

ISSN 1445-6826

Copyright: All rights reserved. The Copyright Act 1968 permits fair dealing for study, research, news reporting, criticism or review. Selected passages, tables or diagrams may be reproduced for such purposes provided acknowledgement of the source is included. Otherwise, no part of this publication may be reproduced, stored or transmitted in any form or by any means without the prior permission in writing of the Publisher.

Disclaimer: While embodying the best efforts of the investigators/authors, and while every reasonable effort has been made to ensure accuracy, neither the South Australian Centre for Economic Studies, the parent Universities, nor the individual authors/investigators, take any responsibility or will accept any liability for any consequences that might arise from reliance on the information presented in this paper.

The views expressed in this paper are the views of the author(s), and should not be taken to represent the views of the South Australian Centre for Economic Studies or of the two parent Universities of the Centre.

Published by: South Australian Centre for Economic Studies
PO Box 125
Rundle Mall SA 5000
AUSTRALIA
Telephone: (61+8) 8303 5555
Facsimile: (61+8) 8232 5307
Internet: <http://www.adelaide.edu.au/saces>
Email: saces@adelaide.edu.au

© SA Centre for Economic Studies, 2006

Subscription and Corporate Membership:

Information on Corporate Membership of the SA Centre for Economic Studies may be obtained by contacting the Centre or at our website, www.adelaide.edu.au/saces

Director's Note

Welcome to the eighteenth issue of *Economic Issues*, a series published by the South Australian Centre for Economic Studies as part of its Corporate Membership Program. The scope of *Economic Issues* is intended to be broad, limited only to topical, applied economic issues of relevance to South Australia

Mining the Labour Market: The Estimated Demand for Labour in the SA Mining Sector 2006-2014

Overview

Soaring global resource demand has led to a significant increase in investment in the mineral sector in South Australia, and in many other parts of the country. This ‘mining boom’ has been widely reported in the media.¹

This paper presents a summary of commissioned research undertaken by the South Australian Centre for Economic Studies on behalf of the State Government, for the purpose of estimating the additional labour requirements due to the planned expansion of mining in this State. After briefly outlining the size of the industry in economic terms, the paper then describes the survey and estimation methodology used to quantify the labour requirements, followed by the estimated demand in the mining sector by occupational grouping and finally, we draw some conclusions.

In Appendix A to this paper, we include an estimate of the combined employment demand for mining, and the heavy engineering and maintenance services sector in the Upper Spencer Gulf. These combined estimates resulted from a second study conducted by the Centre, wherein we examined the demand for skilled labour, arising from economic growth, the impact of retirement and labour turnover, in the heavy engineering sector. The estimates in the Appendix extend only to 2010 for “all mining and GMUSG”² as the study for the heavy engineering sector only collected data (by face to face interviews and survey) out to 2010.

Data on expenditure on mineral exploration in South Australia confirm, that the South Australian mining industry has entered a significant expansion phase. This is without taking into account the prospects for the mining and export of uranium from South Australia, which have recently been advanced with trade deals with China and potentially, India. While mining sector employment will increase certainly, it is not a labour-intensive industry. However, it provides high-wage employment, the industry has the highest labour productivity of any Australian industry and mining exports are significant in terms of Australia’s trade balance.

The Centre developed a Major Projects Estimation Model 2005 that enables input of the number of direct employees in South Australia associated with major mining and resource processing projects, that then provides the following outputs:

- the total gross employment requirement;
- the estimated gross requirement at 4 digit ASCO level;
- the estimated gross requirement by the VET sector; and
- a summary of the increase in employees by industry.

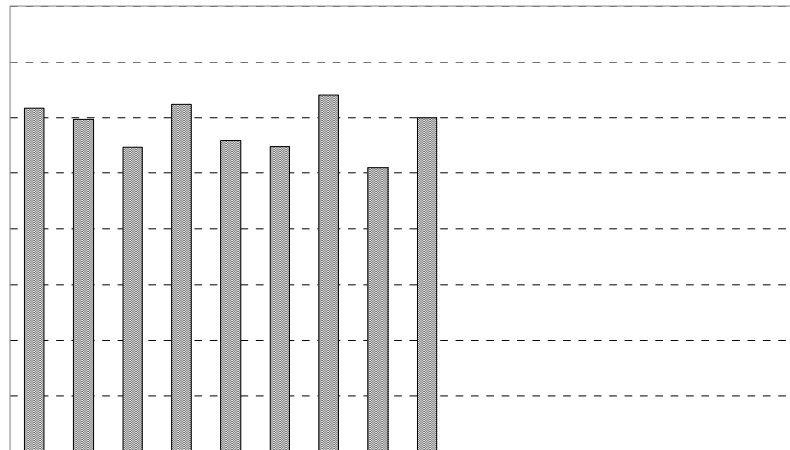
1. Introduction: The South Australian Mining Industry

The South Australian mining industry is a relatively small component of the State economy. In 2004-05, mining generated income of \$1,260 million in South Australia, which represented only 2.4 per cent of the total income from all industries in this State (\$52,093 million).³ By comparison, mining generated 8.2 per cent of State income in Queensland, and 21.4 per cent in Western Australia.

... real mining income and share of State income ... steady

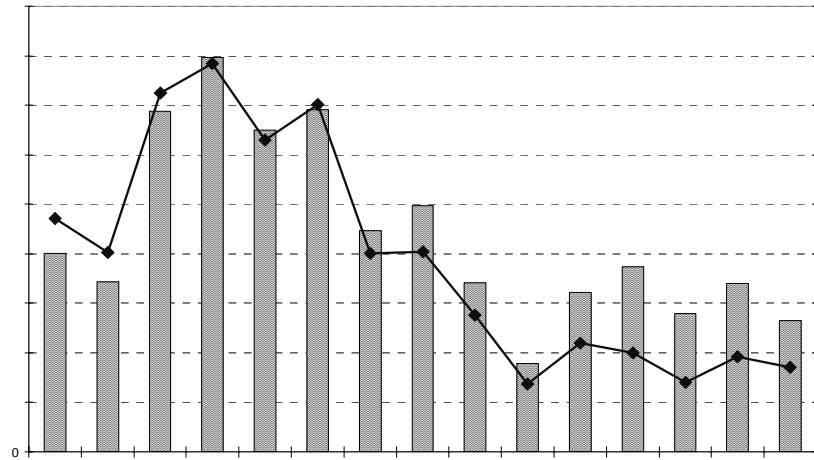
In real terms, the income from mining in South Australia, and its share of total State income, have remained roughly the same over the past 15 years. This is illustrated in Figure 1, with the columns showing real mining income (adjusted to 2004-05 dollars to compensate for inflation) and the line showing the percentage of total State income.

Figure 1
South Australia – Real Mining Income and Share of Total State Income



... only 2 per cent of State exports in 2003-04 ...

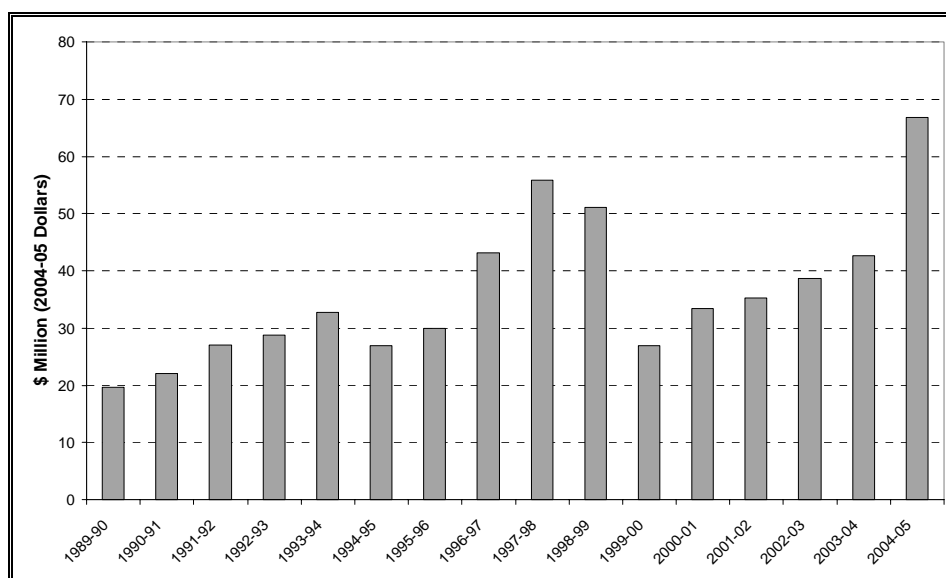
Figure 2
South Australia – Real Mining Exports and Share of Total State Exports



... the mining industry is in an expansion phase ...

... high wage employment and career paths ...

Figure 3
South Australia – Real Mineral Exploration Expenditure



Source: ABS Cat. No. 8412.0 - Mineral and Petroleum Exploration, Australia, Table 4.

Table 1
Australia – All Industries – Value Added, Employment and Productivity

	Gross Value Added (\$ million)	Employed Persons (*000 FTE)	Labour Productivity (\$/FTE)
Mining	36,025	112.6	319,903
Electricity, Gas and Water Supply	18,943	77.0	245,994
Finance and Insurance	58,567	329.2	177,882
Communication Services	23,790	178.0	133,669
Wholesale Trade	42,066	385.4	109,151
Property and Business Services	99,020	971.5	101,922
Manufacturing	96,013	999.7	96,045
Transport and Storage	38,688	413.9	93,470
Agriculture, Forestry and Fishing	26,778	296.9	90,206
Government Administration and Defence	33,528	418.3	80,149
Construction	53,283	774.7	68,783
Health and Community Services	52,064	770.7	67,552
Education	37,005	549.2	67,382
Cultural and Recreational Services	11,765	208.6	56,399
Accommodation, Cafes and Restaurants	18,359	346.0	53,060
Retail Trade	52,415	1,070.3	48,971
Personal and Other Services	15,012	326.1	46,036

Note: figures as at June 2005.

Source: ABS Cat. No. 5206.0 - Australian National Accounts: National Income, Expenditure and Product, Dec 2005 and 6291.0.55.003 - Labour Force, Australia, Detailed, Quarterly, Feb 2006 and SACES calculations.

... skill requirements pose a challenge ...

Though mining's labour needs are relatively modest compared to other industries, they present a unique challenge due to remoteness of some mining operations and the skill sets required. In meeting this challenge, the first step must be to attempt to forecast the industry's labour requirements in the short- to medium-term.

From survey returns, information from annual reports and the Australian Stock Exchange, newspaper reports and company prospectus, the Centre

*... timing of the construction
phase ...*

The occupational structure of employment also varies across commodity/product type. Semi-skilled, trade and professional (e.g., metallurgists, mineral refining) predominate in the mining and processing of gold. Overall, the resources sector demands competence in mechanical (diesel) trades, electrical trades and experienced mining operatives in plant, machinery and equipment, haulage and transport. Professionals in mining engineering in the construction and the operations stage of the development of a mine and resource processing are in high demand, reflected in high starting salaries, particularly in very remote areas.

In a review of Census 2001 occupations by employment in the mining sector, DFEEST noted the following:

“... most people are in “ordinary” occupations not in specialist mining occupations. They may work in an atypical environment but by and large they are transport workers, plant operators, office workers, electricians and so on. ... there are probably fewer than a thousand people in identifiably mining specialist occupations. Secondly, most are in relatively low skill areas, that is, overall the level of technical skill required by the industry (or at least that part of it which can be impacted by external training providers) is not high relative to other industries. In fact, many of the occupations are common to many industries”. (DFEEST: Draft discussion paper, Mining Industry Snapshot).

We concur with this view. Indications of employment provided in survey returns for the occupations of labourers and related workers (ASCO: 7000), and intermediate production and transport workers (ASCO: 9000) for three current mining operations⁹ averages 58 per cent of the total workforce, while for three proposed new mining operations is expected to exceed 62 per cent.¹⁰

2.3 Major Impacts Estimation Model

The Centre developed a Major Projects Estimation Model 2005 that enables input of the number of direct employees in South Australia associated with major mining and resource processing projects, that then provides the following outputs:

- the total gross employment requirement;
- the estimated gross requirement at 4 digit ASCO level;
- the estimated gross requirement by the VET sector;
- a summary of the increase in employees by industry; and
-

*... information from the
model for planning
purposes ...*

and also its indirect effects. A large project that is coming to the end of its operational life can also be entered as a negative value to provide an idea of the scale of employment that is likely to be displaced.

... some importing of workers with specific mining experience ...

It is worth noting that many large projects source a significant proportion of their labour force from outside the State. In the case of mining and oil exploration, employees experienced in various types of mine development, construction or type of deposit (e.g., experience with mineral sands) are in demand to ensure the appropriate levels of skills and experience. Therefore, this type of calculation is only indicative. The Centre consulted with companies to assess the number and types of employees they are intending to source in South Australia, thus providing greater robustness to the estimates.

The breakdown by qualifications is a guide to potential additional qualified persons required in the labour force and represents necessarily a static view of the economy's skill requirements. That is, it is calculated on the current distribution of skills within occupations. This may vary as a result of higher output from the training sector or higher rates of inward migration. Higher retirement rates which are an obvious implication of an ageing workforce could also impact on the economy's skill requirements.

Finally, the model's estimates include all support staff (in the tradition of the ABS), wherein for ABS data, up to 15 per cent of employees in mining are non-production professionals. In some cases, up to 30 to 40 per cent of employees could be 'away from the mine'.

In the next section of this paper, the Centre presents estimates out to 2014 for the labour requirements of the mining sector. There remains a degree of uncertainty concerning the size of the Olympic Dam workforce and exactly when it is most likely to commence operations. However, we express a degree of confidence about the estimates for the mining sector in terms of gross numbers required due to the intended scale of

... combined estimates for mining and heavy engineering ...

3. Estimated Demand

Here we consider the results from the mining survey and estimated employment out to 2014.¹¹ Table 4 summarises the growth in direct employment in mining for 2005 out to 2014 by ASCO 4 digit level occupational classification. Total employment in construction and operations is expected to grow at an annual average rate of 7.6 per cent¹² representing an increase of 94 per cent on current employment for the projects surveyed. Current employment levels in the mining sector are estimated to rise from 3,720 persons to 8,900 persons by 2011 and thereafter decline to 7,200 by 2014.

... over 5,000 additional employees over the next five years to 2011 ...

Table 4a
Employment in the Mining Sector, 2005-2009

... two peaks in the construction phase of mining projects ...

The demand for skilled tradespersons will increase by 116.0 per cent or at an annual growth rate of 8.9 per cent per year; labourers and related workers by 7.3 per cent per year and intermediate production and transport workers by 7.9 per cent (CAGR).

The three occupational groups, tradespersons, intermediate production and transport workers and labourers and related workers represent 74 per cent of the workforce in 2005 rising to 80 per cent by 2010, before declining thereafter (2014: 78 per cent). This is consistent with the employment profile referred to in Table 2 as a mining project moves from the construction phase through to full operations. Skilled tradespersons represent 18 per cent of the workforce in 2005 rising to 21 per cent in 2010, and thereafter decline to 20 per cent by 2014.¹³

Direct non-mine site employment is approximately 21 per cent of total employment.

A total of approximately 5,200 additional employees will be required for the mining, oil and gas and mineral resources processing sector over the period 2005 to end 2011 when the construction workforce is likely to peak. The estimates are subject to the caveats referred to earlier, particularly that the full extent of the BHP Billiton Olympic Dam workforce and the exact date of full-scale operations are not known, nor how many skilled workers are likely to be attracted to South Australia over the period.

*... by 2011, one adult retires
and one young worker
enters the workforce ...*

On this last point, South Australia has enjoyed recent success in attracting migrants who are issued a visa under State-specific or regional migration mechanisms. In 2003-04 South Australia received 16.3 per cent (= 2,750 persons) of skilled migrants under targeted programs, while one year later this had increased to 26.5 per cent of State-specific visa and regional migration programs (= 4,950 persons). This will need to be maintained over the next 5 years to supplement a declining intake of young workers into the labour force. For example, by 2011 for every school leaver entering the labour force one adult will retire across the three Provincial Cities of Port

*... total employment to
increase by 17,200 out to
2014.*

tradespersons will be required and that there is likely to be strong competition in the labour market for those with a trade qualification. Higher retirement rates for an ageing workforce will exacerbate the shortage of skilled tradespersons. The future demand for selected occupations and trade skills is summarised in Table 7.

Table 5
Occupational Classification and Training Requirement 2005-2014

ASCO	Occupational Classification	Total Gross Requirement	Requirement - Other VET
1000	Management Employees	1,421	303
2000	Professional Employees	2,647	178
3000	Business & Administration, Assoc Prof	2,069	573
4000	Trades and Related Workers	2,441	1,459
5000, 6000, 7000	Misc. Clerical Workers	4,573	718
7000	Intermediate Production & Transport	2,482	536
9000	Labourers and Related Workers	1,554	223
Total		17,188	3,990

Note: In addition, approximately 1,000 persons would require a Diploma or Advanced Diploma.

Table 6 illustrates the employment distribution by industry sectors and the number of employees.

Table 6
Employment Distribution by Industry Sectors, 2005-2014

Sector	Number of Employees	Sector	Number of Employees
Agriculture, Forestry & Fisheries	292	Communication Services	408
Mining	4,402	Finance and Insurance	591
Manufacturing	1,864	Property & Business Services	2,188
Electricity, Gas, Water	152	Government Admin & Defence	556
Construction	395	Education	462
Wholesale Trade	830	Health & Community Services	491
Retail Trade	2,326	Cultural & Recreation Services	268
Accomm, Cafes & Restaurants	582	Personal and Other Services	459
Transport and Storage	921	Total	17,188

... other industry impacts ...

Table 7 lists the gross requirement for the top ten VET trained occupations by ASCO code and title out to 2014.

Table 7
Future Demand for Selected Skilled Trades and Occupations 2005-2014

ASCO	Qualification	Estimated Gross VET Requirement
4112	Metal Fitters/Machinists	263
4211	Motor Mechanics (Diesel)	152
4311	Electricians	145
7911	Miners	133
4122	Structural Steel/Welders	97
8211	Sales Assistants	95
1222	Production Managers	79
7311	Truck Drivers	66
3129	Other Building/Engineering Associate Professional	61
7123	Engineering Production System	58

4. Conclusion

... majority are trade, professionals and para professionals ...

Direct employment resulting from the ‘mining boom’ is estimated by the Centre to average 4,000 persons over the period 2005 to 2014. This is not a large number in context of the overall State labour market, currently generating over half a million full-time jobs. The significance of this labour requirement is that the majority of these positions involve trade, professional, or para-professional skills that are already in short supply. Furthermore, this labour demand may have a significant positive impact on regional areas where unemployment has historically often been very high. On the other hand, higher wages in the mining sector will help to attract employees to mining locations and this may contribute to skill shortages in other regional areas. Already, some have voiced concern about this later effect.¹⁴

The key to managing the boom is to provide the right training in the right locations. In our report to the State Government earlier this year, we stated:

“An important outcome [of our report] is the expectation of strong competition in the labour market for skilled trades and experienced mine workers and a desire by all companies to work closely with government to improve enrolments and outcomes in pre-vocational courses. There is broad support for an identifiable (badged!) skills training centre, built on close co-operation between industry and government.”

... brokering new skills and training opportunities ...

The newly re-elected Government made a commitment in its election platform for a Skills Centre that will act in a planning and coordination role for mining and heavy engineering skills. The platform stated:

“We will establish the Mineral Resources and Heavy Engineering Skills Centre. The Centre will work in partnership with industry, and education and training providers, to forecast what skills will be needed by the minerals and mining sector, and by when.

The Skills Centre will act as a one-stop-shop for industry. It will help coordinate schools, TAFEs, universities and other education and research bodies to engage industry in developing solutions to its workforce needs. The Centre also will work to secure funding from industry, and the Commonwealth, to complement the State’s investment.”¹⁵

Appendix A

Employment Requirement for GMUSG and Mining

Global Maintenance Upper Spencer Gulf (GMUSG) is a group of companies specialising in heavy engineering and an array of maintenance services. GMUSG commissioned SACES in 2005 to prepare a projection of their labour requirements out to 2010.

There is considerable overlap between the skills required by GMUSG and those required by the mining sector. They are drawing workers from the same segments of the labour market. So it is useful to project the total labour demand of GMUSG and mining.

... combined mining and heavy engineering sectors

....

To aggregate the mining study and the workforce requirement for GMUSG group of companies we removed data for OneSteel, NRG Flinders and Santos from one set of estimates. In Table A.1 the occupational groups were 'collapsed' into five categories to match the classifications used in the GMUSG report. The data for the combined mining and heavy engineering sectors can only be extended to 2010 as data for GMUSG was only collected out to 2010.

Table A.1
All Mining and GMUSG: 2005-2010

	2005	2006	2007	2008	2009	2010
Managers & Administrators	152	160	164	161	165	170
Professionals & Assoc. Professionals	806	884	919	917	929	967
Tradespersons and Related Workers	1,242	1,529	1,552	1,483	1,703	2,288
Clerical	192	203	218	217	225	234
Labourer, Production & Transport Workers	2,845	3,131	3,125	3,135	3,655	5,426
Employee Numbers	5,238	5,908	5,978	5,913	6,678	9,085
Additional Contractors	167	925	1,078	628	521	521
Total	5,405	6,833	7,056	6,541	7,199	9,606

... even stronger demand for skilled trades ...

... significant role for the VET sector ...

End Notes

- ¹ See, for example, “Mining boom brings glory back to bush”, *The Advertiser*, 25 February 2006.
- ² GMUSG: group of heavy engineering and maintenance companies under the title Global Maintenance Upper Spencer Gulf.
- ³ ABS, *Australian National Accounts: State Accounts*, 2004-05, Table 27, Cat. No. 5220.0.
- ⁴ For further details, see SACES Issues Paper 14 (2005), *South Australia’s Overseas Exports*.
- ⁵ The most recent quarterly Labour Force Survey estimates that there were 513,300 full-time employed persons in South Australia in February 2006. ABS Cat. No. G