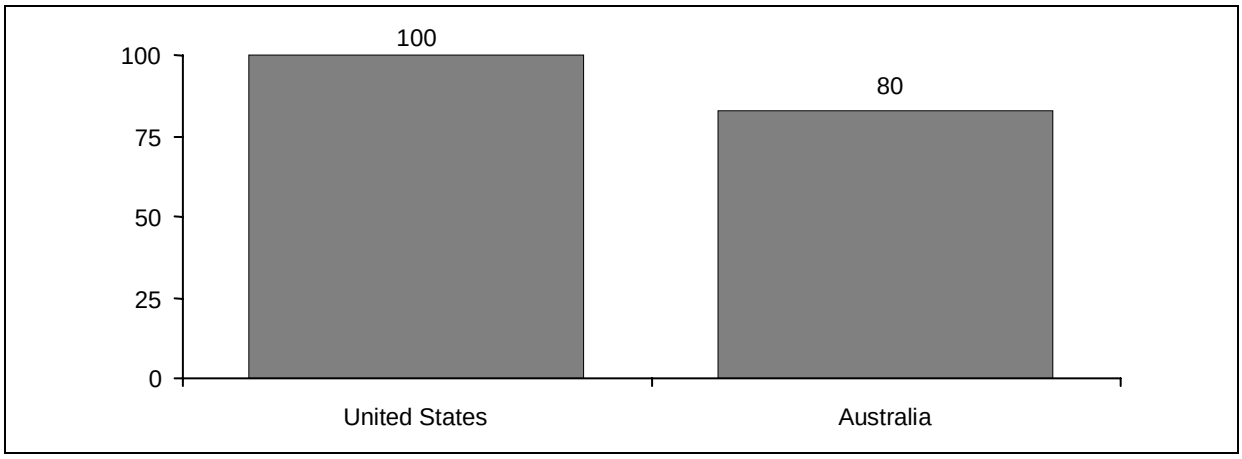
These data are used in conjunction with the output index data in the next section to estimate the total factor productivity of the two longwall mine categories.

5.5 TOTAL PRODUCTIVITY OF LONGWALL OPERATIONS

We have estimated the total productivity of longwall operations by dividing mine output (total tonnes of coal removed at longwalls) by the index of input use derived in section 5.4. This productivity measure is also expressed as an index with the United States category given a value of 100. Figure 5.3 presents the results of this analysis for the two mine categories.

The total factor productivity results show that average productivity performance for the participating Australian black coal longwall mines was below the average of the two United States mines. These Australian longwall mines, as a whole, needed to increase productivity by about 25 per cent to match the performance of the two United States mines.

Figure 5.3: **Total productivity of longwall mines** (index: United States = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

The productivity of the seven Australian mines varied considerably — from a TFP score of around to 50 to nearly 90. However, this indicates that one of the participating mines was close to best practice, around 10 per cent below the total productivity of the best United States mine. This United States mine is well recognised as being a world's best practice performer. This again shows that Australian mines can be at best practice — it is a matter of increasing the number of such exceptional performers.

We now examine factors that contributed to the productivity differences discussed above by looking at partial productivity and other measures of mine performance. As explained in Chapter 3, partial productivity measures are calculated by dividing the output index by the physical inputs used in each input category. To aid analysis and presentation, these partial productivity indicators have been indexed so that average of the two United States coal mines equal 100 for each input class (Table 5.4).

The main cost items are labour, hydraulic roof supports and maintenance labour. Differences in the productivity of these major items explain most of the differences in overall productivity between mine categories. Interestingly, the shearers themselves are a relatively small cost item. However, their effective operation is nevertheless crucial to achieving high longwall productivity.

Table 5.4 shows that low labour and shearer productivity are the main problems for the participating Australian longwall operators. These are discussed in the following section.

Table 5.4: **Partial productivity indicators of longwall operations**

(index: United States = 100)

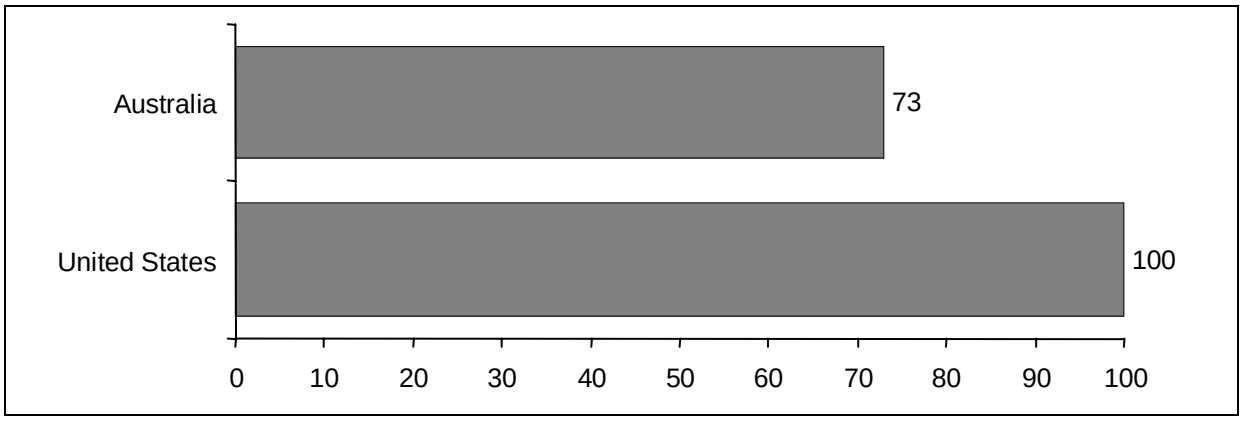
	United States	*Australia*	*Average share of costs* (%)
Labour (000 tonnes per hour worked)	100	73	34
Roof supports (000 tonnes per tonne of support capacity)	100	86	24
Maintenance (000 tonnes per maintenance hour worked)	100	99	16
Electricity (000 tonnes per mWh)	100	88	7
Shearers (000 tonnes per kW of shearer capacity)	100	52	7
Face conveyors (000 tonnes per kW of face conveyor capacity)	100	84	6
Oils (000 tonnes per oil $)	100	70	3
Stage loaders (000 tonnes per kW of stage loader capacity)	100	77	3

Source: Survey undertaken by Tasman Asia Pacific (1998).

5.5.1 Efficiency of the labour force

Labour is a major input to longwall mines, averaging 34 per cent of total measured costs across all mines in the survey (Table 5.4). Thus the efficiency of the labour force is a major determinant of both the productivity and cost of longwall operations.

Figure 5.4: **Labour productivity of longwall mines[a]** (index: United States = 100)



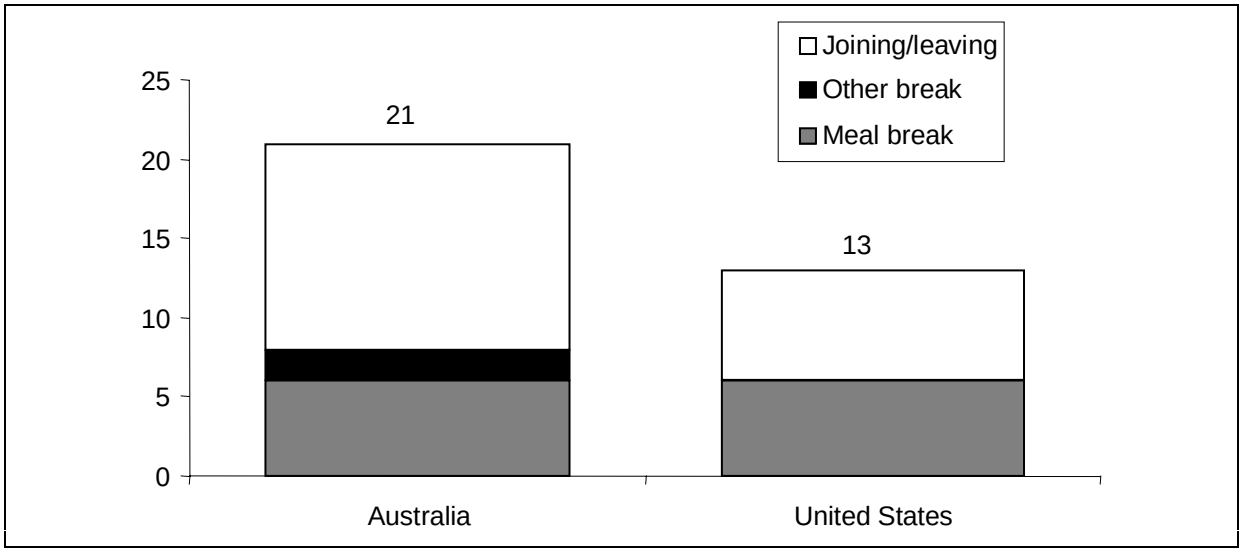
a Labour productivity equals output index divided by total hours worked.
Source: Survey undertaken by Tasman Asia Pacific (1998).

Figure 5.4 above, shows that the average labour productivity of the two United States mines was about 37 per cent higher than the average of the Australian mines surveyed. Again, there was considerable variation in the performance of the Australian and United States mines.

One reason for the lesser labour productivity among the Australian mines surveyed was a

higher extent of idle time in shifts. As illustrated in Figure 5.5, around 21 per cent of the time in shifts at these Australian longwall mines comprised non-production activities such as meal breaks and joining and leaving shifts. Based on this sample of seven mines, a typical eight-hour shift in an Australian longwall mine would comprise a meal break of 30 minutes, another break of 10 minutes and around 60 minutes taken in joining and leaving shifts.

Figure 5.5: **Composition of idle time in shifts at longwall mines** (per cent of total shift time)



Source: Survey undertaken by Tasman Asia Pacific (1998).

The United States mines in the sample would also have a 30 minute meal break, but would typically not have another break and workers would be much quicker in joining and leaving shifts, taking an average of around 30 minutes compared to the 60 minutes in Australian mines. The distance travelled by employees from surface access point to mine face was very similar between the average participating United States and Australian mines so does not explain this large difference in joining and leaving time. Thus it would seem that either different work practice or employee transportation systems were the cause of this observed difference.

This results in around 60 minutes idle time in the United States mines or around 13 per cent of the total shift. This allows an extra 40 minutes production time in the United States mines, increasing labour productivity by about 10 per cent compared to the typical Australian longwalls. It is possible that the difference in working time may be larger than this estimate as some Australian mines are reasonably flexible in allowing crib breaks and do not measure them

in detail.

However, there is still a significant amount of the labour productivity gap not explained by differences in working time. Part of this difference in operating labour productivity can be attributed to mine geology and engineering and the effectiveness of the mine equipment, particularly the shearer, face conveyor and stage loader.

Part of the difference may also be due to differences in work practices and possibly to over-manning. On the latter, it is unlikely that the best practice United States mine is over-manned as it has a significant contractor workforce paid on hourly rates. The mine has the flexibility to reduce labour input to match its workload. Australian mines do not have that degree of flexibility.

Labour cost

The direct financial cost of Australian longwall labour is similar to that in the United States mines. Our survey data indicates that employees in the seven Australian longwall mines are paid about $70 000 per annum, on average, with associated on-costs of around $30 000. They worked around 1,750 hours per year at a cost of about $57 per hour (Table 5.5).

Table 5.5: **Cost of labour in longwall operations: average per worker** ($A)

	Wage cost	*On-cost*	*Total labour cost*	*Average hours worked*	*Labour cost per hour worked*
United States	80,000	20,000	100,000	2,150	47
Australia	70,000	30,000	100,000	1,750	57

Source: Survey undertaken by Tasman Asia Pacific (1998).

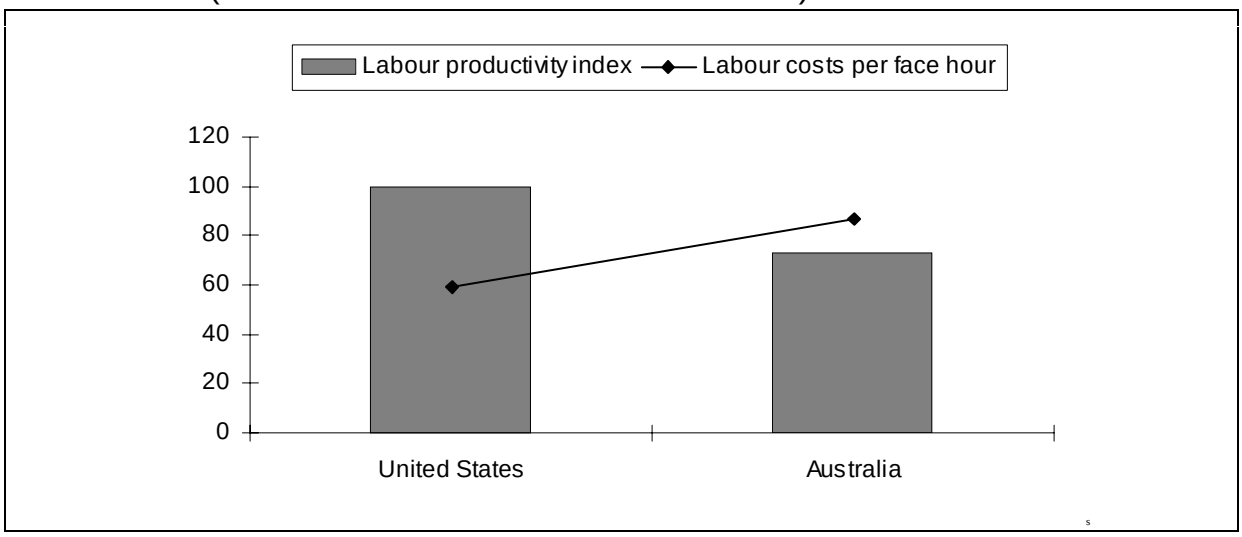
In the two United States longwall mines, employees earned slightly more per annum, on average, but had lower associated on-costs. Their gross wage costs were also about $100,000 per annum. This is using purchasing power parity estimates which equate to an exchange rate of about 76 US cents to the Australian dollar in 1996 and 1997. However, the United States miners worked considerably more hours for their money, costing an average $A47 per hour.

This wage differential is increased when measured on the basis of cost per face hour worked. As mentioned above, the participating Australian longwall mines had around 21 per cent idle time in shifts or 79 per cent face hours worked compared to a corresponding 87 per cent in the two United States mines. Further, leave provisions were more generous in Australian

mines. On average these Australian longwall miners took a day of leave for every 4.7 days worked whereas the ratio was double that for the United States workers (ie a days leave for every 9.3 days worked).

Figure 5.6 reports the resulting cost per face hour worked for the two mine categories, contrasting it with labour productivity achieved. As with the truck and shovel operations, there is an inverse relationship when comparing labour productivity and labour cost between Australian and United States longwall mines in the sample.

Figure 5.6: **Labour productivity and cost in dragline operations**
(index: United States = 100 and $A costs)



Source: Survey undertaken by Tasman Asia Pacific (1998).

Figure 5.6 indicates that the cost per face hour worked was about $60 per hour in the two United States mines and $87 per hour in the seven Australian mines. However, this would be different if recent exchange rates (eg around 63 US cents to the Australian dollar) were selected as the unit of conversion instead of purchasing power parities. In this case, the estimated cost per face hour worked of United States longwall miners would be about $A75 per hour.

One feature of the remuneration of Australian longwall miners that provides an incentive for efficiency is the extent of production bonuses. Our survey indicated that, on average, these bonuses accounted for 23 per cent of the total wage of Australian longwall miners covered by the study. This was significantly higher than in the participating United States mines, where bonuses only represented about five per cent of total wages. However, it is worth noting that

there was a large proportion of contract staff in the leading United States longwall mine.

- *Industrial relations and safety*

As we found for truck and shovel operations, the more productive longwall mines appear to have better industrial relations and safety records. Similarly, the United States longwalls had fewer strikes and less accidents, on average, than the participating Australian mines. However, caution should be taken when interpreting these results given the small sample size and the sporadic nature of disputes. Table 5.6 shows that, like its participating open-cut mines, the United States longwalls had no days lost to industrial disputes in the survey period. The Australian longwalls had an average of 3.7 disputes but, on average, they had less disputes than Australian open-cut mines.

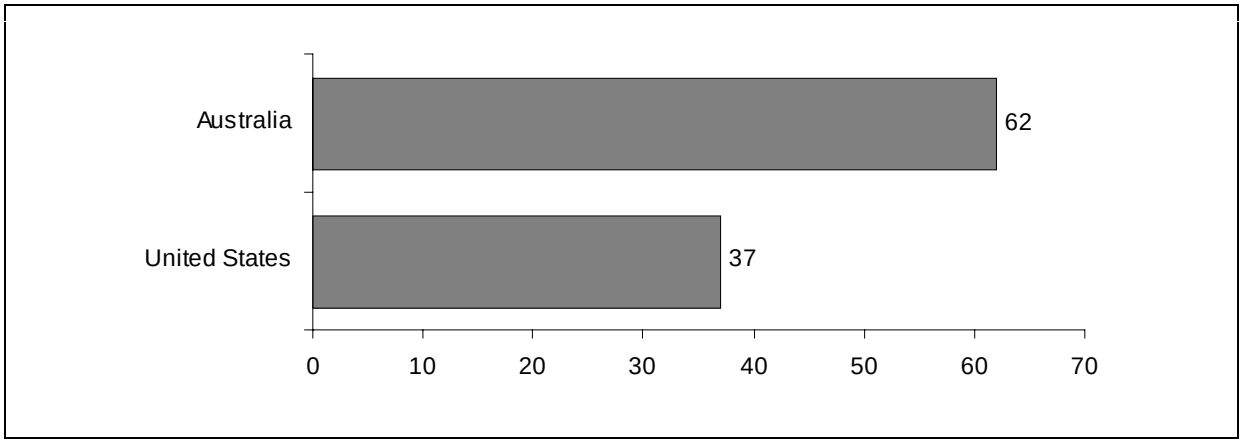
Table 5.6: **Incidence of industrial disputation in longwall mines** (average per mine)

	Number of disputes	*Man hours lost per dispute*	*Hours lost in dispute per thousand hours worked*	*Days lost per thousand employees*
United States	0.0	0	0	0
Australia	3.7	3 718	10	2 100

Source: Survey undertaken by Tasman Asia Pacific (1998).

Similarly, Figure 5.7 shows that these more efficient United States longwall mines had a better safety record than the seven participating mines in the Australian longwall category.

Figure 5.7: **Longwall mine safety** (lost time injuries per million man hours)



Source: Survey undertaken by Tasman Asia Pacific (1998).

However, the most efficient Australian longwall mine had a similar safety record to the two United States mines. Again, lost time injuries are defined to be injuries that prevent a worker from attending the next scheduled shift. Longwall mines generally had a higher incidence of lost time injuries than the open-cut mines in the sample.

5.5.2 Equipment productivity

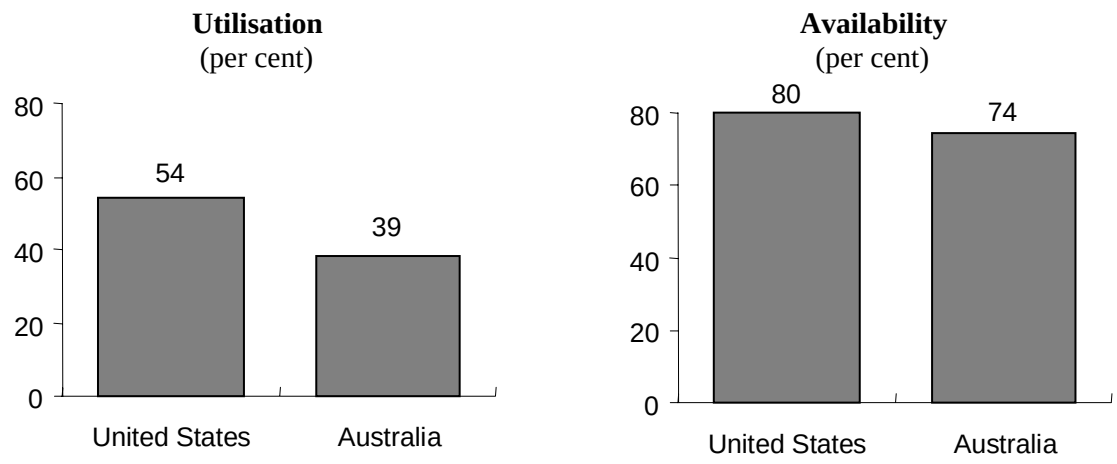
As outlined in Table 5.4, the productivity of shearers in the participating Australian mines was only around half of that achieved by the two United States longwall mines. This was largely due to lower average utilisation of the shearers, in the Australian mines. Box 5.3 shows that the Australian longwalls only operated their shearers 39 per cent of all available hours, or about 3 400 hours per year. The United States mines achieved much higher capacity utilisation of their shearers, operating them around 54 per cent of total hours.

The Australian mines in the sample did not schedule their shearers for as much work as the two United States mines, expecting them to be working 74 per cent of total hours compared to 80 per cent for the United States mines. This mainly reflects the use of spare shearer capacity in a few Australian mines to allow for a speedier transition between longwalls.

This relatively rapid transition between longwalls was achieved in the Australian mines. On average, they spent about 420 hours in moving the longwall compared to about 460 hours in the United States mines. However, the longwall bolt-up was typically much longer in the Australian mines, taking an average 160 hours compared to 70 hours in the United States mines. This warrants further examination as an avenue of possible productivity improvement

in Australian longwall mines.

Box 5.3: **Utilisation[a] and availability[b] of shearers**



a Hours worked as a percentage of total hours in year.
b Hours worked as a percentage of scheduled work hours.
Source: Survey undertaken by Tasman Asia Pacific (1998).

Our data shows that the Australian mines in the sample took considerably longer to achieve targeted production in new longwalls than the two United States mines. The United States longwalls reported that production targets were achieved within 70 hours on a new longwall while it took around 210 hours in the Australian mines, on average. However, this high average figure for the Australian mines was mainly due to extreme problems faced by four of the mines.

The participating Australian mines also achieved lower productivity of their face conveyors and stage loaders. As indicated by Table 5.5, the Australian longwall mine category had to increase the productivity of its face conveyors by about 20 per cent to match the average performance of the United States mines. This shortfall stemmed mainly from two mines that had apparently overcapitalised on the capacity of the face conveyor, given its actual throughput.

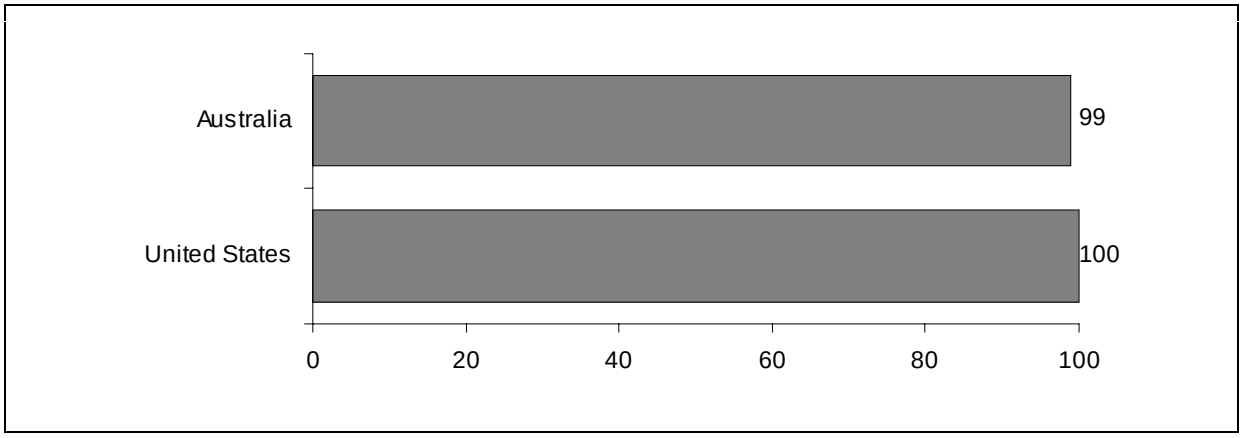
5.5.3 Maintenance

We have included maintenance labour in the productivity analysis as most of the longwall mines have a maintenance workforce mainly involved in routine and preventative maintenance. We have excluded the cost of spares for equipment maintenance as the incidence of these can

vary greatly between mines, depending mainly on the extent of major overhauls or refurbishments of longwall equipment.

As outlined in Figure 5.8, the productivity of Australian maintenance labour in the sample was about the same as in the sampled United States longwall mines. This stemmed mainly from two of the Australian longwall mines having higher productivity of maintenance labour than the best practice United States mine. This highlights that an Australian longwall maintenance workforce can achieve best practice.

Figure 5.8: **Maintenance labour productivity of longwall mines[a]** (index: United States = 100)



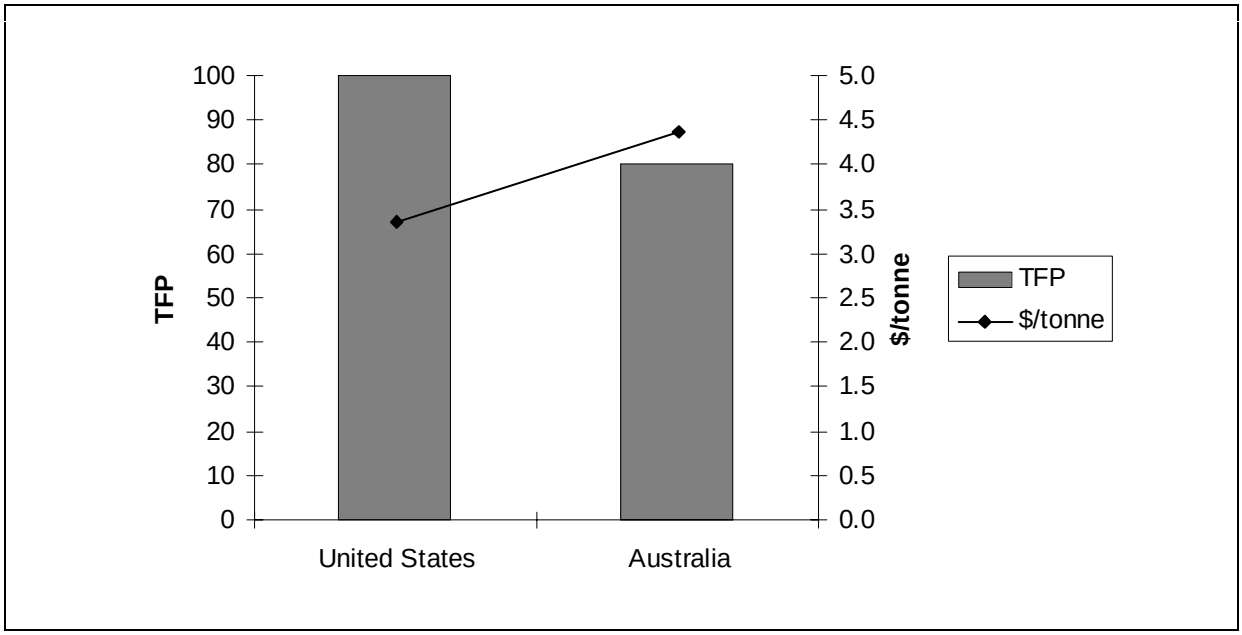
a Maintenance labour productivity equals output index divided by total maintenance hours worked.
Source: Survey undertaken by Tasman Asia Pacific (1998).

5.6 LONGWALL PRODUCTIVITY AND COST

As shown in Figure 5.9, the productivity advantages enjoyed by the two United States longwall mines translate into much lower costs.

This cost difference between the United States and Australian longwall mines surveyed is greater than the difference in productivity. In total, about 20 per cent of the cost difference between the United States and Australian mines in the sample was due to high unit costs — mainly labour costs, as discussed in Section 5.5.1.

Figure 5.9: **Total factor productivity and cost per tonne, Australian and United States longwall operations**
(index: United States coal = 100, cost $A)



Source: Survey undertaken by Tasman Asia Pacific (1997).

However, it is important to keep the scope of these costs in context. Firstly, they only relate to extraction of coal at the longwall. They also exclude overheads, spare parts and some materials costs. Finally, they do not include ex-mine costs such as rail, port and shipping costs. Longwall costs we have reported are those relating to the inputs listed in Box 5.2. Again, costs for United States mines have been converted to Australian currency using purchasing power parity estimates (OECD 1998). These equate to an exchange rate of about 76 US cents to the Australian dollar in 1996 and 1997.

5.7 SUMMARY OF LONGWALL ANALYSIS

The analysis presented above has been based on a relatively small sample of Australian and United States longwall mines. However, it is generally accepted by the industry that one of the United States mines included in the sample is a best practice performer. Given the small sample of Australian mines, the analysis should only be interpreted as indicative of the performance improvements necessary in the Australian longwall mine sector.

The analysis shows that the average productivity of the seven Australian longwall coal mines

in 1997 was about 25 per cent below that of United States longwall mines. This lesser performance mainly stemmed from:

- higher idle times in shifts in Australian longwall mines;
- low utilisation of shearers in Australian longwall mines; and
- geological differences.

Low labour and shearer productivity in the Australian longwalls in the sample contributed to this total factor productivity difference. The productivity of Australian face conveyors was also relatively low — indicating possible excess capacity in a number of participating Australian longwalls.

The relatively high idle time in the sample Australian longwall shifts was mainly due to longer times in joining and leaving shifts. The two United States mines took an average of around 30 minutes in joining and leaving shifts, 30 minutes quicker than the average Australian operations. Extra breaks totalling about 10 minutes per eight-hour shifts meant that an extra 40 minutes idle time per shift in the Australian longwall sample reduced labour productivity by about 10 per cent compared to the United States mines. Other causes of lower labour productivity in the sample Australian longwalls related to operating conditions, installed equipment and, most likely, an element of over-staffing.

Low shearer productivity resulted from lower utilisation in Australian longwalls surveyed. Some of this was due to planning — with spare capacity brought in to allow quicker longwall transitions. This was successful to a point, although there was evidence that some of Australian mines in the sample took much longer to achieve target production on new longwalls than the United States mines.

On average, longwall production costs were higher in the seven Australian mines, than in their United States counterparts. Most of this reflected the productivity differential, although labour costs were also higher in the Australia mines compared to the United States mines.

While the sample of longwalls was small, it was again evident that Australian mines can attain or approach world's best practice productivity performance. One of the Australian mines was only about 10 per cent below the best practice United States mine, which is an acknowledged efficient operator. This was over a period that was not particularly favourable for the Australian mine.

APPENDIX 1: PRODUCTIVITY PERFORMANCE MEASURES

Productivity is a measure of the physical output produced from the use of a given quantity of inputs. In practice, productivity is measured by expressing output as a ratio of inputs used. This report uses two methods for measuring mine productivity:

- total factor productivity (TFP); and
- partial factor productivity.

TFP measures total output relative to *all* inputs used. The TFP index measures the impact of all the factors affecting growth in output other than changes in input levels. It is now widely accepted that TFP is a robust measure of the overall performance of an organisation. Box A1 presents a more detailed description of the TFP measure.

Although TFP[1] is the more accurate productivity measure it provides little insight into the drivers of any inter-mine productivity differences. Partial productivity measures can help identify these drivers.

Partial factor productivity measures one or more outputs relative to one particular input (for example, labour productivity is the ratio of output to labour input). Partial productivity measures are widely used as they are simple to calculate. However, when used in isolation partial factor productivity measures should be interpreted with caution as a misleading impression of overall performance may result if analysis concentrates on only one input.

[1] Strictly speaking, the productivity analysis Tasman undertakes in this study is multi-factor rather than total factor productivity analysis. This is because the estimates exclude overheads and some materials costs. However, because the excluded materials and overheads represent a relatively small share of total costs, the multi-factor and total factor productivity analyses would be very similar. On this basis, we report our productivity analysis as total factor productivity.

Box A1.1: **Total factor productivity: a technical note**

Mathematically, TFP is defined as:

(1) $$TFP = \frac{Q}{I}$$

where Q is the quantity of outputs, and I is the quantity of inputs.

Mines produce several outputs and use a range of inputs. Calculating TFP requires a means of adding together these diverse output and input quantities into measures of total output and total input quantity. The different types of outputs and inputs cannot be simply added (for example, it is not meaningful to add the number of employees to the number of litres of fuel consumed). Index number theory is used to overcome this problem.

The multi-lateral TFP index methodology provides an ideal method of benchmarking an organisation's productivity performance. It represents a significant advance over earlier productivity indexes in that it enables total productivity levels as well as growth rates in productivity to be compared across firms. Lawrence, Swan and Zeitsch (1991a,b) outline the merits of this index.

The multi-lateral translog index is given by:

(2) $$\begin{aligned} Log\ (TFP_m / TFP_n) = & \sum_i (R_{im} + R_i^*)\ (\log Y_{im} - \log Y_i^*)\ /\ 2 - \\ & \sum_i (R_{in} + R_i^*)\ (\log Y_{in} - \log Y_i^*)\ /\ 2 - \\ & \sum_j (S_{jm} + S_j^*)\ (\log X_{jm} - \log X_j^*)\ /\ 2 + \\ & \sum_j (S_{jn} + S_j^*)\ (\log X_{jn} - \log X_j^*)\ /\ 2 \end{aligned}$$

where R_i^* (S_j^*) is the revenue (cost) share averaged over all mines and time periods and log Y_i^* $(\log X_j^*)$ is the average of the log of output i (input j). Using equation (1), comparisons between any two observations m and n will be both base-mine and base-year independent. This index can also be interpreted as comparing each observation to a hypothetical firm with output and input vectors equal to the geometric means of those variables for all observations, revenue shares R_i^* and cost shares S_j^*.

To implement this methodology data are required on the quantity of outputs and inputs used. Data on the prices received for outputs are required if more than one output is to be considered. Input prices are also required.

APPENDIX 2: ESTIMATION OF TRUCK AND SHOVEL OUTPUTS AND INPUTS

This appendix presents detailed information on the model that is used to calculate total factor productivity for truck and shovel operations.

A2.1 TRUCK AND SHOVEL OUTPUTS

A truck and shovel mining operation involves the excavation of material (ie coal and overburden) and its transportation to stockpiles or for processing.

Thus, to accurately compare the productivity of different mining activities, it is necessary to develop an output measure that includes the total excavation function as well as the transport function. Thus, in this analysis, we have used an overall output measure which incorporates a measure of the excavation function and a measure of the transport function (see Box A2.1).

Box A2.1: **Measuring truck and shovel mine outputs**

Excavation

$$\text{Tonnes excavated} = \left[\begin{array}{c}\text{Banked cubic metres of overburden removed (BCM)}\end{array}\right] * \left[\begin{array}{c}\text{Specific gravity of overburden (Tonnes/BCM)}\end{array}\right] + \left[\begin{array}{c}\text{Tonnes of coal/mineral}\end{array}\right]$$

Transport

$$\text{Tonne kilometres} = \left[\begin{array}{c}\text{Tonnes excavated}\end{array}\right] * \left[\begin{array}{c}\text{Average cycle distance in kilometres (one - way)}\end{array}\right]$$

Total output

Index of transport and excavation outputs combined using

$$LogTFP_m = \sum_i (R_{im} + R_i^*)(\log Y_{im} - \log Y_i^*)/2 - \sum_i (R_{in} + R_i^*)(\log Y_{in} - \log Y_i^*)/2$$

from equation (2) in Box 1. Where R_i^* is the revenue share averaged over all mines and time periods and $\log Y_i^*$ is the average of the log of output*i*.

The output measure incorporates factors such as the gravities of material moved and the cycle distances for each mine. The direct incorporation of these site specific factors helps remove productivity differences related to geography rather than efficiency and provides a comprehensive measure of mine output.

Tasman converted the data on total excavation into an index by dividing the level of excavation in each mine category by the level of excavation in the United States coal mines. Similarly an index of transport by mine was formed by dividing the tonne kilometres of transport in each mine type by the tonne kilometres transported in the United States coal mines. Box A2.2 presents the components used to calculate mine output and the excavation and transport indexes by mine class.

Box A2.2: **Characteristics of truck and shovel operations — average per mine**

Excavation	*Overburden* (million BCM)	*Specific gravity* (tonnes/BCM)	*Overburden* (million tonnes)	*ROM coal/ore* (million tonnes)	*Total moves* (million tonnes)	*Index*
	(1)	(2)	(3) = (1) * (2)	(4)	(5) = (3) + (4)	
Aust metal	12	3.15	39	14	53	186
US coal	8	2.08	17	11	29	100
Qld coal	8	2.35	18	8	26	89
NSW coal	19	2.26	43	5	48	167

Transport	*Total movements* (million tonnes)	*Average distance* (kilometres)	*Total transport* (million tonne-kms)	*Index* (US coal = 100)
	(1)	(2)	(3) = (1)*(2)	

Aust metal	53	3.5	187	172
US coal	29	3.8	109	100
Qld coal	26	3.3	85	78
NSW coal	48	2.4	114	105

Total output	(US coal = 100)
Aust metalliferous	179
US coal	100
Qld coal	84
NSW coal	133

As described in Box A2.1, Tasman combined the excavation output index with the transport index to derive an overall index of mine output. Mine level data on the cost, or relative cost, of the transport and excavation functions are required to calculate this combined output index. Tasman derived relative costs by assuming that the total cost of each activity would be proportional to the capital cost associated with the two activities. Thus the transport capital cost was set equal to the capital cost of the truck fleet and the capital cost of excavation was set equal to total capital costs minus the capital cost of the truck fleet. Figure 3.1a in Chapter 3 presents the resulting mine output index.

A2.2 INPUTS USED IN TRUCK AND SHOVEL OPERATIONS

The estimation of an aggregate input volume index is an integral part of the calculation of the multi-lateral TFP index outlined in Appendix 1 (Box A1, equation 2). This index is derived by weighting together inputs used in different mines where the weights used are input cost shares.[2] Thus implementation of the formula requires both price and quantity data on inputs used.

Mine inputs were broken down into the 11 categories listed in Box A2.3.

[2] As outlined in Box 1 the input index is calculated as follows:

$$\sum_j (S_{jm} + S_j^*)(\log X_{jm} - \log X_j^*)/2 + \sum_j (S_{jn} + S_j^*)(\log X_{jn} - \log X_j^*)/2$$

where S_j^* is the revenue (cost) share averaged over all mines and time periods and $logX_j^*$ is the average of the log of input *j*.

With the exception of contracting out, the quantity of inputs was specified in physical units. In many cases, mines employed several pieces of equipment of varying capacity. In these cases a linear relationship was assumed to apply between the name plate capacity of the machine and its physical ability to work. Thus total capacity was found by multiplying the rated capacity of each machine times the number of machines in each capacity range and then summing these products.

With the exception of the capital input costs, the cost of using each input was obtained from the survey forms.

Box A2.3: Specification of inputs used in truck and shovel operations

Input	*Comments*	*Unit of measurement*
Labour	Includes all mine equipment workers, supervisors, Shot-firers, cleaners and staff on general duties. Input calculated as the number of workers times typical hours worked	hours worked
Shovels	Digging capacity of bucket	loose cubic metres
Front-end loaders	Digging capacity of bucket	loose cubic metres
Trucks	Capacity of truck	tonnes
Bulldozers	Capacity of bulldozers	kilowatts
Drills	Capacity of drills	bore hole diameter in centimetres
Other equipment	Includes all other equipment associated with truck and shovel operations	kilowatts
Explosives	Quantity of explosives used in blasting overburden and coal	tonnes
Diesel fuel	Total quantity of diesel used by machinery	'000 litres
Electricity	Total quantity of electricity used by machinery	megawatt hours
Contracting out	Value in Australian dollars.	Australian dollars

In addition to the items outlined in Box A2.3, Tasman also obtained survey data on materials and overhead costs. However, the size of the variation in these costs between participating mines (ie in terms of cost per unit of output) suggested that there was not a consistent coverage of cost items or approach to cost allocation or both. Thus it was decided to drop these costs from the analysis. These costs represent a relatively small share of total costs.

Capital inputs are different from inputs discussed above in that they are not fully consumed in the year of purchase. The cost of employing a capital input consists of two components:

- the depreciation of the capital item; and
- a return on the capital employed.

These two costs can be considered as an annual fee for the use of capital. This fee covers the depreciation of the equipment and provides a return to the owners of the equipment. As outlined in Box A2.4, the methodology used to calculate the cost of capital inputs requires data on the replacement cost of the asset and its expected life.

Box A2.4: **The cost of capital inputs**

The annual fee for the use of capital inputs has been calculated using the formula:

$$\text{(3)} \qquad \text{Annual fee} = \frac{\text{Replacement cost}}{\text{of equipment}} \Big/ \left[\left(1 - e^{-r\ n}\right) / r\right]$$

Where *r* is the real return here assumed to be eight per cent; and
n is the expected life of the equipment in years and is equal to the assumed life in hours divided by
actual operating hours per annum.

The analysis assumes that each piece of equipment provides a constant flow of services over its life.

The replacement cost of each piece of equipment was derived from data reported in the survey. The expected life of each piece of equipment, in operating hours, was based on assumptions about maximum useful working life for the various classes of equipment. The assumptions used were based on information and estimates provided by representatives of the coal and equipment manufacturing industries (see Table A2.1).

Table A2.1: **Assumed working life for equipment used in truck and shovel mines** (hours of operation)

	Assumed working life (hours)
Shovels	100,000
Front-end loaders	40,000
Trucks	45,000
Bulldozers	30, 000
Drills	50,000
Other equipment	30,000

Source: Information obtained from representatives of the coal and equipment manufacturing industries.

These estimates should be treated as broad averages, as equipment life is significantly affected by operating and maintenance practices. However, the productivity analysis is not sensitive to these assumptions. Dividing the expected life reported in Table A2.1 by the survey data on each piece of equipment's hours of operation gave an expected life, in years, for equipment used by each mine.

Table A2.2 summarises the cost data derived from both the survey and the equipment cost

calculations outlined above.

Table A2.2: **Cost shares in truck and shovel operations: weighted average per mine** (per cent)

	Equipment	*Labour*	*Explosives*	*Diesel*	*Electricity*	*Contracting*	*Total*
United States coal	38	36	10	12	4	1	100
Australia metalliferous	38	30	14	15	2	0	100
Queensland coal	35	40	14	11	1	0	100
NSW coal	34	42	14	9	1	1	100
Total	36	38	13	11	2	1	100

Source: Survey undertaken by Tasman Asia Pacific (1998).

Table A2.2 shows that equipment and labour inputs comprise a large share of the costs of excavating and moving materials by truck and shovel technologies within mines. Capital cost shares were fairly similar between all mine categories examined. NSW and Queensland truck and shovel coal mines were the most intensive in their use of labour. Diesel fuel was between nine and 15 per cent of costs in both Australia and the United States. Explosives comprised a much lower share of total costs in the United States coal mines than in Australian mines. This can be explained mainly by the lower price of explosives in the United States. Electricity was a relatively small cost for all mine categories, however, the two Australian coal mine categories had the lowest electricity cost shares.

The estimates presented above allow us to calculate the aggregate input volume index for each mine category. The results are summarised in Figure 3.1b.

These data are used in conjunction with the output index data to estimate the total factor productivity of the four truck and shovel mine categories (Section 3.3).

APPENDIX 3: ESTIMATION OF DRAGLINE OUTPUTS AND INPUTS

This appendix presents detailed information on the model that is used to calculate total factor productivity for dragline operations.

A3.1 DRAGLINE OUTPUTS

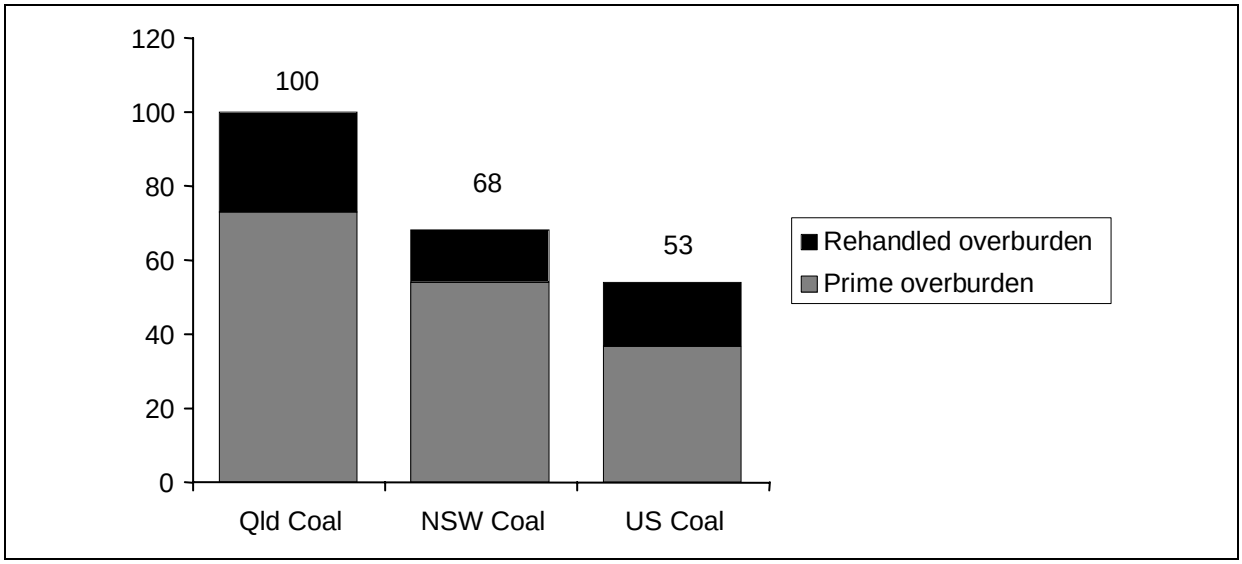
The sole purpose of dragline operations is to move overburden. Overburden removed is typically classified into "prime" overburden and re-handled overburden. For the purpose of calculating total productivity, Tasman has defined the dragline output to be the sum of prime and re-handled overburden expressed in banked cubic metres.

Following the methodology outlined in Appendix 1 (Box A3.1) and used in the benchmarking of truck and shovel operations, Tasman has calculated an output index from these quantities. This index has been derived by dividing the overburden moved in each mine by the overburden moved in Queensland, with each quotient then multiplied by 100. This method produces an output index with Queensland equal to 100. Figure A3.1 presents the resulting output index.

Box A3.1: **Specification of inputs used in dragline operations**

Input	*Comments*	*Unit of measurement*
Draglines	Digging capacity of bucket	Cubic metres
Bulldozers	Capacity of bulldozers used	Kilowatts
Drills	Capacity of drills	Bore hole diameter in centimetres
Labour	Includes supervisors, dragline operators and operators of other equipment involved in dragline operations.	Hours worked
Explosives	Quantity of explosives used in blasting overburden moved by the dragline.	Tonnes
Electricity	Quantity of electricity used by draglines.	Megawatt hours
Diesel fuel	Total quantity of diesel used by machinery supporting the dragline	'000 litres

Figure A3.1: **Dragline output: average per mine**
(index: Queensland Coal = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

A3.2 INPUTS USED IN DRAGLINE OPERATIONS

Dragline inputs can be broken down into the eight categories shown in Box A3.1. With the exception of capital input costs, the survey questionnaire sent to participating mines was the source of information on the inputs used by the three mine categories. In all cases the survey questionnaire specified the quantity of inputs in physical units. In many cases, mines employed several pieces of equipment of varying capacity. In these cases, Tasman assumed a linear relationship applied between the name plate capacity of the machine and its physical ability to work. Thus total capacity was found by multiplying the rated capacity of each machine times the number of machines in each capacity range and then summing these products. As was the case for the truck and shovel analysis, Tasman did not use the survey data collected on materials and overhead costs because of apparent inconsistencies in reporting between different mines.

To calculate the cost of using capital equipment in dragline operations, Tasman used the same methodology as in the truck and shovel analysis reported in Chapter 3. This methodology, which is outlined in Appendix 2, requires data on the replacement cost of equipment and the expected life of equipment in years. Table A3.1 presents estimates of the expected life of each piece of equipment, in operating hours. Tasman estimated the expected life, in years, for equipment used by each mine by dividing the data presented in Table A3.1 by the annual hours of operation of each piece of equipment. Tasman derived the replacement cost of each piece

of equipment from information in the survey.

Table A3.1: **Assumed working life of equipment used in dragline operations** (hours of operation)

Equipment types	*Assumed working life*
Draglines	200,000
Bulldozers	30,000
Drills	50,000

Source: Information obtained from representatives of the coal and equipment manufacturing industries.

Table A3.2 summarises the cost data derived from the survey and the capital cost calculations outlined above in terms of cost shares.

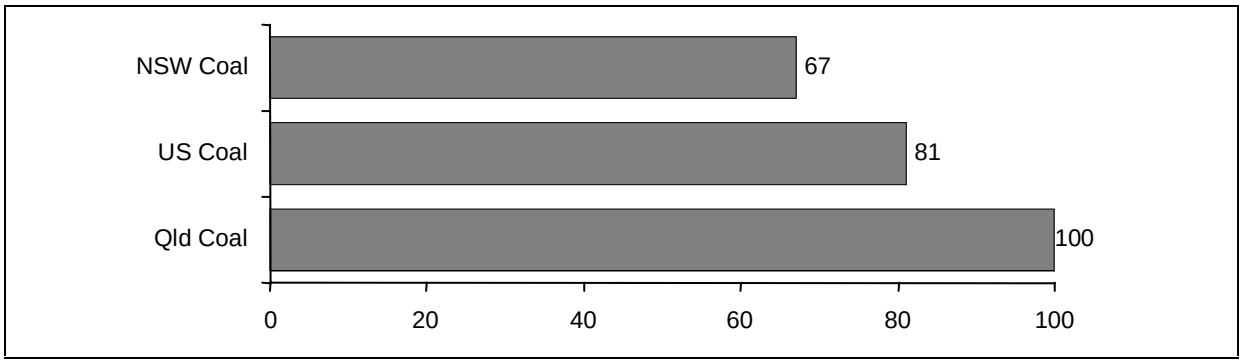
Table A3.2: **Cost shares in dragline operations: weighted average per mine** (per cent)

	Equipment	*Labour*	*Explosives*	*Electricity*	*Diesel*	*Total*
Queensland coal	47	18	20	12	2	100
NSW coal	42	26	23	7	1	100
United States coal	39	22	20	15	5	100
Total	43	21	21	12	3	100

Source: Survey undertaken by Tasman Asia Pacific (1998).

The NSW dragline operations had similar equipment cost shares but higher explosives cost shares compared to the Queensland and United States mines. Following the methodology used in the truck and shovel analysis and outlined in Appendix 1 and Appendix 2, Tasman developed an aggregate dragline input cost index. The methodology weights together differences in inputs used in different mines where the weights used are input cost shares. Figure A3.2 presents information on the average level of input use by mine category.

Figure A3.2: **Total input use in dragline operations, average per mine** (index: Queensland Coal = 100)



Source: Survey undertaken by Tasman Asia Pacific (1998).

These data are used in conjunction with the output index data to estimate the total factor productivity of the three dragline mine categories (Section 4.2.3).

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