Victorian Auditor-General's Office

SPECIAL REPORT NO. 24

• Open Cut Production in the Latrobe Valley

MAY 1993

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Auditor-General
of Victoria

SPECIAL REPORT No. 24

OPEN CUT PRODUCTION IN THE LATROBE VALLEY

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The Honourable the Speaker
Legislative Assembly
Parliament House
Melbourne, Vic. 3002

Sir

Under the provisions of section 48A of the *Audit Act* 1958, I transmit the Auditor-General's Special Report No. 24 on Open Cut Production in the Latrobe Valley.

Yours faithfully

C.A. BARAGWANATH
Auditor-General

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OF THE
AUDITOR - GENERAL

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PART 1

Executive Summary

1.1 FOREWORD

The State Electricity Commission of Victoria's (SECV) extensive operations in the Latrobe Valley produce almost all of Victoria's electricity generation requirements. This Special Report relates to one of the first phases of electricity generation, namely the mining of brown coal, also known as open cut production.

In recent years the SECV has recognised the importance of improving its efficiency and effectiveness of operations and, to this end, has implemented and is pursuing a number of initiatives to increase productivity. Generally these initiatives, such as reducing the total number of employees required for operations and implementing a "no new debt" policy have been implemented with positive results. The action taken by the SECV is commendable and should continue.

This Report highlights areas in open cut production where action to improve operations should be given priority. Of particular concern is the existence of unwarranted restrictive work practices and demarcations between employees in different unions and work groups. These labour inefficiencies have led to both ineffective operational practices and costly maintenance of significant capital investment.

Microeconomic reform is central to the State Government's objective of increasing the competitiveness of State-owned enterprises. In line with this objective, the various matters identified in this Report should provide the SECV with further opportunities for achieving improvements in the efficiency and effectiveness of its operations.

1.2 OVERALL AUDIT CONCLUSION

1.2.1 The State Electricity Commission of Victoria (SECV) is a significant public sector organisation both from a State and national perspective. The SECV is the principal supplier of Victoria's electricity requirements generating, transmitting and distributing electricity to its customers. It employs over 12 000 people and controls assets in excess of $11 000 million.

1.2.2 The objectives of the SECV are aimed at identifying and realising improved benefits to customers, providing a commercial rate of return, maintaining a safe and reliable power supply and operating in a manner which is in harmony with the environment.

1.2.3 Fuel sources used to produce Victoria's electricity include brown coal, gas and hydro, with brown coal accounting for approximately 85 per cent of Victoria's electricity requirements. The SECV's investment in brown coal generation totals some $6 000 million. As a major component of brown coal generation, the operation of 3 open cut mines in Victoria's Latrobe Valley has the potential to impact on the overall efficiency of the SECV. In 1991-92, the brown coal open cuts produced 49.5 million tonnes of coal for use by SECV power stations at a total cost of $408 million, and represented 13 per cent of the SECV's total operating expenditure of $3 144 million.

1.2.4 The SECV, like other Australian electricity generators, is currently operating in a climate of significant change. This climate of change arises from the need to become more efficient and competitive in line with State and Federal strategies for the economy generally and the electricity industry specifically. As a result of these developments, the SECV is under increasing pressure to become more efficient.

1.2.5 To meet this challenge the SECV has initiated a number of programs over recent years aimed at improving its productivity. These initiatives have resulted in substantial staff reductions and the implementation of a "no new debt" strategy to reduce the growth of the high financing costs. However, despite these initiatives, recent studies undertaken both independently and by the SECV have indicated that in many aspects, significant opportunities remain for further improvements in the SECV's operations.

1.2.6 The audit of open cut operations revealed a need for substantial improvement in efficiency and economy with potential savings estimated to be in the order of $50 million a year, which represented 12 per cent of the total 1991-92 expenditure of open cuts. Savings could be achieved through:

- a reduction in workforce levels by achieving greater productivity; and
- the more effective utilisation and maintenance of plant.

Overall audit conclusion - *continued*

1.2.7 In order to achieve these savings, the SECV will need to remove restrictive work practices and work demarcations which are widespread in open cut operations and are evident throughout power stations, production maintenance and other technical functions undertaken in the Latrobe Valley.

1.2.8 SECV management, in conjunction with union and employee representatives, are currently in the process of identifying and implementing methods of improving efficiency with the aim of significantly reducing the operating costs of the electricity production group. To date, there has been some improvement resulting from these recent initiatives. However, it is too early to fully assess the effect of these initiatives on productivity and costs of open cut operations.

1.2.9 In addition to the efficiency aspects, audit also identified a need to improve environmental management within open cuts. Particularly, there is a need for more effective strategic planning in relation to land rehabilitation including greater consideration of future environmental funding requirements.

1.3 OVERALL RESPONSE BY CHIEF GENERAL MANAGER OF THE SECV

1.3.1 The SECV appreciates the opportunity to comment on the audit. The SECV is confident that SECV productivity improvements achieved over the past 4 years of around 60 per cent, combined with the firm plans for further improvement, will continue to provide competitive electricity supply to Victorian and interstate customers. The SECV will utilise the results of this audit to further assist in the process of continuous improvement in our operations.

1.3.2 It is noted that the audit concentrated on the period up to June 1992. In the period since June 1992 many of these issues raised have already been addressed, and others are targeted for action in current Five Year Business Plans.

1.3.3 From an overall perspective the Report does not adequately assess changes and improvements which have been made since June 1992 and the plans for future improvement. The SECV's drive for a competitive, vital and customer focused industry involves major reform and structural change over some years. The process is but part way through. Although significant achievements had been recorded by June 1992, further major productivity improvements have been implemented in the 10 months since then, and further are planned over the next 2 years. The Report, in giving basically a "snapshot" of the situation in June 1992, does not place this process in perspective.

1.3.4 The Report has apparently not fully appreciated the Victorian system high load factor of 70 per cent and the current effective reserve plant margin of 18 per cent. Even with the completion of Loy Yang B1 and B2, the effective reserve plant margin is expected to be only around 13 per cent at the turn of the century. In commenting on the overall industry, reference is made to studies which have been surperceeded, and also on which the SECV has previously provided public comment.

1.3.5 In the 9 months from June 1992, the mines have reduced manning by more than 15 per cent and have strategies in place to achieve an overall productivity improvement of 80 per cent in the 3 years to June 1995.

1.3.6 The SECV is actively pursuing world best practice in its mining operations and has retained consultants to provide advice on the establishment of challenging targets. This information was provided to audit, however, it appears to have been ignored and audit have presented projected cost savings based on alternative information not available for view by the SECV.

Overall response by Chief General Manager of the SECV - *continued*

1.3.7 The coal supply reliabilities achieved by SECV open cuts at 97.5 to 100 per cent are among some of the highest in the world. The achievement of these reliabilities permit relatively small coal stockpiles to be held at each power station. The achievement of higher reliabilities is expected with the improved maintenance strategies being put in place and the achievement of greater operations work force flexibility.

1.3.8 Coal plant availabilities of 65 per cent are currently being achieved against a benchmark target of 75 per cent and overburden system utilisations have improved 22 per cent over the past 6 months.

1.3.9 Based on independent consultant advice the SECV has targeted mine operations improvements and numbers reductions which will result in savings of $20 million a year by June 1995. These projections are some 40 per cent of those claimed by audit. The SECV contends that the audit figures have a less reliable basis than the independent consultant advice provided to the SECV.

1.3.10 Maintenance strategies are being implemented as part of the open plans to achieve world best practice plant performance. The strategies include implementation of operator - maintenance teams in each open cut and the contracting in of major maintenance activities.

1.3.11 The SECV contends that the audit review on environmental performance in the areas of the rehabilitation of disturbed land has not adequately presented the major achievements made in rehabilitating over 550 hectares of disturbed land to date and the planning for further work. This work has been carried out as part of the overall mining operations - which apparently has made it difficult for audit to identify the substantial sums of money committed to this activity.

1.4 SUMMARY OF MAJOR AUDIT FINDINGS

OPEN CUT PRODUCTION - A PERSPECTIVE

Page 29

- Savings in the cost of operating open cuts provide the SECV with a further opportunity to achieve productivity gains.

Paras 3.11 to 3.16

STRATEGIC CHALLENGES

Page 39

- To ensure a competitive price of coal to power generators, the SECV will continually have to pursue greater efficiencies in open cut operations.

Paras 4.1 to 4.7

- To provide electricity at the lowest cost, the SECV needs to avoid unnecessary capital investment costs, minimise production costs and operate within reserve plant margins.

Paras 4.16 to 4.17

- The review by audit disclosed that the SECV had not reviewed its Electricity Development Strategy since it was first produced in December 1989. The need for such a strategy has been recognised and an Electricity Energy Study has been initiated by the Government. The lack of an updated strategy in the interim may have impacted on the effectiveness of the SECV's decisions.

Para. 4.18

- The SECV's ability to manage a surplus generating capacity equivalent to a 500 megawatt power station may be limited due to contractual arrangements to purchase minimum amounts of gas.

Para. 4.25

STRATEGIC CHALLENGES - *continued* **Page 39**

- The proposed restructure of the electricity industry, including the introduction of the National Grid, will necessitate significant technical and productivity improvements by Victoria's power stations and open cuts. Such improvements are necessary to match any future productivity improvements achieved by NSW and existing capital cost advantages that black coal generation in New South Wales has over brown coal generation.

  Paras 4.28 to 4.40

- In the short to medium-term there is little commercial incentive for the SECV to reverse the trend of increasing carbon dioxide emissions. However, in the long-term, to reduce carbon dioxide emissions it may be necessary for the SECV to review Victoria's reliance on brown coal electricity generation and evaluate plans for future open cut development.

  Paras 4.41 to 4.50

COST OF OPEN CUT OPERATIONS **Page 59**

- In 1991-92 the direct operating costs of the 3 open cuts substantially exceeded those of comparable mining operations, despite competitive advantages in the mining of brown coal in the Latrobe Valley and the capital intensive nature of the open cut operations.

  Paras 5.3 to 5.11

- The capital intensive nature of open cut operations, has resulted in high depreciation costs and finance charges which must be recovered through electricity tariffs and will further impact on the competitiveness of open cut operations.

  Para. 5.12

- Recent action has been taken by the General Manager of the SECV's Production Group to achieve total cost savings of between 30 and 40 per cent throughout the Group, including open cuts.

  Para. 5.14

OPEN CUT PRODUCTION AND MAINTENANCE

Page 67

- 100 per cent reliability of coal supply to power stations should be achieved by all open cuts.

  Paras 6.15 to 6.17

- Utilisation rates of open cut dredgers were generally less than half that of best practice benchmarks and there is substantial under-utilisation of both plant and employees.

  Paras 6.22 to 6.27

- Hourly dredger output during actual operation was in most cases significantly below target output rates.

  Paras 6.28 to 6.30

- Ineffective preventative maintenance has led to high levels of unscheduled maintenance, unnecessarily high maintenance costs and the need to maintain excessive plant levels to meet unforeseen plant stoppages.

  Paras 6.42 to 6.47

- Current maintenance information systems were of limited value to predict plant faults, monitor maintenance performance and schedule future maintenance.

  Paras 6.48 to 6.50

- There was low productive time of open cut maintenance employees, with time actually spent on maintenance tasks ranging between 30 and 45 per cent.

  Paras 6.51 to 6.54

- In 1991-92 the SECV's Production Maintenance Unit incurred a substantial loss on its operations of $39.4 million despite exclusive contract arrangements with open cuts and power stations.

  Paras 6.58 to 6.62

- Inadequate co-ordination and restrictive work arrangements between open cut and maintenance unit employees has contributed to unnecessarily high costs, a lack of timeliness and unclear accountability.

  Paras 6.63 to 6.67

- The SECV's Morwell Overburden Group has substantially improved its productivity and efficiency following the stimulus provided by a proposal for the external contracting of overburden removal. As a result, the cost of overburden removal achieved by this group is substantially lower than the price negotiated under the external contract proposal.

  Paras 6.68 to 6.86

MANAGEMENT OF HUMAN RESOURCES

Page 95

- The productivity of open cut employees was comparatively lower than private sector mining operations with opportunities to improve open cut productivity by up to 100 per cent.

  Paras 7.9 to 7.13

- Based on 1991-92 production levels, employee numbers within open cuts could be reduced by approximately 50 per cent with potential ongoing savings to the SECV in the order of $50 million per year.

  Paras 7.14 to 7.19

- The enforcement of fixed manning agreements within open cuts has resulted in excessive manning levels, the manning of non-operational plant and substantial costs associated with the unnecessary replacement of absent employees by other employees at overtime rates.

  Paras 7.24 to 7.33

- The existence of work practices particularly demarcation arrangements between employees and unions are not conducive to efficient open cut operations and prevent the flexible use of labour.

  Paras 7.34 to 7.40

- Overtime primarily arises from the existence of fixed minimum manning agreements and inefficient work practices and resulted in payments to open cut employees of $7.5 million in 1991-92 at an average cost per employee of $6 200.

  Paras 7.43 to 7.50

- Substantial average pay increases to open cut employees of approximately 36 per cent between 1989 and 1992, which were considerably higher than the average wage increases of 13 per cent awarded to Australian salary and wage earners over the same period, were incurred without significant benefits accruing to the SECV.

  Paras 7.84 to 7.94

- Accountability within open cuts could be improved by ensuring a clear allocation of responsibilities within open cuts and between open cuts and other business units.

  Paras 7.110 to 7.117

MANAGEMENT INFORMATION SYSTEMS AND PERFORMANCE MEASUREMENT

Page 131

- Given the similarities in operations and information requirements, greater emphasis should be placed on the joint development of new systems.

  Paras 8.9 to 8.10

- Reprocessing of management information resulted in unnecessary administrative times and costs.

  Paras 8.11 to 8.12

- Deficiencies in management systems resulted in instances of inaccurate and inconsistent management information.

  Paras 8.13 to 8.15

- The level and quality of performance measurement requires improvement.

  Paras 8.16 to 8.17

ENVIRONMENTAL MANAGEMENT

Page 139

- Insufficient consideration has been given to the impact of environmental costs and funding availability on future operations. Future land rehabilitation costs for the open cuts have been estimated to be in the order of $125 million over the next 30 years.

  Paras 9.14 to 9.24

- Final plans for the rehabilitation of the Yallourn, Morwell and Loy Yang open cuts are still under development.

  Paras 9.31 to 9.36

- Comprehensive indicators to measure performance in the area of land rehabilitation and water quality management have not been established.

  Paras 9.37 to 9.41

- The effectiveness of completed land rehabilitation works has not been evaluated.

  Paras 9.42 to 9.50

- Backfilling of open cuts has not been undertaken despite evaluations by the SECV that this was the most economic alternative for the disposal of overburden.

  Paras 9.51 to 9.61

PART 2

Conduct of the Audit Review

AUDIT OBJECTIVES AND SCOPE

Audit objectives

2.1 The principal objective of the audit was to review the effectiveness, efficiency and economy of the management and operations of open cut production within the SECV, including an assessment of:

- the extent to which the proposed National Electricity Grid, and measures for the corporatisation and privatisation of the SECV and open cut operations would impact on overall strategies for future open cut operations;
- the effectiveness and efficiency of management and operating practices within open cut mines and whether coal production meets power generation requirements at a competitive cost;
- whether the utilisation and maintenance of plant and equipment was effective and efficient; and
- the effectiveness of the implementation of environmental strategies relevant to open cut production.

Audit scope

2.2 In line with the above objective, the scope of the audit included a review of:

- current developments affecting the operations of the open cut mines;
- the impact of open cut production on the effectiveness and efficiency of power station operations and the cost of electricity generation;
- the comparative performance of the 3 open cut operations and their efficiency in comparison with other public and private sector mining operations;
- the adequacy of the maintenance and utilisation of infrastructure, plant and equipment and the effect of these activities on the efficiency and effectiveness of operations;
- the adequacy of SECV performance measures and targets for open cut production, the extent to which these are achieved and consideration of alternative performance measures; and
- planning and implementation of environmental strategies.

2.3 The audit involved:

- discussions with SECV management and employees, union representatives, and other public and private sector agencies; and
- review of relevant SECV documentation including strategic plans, performance measures, personnel records, internal audit and other internally generated reports on open cut operations, and external consultants' reports previously commissioned by the SECV on various aspects of open cut operations.

2.4 Due to the technical nature of several elements of the audit, Minenco Pty Ltd, a subsidiary of CRA Limited, was appointed by audit to provide advice in relation to aspects of open cut operations and the comparison of these operations with industry standards. Minenco Pty Ltd was appointed due to its experience in undertaking a range of reviews within mining entities and its previous involvement in a number of evaluations of SECV operations in the Latrobe Valley.

REASONS FOR UNDERTAKING THE REVIEW OF OPEN CUT PRODUCTION

2.5 The SECV open cut production was chosen for review on the following grounds:

- the substantial impact of open cuts on the effective production of electricity and the total SECV costs and the affect of these costs on the profitability of the SECV and electricity tariffs;
- the significance of personnel and industrial relations policies within open cuts and other areas of the SECV's Production Group given the substantial employee base;
- proposals to restructure the electricity industry; and
- public interest surrounding recent SECV moves towards outsourcing or external contracting of certain activities.

WORLD BEST PRACTICE AS A MEASUREMENT OF PERFORMANCE

2.6 Throughout the Report, reference is made to *"world best practice"* as a comparative measurement of the performance and resourcing of the 3 open cut mines.

2.7 In this context, world best practice refers to the best performance achievable by comparable operations throughout the world. Performance measured against world best practice is normally accepted and used by business as a benchmark or target against which an entity's operational targets can be established and measured. Open cut operational performance evaluated by audit against world best practice standards as provided by Minenco Pty Ltd included employee and plant productivity, and the overall level of human and financial resources utilised in operations.

2.8 It should be noted that recently the SECV and management at each of the open cuts have gathered information on world best practice in a variety of areas with the intention of using such information as the basis for setting performance targets for their own operations.

ASSISTANCE PROVIDED BY SECV MANAGEMENT AND EMPLOYEES

2.9 Management and employees, particularly those of the 3 open cuts, provided significant support and assistance throughout the course of the audit. Considerable assistance was also provided by other individuals and organisations during the audit and I wish to acknowledge the contribution that such assistance made to the preparation of material for this Report.

PART 3

Open Cut Production - a Perspective

BACKGROUND

3.1 The Victorian economy is dependent on electricity as a major source of its energy requirements. The SECV directly supplies over 1.6 million domestic, commercial and industrial Victorian consumers and provides bulk electricity supply to 11 municipal electricity undertakings for subsequent distribution. Over 85 per cent of Victoria's annual electricity generation requirements are met through generation by brown coal power stations in the Latrobe Valley. In order to meet the coal requirements of these power stations, the SECV operates 3 open cut brown coal mines at Yallourn, Morwell and Loy Yang in the Latrobe Valley.

COMPETITIVE ADVANTAGES OF BROWN COAL

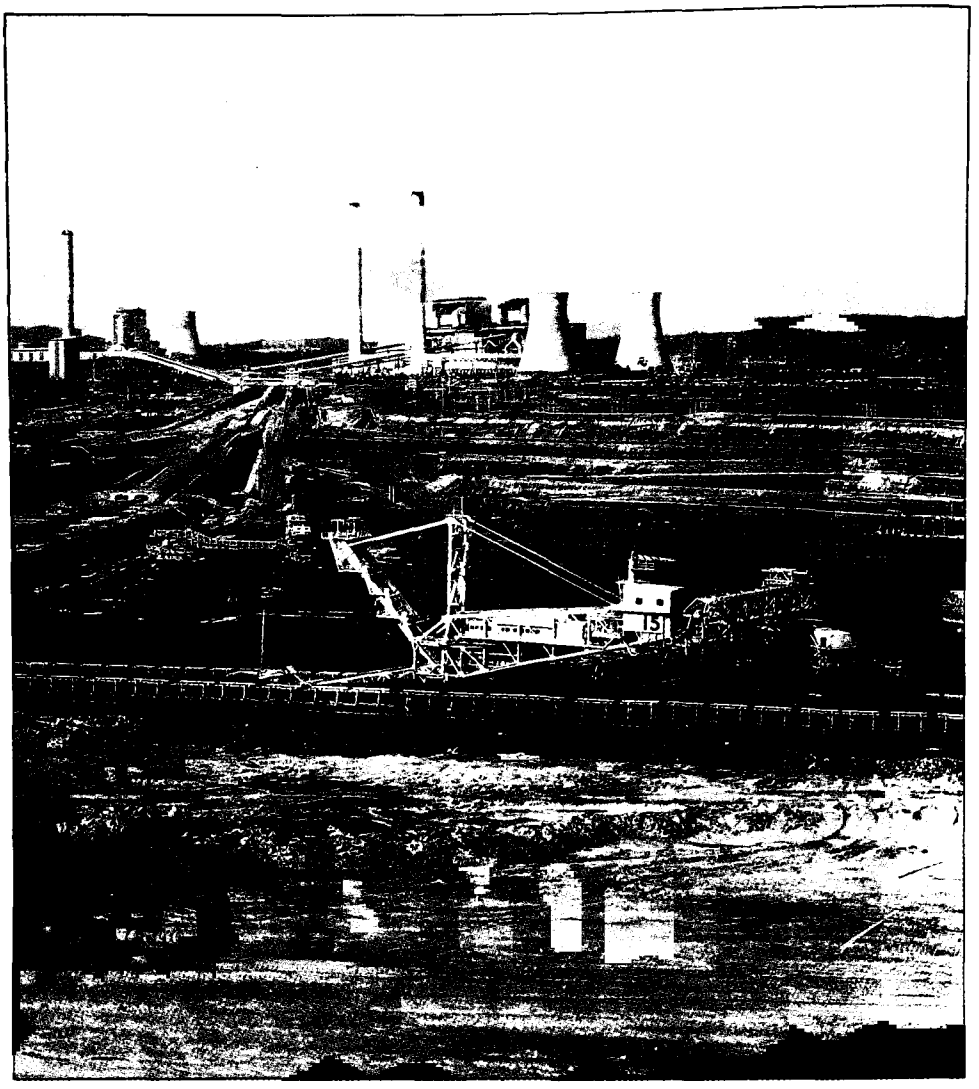
3.2 SECV open cuts in the Latrobe Valley represent one of the largest coal mining operations in the world in terms of both the volume of coal produced and the level of resources utilised in operations.

3.3 Mining of brown coal in the Latrobe Valley has many competitive advantages compared with similar operations in other States and overseas, for example:

- the existence of vast reserves of coal, estimated to be in excess of 200 billion tonnes, which enables only the most cost-efficient reserves to be utilised for coal excavation in the foreseeable future;
- coal within the Latrobe Valley generally lies close to the surface with a low overburden to coal ratio, which facilitates the economic mining of coal;
- the continuous nature of coal seams within the Latrobe Valley and the large scale of operations in terms of the volumes of coal extracted; and
- the relative high quality of coal in comparison with other brown coal operations in terms of its low ash and sulphur content which facilitates the excavation and handling of coal.

3.4 These advantages enable the SECV open cuts to utilise capital intensive and continuous mining techniques normally not feasible in many mining operations. Both the removal of overburden and the excavation of coal within the open cuts is largely performed by large bucketwheel excavators which are capable of excavating between 820 and 3 685 tonnes per hour. The coal is then transported by conveyor systems to storage bunkers located near the relevant power stations. Further explanation of the production techniques of the open cuts is provided in Part 6 of this Report.

3.5 As a result of the ability to utilise highly capital intensive techniques, the SECV open cuts should be able to match or better the operating efficiency of many other comparative mining operations.



Loy Yang open cut and power stations.

3.6 Certain disadvantages also exist in the use of Latrobe Valley brown coal for the generation of electricity. These include:

- The relatively high water content of brown coal resulting in low heating values in comparison with black coal and accordingly the need to use higher quantities of brown coal in the generation of electricity;
- The high combustion factors of brown coal necessitates fire protection for exposed coal reserves, decreases the ability to store excavated brown coal, and together with the high water content results in difficulties in transporting coal in its raw form making it more economic for power stations to be located in close proximity to the coal reserves; and

- Environmental factors associated with the use of brown coal for electricity generation. Specifically, the need for large-scale land rehabilitation following mining and the higher levels of carbon dioxide emissions resulting from generation compared with black coal.

3.7 The inherent qualities of brown coal in the Latrobe Valley require higher production volumes and adequate fire protection of exposed combustible coal reserves. These qualities also reduce the opportunities for the export of brown coal in its raw form, in contrast to the large export markets that have been established by black coal producers throughout Australia.

3.8 Due to the relatively few opportunities available for Latrobe Valley brown coal to be used or sold for other purposes, coal excavated by the SECV is almost exclusively used for the production of electricity within its Latrobe Valley thermal power generators. An exception to this is the use of brown coal for the production of briquettes for the firing of power stations, and sale on the domestic and export market by the Coal Corporation of Victoria. The volume and consumption of coal excavated by the open cuts is illustrated in Table 3A.

TABLE 3A
BROWN COAL PRODUCTION AND CONSUMPTION, 1991-92
(kilotonnes)

Open cut	*Coal produced*	*Power station supplied*	*Coal consumed*
Yallourn	17 110	Yallourn W	15 100
		Morwell Briquette Factory *(a)*	2 010
Morwell	14 872	Hazelwood	13 692
		Morwell	1 180
Loy Yang	17 520	Loy Yang A	17 520

(a) Coal used to produce 721 kilotonnes of briquettes.

RESOURCES USED IN OPEN CUTS

3.9 In 1991-92, the total volume of coal excavated by the 3 open cuts exceeded 49 million tonnes. Resources used in this production included:

- Employees engaged in open cut production totalled 1 753 or 12 per cent of the total SECV employee numbers of 14 827 at 30 June 1992. Of these employees, an estimated 546 were production maintenance employees associated with open cut operations. Additional services are provided to open cuts by the technology and services and maintenance sections as well as through external contracting arrangements;
- Funding of total operating expenditure of $408 million including corporate overheads and finance charges, representing 13 per cent of the total SECV operating expenditure of $3 144 million; and

- Funding of capital expenditure of $36.4 million representing 5 per cent of the total capital costs of the SECV in 1991-92. At 30 June 1992, the open cuts were in control of assets with an historical cost in excess of $1 509 million or 11 per cent of the total assets of the SECV. This amount excludes the value of the major resource represented by the underlying coal fields yet to be excavated.

3.10 Table 3B provides details of the comparative production and resources utilised by the 3 open cuts.

TABLE 3B
OPEN CUT PRODUCTION AND RESOURCES, 1991-92

	Yallourn open cut	*Morwell open cut*	*Loy Yang open cut*	*Total*
Production -				
Coal (million tonnes)	17.1	14.9	17.5	49.5
Overburden (million cubic metres)	0.6	3.5	5.6	9.7
Employees (nos.) -				
Direct	396	412	399	1 207
Indirect *(a)*	221	158	167	546
Total	617	570	566	1 753
Financial information ($ million)				
Operating expenditure	98.7	103.3	206.4	408.4
Capital expenditure	11.4	20.9	4.1	36.4
Fixed assets *(b)*	255.0	281.4	972.7	1 509.1

(a) Indirect employee numbers relate to the SECV's Production Maintenance Unit employees associated with open cut operations.
(b) Fixed asset values are at historical costs and are prior to the deduction of accumulated depreciation.

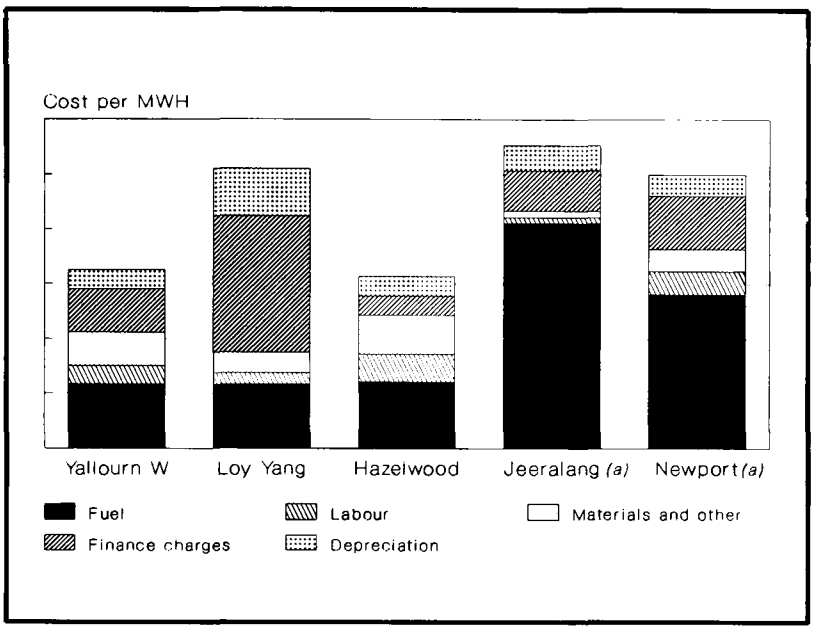
INDICATIVE GENERATION COSTS

3.11 The advent of a National Grid (refer paragraphs 4.28 to 4.40 of this Report) will expose the SECV to major competition from interstate power generators. The greatest potential for competition is likely to arise from Pacific Power in NSW. While SECV documents indicate that the SECV is currently cost competitive with Pacific Power, both on a variable cost and total cost basis, the failure by individual SECV power stations to continue to reduce costs and increase productivity in line with its competitors would increase the risk of losing Victorian electricity markets to interstate competitors.

3.12 Further, the National Grid Management Council has estimated that a National Grid will initially have large amounts of surplus generating capacity which will result in a significant downward pressure on the current market price for electricity. The SECV's Production Group, which is responsible for the operation of power stations and open cuts, has estimated that such market pressures could lower the current market price for electricity by up to 20 per cent. Any reduction in the market price of electricity that occurs as a result of operating in a competitive environment, such as the proposed National Grid arrangement, may result in a reduction in the SECV's revenue base. To remain competitive the SECV would need to offset any revenue loss by productivity improvements.

3.13 The opportunity for SECV to reduce the total cost of generation in the short to medium-term is through the reduction in variable costs. The proportion of variable costs (of which major components include fuel, labour and materials), finance charges and depreciation relating to the total cost of generation is shown in Chart 3C. This chart discloses that fuel is the most significant variable cost.

CHART 3C
INDICATIVE GENERATION COSTS

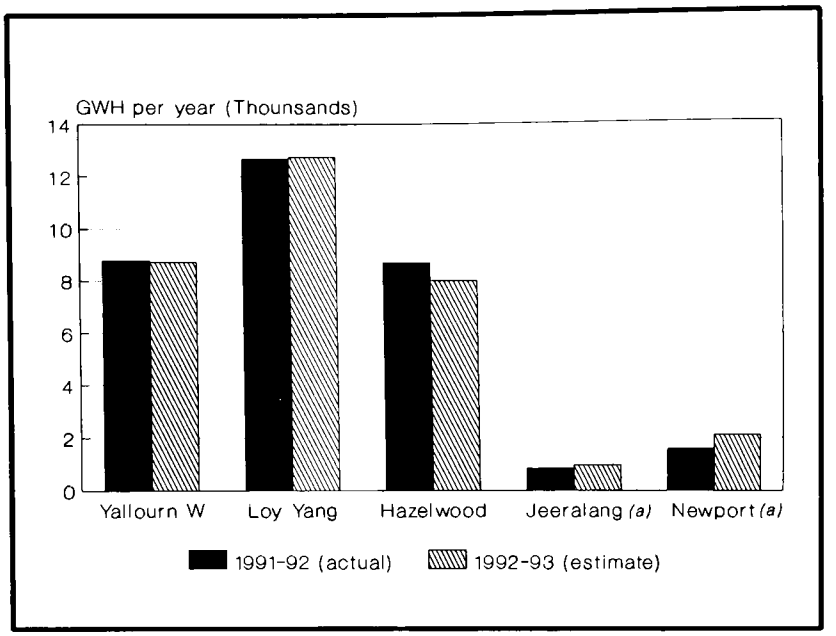


(a) Gas-fired power stations.

Source: SECV Production Group 3 year plan.

3.14 Given that the price of gas obtained by the SECV, representing between 80 to 90 per cent of the total variable cost of gas-fired generation, is determined either by the market or through contract negotiations the scope to reduce the cost of gas-fired production through productivity improvements is limited. Further, an analysis of Chart 3D discloses gas-fired generation represents approximately 8 per cent of Victoria's total power generation and is only used to meet medium and peak demand periods.

CHART 3D
ELECTRICITY PRODUCTION



(a) Gas-fired power stations.

Source: SECV Production Group 3 year plan.

3.15 Due to existing inefficiencies (refer to Parts 6 and 7 of this Report) and the significance of fuel costs to total electricity production costs, open cut operations provide one of the best opportunities for productivity gains. Further, the effect of open cut production costs on electricity prices can be significant as:

- fuel costs currently represent approximately 50 per cent of brown coal power station variable costs; and
- about 85 per cent of electricity demand is met through the SECV's investment in thermal generation.

3.16 If the SECV is unable to match reductions in the market price of electricity by continuing to achieve productivity improvements, the end result will be a substantial reduction in its net revenue. Further, the inability to remain competitive will influence the market price of its power generation assets and diminish the return from its investment in open cuts and power stations.

CORPORATE STRATEGIES OF THE SECV

Principal corporate strategies

3.17 During 1992, the SECV revised its corporate objectives in line with proposed changes in the Australian and Victorian electricity industry including future increased competition from other electricity authorities. The principal corporate strategies, as detailed in the SECV's *1992 Annual Report*, are to:

- focus on the identification and realisation of customer benefits to be derived from improvements in the performance of the industry;
- provide commercial rates of return to shareholders by increasing the long-term value of the business as measured by net worth;
- maintain a safe and reliable electricity supply for the benefit of the State and act in a socially responsible manner; and
- design and operate SECV assets in a way that is in harmony with the environment.

3.18 The open cuts reflect one of the major operational areas of the SECV and have a significant impact on the overall performance and rate of return of the organisation. As such, open cut operations can influence the SECV's ability to successfully achieve these objectives.

Debt strategy

3.19 The level of debt and associated finance charges significantly affects the SECV's performance as a whole. Throughout the 1980s the SECV's level of debt increased from $3 billion in 1981 to $9 billion in 1990. The high level of debt, in part, reflects the capital intensive nature of brown coal generation and the significant capital commitment made by the SECV in the development of the Loy Yang project.

3.20 In 1990-91, due to Loan Council restrictions on the level of new debt available to Victoria and the SECV's recognition of the need to cap both the level of its debt and the level of related finance charges, the SECV implemented a "no new debt" policy. Improvement in the SECV's debt position will also result from:

- the partial privatisation of Loy Yang B through the sale to Mission Energy of a 51 per cent share of the asset and the use of the proceeds of over $500 million to reduce debt;
- the 10 per cent increase in electricity charges announced in the October 1992 budget; and
- any reductions in operating costs achieved through improved efficiencies.

Improvements in productivity

3.21 The SECV has long recognised the importance of improving the efficiency and effectiveness of its operations and has achieved considerable improvements in recent years for which it should be commended. For example, since 1989, a period over which the SECV restructured its operations, total employee numbers have reduced from over 21 500 to 14 827 at 30 June 1992. Between 30 June 1992 and 31 December 1992, employee levels have been further reduced to 12 500. In addition:

- a real rate of return of at least 5.3 per cent has been achieved on SECV assets since 1986-87 with an 8.5 per cent real rate of return being achieved in 1991-92; and
- based on information provided by the SECV through its Annual Report to Parliament electricity sold per employee (expressed in gigawatts) has increased from less than 1.5 gigawatts per employee in 1989 to 2.02 gigawatts per employee in 1992, due mainly to the reduction in employee levels.

PART 4

Strategic Challenges

OVERVIEW

4.1 Based on various independent and internal reviews of electricity industry operations, the current Government's energy policy indicates the need for a restructuring of the industry. It considers that the current monopolistic structure of the SECV has discouraged the efficient use of resources, and inhibited the introduction of necessary productivity improvements, including better employee/employer relations and the elimination of outdated work practices.

4.2 The energy policy also includes a number of strategies which will significantly effect the operations of the SECV. The overall aim of the policy is to implement structural change in the industry to promote economic prosperity and job opportunities for Victorians. Specific policy objectives with major impact on the industry include:

- restructuring energy instrumentalities so that opportunities for competition, efficiency, cost-effectiveness and debt reduction are maximised; and
- the promotion of co-generation of electricity and other practical alternative energy sources.

4.3 The Government stated in its April 1993 statement *Restoring Victoria's Finances* that *"... reforms in the electricity industry will be extensive and complex and will require careful management"*. One of the major steps in this reform process is the review of recommendations arising from the completion of the Electricity Energy Study initiated by the Government. One of the aims of the review is to determine the optimal competitive structure of the Victorian electricity industry and a practical implementation plan. Notwithstanding the direction that any restructure of the electricity industry may take, it will necessarily include assured access to coal, by owners of power stations.

4.4 In line with the SECV's corporate strategies and the restructure of the Victorian electricity industry, it is important to acknowledge that any reduction in debt or operating costs arising from increased efficiencies in operations such as those identified throughout this Report will significantly increase the value of the SECV's assets. This is because any reduction in the cost of operations will increase the future net income stream of the SECV's operations and therefore the value of the business. Debt reduction and more efficient operations will enable proceeds from any potential privatisation proposals of the SECV's operations to be maximised. In addition, such reductions in the cost of operations reduces pressures to increase electricity tariffs charged to consumers and ensures that the SECV remains competitive with other interstate power generators.

4.5 The Government also considers that the future prosperity of the Victorian electricity industry is dependent on structural change to keep Victoria's energy supplies competitive with other States which will be linked to the proposed National Grid. The proposals envisage that all participating generators, including the New South Wales and Queensland electricity industries, will be able to supply energy to any Victorian or interstate customer.

4.6 In the light of these proposals, it is imperative that SECV open cuts operate at an efficiency level comparable and competitive with similar mining entities supplying interstate power generators. Unless such efficiency levels are achieved Victorian consumers may, in future, purchase electricity from interstate suppliers thereby reducing the levels of electricity generated by power stations in the Latrobe Valley and the associated operations of the 3 SECV open cuts. Such reductions would have significant consequences in terms of economic activity and levels of employment within the Latrobe Valley region.

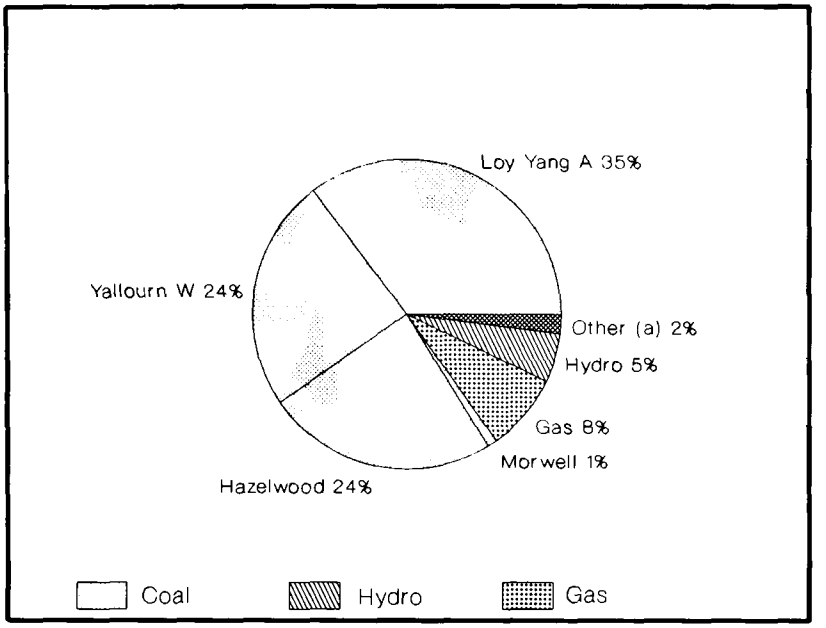
4.7 If electricity production targets are to be met while maintaining a competitive rate of return to owners, there is a need to provide coal to power generators at a competitive price. To ensure a competitive price the SECV will continually have to pursue greater efficiencies in its open cut operations. A number of opportunities to achieve such efficiencies are detailed throughout this Report.

MEETING DEMAND REQUIREMENTS

4.8 As referred to in Part 3 of this Report, Victorian industry and households alike are heavily dependent on electricity as a major source of their energy requirements. Given this dependence, the reliability and price of electricity are essential to the efficient and effective functioning of Victoria's economy.

4.9 Chart 4A illustrates that approximately 85 per cent of Victoria's annual electricity requirements are met through brown coal generation. The abundance of brown coal in the Latrobe Valley, low operating costs relative to other fossil fuel types such as gas, and the limited hydro sources available to sustain high levels of electricity production has led to significant investment by the SECV in brown coal open cut mines and power stations. The total book value of SECV investments in brown coal electricity production at March 1993 is approximately $5 billion excluding the construction of Loy Yang B1 and B2 power stations at an estimated cost of $1.8 billion not including finance charges. This investment has become the foundation for Victoria's electricity requirements, and therefore, the efficiency of brown coal generation is important to the Victorian economy.

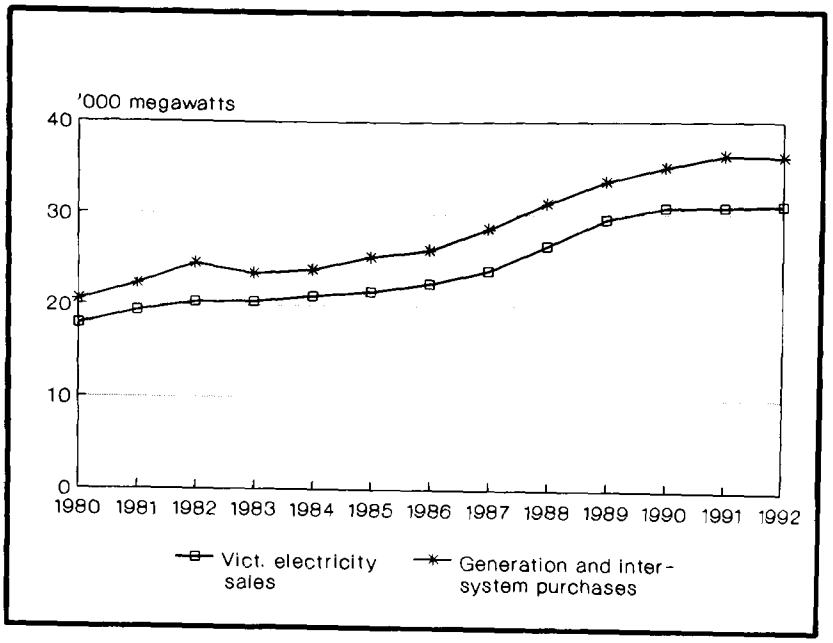
CHART 4A
SOURCES OF ELECTRICITY GENERATION



(a) Other generation includes net purchases from interstate and the co-generation of electricity.

4.10 As disclosed in Chart 4B, in the period 1980 to 1992 electricity generated exceeded sales to Victorian consumers due to interstate electricity sales, electricity usage by the SECV to enable ongoing generation, and distribution losses that occur during the transmission process. The chart also indicates that the main periods of growth in electricity demand have occurred between 1980-1982 and 1986-1989, corresponding with periods of stable and strong growth in Gross Domestic Product (GDP).

CHART 4B
SECV POWER GENERATION AND SALES

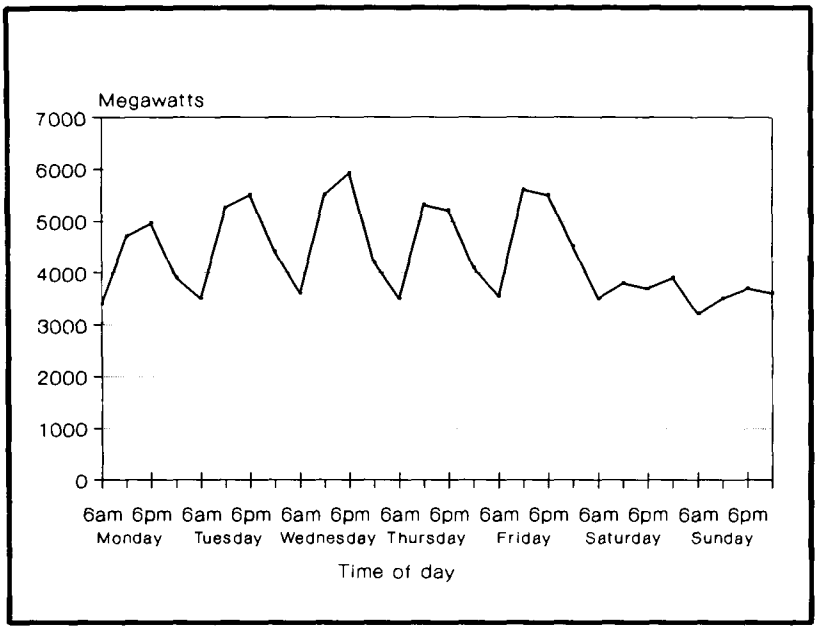


Source: SECV.

4.11 Electricity demand in Victoria generally peaks in the afternoon when domestic and industry demand are both at their highest and drops to its lowest point between the hours of 4 and 6 in the morning and on weekends. The level of demand can vary from about 2 900 megawatts (MW) on a public holiday to about 6 600 MW on a cold winter's day.

4.12 Chart 4C illustrates the fluctuations in demand for electricity, known as a load curve, over a typical week. The system is required to cater for the peaks and troughs in demand in the most economic, efficient and flexible manner while ensuring the reliability of supply to consumers. A more even distribution of daily and weekly demand levels reduces peaks and troughs. Over the last few years the SECV has in fact experienced a low variability in demand.

CHART 4C
INDICATIVE DEMAND FOR ELECTRICITY



Source: SECV.

4.13 Victoria's current mix of generation is linked to:

- the demand patterns of consumers as outlined above; and
- the inherent cost differentials existing between coal, gas and hydro electricity generation.

4.14 Due to the high infrastructure costs and the high generation capacity of each brown coal power station, the use of brown coal generation is only economic to meet the bulk of Victoria's electricity requirements referred to as base load requirements. To meet additional peak requirements above the base load through brown coal would result in over capitalisation and lead to unnecessarily high electricity charges. Therefore, as gas and hydro electricity production have lower capital infrastructure costs it is more economic for Victoria's peak electricity demand to be met through gas and hydro generation.

4.15 It is not uncommon for generating units, particularly brown coal and hydro stations, to require a planning lead time of up to 15 years which makes it necessary to forecast electricity needs for periods up to 15-20 years in advance. Commonly, these forecasts produce a significant range of possible electricity requirements with the upper and lower range of these forecasts differing by up to 50 per cent. In the past Australian power utilities have had difficulty estimating electricity growth rates due to the complexities of forecasting economic conditions, impact of changes in government policies, tariff structures, population and industry growth and the rate of technological improvements.

4.16 To provide electricity at the lowest possible cost, the SECV needs to:

- avoid unnecessary capital and finance costs by ensuring decisions on capital investment in brown coal generation are based on detailed economic analysis;
- minimise production costs including those related to open cut operations to offset high capital costs;
- operate within reserve plant margins, that is emergency and spare generating capacity consistent with the required level of supply reliability; and
- consider recent national and international developments in the electricity industry such as the government's proposal to restructure the SECV, the Federal Government's micro-economic reforms, the National Grid and commitments for the reduction of carbon dioxide emissions.

4.17 The considerable challenge facing the SECV is to evaluate all feasible electricity demand scenarios and choose the mix of generation, (e.g. coal, gas and hydro) which exposes the SECV to the least cost and minimises any risk arising from changes in demand, prices, or the economy, while providing an economic supply of electricity. In addition, the system needs to meet unforeseen events and therefore planning decisions need to ensure plant flexibility. The costs of having an inadequate, inflexible or inappropriate plant mix can be quite significant especially given the planning lead times and the relative high cost of power stations and associated infrastructure including open cut developments. For example, overestimating Victoria's demand for electricity could result in significant investment in the development of an open cut and the construction of a brown coal power station before it was required. Conversely, an underestimation of required generating capacity may lead to power shortages and higher electricity costs for consumers.

4.18 In 1988 a Report by the State Parliamentary Committee of National Resources and Environment (NREC) which reviewed electricity supply and demand beyond the 1990s, recommended that the SECV produce an annual Electricity Development Strategy. The rationale for this requirement centred around the need to maintain plant flexibility and minimise the risks of unnecessarily committing significant capital resources before required. The review by audit disclosed that the SECV had not reviewed its Electricity Development Strategy since it was first produced in December 1989. Although it is acknowledged that the development of such a comprehensive strategy is complex and difficult in an environment of significant change, there is a risk that in its absence the SECV may not have effectively addressed all competing interests, threats and challenges and so assure that the SECV decisions are efficient and effective in the long-term. The need for such a strategy has been recognised and the Electricity Energy Study has been initiated by the Government.

- *RESPONSE provided by the Chief General Manager, SECV*

  The SECV continually reviews the electricity demand scenario to ensure an economic and reliable supply, however in 1990 the Minister deferred the requirement for the publication of an annual review of the Electricity Development Strategy.

THE ECONOMIC PERFORMANCE OF THE SECV

Introduction

4.19 An evaluation of the SECV's performance and comparison with other electrical undertakings needs to be considered in light of the different technologies used to generate electricity, the regulatory and government framework under which it operates and the methods used to finance capital investment. Victoria's vast amounts of brown coal and related technology is said by the SECV to be unmatched anywhere in the world. Audit acknowledges that differences exist between electrical undertakings, but considers that comparisons can be made given that electricity is a homogeneous product and that even though the methods to produce electricity may differ, the outcome, electricity to service the needs of consumers, is the same.

4.20 An analysis of performance usually evaluates:

- price and reliability;
- technical efficiency; and
- electricity production cost (refer to paragraphs 3.9 to 3.16 of this Report).

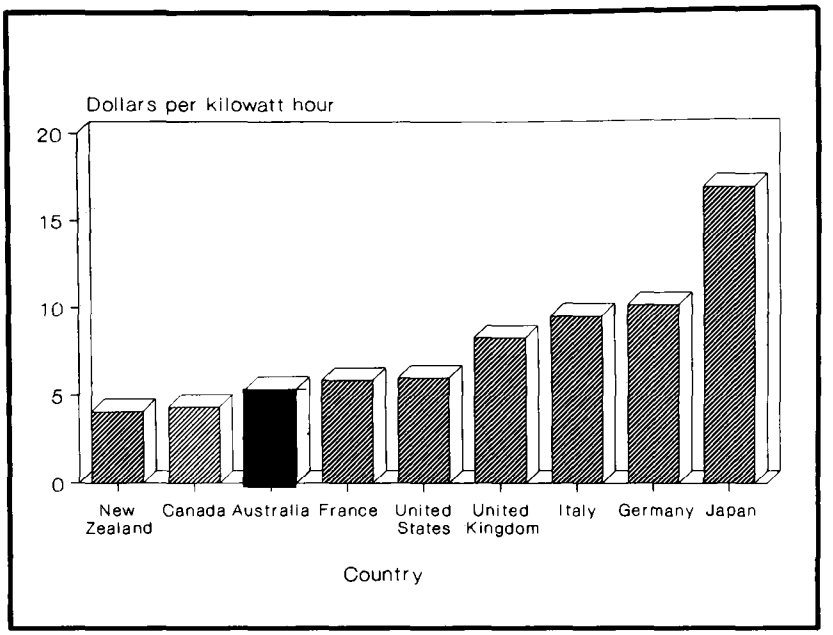
4.21 Recent reviews conducted for the Commonwealth by the Bureau of Industry Economics (BIE) and the Industry Commission have been used by audit to provide some insight into the SECV's performance relative to interstate and overseas utilities.

Comparative performance

4.22 Chart 4D indicates that average electricity prices in Australia are among the lowest in the world and compare favourably with most OECD countries.

4.23 Reasons for differences in pricing do not solely relate to efficiency, but also to the cost of fuel and the fuel mix used by individual countries. For example hydro-based systems such as those operated in New Zealand and Canada have relatively low electricity prices and minimal fuel costs. Conversely, countries which require major excavation activities to extract fossil fuel such as Germany or import fuel such as Japan have relatively high electricity charges. The costs of extracting coal varies significantly from country to country. Australia has bountiful supplies of coal that is by comparison cheap to mine, providing a sound basis for producing low cost electricity. It is important to note that even though Australia has low electricity prices some individual industrial and commercial customer classes pay relatively high electricity prices. The Industry Commission also reported in 1991, that other countries with industries in the same export markets as Australia, have considerably lower total electricity prices than Australia.

CHART 4D
AVERAGE PRICE OF ELECTRICITY, 1989-90



Source: Extracts from Bureau of Industry Economics Report No. 40.

4.24 As demonstrated in Table 4E, Victoria has over the last 4 years experienced favourable electricity prices compared with Australia as a whole with lower growth in prices than the Australian average. However, pricing levels should not be considered as an indication of efficiency in isolation as government pricing policies (e.g. decisions by Government to cap prices and to require electricity producers to fund community service obligations) have a significant impact on the level of prices and price increases.

TABLE 4E
AVERAGE ELECTRICITY PRICES
(All customer classes cents per kwh)

State/Territory	*1988*	*1989*	*1990*	*1991*
Northern Territory	13.9	14.0	13.6	13.7
Western Australia	11.1	11.3	11.8	12.6
South Australia	9.3	9.5	9.7	9.9
ACT	8.0	8.5	8.8	9.2
Victoria	**8.1**	**8.0**	**8.4**	**8.9**
New South Wales	7.5	8.1	8.5	8.9
Australia	7.8	8.1	8.5	8.8
Queensland	7.8	7.9	7.9	8.0
Tasmania	3.8	4.0	4.4	4.7

Source: ESAA: Electricity Supply Indicators: 1987-88 to 1990-91.

4.25 As the price of electricity is not an appropriate indication of efficiency when reviewed in isolation, it is important to consider various technical efficiency measures. Technical efficiency indicators measure the extent to which the production inputs are utilised efficiently. A number of technical efficiency measures have been recently used in reviews conducted by the Industry Commission and the Bureau of Industry Economics including:

- *Capacity factor* which measures annual energy production compared with the total energy that would have been produced had the plant operated at full output during the year. The greater the capacity factor the more efficient the use of plant.

  The capacity factors for both Queensland and Victorian utilities are among the highest in the world.

- *Load factor ratio* measures the average annual generated load against the maximum possible peak load. The higher the ratio the greater the utilisation of capital with figures of 80 per cent and above implying relatively constant utilisation of capital.

  Australian electrical utilities have returned load factors averaging about 65 per cent for the 4 year period between 1988 to 1991. The SECV will have achieved a load factor of around 70 per cent in 1992-93 which is among the highest in the world.

- *Reserve plant margin (RPM)* reflects the level of excess generation capacity over maximum demand requirements. The RPM is required to ensure supply during regular maintenance, unscheduled breakdowns and in the event of other contingencies. The optimal level of RPM is dependent on the age and mix of generating plant, weather conditions, the effectiveness of maintenance programs and the availability of power from other sources. Extremely low levels of RPM may not allow the utility to undertake adequate maintenance programs. Conversely high RPM may result in the under utilisation of significant capital investment. A margin of approximately 20 per cent is generally used as a benchmark.

  The SECV has targeted an optimum RPM of between 15 to 20 per cent. In recent years the SECV has experienced high levels of RPM peaking at 43 per cent in 1988 which will have reduced to 21 per cent by June 1993. However, the RPM is expected to again increase to approximately 28 per cent by 1995-96. Based on growth in electricity demand of approximately 2 per cent and no scheduled plant closures, Victoria's RPM can be expected to remain above or around 20 per cent up until the year 1999. Reasons given for the predicted high RPM have been the difficulties in forecasting future electricity demand and the recent economic downturn. Victoria's high RPM may also be related to the scheduled commissioning of Loy Yang B1 and B2 power stations in 1993 and 1996, respectively, which will add an additional 1 000 megawatts of base load generating capacity or over 10 per cent of existing installed capacity.

The additional plant will create surplus generation up until 1999 which has been estimated by the Production Group of the SECV to be equivalent to a 500 MW power station. **The SECV's ability to effectively manage the surplus generation may be limited due principally to:**

- **contractual arrangements to purchase minimum amounts of gas in accordance with SECV's negotiated gas contracts; and**
- **to a lesser extent the high level of hydro reserves.**

As a consequence it may be necessary to reduce generation through the retirement of parts of older brown coal power stations but to date definite planning decisions on the retirement of plant have not been made.

- *Availability factor* measures the time that plant is available to generate electricity. Availability of plant is affected by planned maintenance and unscheduled outages due to breakdowns.

  The SECV plant has achieved lower availability compared with the performance achieved by Queensland and international undertakings. The reasons for this lower performance can in part be attributed to breakdowns, maintenance requirements and coal fouling problems.

- *Labour productivity* in the power industry has been traditionally measured by 2 ratios, namely electricity produced per year by each employee and customers per employee. The significance of labour on overall productivity is also dependent upon other major inputs such as fuel and capital. For example, a high level of plant capitalisation should require less labour intensive production methods. Gas and hydro generation requiring significantly less labour per output of electricity than coal generation. Although Australian power utilities, including the SECV, have recently experienced significant improvements in labour productivity, these improvements were claimed by the Industry Commission and BIE in 1992 to be:

  - off a low base relative to international best practice; and
  - still well below international best practice levels.

  Table 4F relating to labour productivity excludes mining operations which is not a function of the other electrical utilities, and indicates that, SECV labour productivity levels have not always been as high as other States.

TABLE 4F
LABOUR PRODUCTIVITY *(a)*

Performance Indicator	Vic		NSW		Qld	
	1990-91	*1991-92*	*1990-91*	*1991-92*	*1990-91*	*1991-92*
Labour productivity (Gwh per employee)	2.0	2.5	2.2	2.3	2.6	2.7
Customers per employee	123	134	114	125	142	148

(a) 1990-91 figures are the final figures provided to ESSA. 1991-92 figures are to be confirmed.

Source: Electricity Supply Association of Australia Limited (ESSA).

4.26 Another performance measure is, Total Factor Productivity (TFP). TFP was defined by the Bureau of Industry Economics in its Resource Report No. 40 in 1992 as *"a comprehensive measure of technical efficiency as it represents the weighted average of the productivity of all inputs used in production. An optimal combination of capacity factor, load factor, reserve plant margin and utilisation of labour would be reflected in a relatively high TFP. Improvements in TFP would be reflected in reductions in the unit cost of production".*

4.27 A study by Swan Consultants Pty Ltd, in conjunction with the Industry Commission compared Australian States TFP from 1976 to 1990. The findings included:

- although TFP has been growing more strongly in Victoria since 1983-84, Victoria had the lowest TFP of all States up until 1989-90;
- Victoria's capital productivity, a component of TFP, over the whole period was the lowest, reflecting the more capital intensive nature of brown coal operating plant compared with black coal;
- Victoria's level of TFP can in part be attributed to its reliance on brown coal deposits with lower fuel productivity levels relative to black coal; and
- improvements in Victoria's productivity similar to that achieved by Queensland would result in substantial savings.

■ *RESPONSE provided by the Chief General Manager, SECV*

The Victorian system currently has a load factor of about 70 per cent, although this is forecast to decrease during the 1990's to about 66 per cent, depending on the level of demand management. Currently Victoria's load factor of 70 per cent is among the highest in Australia and internationally.

The Effective Reserve Plant Margin for the SECV is currently 18 per cent and will increase with the availability of Loy Yang B1 and B2 units in 1993 and 1996 respectively. However, the current forecasts on Victorian maximum demand result in levels of 18 per cent for 1995 and 13 per cent for the year 2000.

These reserve plant margins do not imply that there is surplus generation capacity.

The current reserve margins are sufficient to provide for good system reliability, but are not sufficient to allow for the closure of any major generating units.

However, in any system, there can be periods where the production of electricity can be best served by other than major base load generating units.

This occurred recently on the SECV system, where, because of a reduction in energy sales to South Australia combined with available economic use of peaking plant, some base load plant was held back on standby. This allowed for the economic use of other plant which better matched the reduced market caused by the temporary loss of sales to South Australia.

Through the period from now to 1998-99, there will be substantial periods where the level of capacity reserve is sufficient to provide for good system reliability, but not sufficient to allow for the closure of a 500 megawatt generating unit.

The Labour Productivity measure is the electricity produced annually per employee and excludes the mining part of our operations to allow comparisons with other States. Expected figures by June 1993 are 3.1 GWh per employee and 155 customers per employee. These figures indicate a labour productivity improvement of approximately 60 per cent over the last 4 years.

The comments on Total Factor Productivity are based on a dated study which does not reflect the draft results from the current National Performance Indicators Study conducted by London Economics for the ESAA. This study is expected to show a high TFP growth for Victorian generation during the period 1981 to 1991.

Total Factor Productivity is not an absolute measure but provides a comparative measure of productivity growth over time. It is therefore misleading to directly compare absolute measures. The Report acknowledges this by referring to the impact of brown coal fuel on absolute TFP results.

NATIONAL GRID

4.28 The Industry Commission, in accordance with the Commonwealth's Industry Commission (1989) legislation, examined the scope for improving the efficiency of electricity and gas supply, and was required to report on any arrangements which led to the inefficient use of resources. The Commission's report released in May 1991 identified various impediments to the efficient use of resources throughout Australia's energy industry. In relation to electricity generation and distribution, these included:

- investment decisions that have led to excess generation capacity, represented by high reserve plant margins, and significant over-staffing within electricity authorities; and
- the failure of electricity prices to accurately reflect the cost of supply.

4.29 The Commission estimated that if the performance of the States' electricity utilities matched international best practice and cross subsidies between consumers within pricing structures were eliminated:

- national output could expand by around $2.2 billion annually;
- reforms would create 8 000 new jobs throughout Australia; and
- annual household disposable income would increase by approximately $300.

4.30 Annual potential savings for Victoria as a result of reform of the electricity industry were estimated at $400 million. In response to the Industry Commission's findings the SECV disputed the assumptions inherent in the overall estimates of savings. While acknowledging these concerns there was general support by the Commonwealth Government for the Industry Commission's conclusions as indicated by the proposed formation of a National Grid.

4.31 To achieve these improvements the Commission recommended a staged but radical restructuring of the electricity industry to increase competition. The Commission identified that existing restructuring would involve the:

- separation of ownership of generation, transmission and distribution functions;
- corporatisation of these functions so that all entities operate on a commercial basis at arms length from the government;
- creation of a national grid; and
- sale of all generation and distribution assets to the private sector.

4.32 Following the Industry Commission Report, which was adopted by the Commonwealth Government in January 1992, the Commonwealth and the States developed 2 separate National Grid proposals. Both proposals have the same overall objective of achieving greater efficiency through increased competition but differ in that the States' propose to retain ownership of transmission assets while the Commonwealth proposed removing any potential conflicts of interest by establishing a co-operative body. This co-operative body to be known as the National Grid Council, would own, operate and maintain all existing transmission assets.

4.33 The introduction of the National Grid has been scheduled for 1 July 1993 but, no firm decision has been taken on which proposal should be adopted. To date, all State governments have endorsed the National Grid Protocol, proposals for Market and Trading arrangements and Network Pricing which have now been published for public comment.

- *RESPONSE provided by the Chief General Manager, SECV*

  The SECV and the ESAA have disputed the assumptions inherent in the estimates made by the Industries Commission and it is quite inappropriate for the largely unsubstantiated conclusions to be again quoted without reference to the wider industries' response.

Implications for Victorian brown coal generation

4.34 Due to its geographical location, Victoria is strategically placed to benefit from the National Grid developments. In particular, the proposal to interconnect electricity transmission between Tasmania and the mainland and upgrade the South Australian transmission link should provide the SECV with an opportunity to supply additional markets. Further, the SECV will be well placed to reduce electricity supply costs in Victoria by substituting more costly gas generating units with Tasmania's hydro resources at peak load times.

4.35 Under National Grid arrangements it is proposed to meet electricity supply requirements from existing power generators in order of least variable costs. The formation of the National Grid will present opportunities to both the SECV and its counterpart in New South Wales, Pacific Power, to off-load surplus generating capacity through electricity sales to other States.

4.36 Current indications are that newer technology brown coal stations such as Loy Yang A and B have less variable costs than New South Wales black coal power stations. Although the older brown coal power stations of Hazelwood and Yallourn also currently have a cost advantage, it is minimal. Given indications that Victoria currently has a lower variable cost of generation compared with New South Wales, Victoria's brown coal power stations and open cut mines will, in the short-term, be presented with opportunities to increase sales to interstate customers. However, this is dependent upon Victoria's variable costs of production continuing to be less than those of New South Wales black coal generators. **A failure by Victoria's power stations and open cuts to match productivity improvements in New South Wales will expose Victoria to increased risk of lower electricity sales resulting in lower plant utilisation and a decline in the rate of open cut production.**

4.37 National Grid arrangements also propose that future growth in national demand for power generation above existing capacity, will be met from those generators which produce electricity at lowest total costs, i.e. all fixed capital and variable costs. It is envisaged that such a process would reduce and avoid future high levels of surplus generation that currently exist in New South Wales and Victoria, and ensure that only the most economic level of capital investment.

4.38 The implications for open cuts and brown coal power stations could be significant as estimates for building new brown coal generating plant cost in the order of $2 million per megawatt compared with New South Wales and Queensland black coal generation investment of approximately $1 million per megawatt. The lower construction capital costs for new generation plant coupled with the fact that on a total cost basis Queensland and New South Wales black coal generation is currently cheaper than brown coal generation, may reduce the need for further investment in the Loy Yang B3 and B4 power stations. This is despite the fact that substantial infrastructure investments such as the open cut development have already been made. Further, there is a risk due to the higher overall costs of brown coal generation that the operation of the Morwell and Yallourn open cuts may not proceed beyond the end of the current life spans of the Morwell and Yallourn W power stations (years 2005 and 2010, respectively).

4.39 The SECV needs to ensure that recent productivity improvements in power generation including open cut production continue so that Victoria retains its cost advantage over New South Wales, in the short-term. This is particularly important as variable cost relativities between Victoria and New South Wales are minimal.

4.40 In the medium to long-term, brown coal generation will need to make significant technical and productivity improvements in order to offset the significant capital cost advantages that black coal power production has over brown coal. If such improvements do not occur the possibility of additional investments in brown coal power stations and open cuts will diminish.

- *RESPONSE provided by the Chief General Manager, SECV*

  The SECV recognises the importance of continued productivity improvement in competing successfully in the National Grid. In the longer-term this competition will extend to the competitive sourcing of new plant. The data given on comparative capital costs of new plant are distorted as the brown coal costs include the cost of the mine. Further, the review fails to recognise the substantial research and development work carried out into new technologies for brown coal fired generation. These technologies, particularly that of integrated drying, gasification and combined cycle generation (IDGCC) could well result in the next coal fired power station development being based on brown coal. Research results indicate that the IDGCC process is likely to result in generation cost for brown coal at least 20 per cent below that of black coal power and carbon dioxide emissions some 10 to 15 per cent lower than those from black coal. The SECV has already spent around $20 million on the first phase of the development of this new technology.

  Finally, the SECV currently expects Morwell and Yallourn open cuts to have life spans beyond the 2005 and 2010 time given in this report.

BROWN COAL ELECTRICITY GENERATION AND THE GREENHOUSE EFFECT

Introduction

4.41 Electricity production in Australia and particularly Victoria is heavily dependent on the burning of fossil fuel such as coal and gas which produces large amounts of carbon dioxide. The electricity industry produce 42 per cent of all carbon dioxide emissions in Australia, while in Victoria the SECV produces 51 per cent of all carbon dioxide emissions. Almost all of these emissions result from electricity generated from brown coal.

4.42 Currently, the generation of electricity from black coal and natural gas technology results in lower carbon dioxide emissions than brown coal. Generally, Victorian brown coal power stations produce:

- over twice the level of carbon dioxide compared with gas generation per unit of output; and
- about 30 per cent more carbon dioxide compared with black coal power stations, with the older brown coal technology plant at Hazelwood power station having even higher emissions.

The Toronto Target

4.43 Following a world environmental conference in Toronto, Canada in 1988, the Commonwealth Government adopted a target to achieve a reduction of 20 per cent in carbon dioxide emission levels by the year 2005. This target has become known as the *Toronto Target*. However, achievement of the target was subject to the proviso that, the Commonwealth would not proceed with any measures to reduce carbon dioxide emissions that had a net adverse economic impact for Australia without similar action by other countries. Other countries adopting strategies for reducing and/or stabilising carbon dioxide emissions include Germany, Canada, Japan, Sweden and the United Kingdom.

4.44 This commitment to the *Toronto Target* was confirmed by the Victorian Government through the endorsement of the National Greenhouse Response Strategy (NGRS) on 7 December 1992. It was also agreed that Australia should initially concentrate on those actions where the economic and social costs would be low and equitable, with minimal disruption to the wider community, any single sector or any particular geographical region.

4.45 In its discussion paper on the Greenhouse effect, the SECV has stated that *"... our no-regrets policy means doing what we can reasonably do now to reduce carbon dioxide emissions in ways which are cost effective under current business conditions. This means pursuing options which provide a range of environmental as well as economic benefits. The results obtained from a no regrets approach are thus in the best interest of the community irrespective of the outcome of greenhouse issues".*

Options for reducing carbon dioxide emissions

4.46 In 1989, the SECV developed an action plan to investigate and develop various options to meet the *Toronto Target*. It determined that the most efficient way to reduce carbon dioxide emissions and meet electricity requirements was through demand management (DM) Programs. A 3 year, $55 million DM program commenced in 1990 and identified numerous projects where potential benefits could be gained by either reducing demand for electricity or by using resources more efficiently. The potential to reduce annual electricity demand by the year 2005 was estimated at 10 000 GWH per year, which represents approximately one-third of 1991-92 electricity sales. Such a reduction in demand would reduce carbon dioxide emissions by up to 14 megatonnes or about 30 per cent. The major features of the project included, reduced off-peak tariffs to encourage a shift in demand from peak load times, appliance labelling, the promotion of compact fluorescent lamps and incentives for the installation of efficient lighting systems. The SECV has recently acknowledged that the potential benefits to the SECV of DM programs have diminished due to relatively cheap surplus electricity capacity existing in both Victoria and New South Wales which reduces the medium-term commercial benefits of DM programs.

4.47 Other options under consideration by the SECV include:

- Renewable energy resources such as hydro, wind and solar power which produce electricity without emitting harmful greenhouse gases including carbon dioxide. The introduction of renewable technologies would also allow additional capacity to be added in small increments and closer to demand requirements, as opposed to large blocks of power provided by coal power stations such as Loy Yang B;
- Fuel substitution by converting brown coal plant such as the Loy Yang A power station to gas-firing. However, at present, fuel substitution is not considered by the SECV to be a practical and economical method of reducing emissions of carbon dioxide; and
- Investigation of more efficient methods for producing electricity from brown coal. The SECV is confident that in the medium to long-term the development of new technologies will lead to significant reductions in carbon dioxide emissions.

Current status

4.48 To achieve the *Toronto Target*, the SECV has stated that it would need to reduce carbon dioxide emissions from 37.1 megatonnes (1988 levels) to 29.7 megatonnes by the year 2005. However, in 1991-92, carbon dioxide emissions from electricity production increased to 42 megatonnes with the SECV forecasting an increase in carbon dioxide emissions to 43 megatonnes by 1994-95. As a result, by 1994-95 carbon dioxide emissions would have increased by nearly 16 per cent since 1988. This growth in emissions would require the SECV to aim to achieve an overall reduction in carbon dioxide emissions of nearly 45 per cent by the 2005. As a result it may be difficult for Victoria to meet the *Toronto Target* adopted by both the State and Commonwealth Governments.

4.49 In the short-term, there is insufficient commercial incentive for the SECV to reverse this trend due to the:

- **reliance on brown coal for the generation of Victoria's electricity;**
- **amount of existing excess generating capacity; and**
- **the potential for the SECV to maximise income by increasing electricity sales in the interstate market.**

4.50 Nevertheless, in the long-term, it may be necessary for the SECV to review Victoria's reliance on brown coal electricity production and further evaluate plans for future open cut development in the light of the need to reduce carbon dioxide emissions.

- *RESPONSE provided by the Chief General Manager, SECV*

  Any review of fuel sources for electricity generation to meet carbon dioxide emission targets should take into account action taken nationally and internationally.

  Further, greenhouse targets should take into account all sources and emissions. For example, carbon dioxide emissions comparisons with black coal ignore the methane greenhouse gas in underground mining. As previously advised, the new brown coal technologies referred to in the response to paragraphs 4.38 to 4.40 of this Report, are expected to reduce greenhouse emissions by 10 to 15 per cent than the emission levels from black coal electricity generation.

PART 5

Cost of Open Cut Operations

INTRODUCTION

5.1 In 1991-92, total operating expenditure of the 3 open cuts of $408.4 million, as detailed in Table 5A, represented 27 per cent of the total costs of the Production Group of $1 534 million or 13 per cent of the SECV's total operating costs of $3 144 million. An analysis of expenditure for the 6 months to 31 December 1992 indicated that although there was some reduction in open cut operating costs during this period, these reductions were more than offset by an increase in depreciation and finance charges. The analysis also indicated that labour costs for the 6 months to 31 December 1992 proportionally increased by nearly 10 per cent compared with 1991-92, reflecting the costs associated with reductions in employee numbers through voluntary redundancies.

5.2 Given the significance of open cut operating expenditure, reductions in these costs through greater efficiencies will improve the overall competitiveness of the SECV.

TABLE 5A
TOTAL OPERATING COSTS
($million)

	1991-92				*Total 1 July to 31 Dec. 1992*
Expenditure	*Yallourn*	*Morwell*	*Loy Yang*	*Total*	
Labour and associated costs	23.4	26.7	24.8	**74.9**	**41.1**
Material, contract and miscellaneous costs	11.0	12.1	11.9	**35.0**	**17.0**
Other costs *(a)*	45.3	40.8	48.4	**134.5**	**64.0**
Direct operating costs	**79.7**	**79.6**	**85.1**	**244.4**	**122.1**
Depreciation	6.2	12.5	36.6	**55.3**	**33.5**
Finance charges	12.8	11.2	84.7	**108.7**	**67.8**
Total expenditure	**98.7**	**103.3**	**206.4**	**408.4**	**223.4**

(a) Other costs include the cost of services provided by other SECV business units including maintenance, production technology and corporate overheads.

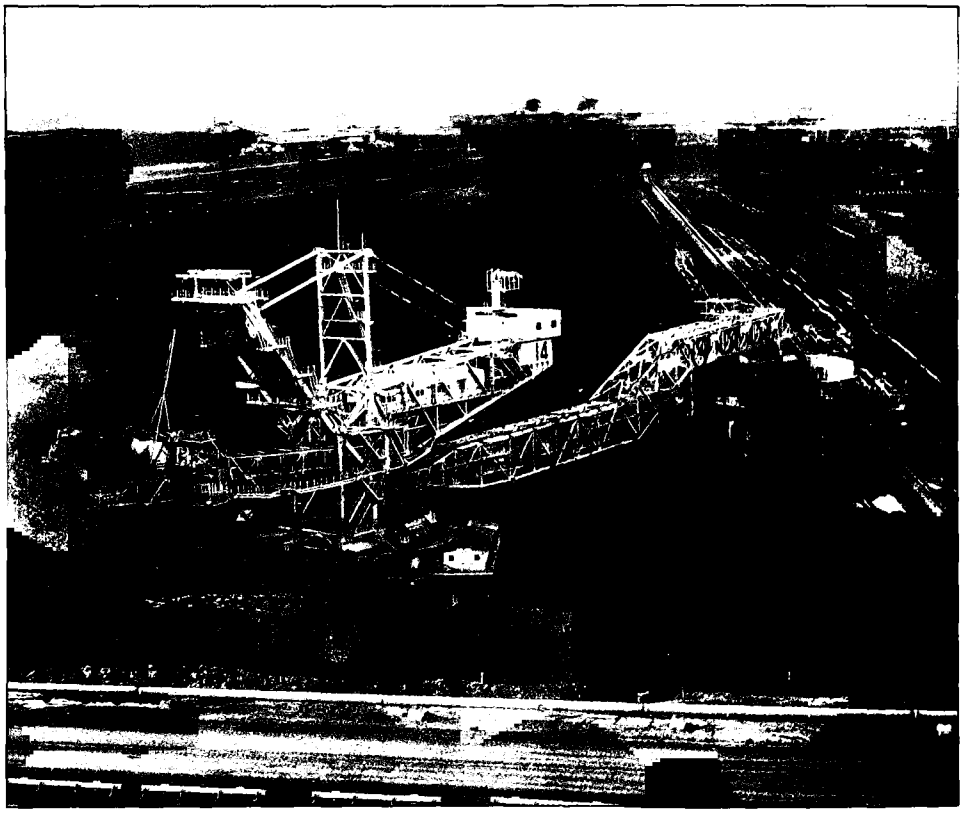
Source: Production Group performance reports June 1992 and December 1992.

COSTS OF OPEN CUT OPERATIONS COMPARED WITH PRIVATE SECTOR MINES

5.3 A comparison of the current operating costs of open cuts with those of private sector mining operations was undertaken. To facilitate this comparison, specialist assistance from Minenco Pty Ltd was obtained to compile comparative figures from a number of Australian and overseas mining operations. The mines used for comparative purposes are similar in size to the Latrobe Valley open cuts but vary in relation to the materials mined and the methods of mining. In particular, some mines are metal mines and use truck and shovel operations with blasting required to free the ore and overburden, while other mines are coal mines using bucketwheel excavators for the removal of overburden. One of the overseas mines uses bucketwheel excavators for both the removal of overburden and coal.

5.4 In undertaking these comparisons one would expect that the direct operating costs of the 3 Latrobe Valley open cuts would be significantly lower than those mines used in the comparison. This expectation is based on the SECV's capability to use large capacity plant and conveying systems due to:

- the ease of excavation of Latrobe Valley coal in comparison with the private sector mining operations arising from the low overburden to coal ratio and the continuous nature of Latrobe Valley coal seams;
- the higher production capacity of the SECV's plant in comparison to less sophisticated mining processes such as truck and shovel operations; and
- the fact that more capital intensive operations should reduce the need for a significant labour force.

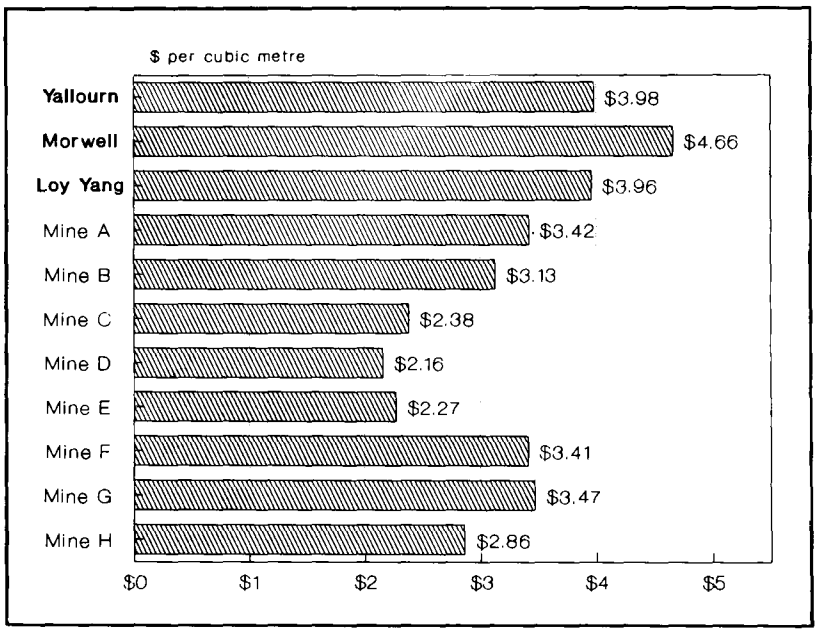


Coal excavation in the Latrobe Valley.

5.5 These competitive advantages are to some extent offset by the higher capital acquisition, financing and depreciation costs associated with the highly capital intensive production processes. As illustrated in Table 5A, depreciation and finance charges totalled $164 million in 1991-92 and accounted for 40 per cent of open cut expenditure. Due to different methods of accounting for depreciation and financing capital acquisitions between organisations and to facilitate comparison of open cut operating costs with other mines on a consistent basis, these items have been excluded from the initial analysis.

5.6 Chart 5B provides a comparison of the operating cost of open cuts with those of private sector mines. The chart indicates that the 1991-92 operating costs of the 3 SECV open cuts substantially exceed those of comparable mining operations with costs of excavation per bank cubic metre for the open cuts varying between $3.96 and $4.66 as compared with rates of $2.16 to $3.47 for the other mining operations. The SECV open cut operating costs are between 14 and 116 per cent higher than the operating costs of the other mining operations which supports conclusions detailed throughout this Report that there is scope to achieve further efficiencies in the SECV's open cut operations.

CHART 5B
COMPARATIVE COST OF MINING OPERATIONS



Note: To enable consistent comparison of each of the mines, comparison is on the basis of cost per bank cubic metre. This basis assumes that overburden and coal are excavated in the same proportion to the overburden to coal ratio and allow for the density of the material excavated in each mine.
Refer to paragraph 5.7 of this Report for further explanation of Yallourn operations.
Private sector mines represented by Mine A through to Mine H.
Costs exclude depreciation and finance charges.

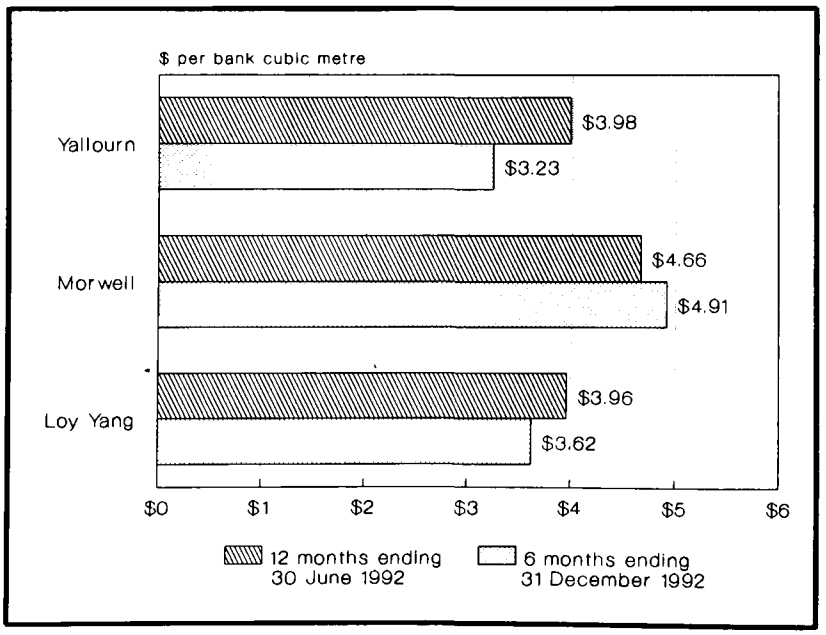
5.7 Although Chart 5B has been adjusted to reflect normal levels of overburden excavation by Yallourn open cut, the actual cost of excavation in 1991-92, was $4.95 per cubic metre. This higher cost is due to the low levels of overburden removal at Yallourn resulting from the development and relocation of a new coalfield. In addition, delays in overburden removal at Morwell led to lower than usual excavation levels of overburden. These delays arose due to industrial action in late 1991 relating to the proposal to privatise this activity and the damage suffered by a dredger during an earth slip in early 1992.

5.8 These lower excavation levels while maintaining the same level of employees results in a substantially higher excavation cost. Accordingly, the SECV needs to gain increased work force flexibility in order to reduce the unit cost of coal and overburden removal especially with respect to accommodating variations in excavation requirements (refer to Parts 6 and 7 of this Report).

CHANGES IN OPEN CUT OPERATING COSTS

5.9 An analysis of the operating costs of the 3 open cuts for the 6 months to 31 December 1992 reveals an improvement in the cost per bank cubic metre for the Yallourn and Loy Yang open cuts while Morwell has continued to incur costs at a high rate compared with the volume of material excavated as detailed in Chart 5C.

CHART 5C
COMPARATIVE COST OF SECV OPEN CUT OPERATIONS



5.10 The major reasons for the changes in the direct costs of excavation for the 6 months to 31 December 1992 include:

- Higher levels of overburden excavation at both Yallourn open cut and Loy Yang open cut enabling more effective utilisation of operational employees has resulted in a lower unit cost for material removed. Specifically:
  - Following commencement of operations in a new coalfield, Yallourn open cut has removed 2.8 million cubic metres of overburden in the 6 months to 31 December 1992 as compared with 0.6 million cubic metres removed in a full year in 1991-92; and
  - Loy Yang open cut has progressively increased the level of overburden removal from 5.6 million cubic metres for a full year in 1991-92 to 4 million cubic metres for the 6 months to the 31 December 1992.
- The cost per bank cubic metre in Morwell open cut has increased by 3.8 per cent due to minor increases in direct operating costs while maintaining similar levels of production to those undertaken in 1991-92.

5.11 Despite the reduction in costs per bank cubic metre for Yallourn and Loy Yang open cuts over the 6 months to 31 December 1992, costs still remain high relative to most other mining operations, particularly given the inherent competitive advantages of SECV open cut operations.

5.12 While direct comparison of depreciation and finance costs cannot be easily made with the other mining operations for the reasons previously provided, it is likely that these costs would be substantially larger in the case of the SECV compared with other mining operations due to the capital intensive nature of operations and the historical reliance on external borrowing to finance capital acquisitions. Inclusion of depreciation and finance costs substantially increases the costs per bank cubic metre for 1991-92 to $6.11 for Yallourn open cut, $6.06 for Morwell and $9.60 for Loy Yang. The extremely high cost for Loy Yang open cut results from greater depreciation and finance costs due to the more expensive acquisition costs of the larger capacity and more modern plant utilised in its operations. **High depreciation and finance charges have further implications for the competitiveness of open cut operations as these costs must still be recovered through revenue which adversely affects electricity prices charged to consumers.**

CONCLUSION

5.13 Recent action by the Production Group involves the identification and elimination of unnecessary costs and includes reductions in employee levels, proposals for the external contracting of aspects of maintenance and progressive improvements in plant utilisation. Senior SECV management maintain that if electricity generation is to be made competitive with private sector electricity generation, the need for total cost savings of between 30 and 40 per cent throughout the Production Group will be required.

5.14 The principal factors influencing the comparatively higher SECV operating costs are summarised throughout this Report and include the:

- **low utilisation rates of major plant** (refer to paragraphs 6.22 to 6.27 of this Report);
- **excessive maintenance costs** (refer to paragraphs 6.58 to 6.62 of this Report);
- **low productivity of operational and maintenance employees** (refer to paragraphs 6.16 to 6.20 of this Report); **and**
- **substantial excessive employee numbers due to minimum manning agreements and other inefficient work practices** (refer to paragraphs 7.20 to 7.50 of this Report).

■ *RESPONSE provided by the Chief General Manager, SECV*

In the 9 months from June 1992, the mines have reduced manning by more than 15 per cent and have strategy plans in place to achieve an overall productivity improvement of 80 per cent in the 3 years to June 1995.

It is recognised that overburden system plant utilisation has been low and current initiatives, including the contracting of overburden removal, are addressing this matter.

Major operations and maintenance initiatives include enterprise proposals to improve operators flexibility and the outsourcing of the majority of the open cut maintenance functions to private industry.

PART 6

Open Cut Production and Maintenance

OVERALL CONCLUSION

6.1 As referred to previously, the Latrobe Valley open cuts represent one of the largest coal mining operations in the world and contribute to the production of approximately 85 per cent of Victoria's electricity requirements through the supply of brown coal to the SECV's thermal power stations. Given the importance of open cut operations and the significant capital investment in plant and equipment it is essential that coal-winning processes and related activities, including the maintenance of plant, are undertaken with the aim of ensuring a reliable and cost-efficient supply of coal.

6.2 The review of the utilisation and maintenance of plant identified significant opportunities for productivity and efficiency improvements within open cut operations. The achievement of these improvements should ensure that coal supplied to the thermal power stations is provided effectively at a cost that is competitive with alternative power generators.

6.3 As a result, the SECV should take action to overcome current deficiencies in the utilisation and maintenance of plant by:

- improving the utilisation and output of plant to best practice benchmarks;
- ensuring that appropriate preventative maintenance programs are implemented; and
- improving the financial performance and productivity of the Production Maintenance Unit.

6.4 The extent to which productivity improvements can be achieved within open cuts has been illustrated by the improved performance of the Morwell Overburden Group. Following the proposal for the contracting of overburden removal to the private sector, the Morwell Overburden Group substantially increased output and productivity by relaxation of restrictive work practices and improved utilisation of plant.

6.5 Due to the low storage capacity for excavated coal and the limit on coal production to that volume necessary to meet daily electricity requirements, additional production from improved plant performance and utilisation is not warranted at the current levels of electricity demanded by Victorian consumers. Therefore, improved performance would provide the SECV with opportunities to consider options aimed at reducing operating costs. These options could encompass discontinuing the use of lower capacity or older plant, or reducing the number or length of open cut production shifts.

6.6 Specific audit findings relating to the utilisation and maintenance of plant included:

- **One hundred per cent reliability of coal supplies to power stations, which currently ranges between 97.5 per cent at Morwell open cut and 100 per cent at Loy Yang open cut, should be achievable for all open cuts** (refer to paragraphs 6.13 to 6.17 of this Report);
- **The utilisation rates of dredgers were generally less than half that of best practice benchmarks resulting in under-utilisation of both plant and employees** (refer to paragraphs 6.22 to 6.27 of this Report);
- **The hourly output of dredgers during actual operation was in most cases significantly below the guaranteed output rates achievable under technical specifications** (refer to paragraphs 6.28 to 6.30 of this Report);
- **The lack of effective preventative maintenance programs has in the past led to high levels of unscheduled and breakdown maintenance and the need to maintain excessive plant levels to meet unforeseen plant stoppages** (refer to paragraphs 6.42 to 6.47 of this Report);
- **Time actually spent on performing maintenance and associated duties by electrical and mechanical maintenance workers is low within open cuts with productive time ranging between 30 and 45 per cent** (refer to paragraph 6.53 of this Report);
- **In 1991-92, despite the exclusive contract arrangements with open cuts and power stations, the Production Maintenance Unit of the SECV incurred a substantial loss on its operations of $39.4 million** (refer to paragraphs 6.58 to 6.62 of this Report); and
- **Inadequate co-ordination and restrictive work arrangements, between open cut and maintenance unit employees, has resulted in a number of concerns including the timeliness of maintenance performed, unclear accountability for maintenance tasks and the lack of maintenance services as required** (refer to paragraphs 6.63 to 6.67 of this Report).

6.7 To address these issues, the Production Group is currently initiating changes aimed at improving productivity throughout the open cuts. Specifically, the Production Group has recently commenced improving the utilisation of plant, implementing preventative maintenance programs and considering the external contracting of maintenance currently undertaken by the maintenance unit.

OPEN CUT PRODUCTION

Production methods

6.8 Brown coal reserves in the Latrobe Valley are estimated to exceed 200 billion tonnes. Given these vast coal reserves, the ease of access and the fact that the thermal power stations have been sited along side the open cuts, the SECV can progressively expose and excavate those coal reserves that can be most efficiently mined.

6.9 The relatively easy access to coal reserves, and the substantial volume of coal required for electricity generation enables the use of capital intensive production techniques. These techniques incorporate the use of large bucketwheel dredgers supported by an extensive conveyor system to transport excavated material to the storage facilities at power stations. A major factor affecting plant availability given the size and complexity of open cut plant, is the requirement for extensive and ongoing maintenance. Maintenance ranges from routine tasks performed regularly while plant is temporarily non-operational, to major servicing which can result in the unavailability of dredgers for periods up to 6 months.

6.10 To obtain access to coal reserves, the Commission must first remove overburden from open cuts (i.e. soil, clay and other material lying above and between coal seams). The majority of overburden is removed by bucketwheel dredgers supported by conveyor systems which transport overburden to overburden dumps or for use as backfill material in areas of the mine which are no longer required for coal production. The removal of overburden by dredgers is at times supplemented by the use of mobile plant. These are known as truck and shovel operations and occur when the type of material or its location is unsuitable for removal by dredgers or to make up shortfalls in removal performance targets by dredgers. In the past, mobile removal of overburden has been performed by mobile plant groups located at Yallourn and Loy Yang. However, in 1992, removal of overburden by mobile plant at Morwell open cut was externally contracted (refer to paragraphs 6.68 to 6.86 of this Report).

6.11 Within the open cuts, overburden is progressively excavated, normally with the aim of exposing sufficient coal to meet production requirements for the next 6 to 12 months. However, overburden removal is not continuous throughout the year with volumes removed varying significantly depending on production requirements and plant availability. For example, during the development of new coalfields, such as the Yallourn open cut Eastfield, exposed coal reserves in the current mine field are built up to allow coal to continue to be excavated when plant is subsequently relocated to new fields. However, when the open cuts are extended into new coalfields overburden removal may reduce, while plant is relocated.

Overburden removal by bucketwheel excavation.

6.12 Once the overburden is removed, a number of coalfaces in each open cut are mined simultaneously on different levels, in effect a terraced arrangement. Due to this mining method and the cost and time necessary to relocate dredgers and conveyor systems to support mining at these different levels, a number of dredgers and conveyor systems are operated in each open cut. The aim of this production method is to ensure a continuous coal supply to power stations even in the event of plant maintenance or the relocation of plant.

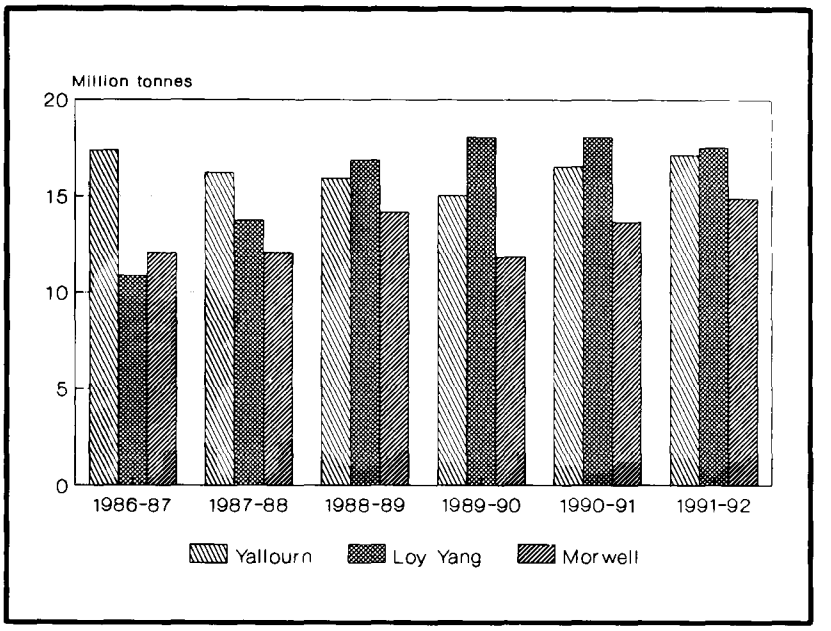
Production levels

6.13 The level of coal to be excavated by each open cut is determined on the basis of the electricity generation targets of each power station. Based on these targets:

- The level of coal excavated by Morwell open cut is generally less than that of the other 2 open cuts due to the lower coal requirements of the Hazelwood power station; and
- Levels excavated within Loy Yang open cut have generally increased in line with the increasing generation provided by Loy Yang A power station. The level of coal production is likely to further increase with the commissioning of the first stage of Loy Yang B in 1993.

6.14 Actual coal production of the 3 open cuts since 1986-87 is provided in Chart 6A.

CHART 6A
COAL PRODUCTION



6.15 The reliability of coal supply by open cuts to the relevant power stations is considered by the SECV to represent a major measure for open cut performance. Any failure of open cuts to meet coal supply demand may result in the inability of power stations to meet generation requirements and the need to transfer generation to another power station. However, while coal reliability measures the effectiveness of open cut operations in meeting production requirements, this indicator of itself does not:

- provide measurement of the efficiency with which open cut operations are undertaken; or
- account for lower production targets as a result of reduced levels of electricity generation by power stations.

6.16 In 1991-92, the average coal reliability was 100 per cent at Loy Yang open cut, 99.9 per cent at Yallourn open cut, and 97.5 per cent at Morwell open cut. Similar levels of reliability have continued to be achieved in the 6 months to 31 December 1992 with 100 per cent at Loy Yang, 98.4 per cent at Yallourn and 98.1 per cent at Morwell.

6.17 **In audit opinion, given the low utilisation rates of plant a 100 per cent level of reliability should be achieved by all 3 open cuts** (refer to paragraphs 6.22 to 6.27 of this Report).

Coal production processes and storage facilities

6.18 Coal is only excavated as needed due to limited storage facilities located at each of the power stations. Coal storage bunkers at the Yallourn W and Hazelwood power stations have a maximum coal storage capacity of approximately a half day's coal requirements. Loy Yang A currently has storage capacity sufficient for 24 hours of power generation but this will decrease when Loy Yang B1 is commissioned in 1993.

6.19 As a result of low storage capacity for coal at power stations, current workforce arrangements and the need for ongoing supplies of coal to continue power generation, excavation occurs on a 24 hour shift basis. However, excavation is not continuous with dredgers operating on average for approximately 30 per cent of the total available time on any one day (refer to chart 6B of this Report). Further, the average spare time of 17.6 per cent identified in paragraph 6.25 is almost entirely due to the cessation of coal excavation as maximum storage capacity has been achieved. **The limited storage capacity therefore prevents further production until coal reserves have been run down by power stations.**

- *RESPONSE provided by the Chief General Manager, SECV*

  The coal supply reliabilities achieved by SECV open cuts at 97.5 per cent and 100 per cent are among some of the highest in the world. The achievement of these reliabilities permit relatively small coal stockpiles to be held at each power station. The achievement of higher reliabilities is expected with the improved maintenance strategies put in place and the achievement of greater operations workforce flexibility.

  Coal reliability is only one of the measures used for open cuts. Plant utilisation, plant output, plant delays and the cost of coal are others that are used regularly to monitor the efficiency of the operations against production demands.

UTILISATION OF PLANT AND EQUIPMENT

Background

6.20 Depending on existing production requirements, each dredger may be assigned specifically to coal or overburden excavation, or may excavate a mix of both. Dredgers used in the Latrobe Valley open cuts, depending on size, age and technical capabilities, have the capacity to remove coal at a rate of between 1 100 and 3 700 tonnes per hour. The purchase and construction of these high capacity dredgers require considerable capital outlay as evidenced by the cost of $30 million for Dredger Number 27 which commenced operation in Loy Yang open cut in August 1992.

6.21 Given the substantial capital investment in the plant and equipment, it is important that operations are undertaken efficiently to justify the cost. To achieve maximum output of plant, open cuts must:

- achieve high levels of plant utilisation, that is the total operating time of plant; and
- maximise the output capacity of plant, that is the volume of coal or overburden that a dredger can excavate in each hour of operation.

Low utilisation rates of open cut plant

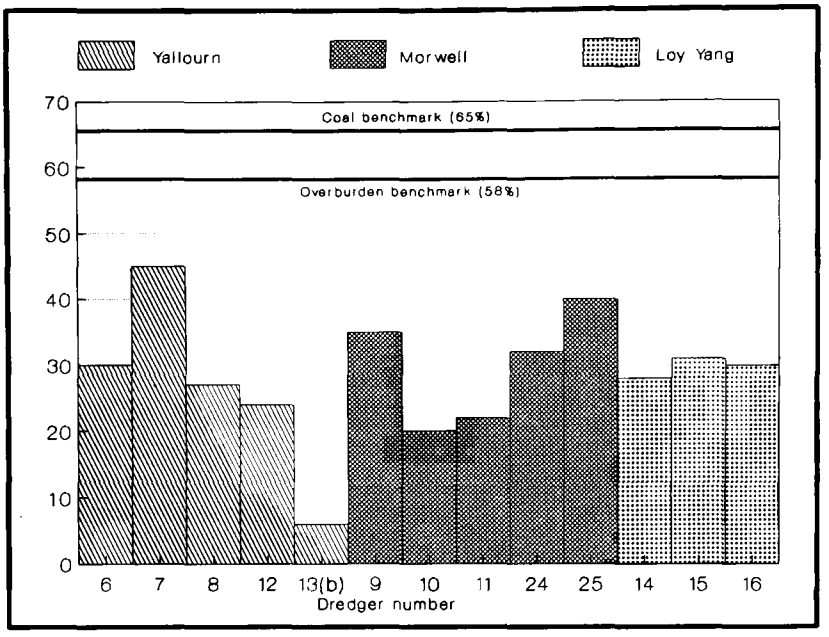
6.22 The Production Group has recently established performance targets for dredger availability for coal production. However, when evaluating the efficiency and effectiveness of operations, monitoring of plant availability of itself does not indicate the extent to which plant is actually utilised in operations and may therefore not identify underutilised plant or inefficient operations. Accordingly, at the request of audit, investigation by Minenco Pty Ltd established that best practice benchmarks for the utilisation of bucketwheel dredgers and conveyor systems were:

- a minimum of 65 per cent of total time for the excavation of coal; and
- 58 per cent of total time for the removal of overburden.

6.23 The lower utilisation benchmark for overburden excavation is due to the higher levels of maintenance of dredgers and breakdown of stackers at overburden dumps and difficulties in removing some types of overburden during wet months.

6.24 Chart 6B compares the utilisation rates of all open cut dredgers to the best practice benchmarks. **Analysis of the average utilisation of dredgers in the 3 open cuts throughout 1991-92 revealed that the benchmarks identified by Minenco Pty Ltd were not achieved. The best utilisation rate of 45 per cent achieved by Dredger Number 7 at Yallourn open cut was still 20 per cent less than the benchmark of 65 per cent. The majority of other dredgers performed at less than half of the best practice utilisation levels.** In fact, failure to meet best practice benchmarks for dredger utilisation has been ongoing. Performance indicators maintained by open cuts since 1987 disclosed that utilisation rates higher than 40 per cent have rarely been achieved.

CHART 6B
DREDGER UTILISATION COMPARED WITH BEST PRACTICE BENCHMARKS, 1991-92 *(a)*



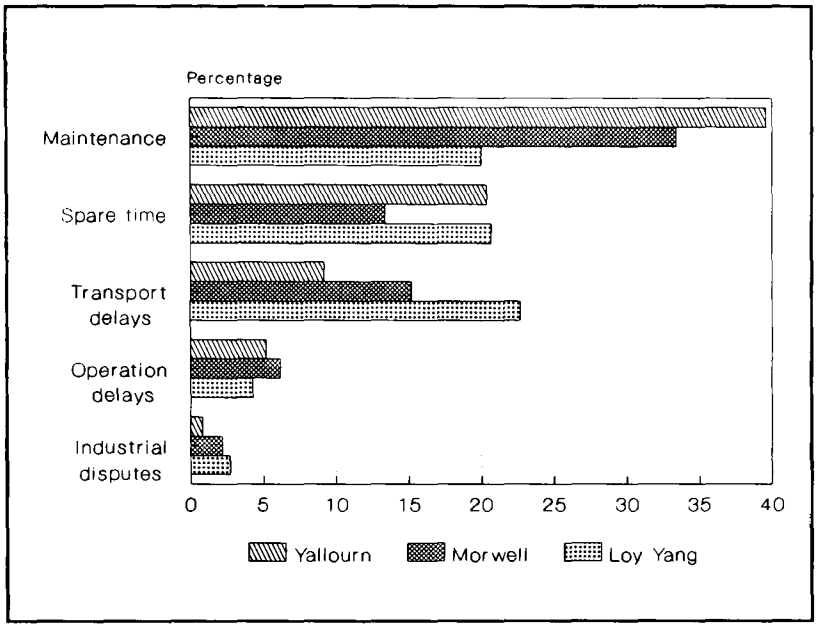
(a) Dredger utilisation expressed as a percentage.
(b) The low utilisation rate for Dredger No. 13 occurred as a result of the movement of plant to the new East Field.

6.25 In 1991-92, the low plant utilisation rates in the open cuts can be attributed to:

- Excessive downtime due to maintenance requirements with an average maintenance time for all dredgers of 33 per cent of total available time ranging from 11 per cent for Dredger Number 24 at Morwell open cut to 89 per cent for Dredger Number 13 at Yallourn open cut;
- Spare time which results from non-operation of plant due to a lack of demand for coal by power stations or full coal storage bunkers restricting further coal excavation. Spare time averaged 17.6 per cent of total available time with spare time of up to 34 per cent for Dredger Number 14 at Loy Yang open cut;
- Other non-productive time resulting from operational delays such as dredger crews performing inspections and minor maintenance;
- Transport delays averaging 15 per cent for all dredgers. These delays related to the time taken to relocate or repair supporting plant such as conveyors; and
- Delays due to industrial disputes which on average accounted for up to 2 per cent of the total available time for dredger operations.

6.26 Chart 6C summarises the reasons for the non-operation of dredgers in 1991-92.

CHART 6C
REASONS FOR NON-OPERATION OF DREDGERS



Source: SECV Production Group Report, Open cut performance indicators to June 1992.

6.27 The failure by open cuts to achieve the best practice benchmarks for the utilisation of dredgers, indicates that there is further scope for efficiencies to be achieved in open cut operations. However, in the light of the fact that reliable supplies of coal have been maintained despite the low utilisation of plant, it is apparent that significant levels of surplus operating capacity exist at current production levels.

- *RESPONSE provided by the Chief General Manager, SECV*

  The comments on dredger system productivity appear to be based on an incomplete appreciation of the coal and overburden operations in the Latrobe Valley. Improvements to the utilisation and output from current equipment is a major part of each mine's strategy of improving the productive capability and lowering costs.

  Given the nature of our brown coal operations, with very small stockpiles between the mine and the power station, plant availability is the critical measure, rather than actual utilisation. The Report has failed to recognise this. Benchmark targets for plant availability, taking into account the specific Latrobe Valley mining conditions, have been established.

The 65 per cent coal dredger plant utilisations would apply for open ended systems - i.e. basically as applying in the German mines, or with very large coal stockpiles. The Latrobe Valley mine design allows for a significant amount of 'planned' spare plant time to ensure the appropriate supply reliability. Simulation studies have clearly shown that it is more economical to provide this plant capability at the operating face in the mine rather than maintain additional large coal stockpiles with the associated need for more plant at the stockpile (but with less plant in the mine itself).

Coal plant availabilities of 65 per cent are currently being achieved against a benchmark target 75 per cent and overburden system utilisations have improved 22 per cent over the past 6 months.

Output capacity of open cut plant

6.28 Guaranteed output rates or target rates represent the level of excavation that should be achievable by each dredger for each hour of actual utilisation based on the dredger's technical specifications. In 1991-92, the actual output of each dredger was between 52 and 115 per cent of the target output as detailed in Table 6D.

TABLE 6D.
1991-92 DREDGER OUTPUT RATES PER HOUR *(a)*

Open cut	*Number*	*Target rate (tonnes)*	*Actual rate (tonnes)*	*Output (%)*
Yallourn	6	1 310	1 370	105
	7	1 130	1 300	115
	8	1 750	1 930	110
	12	2 020	2 210	109
	(b) 13	1 500	1 260	84
Morwell	9	1 520	1 250	82
	10	1 600	1 470	92
	(b) 10	1 340	700	52
	11	2 020	1 560	77
	(b) 24	850	880	104
	25	1 870	1 400	75
	(b) 25	1 350	850	63
Loy Yang	14	3 685	3 600	98
	(b) 14	2 500	1 400	56
	15	3 685	3 325	90
	16	3 685	2 350	64
	(b) 16	2 500	2 150	86

(a) Coal output rates represent tonnes excavated per hour of operation. Overburden output rates represent cubic metres excavated per hour.
(b) Relates to overburden removal.

Source: SECV Production Group Report, Open cut performance indicators to June 1992.

6.29 In the majority of cases, the Yallourn open cut has achieved or exceeded target output rates for each dredger with far lower rates obtained in Morwell and Loy Yang open cuts. The failure to achieve target rates is of particular concern at Loy Yang open cut given the relatively newer and more technologically advanced plant. The ability of Yallourn open cut to achieve target rates is indicative of the fact that the targets set are achievable.

6.30 Open cuts have recently established hourly target output rates for each dredger with the aim of progressively increasing output to ensure that at least the target output rates detailed in Table 6D are achieved by 1996. In the case of dredgers currently exceeding target rates, particularly at Yallourn open cut, target rates have been re-examined and increased to reflect actual performance over the last 5 years.

- *RESPONSE provided by the Chief General Manager, SECV*

  The SECV has established benchmarks for dredger output which take account of the difference between German mining conditions and the Latrobe Valley requirements. Specifically, some 30 per cent of the Morwell open cut operations require a machine arrangement not catered for in the standard dredger guaranteed rate tests and all Latrobe Valley open cuts have to excavate sticky clay overburden whilst the German machines dig largely a loose sandy material. The Loy Yang open cut machines dig a combined coal/interseam face, having to separate each material, and this also is not catered for in the guaranteed rates quoted.

Potential for more efficient production

6.31 Based on benchmarks provided to audit, substantial scope exists for increasing both the levels of plant utilisation and hourly output rates for certain dredgers. In particular, current dredger utilisation is generally less than half that of best practice standards (refer to Chart 6B of this Report). Therefore, subject to the achievement of target hourly output rates, coal production by each open cut has the potential to be at least double that currently obtained.

6.32 As electricity cannot be stored for future use coal production is limited to that necessary to meet electricity requirements. Accordingly, additional production resulting from improved plant performance and utilisation is not warranted. Therefore, improved production performance would provide the SECV with the opportunity to review other options which lower open cut operating and maintenance costs. For example:

- discontinuing the use of lower capacity or older and less efficient dredgers within open cuts while maintaining required coal supplies to power stations; or
- reducing the number of production shifts or the time allocated to an individual shift.

6.33 The more effective utilisation of plant should result in substantial cost savings.

- *RESPONSE provided by the Chief General Manager, SECV*

  The SECV has plans to retire older plant in both the Morwell and Yallourn open cuts. At Loy Yang open cut, plant utilisation is planned to increase by some 50 per cent with increase in coal demand from the Loy Yang B power station.

  The Report has made a suggestion regarding changing production shift manning without fully considering the dramatic effect such a change could have on supply reliability given that only 2 coal machines are manned in each open cut at any one time.

THE MAINTENANCE OF PLANT AND EQUIPMENT

Introduction

6.34 The effective maintenance of plant and equipment is of major importance in ensuring the efficiency of an organisation's operations. The majority of maintenance within open cuts is undertaken by the Production Maintenance Unit (PMU) under internal contractual arrangements with open cut management. This maintenance is supplemented by maintenance employees under the direct responsibility of open cut management who are mainly responsible for the repair of plant when breakdowns and faults occur.

6.35 Maintenance represents a significant proportion of the total open cut operational costs. In 1991-92, based on information supplied by open cut management, the total cost of maintenance exceeded $80 million or 19 per cent of the total costs of open cuts. This cost comprised both payments to the PMU and the cost of maintenance undertaken directly by open cut employees.

6.36 Within open cuts, the maintenance of plant represents a major factor in the non-operational time of dredgers and other plant as indicated in Chart 6C and paragraph 6.25 of this Report. For open cuts to improve plant utilisation to best practice standards:

- there should be a program of preventative maintenance in operation;
- plant should be maintained to a standard that reduces the level of unscheduled maintenance stoppages due to plant breakdowns and faults; and
- plant maintenance time and costs should be minimised.

6.37 In recent years, a number of reviews have been commissioned by the SECV to examine the effectiveness of the maintenance function within open cuts including:

- *A review of maintenance practices in open cut coal mines* - by Minenco Pty Ltd in November 1991; and
- *Loy Yang mine: Maintenance improvement program* - SECV joint review with IBM Utilities Group in May 1992.

6.38 Such reviews have identified the need for substantial improvement to the maintenance function, in particular:

- the development of appropriate maintenance strategies;
- clearly assigning accountability for plant performance; and
- maintaining relevant information systems to facilitate the planning and performance of maintenance.

6.39 As a result of these recommendations, management is progressively implementing changes aimed at improving the effectiveness of maintenance and the consequential availability of plant. Major initiatives have included:

- the development of long-term maintenance plans;
- recognition of the need for greater preventative maintenance with plans incorporating regular downtime to enable inspections and repairs in advance of breakdowns occurring;
- the development of performance measures to assess the effectiveness of the maintenance function including the level of breakdowns and the extent to which planned maintenance has been undertaken;
- the development of specific maintenance specifications for major items of plant; and
- the implementation of more detailed contractual arrangements with the PMU to clearly specify the maintenance work to be undertaken, the cost and timing of maintenance to be performed and accountability for the completion and quality of maintenance.

6.40 In addition, the General Manager of the Production Group is currently initiating action aimed at improving the efficiency of maintenance including consideration of the external contracting of a wide range of maintenance tasks where this is shown to be more cost-effective.

6.41 The action initiated by management is commended and should be continued. In particular, priority should be given to addressing the matters referred to in the following paragraphs.

Preventative maintenance program

6.42 In the past, maintenance of plant within open cuts has mainly involved:

- major overhauls, performed every 3 to 5 years by the PMU, which require plant to be removed from service for periods of up to 6 months;
- repairs of faults and other minor maintenance to plant and equipment during scheduled maintenance by the PMU, and on breakdown of plant by the open cuts maintenance employees; and
- regular safety checks of key components of major plant.

6.43 An effective preventative maintenance program requires regular scheduled inspections and overhauls of plant aimed at:

- maximising the operating life of plant and equipment to minimise the level of future capital investment;
- minimising unscheduled stoppages to production caused by the breakdown of plant; and
- reducing the total costs of maintenance.

6.44 In discussions with mining enterprises in the private sector, it was maintained that in most cases, preventative maintenance of major plant is scheduled on a weekly or fortnightly basis.

6.45 Despite the benefits of an effective preventative maintenance program, low priority has been given in the past to regular scheduled maintenance of open cut plant with emphasis placed on the repair of plant as breakdowns and faults occur. The SECV Production Group management has advised that as a result of the lack of preventative maintenance:

- High levels of unscheduled and breakdown maintenance have occurred on dredgers and associated open cut plant such as conveyor systems. As a consequence open cut plant has incurred substantial downtime which has led to the need to maintain excessive plant levels to meet unforeseen plant stoppages; and
- The resources necessary to perform breakdown maintenance cannot be accurately planned leading to substantial under-utilisation of maintenance employees which contributes to the high cost of maintenance within open cuts.

6.46 The ineffectiveness of the current open cut maintenance function is indicated by the downtime occasioned by the extent of unscheduled maintenance experienced in the open cuts. In its report to the SECV on labour productivity and coal plant performance in August 1992, a consultant concluded that the proportion of maintenance time to operating time of open cut plant was up to 130 per cent higher than the time allocated to maintenance in comparable German brown coal mining operations.

6.47 Given the need to improve the utilisation of plant to best practice standards and to ensure that plant life is maximised, it is important that plant be effectively maintained and the levels of breakdowns of plant be substantially reduced. To achieve a more acceptable level of performance, action needs to be taken to improve the level of preventative maintenance undertaken.

- *RESPONSE provided by the Chief General Manager, SECV*

  Maintenance strategies are being implemented as part of the open cuts plans to achieve world best practice performance. The strategies include implementation of operator-maintainer teams in each open cut and the contracting in of major maintenance activities.

Maintenance information systems

6.48 To facilitate the planning and monitoring of maintenance, appropriate information systems should be established to record:

- the extent, timing and cost of maintenance for each item of plant;
- details of previous faults occurring in plant; and
- time previously taken to perform maintenance tasks.

6.49 Each open cut operates a computerised system to record maintenance details. However, during discussions with Production Group management, audit was advised that information contained in these systems could not be relied upon to record all the required facets of plant operation and maintenance. As a result, these systems were of limited value as a tool for the prediction of plant faults, the monitoring of maintenance performance and the scheduling of future maintenance. To overcome these deficiencies in the computerised systems, additional manual information was in many cases required to be maintained by open cuts.

6.50 Action is necessary to upgrade current information systems to ensure that all information necessary for the planning and monitoring of maintenance activities is maintained.

- *RESPONSE provided by the Chief General Manager, SECV*

  The SECV is currently reviewing the use of the existing Plant Maintenance System (PMS) which, when it was introduced into the Latrobe Valley operations in the early 1980s was one of the most advanced systems available worldwide. New systems have been introduced into the transmission grid operations and these are currently being evaluated for the Production Group mines and power stations.

On-site maintenance of conveyor systems.

Open cut maintenance employees

6.51 Within open cuts, certain minor and routine maintenance tasks are undertaken by employees directly under the responsibility of open cut management. These employees include mechanical and electrical maintenance employees responsible for the repair of faults and breakdowns associated with open cut plant and equipment. To ensure the availability of maintenance employees to undertake required tasks on a timely basis and accordingly minimise the proportion of plant downtime arising from breakdowns and faults, maintenance is generally performed over a 24 hour period.

6.52 However, the extent and variety of duties that can be performed by these open cut employees has been limited. Specifically, arrangements with the PMU have in the past not allowed open cut employees to perform preventative maintenance tasks (refer to paragraph 6.63 of this Report).

6.53 Management has advised that the restriction on the performance of preventative maintenance has resulted in under-utilisation of open cut employee time. Information provided by Morwell open cut indicated that in 1991-92, the average productive time of these employees to total time available was 45 per cent for mechanical maintenance employees and 30 per cent for electrical maintenance employees. Maintenance employees in the other open cuts had similar low levels of productive time in 1991-92. Open cut management has attempted to improve the utilisation of maintenance employee time.

6.54 To achieve significant improvements in the productivity of maintenance employees the SECV will need to ensure employee flexibility particularly in the area of preventative maintenance tasks. Such an initiative should be given greater priority to ensure that employee time is effectively utilised.

- *RESPONSE provided by the Chief General Manager, SECV*

  Restrictive work practices are one of the main reasons why the management has initiated the outsourcing of much of the maintenance activity.

The production maintenance unit

Organisation and responsibilities

6.55 The PMU was established in September 1991 to consolidate the various maintenance activities previously performed in groups attached to each power station and open cut. It now represents the largest business unit within the Production Group with 2 453 employees or 35 per cent of the total employees of the Production Group at 30 June 1992.

6.56 The PMU is organised into a number of separate groups each responsible for providing services to open cuts and power stations. These groups include:

- Project maintenance, which is responsible for on site major repairs and overhauls of plant in open cuts and power stations;
- Routine maintenance which is split into groups located at the site of each open cut and power station. Within open cuts, this group performs routine and ongoing maintenance of dredgers and conveyor systems not allowed to be undertaken by open cut maintenance employees;
- Specialist services including the hire of labour and mobile plant. In the past, specialist services have assisted in the removal of overburden at open cuts; and
- Mechanical and transport workshops which are responsible for maintenance that cannot be undertaken on site.

6.57 Electrical workshops, previously under the control of the PMU were sold in 1991 and are now operated privately by Siemens Industries Pty Ltd.

Financial performance

6.58 The PMU provide maintenance and other services to the other business units of the Production Group through internal contracting arrangements. In the past these services have been exclusively assigned to the PMU without competitive tendering from private industry.

6.59 In 1991-92, revenue raised by the PMU amounted to $185.1 million of which 95 per cent related to services provided to other business units including maintenance and other services for open cuts of $87.4 million, with total expenditure of the PMU of $224.5 million. This has resulted in a net loss for 1991-92 of $39.4 million despite the exclusive contract conditions under which the unit operate. A summary of the PMUs revenue and expenditure is provided in Table 6E and indicates the high costs relating to direct expenditure, that is labour and materials, incurred by the unit.

TABLE 6E
PRODUCTION MAINTENANCE UNIT FINANCIAL RESULTS, 1991-92

	$million
Revenue -	
Services to other units -	
Open cuts	87.4
Power stations	73.2
Other	16.1
Other revenue	8.4
Total revenue	185.1
Less Expenditure -	
Labour	121.0
Material and contracts	68.7
Depreciation	7.7
Finance costs	2.0
Other expenditure *(a)*	25.1
Total expenditure	224.5
Net Loss	**39.4**

(a) Other expenditure includes corporate overheads and internal purchases from other SECV units.

Source: Annual internal report for maintenance 1992.

6.60 A major factor in the adverse financial performance of the PMU is due to the unnecessarily high level of employees and the consequential under-utilisation of their time. An internally generated report in 1991-92 for maintenance indicated that the proportion of employee time utilised in revenue earning activities as compared with total available time was only 80 per cent, resulting in a significant proportion of time for which no revenue was earned. The SECV further advised audit that although 80 per cent of the time is billed, effective maintenance time of these employees is only 30 to 45 per cent of total available time. This is supported by the audit findings.

6.61 Production Group management have advised that action is underway to address the adverse financial performance of the PMU. Initiatives include reductions in employee numbers and consideration of the external contracting of services where this is shown to be more cost-effective.

6.62 If services provided by the PMU were provided in a more cost-efficient manner, the competitiveness of other business units would be improved. Given the impetus towards improving the competitiveness of the Production Group and the SECV as a whole, it is important that the production maintenance costs be substantially improved by either increasing productivity or contracting out services.

Relationship with open cuts

6.63 While the PMU is organisationally responsible to each open cut manager, in practice, the unit is fully autonomous and has its own management, reporting directly to the General Manager of the Production Group. Discussions with open cut and Production Group management revealed a number of concerns over the operations of the PMU and the co-ordination of its activities with open cuts operations. These concerns included:

- The timeliness of maintenance tasks performed by the PMU. The time taken for this unit to complete similar tasks varied significantly. The PMU's annual report for 1991-92 indicated that on average only 64.5 per cent of tasks performed by the routine and project maintenance and specialist services units were completed on time, compared with a target rate of 90 per cent;
- The availability of PMU employees. Employee availability was not always co-ordinated with the maintenance requirements of open cuts which was compounded by the inflexibility of the PMU work force. Specifically, routine maintenance employees allocated to a particular open cut or power station are rarely relocated to another business unit even when more pressing maintenance requirements have been identified. This has resulted in substantial unproductive time of maintenance employees and delays in completing urgent maintenance; and
- The restrictive work arrangements between the PMU and the direct maintenance employees of the open cuts which unnecessarily increased the total costs of the maintenance function (refer to paragraph 7.39 of this Report).

6.64 In 1992, a major review of the maintenance function within the production unit was jointly undertaken by Production Group management and union representatives. This review recommended that all maintenance be undertaken by the PMU. In line with this recommendation, mechanical and electrical maintenance employees currently under the direct responsibility of open cuts were to be transferred to the responsibility of the PMU. The aim of this initiative was to improve the planning, co-ordination and efficiency of maintenance by removing the current restrictive work arrangements between PMU and open cut maintenance employees by more clearly allocating responsibility for maintenance tasks.

Inspection of dredger by the PMU.

6.65 To date, the recommendations of the maintenance review have not been implemented. Management of open cuts expressed concern that the centralisation of all maintenance responsibility under the PMU would compound problems in the co-ordination and delays of maintenance particularly as:

- access to emergency electrical and mechanical maintenance services, previously undertaken by open cut employees allocated to operating shifts, would be dependent on the availability of PMU employees;
- time associated with arranging the attendance of the PMU would increase the non-operational time of major plant; and
- control over and accountability for the maintenance and performance of plant would largely be removed from open cut responsibility.

6.66 The views of open cut management were supported by private sector mining sources consulted by audit.

6.67 In light of this view and management's concern, audit considers that the recommendation of the maintenance review should be reassessed. Specifically, consideration could be given to:

- **placing all maintenance under the control and responsibility of the operators of plant;**
- **employing only those staff to undertake regular and routine maintenance that can be effectively employed;**
- **contracting, internally or externally, other maintenance tasks where employment is not justified; and**
- **contracting maintenance that cannot be undertaken by open cut employees on a competitive tender basis.**

■ *RESPONSE provided by the Chief General Manager, SECV*

The Production Group maintenance strategy which has been underway for some 6 months, will result in objectives being attained.

OVERBURDEN REMOVAL

Levels of overburden removal

6.68 Annual targets for the volume of overburden removal are established to ensure that sufficient volumes of coal are exposed to meet power station requirements.

6.69 In recent years, concern has been expressed by Production Group management at the failure of open cuts to achieve required levels of overburden removal. To date, this has not resulted in shortages in coal supply to power stations. However, given the movement of coal operations to new fields in both Yallourn and Morwell over the last 12 months, and the increased coal requirements that will become necessary with the commissioning of Loy Yang B power station in 1993, the required levels of overburden removal in each of the 3 open cuts will need to be substantially increased.

6.70 During 1991-92 and the 6 months to 31 December 1992, all mines have achieved higher levels of overburden removal than in previous years. Actual overburden levels removed compared with established targets for these periods are detailed in Table 6F.

TABLE 6F
LEVELS OF OVERBURDEN REMOVAL
(million cubic metres)

	1991-92		*6 months to December 1982*	
Open cut	*Actual*	*Target*	*Actual*	*Target*
Yallourn	0.6	(a)0.5	2.8	2.6
Morwell	3.5	3.2	1.6	1.4
Loy Yang	5.6	7.0	4.4	2.8

(a) Low levels of overburden excavated at Yallourn open cut in 1991-92 during movement to East Field.

Source: Production Group Business Reports.

6.71 The improved performance in respect of overburden removal at Morwell open cut occurred subsequent to the SECV proposal that overburden removal be contracted to the private sector. Comment on this proposal is provided in the following paragraphs.

Contracting of Morwell overburden removal

Initial proposal

6.72 In recent years, Morwell open cut did not achieve the necessary levels of overburden removal at a competitive cost. In addition, due to the opening of a new field in Morwell open cut in 1992, the level of overburden removal required in the immediate future increased to an estimated 5 million cubic metres each year, double the average 2.5 million cubic metres of overburden removed from Morwell open cut over the previous 5 years.

6.73 To meet the higher overburden removal requirements, the SECV proposed the contracting of Morwell overburden to the private sector. The SECV estimated that this proposal would result in costs savings of up to $19 million over the 5 years of the contract even after the payment of voluntary departure packages to employees no longer required for overburden removal.

6.74 In line with the evaluation, removal of Morwell overburden and the operation and maintenance of associated plant was subsequently contracted to a private sector joint venture, Roche-Thiess-Linfox (RTL). Under the arrangements with RTL, certain SECV Morwell Overburden Group (MOG) employees were to be paid voluntary departure packages by the SECV and re-employed by the RTL joint venture. At the time of the initial proposal the remaining MOG employees had the option of receiving voluntary departure packages without re-employment or being placed in positions within other areas of the SECV's Latrobe Valley operations.

Final agreement

6.75 Following industrial action, and negotiations between the SECV, the then Minister and relevant trade unions, significant variations were made to the original proposal in January 1992. Major variations to the contract were:

- RTL retained overall management responsibility for overburden removal but was required to sub-contract approximately 50 per cent of mobile overburden removal for the 6 months to July 1992 to the SECV's Yallourn mobile plant group. Only mobile plant removal was possible until July 1992 due to damage to the Morwell overburden dredger following a major earth slip in the open cut;
- RTL was contracted for all mobile plant overburden removal requirements after July 1992; and
- Removal of overburden by dredger would be undertaken by the MOG for a 6 month trial period to January 1993. Under arrangements with these employees, this Group's performance would then be assessed at the completion of this period on the basis of comparisons with the productivity and cost efficiency that would be achievable had RTL removed the overburden by dredger. The continuation of this arrangement after January 1993 was dependent on the MOG achieving cost and performance targets.

Performance of the Morwell Overburden Group

6.76 The MOG has substantially improved its productivity as evidenced by significantly higher levels of overburden removal than those previously excavated in the Morwell open cut. For the 6 month period to 31 December 1992, the MOG had excavated 1.6 million cubic metres of overburden which exceeded the target established by management of 1.4 million cubic metres and represented over 60 per cent of the average annual level of overburden removal previously achieved.

6.77 In addition, overburden removal costs by dredger within the Morwell open cut have substantially reduced from an approximate average of $5.76 per cubic metre over the 5 years prior to the arrangement with RTL to $2.50 per cubic metre in the 6 months to December 1992. **This cost per cubic metre was substantially lower than the price for overburden removal negotiated with RTL under the original contracting proposal.**

6.78 The major factors for the improved productivity of overburden removal at Morwell include:

- The relaxation of restrictive work practices that previously operated within the MOG. For example:
  - more flexible minimum manning arrangements, in that absent employees are only replaced if required to meet production targets, thereby resulting in substantial reduction in overtime costs ; and
  - operators and other employees performed a wider variety of tasks than those permitted under demarcation arrangements.

- Improved utilisation of plant associated with the removal of overburden. For example, the average utilisation rate of Dredger Number 10 has been improved, exceeding 50 per cent of total available time which was substantially higher than the utilisation rates achieved for the dredger since 1986-87 which have seldom exceeded 40 per cent.

6.79 Given the performance of the MOG since July 1992, the arrangements for the excavation of overburden by this group have been extended for a further 6 months with RTL to provide additional overburden removal as required by the use of mobile plant. It is important that both management and MOG employees ensure that the improved performance and work practices reform continues.

6.80 The MOG has made substantial improvements in productivity and efficiency following the introduction of competitive targets based on tenders received from private sector organisations as distinct from initiatives introduced under the structural efficiency program (refer to paragraphs 7.53 to 7.94 of this Report).

6.81 However, while substantial improvement has been achieved in the Morwell Overburden Group further improvements could be achieved by permanently reducing manning levels on all shifts to reflect actual operating requirements.

6.82 It was also disclosed that despite the reduction in overtime used for overburden removal, MOG employees continued to receive high overtime payments as employees remained assigned to coal production activities and the overtime equalisation scheme operating in Morwell open cut (refer to 7.48 and Tables 7E and 7F of this Report).

6.83 To date, work reforms implemented by the MOG and Yallourn open cut (refer to Part 7 of this Report) have not been similarly achieved across all open cuts. **Action should be taken to ensure that work reforms are implemented in all open cuts so that productivity and efficiency improvements can be maximised and the SECV can be competitive when the National Grid is introduced.**

Contractual arrangements with RTL

6.84 Under the contractual arrangements between RTL and open cuts, a management fee of $94 000 per month is payable to RTL for the overall management of the MOG. However, audit was advised by open cut management that in practice, the management of the MOG continues to be largely undertaken by open cut management with only limited input from RTL.

6.85 Given the level of the fee paid to RTL, it is important that the management input of RTL be maximised in overseeing the operations of the MOG. Accordingly, discussions should be held between open cut and RTL management to appropriately allocate management tasks.

Conclusion - arrangements with the Morwell Overburden Group

6.86 The MOG has substantially improved its productivity and efficiency following the stimulus provided by the proposal for the external contracting of overburden removal. The improvements achieved by the MOG demonstrate the potential to improve performance in all areas of operations of the 3 Latrobe Valley open cuts.

- *RESPONSE provided by the Chief General Manager, SECV*

  Action is in hand to spread work reforms to all open cuts and there is already evidence that this is happening.

PART 7

Management of Human Resources

OVERALL CONCLUSION

7.1 The performance of an organisation's work force is critical to the production process, this is particularly the case in the SECV where labour costs generally represent a major proportion of the total cost of operations. Accordingly, SECV should aim to optimise employee productivity by maximising the level and quality of output per employee, while minimising the cost of production without affecting the safety of the work environment.

7.2 In recent years, the SECV has increasingly recognised the key role of effective human resource management as a means of achieving greater productivity and reducing the costs of generation and distribution. A number of initiatives have been implemented by the SECV, at both the corporate level and within open cuts, with the aim of improving efficiency and reducing labour costs.

7.3 Despite these initiatives, opportunities to improve the efficiency of operations remain. Specifically, the audit of the management of human resources disclosed that:

- **The productivity of open cut employees measured in terms of the volume of material excavated was comparatively lower than private sector mining operations despite the competitive advantages and capital intensive nature of open cut production processes. The audit identified that opportunities exist to improve open cut productivity by up to 100 per cent** (refer to paragraphs 7.9 to 7.13 of this Report);
- **Based on 1991-92 production levels, employee numbers within open cuts could be reduced by approximately 50 per cent with potential ongoing savings to the SECV in the order of $50 million a year** (refer to paragraphs 7.14 to 7.19 of this Report);
- **The enforcement of fixed manning agreements within open cuts has resulted in excessive manning levels, the manning of non-operational plant and substantial costs associated with the unnecessary replacement of absent employees by other employees at overtime rates** (refer to paragraphs 7.24 to 7.33 of this Report);
- **The existence of work practices particularly demarcation arrangements between employees and unions which are not conducive to efficient open cut operations and prevent the flexible use of labour** (refer to paragraphs 7.34 to 7.40 of this Report);
- **Overtime which primarily arises from the existence of fixed minimum manning agreements and inefficient work practices and resulted in payments of $7.5 million in 1991-92 at an average cost per employee of $6 200** (refer to paragraphs 7.43 to 7.50 of this Report);

- **Average pay increases to open cut employees of approximately 36 per cent between 1989 and 1992 were considerably higher than the average wage increases of 13 per cent awarded to Australian salary and wage earners over the same period. Despite the payments to employees in the form of higher remuneration, structural efficiency programs incorporating award restructuring and skills training did not result in significant benefits to the SECV** (refer to paragraphs 7.84 to 7.94 of this Report); and
- **Accountability within open cuts could be improved by ensuring a clear allocation of responsibilities within open cuts and between open cuts and other business units** (refer to paragraphs 7.110 to 7.117 of this Report).

7.4 Given these significant deficiencies, action is required by the SECV to improve the management of human resources, particularly by further reductions in employee levels and the elimination of inefficient work practices. The SECV has recognised that similar human resource management issues exist throughout the Production Group and that improvement across the whole group would result in further substantial savings. It is recognised that in recent months the SECV and Production Group management have initiated significant action to address many of the inefficiencies in open cut operations. Audit has been advised by the SECV that these initiatives have been successful as demonstrated by reductions of 1 450 in employee numbers achieved across the Production Group since July 1992 with further progressive reductions planned until 1995.

7.5 Recent and proposed developments in the Australian electricity industry, outlined in Part 4 of this Report, illustrate the importance of the success of initiatives aimed at improving the productivity and efficiency of human resources. These developments are of great significance to the SECV with improvements in productivity essential if it is to maintain and improve its competitive position in relation to interstate electricity generation authorities.

7.6 Comments on the extent to which human resources have been effectively managed in open cuts are provided in the following paragraphs.

- *RESPONSE provided by the Chief General Manager, SECV*

  Prior to the audit review, the SECV had retained advice from Minenco to set benchmark manning levels for Latrobe Valley open cuts. Based on this advice the SECV estimate savings resulting from reduce manning in open cuts of $20 million a year.

  Changes in fixed manning and work practices are being achieved addressing the issues raised in this Report.

  Production employee numbers were reduced from 7 107 in June 1992 to 5 657 at 1 April 1993.

  Overtime has been reduced by 25 per cent across the Production Group since June 1992.

EMPLOYEE LEVELS

Background

7.7 A major objective of any organisation should be to employ only those employees necessary to efficiently achieve the required output, with due regard to the health and safety of employees. To achieve this objective one would expect an organisation to:

- not employ personnel in excess of operational requirements;
- contract specialised services in instances where to employ in-house personnel is not cost-effective; and
- ensure that employees are trained in a variety of skills which can be utilised as required without the imposition of undue restrictions such as demarcation arrangements between employee groups.

Employee levels within open cuts

7.8 At 30 June 1992, employees directly associated with open cuts totalled 1 207 with an estimated equivalent of 546 employees assigned from the Production Maintenance Unit to perform duties, directly associated with the operations of open cuts, such as routine maintenance, major plant overhauls and the operation of mobile plant. Electrical maintenance and transport services work previously undertaken in-house for the entire Production Group have been contracted out. Table 7A details the total annual labour cost including associated overheads. Direct open cut employee costs totalled $73.2 million (or 30 per cent of the total operating costs excluding depreciation and finance charges of the open cuts in 1991-92). The estimated cost associated with production maintenance employees was $29 million in 1991-92.

TABLE 7A
OPEN CUT LABOUR, 1991-92

Open cut	*Employee numbers*	*Cost*
		($m)
Yallourn	*(a)*396	22.8
Morwell	*(a)*412	25.9
Loy Yang	*(a)*399	24.5
Total open cuts	1 207	73.2
Production maintenance *(a)*	546	29.0
Total employees	**1 753**	*(b)***102.2**

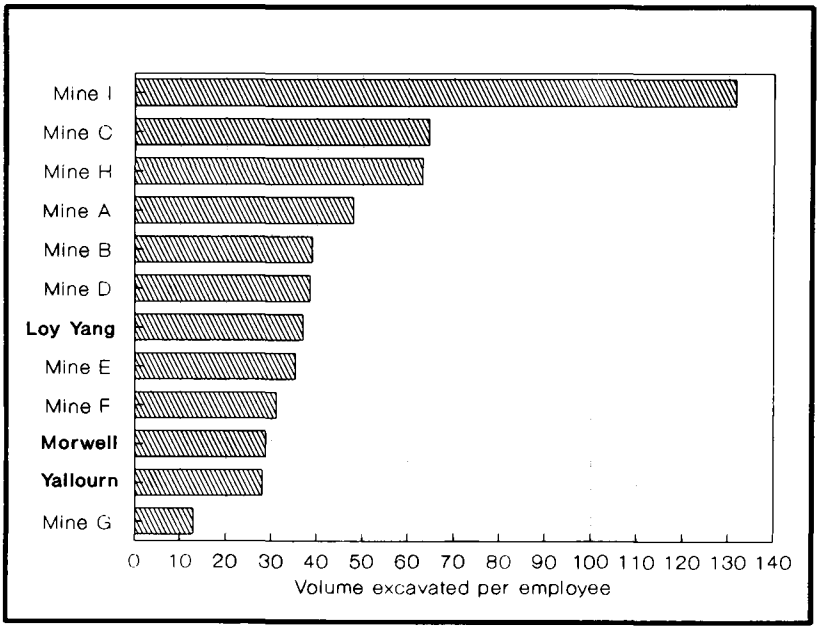
(a) Approximate cost based on estimated equivalent employees involved in maintenance and the operation of mobile plant.
(b) The cost of $1.6 million for voluntary departure packages is excluded from labour costs.
Source: SECV Annual Report.

Open cut productivity

7.9 For efficient open cut operations, it is important to maximise productivity of operational and maintenance employees. Within open cuts, the level of employee productivity is measured on the basis of the volume of material excavated for each open cut employee.

7.10 With the assistance of Minenco Pty Ltd, the productivity of the open cuts was compared with productivity levels achieved in a range of other mining operations. The results of this evaluation are provided in Chart 7B.

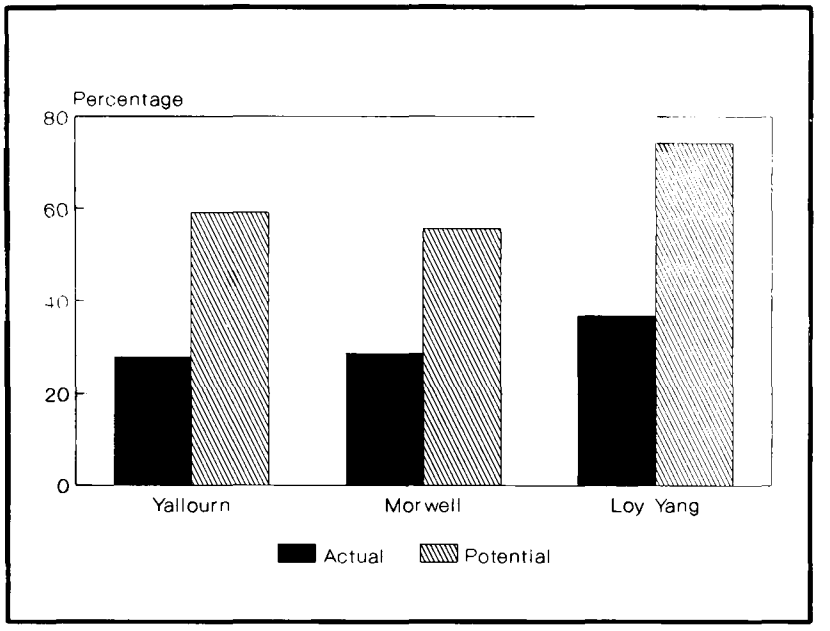
CHART 7B
COMPARISON OF PRODUCTIVITY, 1991-92



7.11 As stated previously, one would expect that comparatively higher levels of employee productivity would be achieved by the SECV open cuts due to the capital-intensive nature of operations and the competitive advantages associated with the mining of Latrobe Valley brown coal. However, as illustrated in Chart 7B, the SECV open cuts generally achieved lower productivity than most other mines included in the comparison. Information provided by open cut management indicated that the productive time of both operational and maintenance employees would normally not exceed 45 per cent of total available time.

7.12 Minenco Pty Ltd provided an assessment of the levels of productivity achievable based on current production requirements and the production processes utilised in the open cuts. Minenco Pty Ltd estimated that open cut productivity could increase by approximately 100 per cent through improved utilisation of employee time and reduced employee levels. Chart 7C provides a comparison of current open cut productivity compared with potential productivity as identified by Minenco Pty Ltd.

CHART 7C
ACTUAL AND POTENTIAL PRODUCTIVITY OF OPEN CUT EMPLOYEES



7.13 In audit opinion, the main reasons for the low productivity levels in open cuts is the under-utilisation of both operational and maintenance employees and employee numbers in excess of that required to meet current production levels.

- *RESPONSE provided by the Chief General Manager, SECV*

  The SECV has reduced open cut employee numbers by 15 per cent over the past 9 months and has achieved improvements in work force flexibility. Further productivity and work force flexibility improvements are planned. The comparison with other mines on Chart 7B using the latest data would indicate that the output productivity of the Latrobe Valley mines is currently equivalent to the majority of the other mines quoted.

Excessive staff levels in open cuts

7.14 Table 7D provides a comparison of the actual employee numbers in the 3 open cuts at 30 June 1992 with levels determined by the audit consultant Minenco Pty Ltd. These levels are based on commercial mining operations and reflect the consultant's judgement of the number of employees required to meet current coal and overburden excavation volumes of the 3 open cuts.

TABLE 7D
COMPARISON OF EXISTING OPEN CUT EMPLOYEES TO ESTIMATED REQUIREMENTS, 1991-92
(employee numbers)

	Yallourn		*Morwell*		*Loy Yang*		*Total*	
Function	*Existing*	*Estimate*	*Existing*	*Estimate*	*Existing*	*Estimate*	*Existing*	*Estimate*
Operations*(a)*	278	95	229	111	210	101	717	307
Maintenance*(b)*	291	114	266	128	258	121	815	363
Support*(c)*	45	64	75	68	98	68	221	200
Total	617	**273**	570	**307**	566	**290**	1 753	**870**

(a) Includes all employees associated with the excavation of coal and the removal of overburden.
(b) Includes all maintenance employees under the direct responsibility of open cuts and an estimate for each open cut of employees of the Production Maintenance Unit.
(c) Includes management and support service employees such as administration, fire services and technical services.

7.15 As illustrated in Table 7D, total employee numbers of 1 753 within the 3 open cuts at 30 June 1992 were approximately 50 per cent in excess of the numbers estimated by the consultant to meet current production levels. Audit estimates that reductions in staff numbers would result in ongoing savings to open cuts and the SECV in excess of $50 million each year.

7.16 While the scope for staff reductions within open cuts is substantial, it should be pointed out that equivalent savings were achieved by the Morwell Briquette and Power facility. As part of the aim to make the facility more efficient, work practices have been revised and employee numbers reduced from 681 at 1 January 1992 to 331 at 31 December 1992.

7.17 Between July and December 1992, further net staff reductions of 76 direct open cut employees have occurred. Management intends that ongoing staff reductions will continue unless increased production levels are required, a scenario which is unlikely in the current climate of excess generating capacity and the move towards the outsourcing of certain functions particularly in the maintenance area.

7.18 Audit considers that in the absence of a significant growth in production requirements, substantial scope exists for further reductions in employee numbers and action by management to achieve these reductions should be vigorously pursued. In audit opinion the level of employees within open cuts is excessive in relation to the levels of coal production due mainly to:

- **the failure to effectively implement programs in open cuts aimed at improving the performance of the work force;**
- **an inflexible work force characterised by the existence of restrictive work practices in open cuts such as minimum manning and demarcation arrangements which limit the extent to which available resources can be assigned to meet changing levels in production requirements;**
- **high levels of overtime and absenteeism; and**
- **the low productivity of operations and maintenance staff (refer to Part 6 of this Report).**

7.19 A detailed audit of staffing levels within other areas of the Production Group, including power stations and sections of the production maintenance group not related to open cut operations, was not undertaken. However, discussions with managers of power stations and other business units within the Production Group indicated that restrictive work practices and other inefficient operations are widespread throughout the Production Group and if addressed could result in the achievement of similar levels of staff reductions to those identified as attainable in open cuts.

- *RESPONSE provided by the Chief General Manager, SECV*

  Much of the quoted results in relation to work force numbers are as at June 1992 which does not take account of the significant reductions in 1992-93. Also, these numbers do not highlight the devolvement of duties to the mines over the years. Personnel reductions in the 9 months since June 1992 exceed 15 per cent in the mines and projected reductions to June 1995 are 40 per cent.

  Audit projected cost savings are different to that provided by Minenco to the SECV in November 1992 and used to establish best practice manning levels. Based on the Minenco advice the SECV has targeted numbers reductions to be achieved by June 1995, which provide future ongoing savings of some $20 million a year. The projections of future savings are therefore some 40 per cent of those claimed in the Report. These SECV projected future savings form the basis of SECV business plans. The SECV would contend that the audit figures have a less reliable basis.

  Personnel reductions in the Production Group will have reached an estimated 2 000 during the 1992-93 year.

RESTRICTIVE WORK PRACTICES

Background

7.20 Work practices operating throughout industry aim to provide the most cost-efficient and productive work techniques while protecting the health and safety of employees. In recent years there has been a growing recognition of the need to reform those work practices that add significantly to production costs without improving productivity or the welfare of employees. Reform has gained momentum as a result of the need to improve the competitiveness of Australian industry during a recessionary economic climate.

7.21 Restrictive practices have been perpetuated since the early 1970s and continue to exist throughout SECV operations. In recent years, the SECV has placed greater emphasis on the need for major work place reform and has attempted to eliminate restrictive work practices through initiatives including the structural efficiency program and award restructuring.

7.22 Restrictive work practices within open cuts and the Production Group have been recognised as one of the principal areas where reform would result in substantial benefits in terms of reduced costs and greater productivity. Restrictive practices which affect the efficiency of open cuts are due in the main to:

- Fixed manning agreements. These agreements exist between open cut management and employees and prescribe minimum manning levels for operational and maintenance tasks which result in employee levels in excess of the actual number necessary to achieve required output levels;
- Demarcation arrangements. These arrangements strictly define the tasks that can be performed by groups of employees and extend across management, supervisors and employees alike, and exist between different trades, unions, work gangs and work shifts; and
- The interpretation of industrial awards.

7.23 The extent and impact of these restrictive practices are outlined below.

Fixed manning agreements

7.24 Formalised fixed manning agreements covering all operational areas typically include conditions prescribing:

- the minimum level of manning that is required on each work shift before plant and equipment can be operated by employees; and
- the replacement of any employee who is absent, unavailable for part of the shift or undertaking on-job-training in order to maintain the agreed minimum manning levels.

7.25 The application of these agreements has resulted in inefficiencies with substantial impact on the operating costs of the open cuts as detailed in the following paragraphs.

Excessive minimum manning levels

7.26 Employees on operating shifts within open cuts include a supervisor and power workers responsible for the operation of dredgers, travelling stackers and conveyor systems with actual manning varying between open cuts depending on the minimum levels agreed between management and employees. Current minimum manning numbers for operating shifts are 11 at Yallourn, 13 at Morwell, and 15 at Loy Yang. **In audit opinion, based on manning levels within private industry and the views of open cut management, these shift manning numbers are excessive and result in the under-utilisation of employee time. Discussions with open cut managers revealed reductions of up to 40 per cent could be made to minimum manning levels on operating shifts, a situation which is not significantly improved by the allocation of additional tasks, such as the performance of additional maintenance by operating employees.**

7.27 The extent of excessive manning is further illustrated by the number of operators assigned to dredgers on each shift. Agreed manning levels on the bucketwheel dredgers in the open cuts require 4 operators for each dredger at Yallourn, 6 at Morwell, and 6 to 7 at Loy Yang to perform duties including the excavation and off-loading of coal, bulldozing around the coal bed, cleaning, conducting inspections, training and basic maintenance. Employee levels between open cuts is based partly on differences in the type of plant utilised and the minimum manning agreements negotiated with local management. Both private industry mining sources and open cut management have maintained that such duties could be competently undertaken by a maximum team of 3 operators regardless of dredger capacity levels without adversely effecting performance levels or employee health and safety.

7.28 Of particular concern is the excessive number of operators employed on Loy Yang dredgers. Specifications allow the operation of the dredgers to be undertaken by one person at most times. However, when the plant came into service in the early 1980s, discussions between union representatives and open cut management resulted in assigning 3 positions on each shift to the operation of these dredgers. Subsequently, as the result of an industrial dispute, the Australian Industrial Relations Commission ruled that dredgers at Loy Yang be manned by 6 people on each shift. This decision was in line with union submissions that as dredgers at Loy Yang were larger than dredgers at Yallourn and Morwell additional operating employees were necessary. In audit opinion, the additional numbers are excessive given the technological advantages of the Loy Yang plant which, as stated above, can be operated by a single person.

Manning of non-operational plant

7.29 At Loy Yang and Morwell open cuts, plant and equipment has in the past been manned on each shift to the minimum numbers required in the agreements even when this plant is not required due to excess production or maintenance shut-downs. Further, under the local agreements, once a shift has commenced and duties allocated, employees remain assigned, even when the plant is no longer operating, and cannot be moved to other duties such as the replacement of absent employees assigned to other operational plant and equipment.

7.30 The above arrangement does not compare favourably with the greater flexibility which currently exists at Yallourn open cut under an informal arrangement with employees. Under this arrangement, employees are reassigned to other tasks in the case of the non-operation of plant.

Replacement of absent employees

7.31 All fixed manning agreements require an employee who is absent to be replaced by another employee on paid overtime irrespective of whether a replacement is actually required given the operating levels of plant and equipment including the circumstances identified in paragraph 7.29 of this Report. Circumstances where overtime is paid include the replacement of absent employees due to:

- Another employee undertaking on-the-job training. In such circumstances this employee is not considered part of the minimum manning level agreed for the shift; and
- Recreation and sick leave and other unplanned absences.

7.32 Given the inefficiencies associated with minimum manning agreements within open cuts, it is important to ensure that manning levels of plant and equipment represent only that necessary to enable production to be undertaken efficiently and safely.

7.33 In the past, attempts by open cut management to revise manning arrangements have generally failed to obtain union and employee assent. However, audit was advised by open cut management that over recent months greater flexibility in manning arrangements has been introduced in certain areas of open cut operations, including the Yallourn open cut and the Morwell overburden group. Specifically, the replacement of absent workers required under formal manning agreements is not always routinely enforced when such staff are needed to meet production requirements. However, these more flexible arrangements do not extend across all open cut operations.

Demarcation arrangements

7.34 Inefficient practices in open cuts also occur as a result of demarcation arrangements between trades, unions and employees of different SECV business units including open cuts. Such demarcation arrangements are disruptive to open cut operations by preventing the flexible use of labour. The strict interpretation of the organisation and allocation of work between different groups of employees has permeated down to even the most basic tasks performed in open cuts resulting in the less than optimum use of available employee time and skills. The following examples are indicative of the numerous inefficient demarcation arrangements.

Employment of trades assistants

7.35 Despite insufficient skilled tasks to fully utilise qualified tradespeople these employees will not perform semi and unskilled tasks which are within their capabilities. As a result, it is necessary to employ up to 2 assistants on each shift. These trades assistants are employed in open cuts to perform duties including driving vehicles to work sites, rigging and basic tool handling. Audit was advised by open cut management that the volume of these duties does not justify the current level of trades assistants employed.

Demarcations between similarly skilled employees

7.36 A number of demarcation arrangements exist between employees with the same trade qualifications and skills but who have traditionally performed different tasks or are classified at different levels. The application of this type of demarcation normally results in the replacement of absent employees by an employee of the same pay classification at overtime rates. Examples of this form of demarcation include:

- Employees prevented from acting in more highly classified positions due to the absence of a supervisor or operator from a shift even though these employees possess the skills necessary to perform the higher level tasks. For example, an absent supervisor must be replaced by another supervisor despite the fact that other employees on the shift possess the skills and experience to competently act in the supervisory role during short term absences of the supervisor; and
- Plant operations not commencing unless 2 similarly classified dredger operators are in attendance on each shift despite other staff on the shift possessing the necessary skills to assist in the operation of dredgers.

Union demarcations

7.37 Each union represented in open cuts often enforce claims to restrict the duties performed by their members, or to ensure exclusive rights for their members to perform certain tasks. An example of this form of demarcation is the division of tasks for the operation and maintenance of dredgers. Dredger operators, members of the Construction Forestry and Mining Employees Union (CFMEU), have responsibility for dredger operation and constantly monitor instrumentation for any breakdowns of any electrical and mechanical components on the dredger. Although the operators also possess basic maintenance skills, any equipment fault or breakdown, including minor faults such as re-setting of circuit breakers or replacing light globes, has in the past required the shut-down of the plant while awaiting the attendance of a maintenance worker from the Production Maintenance Unit (PMU).

7.38 Demarcation arrangements also operate within a union where members with different trade qualifications possess similar skills. Despite possessing the same skills, members within the one union will often not undertake tasks in the open cuts traditionally performed by another trade.

7.39 This form of demarcation is particularly prevalent among maintenance employees who are members of the Metal Employees Workers Union (MEWU). For example:

- Within the Production Group, welding is restricted to boilermakers while fitters and turners are only allowed to perform machining tasks. This is despite the fact that boilermakers and fitters and turners possess many identical skills, including training in welding. The impact of this demarcation is increased by arrangements with maintenance unions and employees which prevent open cuts from directly employing boilermakers to perform welding tasks. Welding associated with the breakdown of plant in open cuts must be undertaken by a boilermaker and his assistant allocated from the PMU. Audit was advised that this restrictive arrangement often results in unnecessary delays in resuming plant operation due to the lack of immediate availability within the open cut of the required maintenance employee.
- Restrictions exist between the tasks that may be performed by different maintenance shifts and the allocation of duties between open cut maintenance employees and the employees of the maintenance group including:
  - Maintenance tasks commenced by a particular shift or work group will not be continued by another work group. This restriction is enforced even when the completion of the task is vital to the operation of open cut plant and the next shift is not involved in urgent tasks. As a result, the completion of maintenance is either delayed or the employees who commenced the task are paid overtime to complete the maintenance; and
  - Shift maintenance workers employed by the open cuts are largely limited to performing breakdown maintenance with preventative maintenance restricted to maintenance group employees. In the absence of plant breakdowns, this can result in substantial idle time for open cut maintenance workers as indicated by the low productivity of mechanical and electrical maintenance workers within open cuts.

7.40 The SECV has recently attempted to redress the inefficiencies caused by demarcation arrangements by seeking union agreement to greater flexibility in the range of tasks that may be performed by employees. Specific changes sought with relevance to open cut operations have included allowing more maintenance tasks to be performed by dredger operators and reducing restrictions on the allocation of work between open cut maintenance employees and the employees of the PMU. The success of the initiatives will be dependent on both union agreement and the acceptance by employees to changes in traditional demarcation arrangements.

Industrial awards interpretation

7.41 Inefficient practices have also arisen due to the application and liberal interpretation of provisions within industrial awards applicable to open cut employees. Comment has been included in paragraph 7.77 of this Report on the affect of provisions related to the training and promotion of employees as a result of the establishment of an award with the CFMEU during the structural efficiency program.

7.42 Other provisions in awards which adversely affect the cost of open cut operations are those relating to sick leave. Awards which do not clearly specify entitlements have been interpreted by both employees and unions as allowing unlimited sick leave to be taken without medical certificates. As a result of the interpretation of sick leave provisions, examples have occurred where employees have taken in excess of 20 days sick leave in a year without a medical certificate.

Overtime

7.43 On average, the cost of overtime in 1991-92 for each open cut employee amounted to $6 200. However, overtime levels varied significantly between open cuts and individual employees, with specific examples of employees receiving extraordinary levels of overtime including one employee with total payments for the year in excess of $39 000.

7.44 Audit was advised by open cut management that total overtime payments of $7.5 million in 1991-92 were almost entirely attributable to the application of restrictive work practices including the impact of replacing absent employees under minimum manning arrangements and the existence of demarcation arrangements between day and night shift employees.

7.45 Details of overtime payments within open cuts are provided in Table 7E.

TABLE 7E
OVERTIME PAYMENTS, 1991-92 *(a)*

Item	*Yallourn*	*Morwell*	*Loy Yang*	*Total*
Total overtime hours	34 200	89 300	80 200	203 700
Percentage of total ordinary hours	4.2	10.7	10.3	8.4
Overtime costs ($million)	1.3	3.2	3.0	7.5
Total employees numbers	396	412	399	1 207
Average cost per employee	**$3 300**	**$7 800**	**$7 500**	**$6 200**

(a) Costs include labour overheads associated with the direct cost of overtime and relate to direct open cut employees only.

7.46 The significantly lower cost and extent of overtime within Yallourn open cut reflects the greater flexibility provided by employees and management in relation to minimum manning arrangements as detailed in paragraph 7.30 of this Report.

7.47 Despite recognition by open cut management of the need to reduce overtime, there has been a limited reduction in the levels and cost of overtime, as illustrated in Table 7F, in the period July to December 1992.

TABLE 7F
OVERTIME FOR THE 6 MONTHS, 1 JULY TO 31 DECEMBER 1992 *(a)*

Item	*Yallourn*	*Morwell*	*Loy Yang*	*Total*
Total overtime hours	23 700	43 500	36 300	103 500
Percentage of total ordinary hours	5.9	10.0	9.0	8.3
Overtime costs ($million)	0.8	1.5	1.4	3.7
Average cost per employee	**$2 000**	**$3 600**	**$3 500**	**$3 100**

(a) Costs include labour overheads associated with the direct cost of overtime and relate to direct employees of open cuts only.

7.48 Overtime earnings have to a large extent become institutionalised within open cuts with employees depending upon it as a regular source of their normal income. The extent of this dependency has led to management at Morwell and Loy Yang, at union request, establishing a system known as overtime equalisation. The system provides for an equitable share among all employees of available overtime when a replacement is required. Employees nominate if they wish to be available to be called to earn overtime and are recalled on a rotation basis. While recognising this availability system as a means of limiting disputes between employees on levels of overtime allocated, in audit opinion, the system may also perpetuate the expectation of employees for high levels of overtime irrespective of whether replacements are necessary and restricts management's ability to recall the employee considered most able to perform the job required.

7.49 High levels of overtime are prevalent throughout the business units of the Production Group. The cost of overtime in the Production Group totalled $35 million in 1991-92 and $15.1 million for the 6 months to 31 December 1992.

7.50 The high level of overtime within the total Production Group is indicative of the existence of similar problems to those in open cuts and has a major impact on the cost efficiency of operations. Accordingly, it is important that further action be taken by management to reduce current overtime levels.

- *RESPONSE provided by the Chief General Manager, SECV*

  The Production Group has been actively taking steps to reduce overtime use and has achieved a 25 per cent reduction in the period June 1992 to March 1993.

Current initiatives in workplace reform

7.51 In the past, SECV management has attempted to obtain major reform to work practices to improve the overall efficiency of open cut operations through the award restructuring process and other recent initiatives aimed at reforming work practices. However, as indicated above numerous inefficient restrictive work practices and demarcation arrangements still remain in operation. It is therefore important that management continue their efforts to eliminate such practices.

7.52 Discussions with the General Manager of the Production Group have revealed that negotiations are currently underway with unions throughout the Production Group aimed at gaining acceptance for major workplace reform and resultant improvement in the competitiveness and efficiency of all Production Group business units.

STRUCTURAL EFFICIENCY AND AWARD RESTRUCTURING

Structural Efficiency Principles

7.53 In recent years, substantial emphasis has been given to improving the productivity and efficiency of the Australian work force as a means of enhancing the competitiveness of Australian industry. In 1988, the Australian Conciliation and Arbitration Commission, now the Australian Industrial Relations Commission (AIRC), reinforced this principle and envisaged substantial changes to wage fixing systems to stimulate improvements in productivity and efficiency. Accordingly, the Commission required employers and unions negotiate the restructuring of industrial awards *"... with a view to implementing measures to improve the efficiency of industry and provide workers with access to more varied, fulfilling and better paid jobs"*. This process was referred to as structural efficiency.

7.54 In National Wage Case Decisions in ensuing years, the AIRC was critical of the failure of organisations to achieve real reform and reiterated its support for the successful implementation of structural efficiency principles.

7.55 The Victorian Department of Labour, in response to the AIRC's 1988 decision, issued instructions to statutory authorities detailing the Government's approach to the negotiation and award restructuring requirements under Structural Efficiency Principles. These instructions required statutory authorities to formulate structural efficiency strategies including the review of relevant industrial awards for submission and approval by the Industrial Relations Task Force (IRTF), a sub-committee of Cabinet.

7.56 In response to this requirement, the SECV incorporated its proposed approach to structural efficiency in a document titled *"The Challenge"*. In presenting this document to the IRTF in March 1989, the SECV stated the organisation's aim to significantly improve performance and provide satisfying and challenging work for all employees by a critical review of *"... work organisation, culture and values, job design, remuneration policy, education and training, employee involvement and participation, and a range of other human resource management systems, policies and practices"*.

7.57 In accordance with this approach, the final *Challenge* document, endorsed by the IRTF in September 1989, provided for:

- the creation of a single award for all SECV employees;
- revised organisation structure, employee classifications and remuneration policies, to attract, retain and motivate a skilled and adaptable work force;
- the development of a skills extension program and revised career paths;
- development of a productive culture;
- a reduction in employee numbers to reflect the improved productivity resulting from a more skilled and flexible work force; and
- substantial savings to the SECV and the people of Victoria.

7.58 An assessment by audit of the extent to which the objectives of the *Challenge* document have been achieved within open cuts is provided in the following paragraphs.

Negotiation of a single award

7.59 The AIRC's structural efficiency principles required the SECV and its employee unions to examine relevant industrial awards with a view to:

- ensuring that working patterns and arrangements enhance the flexibility and the efficiency of the industry; and
- updating and rationalising the number of unions representing employees.

7.60 At the time of the AIRC's introduction of award restructuring and structural efficiency principles, the SECV had 21 industrial awards and 22 individual unions covering its work force. Major adverse effects associated with the large number of awards and unions included:

- a wide range of employee classifications each with separate conditions a situation which had the potential to create disharmony within the work force;
- considerable inter-union rivalry in terms of demarcation and membership disputes; and
- inefficient work practices.

7.61 To address the adverse effects associated with the application of the numerous awards, the SECV's *Challenge* document proposed the negotiation of a single enterprise-based award to cover all of its employees. The enterprise-based award was aimed at changing the work force culture, reducing union and trade demarcations and hastening the pace of union rationalisation. It was proposed that the award would initially operate for a period of 3 years.

7.62 Some progress has been made by the SECV towards award restructure, as evidenced by:

- the replacement of the former 21 awards by 10 new awards, each of which apply to open cut employees;
- the rationalisation of the number of unions, with a reduction in unions from 22 to 15, and
- the partial introduction of common provisions for pay structure, employment conditions and definitions within the new awards.

7.63 However, the SECV has fallen substantially short of its aim to establish a single award and reduce the number of unions with the consequence that many of the problems expected to be resolved by the rationalisation are still in existence.

7.64 There had in some instances been reluctance by unions to accept the proposed work place reform envisaged under the new awards. Given this reluctance and the willingness of the Municipal Officers Association (MOA) to participate in reforms, and in an attempt to maintain the momentum for award restructuring, the SECV negotiated a separate award, the Electrical, Electronic & Electrical Engineering Award (EE&EE Award) in October 1989 with the MOA. The MOA subsequently amalgamated into the Australian Services Union (ASU). Coverage under the EE&EE Award was later extended to a number of other separate unions including the Electrical Trades Union (ETU). However, the SECV had originally agreed with the ASU that no other unions would become respondents to this Award.

7.65 Accordingly, the new Award was not extended to other unions with representation in the SECV's Production Group. These unions included the Metal and Engineering Worker's Union (MEWU) and the Federated Engine Drivers and Fireman's Association (FEDFA) which were subsequently amalgamated into the Construction, Forestry and Mining Employees Union (CFMEU). As a result, and following widespread industrial action by the members of FEDFA and MEWU, in December 1989 separate awards were established for both of these unions thereby preventing the SECV from achieving its objective of establishing a single award for all employees including those of open cuts. Within open cuts, following the creation of new awards:

- 65 per cent of employees are covered under the Engine Drivers and Fireman's Award (ED&F Award), with its major respondent the CFMEU;
- in excess of 20 per cent of employees are covered under the EE&EE Award, with its major union respondent, the ASU; and
- the remaining employees are covered under one of 8 other industrial awards.

7.66 The failure to achieve a single award and reduce the number of unions represented in open cuts has contributed to the retention of a range of work place conditions which impede improvements to work force productivity within open cuts and the Production Group as a whole, including:

- The negotiation of the EE&EE Award between management and unions did not eliminate existing practices which were considered restrictive by management but instead only consolidated a large number of practices and allowances previously contained in the individual awards into the new award; and
- CFMEU members gained exclusive working and training conditions in their separate award, which are not available to other members of the SECV work force (refer to paragraph 7.77 of this Report).

7.67 As a result, union and trade demarcations, together with restrictive work practices as detailed in paragraphs 7.24 to 7.40 of this Report, remain prevalent in the open cuts even though employees are covered under the same award.

7.68 Given the failure to achieve the significant reforms envisaged by the "Challenge" document from the negotiation of a single award, the SECV should evaluate the award restructuring process to avoid similar pitfalls and ascertain the most appropriate means of achieving future work place reform.

7.69 In undertaking this evaluation and during future award negotiations, consideration will need to be given to recent changes in wage fixing and industrial relations, including the principles of enterprise bargaining and the industrial relations policies of the Victorian Government. The negotiation of agreements on an enterprise basis still provides the opportunity for achieving the reforms sought by the SECV to improve productivity, and should also facilitate the implementation of enterprise agreements more specific and relevant to open cut operations. To facilitate this negotiation, further action is therefore required to rationalise unions with the aim of establishing a single union or bargaining unit covering employees within the open cuts and other units of the Production Group.

- *RESPONSE provided by the Chief General Manager, SECV*

  The structural efficiency changes made in the mines in the period 1989 to 1992 fell short of original expectations but were still significant in reducing cost and helping create the environment for the major changes that have been achieved in the mines during 1991-92.

  The SECV has effectively achieved two awards for all of its workforce.

  The SECV did not restrict any union from becoming a respondent to the EE&EE award. The new award was offered to other unions.

  The inability to achieve a single award and the retention of some local work practices do not relate. These local conditions/agreements are not contained in past or current awards.

Development of employee skills and career paths

7.70 The structural efficiency program also aimed to improve the flexibility, adaptability, and productivity of all employees, by the implementation of a major program of work re-design and re-training. It was intended that as a result of this program, employees would be able to perform all tasks and functions they were qualified to perform provided it was safe and efficient. Accordingly, new awards included provisions for the training and extension of skills known as a skills extension program such as:

- on-the-job training by direct work experience, self-paced learning and computer-based training to expand both the depth and range of employee skills;
- ongoing effective utilisation of acquired skills as a prerequisite for progression to a higher level within each employee classification;
- skills extension payments, at minimum intervals of 9 months, to employees satisfying the skills extension criteria; and
- progression between classifications to only occur by promotion to a vacant position and not automatically on the attainment of additional skills.

7.71 A major prerequisite for the success of the skills extension program was work practice reform throughout the SECV to enable employees to effectively apply newly acquired skills. The need for this reform was particularly relevant to open cuts where a large number of restrictive work practices, including demarcation arrangements between trades and between unions, had in the past precluded the successful sharing of skills and tasks between various categories of employees. The SECV therefore endeavoured to obtain agreement from unions and employees for the removal of certain practices, and the utilisation of acquired skills in return for skills extension payments.

Payments under National Wage decisions

7.72 In line with previous National Wage Decisions and the SECV's *Challenge* document new awards were negotiated throughout the SECV. Following the introduction of the new EE&EE and ED&F Awards in the latter part of 1990 the SECV was then required to pay, within 6 months, the employees concerned a second tier wage increase. Such payment was conditional on both the SECV and employees making significant inroads into work place reform through the implementation of the new awards. The SECV considered the second tier wage rise to be integral to their skills extension program. The Awards required the SECV to achieve changes to organisational structure, job re-design, manning reviews and improved industrial relations performance in return for this payment. While certain changes were made to the organisation structure, in the open cuts demarcation arrangements and minimum manning levels continued to apply.

7.73 However, despite the failure to achieve the necessary reforms in the Production Group, the SECV was ordered by the AIRC to pay the 3 per cent wage increase to all employees including those in open cuts. This ruling was made by the AIRC on the grounds that it considered that the SECV management was responsible for delays in implementing work place reform and the employees should not be financially disadvantaged. As a result of this decision, the second tier payment was made to open cut employees before the significant reforms envisaged under the structural efficiency principles had been achieved by the SECV.

Skills extension payments

7.74 Following this 3 per cent wage increase, the SECV made a further payment between July and August 1990 to all SECV employees under the skills extension program. The second round of skills extension payments were then due 9 months later in April 1991. In return for this payment, the SECV sought an increase in productivity through more flexible working arrangements and the elimination of certain inefficient work practices. In relation to open cuts, agreement to establish more efficient work arrangements included:

- The elimination of certain restrictive demarcation arrangements to enable:
  - greater flexibility in the timing and performance of work between work groups and shifts;
  - creation of work groups consisting of an appropriate mix of trade and non-trade personnel crossing traditional skill boundaries; and
  - employees to perform duties normally undertaken by an employee of a lower classification.
- The removal of fixed manning agreements to reduce staff numbers to appropriate levels, with a wider range of skilled tasks performed by all employees; and
- Increasing the number of employees responsible to each supervisor to enable reduction in the number of supervisory positions.

7.75 While unions agreed to certain changes, crucial reforms relating to fixed manning arrangements and demarcation were not achieved. Failure to achieve the necessary reforms resulted in the continuation of these inefficient work arrangements which significantly limited the extent to which the new skills attained by employees could be effectively utilised.

7.76 Despite the failure to achieve these important reforms, second round skills extension payments were made to open cut employees resulting in further increased operating costs to the open cuts without significant improvements in productivity. A further skill extension payment was made to all open cut employees between January and March 1992 without demonstrating the effective utilisation of acquired skills or substantial productivity improvements.

Lack of success of skills extension

7.77 Audit is of the opinion that the major reasons for the lack of success of the skills extension program within open cuts included:

- A general reluctance of employees and unions to accept the principles of skills extension and to apply acquired skills. Specifically:
  - While acceptance was obtained by the majority of unions to the skills extension model proposed by the SECV, the MEWU proposed trade-based standards that were not specific to SECV operations and inconsistent with the arrangements for training agreed with other unions. The SECV did not agree with the introduction of these training standards, and the MEWU then refused to participate in the skills extension program after the second tier payments in April 1990. To date, this issue remains unresolved with MEWU employees continuing to exclude themselves from the skills training program;
  - As a result of MEWU members not participating in the skills extension program, the extent to which skills acquired by other employees can be applied in open cuts has been limited. Despite dredger drivers and other open cut operational staff now possessing the skills to perform many of the maintenance tasks, many tasks remain restricted to MEWU members; and
  - Fixed manning agreements and continuing trade and union demarcations have effectively prevented employees utilising acquired skills.
- Provisions incorporated in the CFMEU's Award above those applicable to members of other unions have resulted in a range of inefficiencies in the skills extension program within open cuts including:
  - Engaging a full time employee at each open cut to schedule training on a seniority basis to avoid disputes between employees;
  - Allowing an employee to sit unlimited skill examinations until successful, with other employees unable to receive training until the more senior employees are successful; and

The interpretation of "self-paced learning" to mean that unlimited training time is available which has resulted in severe problems in controlling training times and associated costs at Loy Yang open cut. Audit was advised by the manager of Loy Yang open cut that training in dredger operations at Loy Yang has taken an average of 228 hours for each employee. **Of particular significance was the 816 hours training time undertaken by one employee, at a total cost of $55 111 in unproductive wages, to complete the training before considering himself ready to be examined in dredger operating skills.** (Substantial overtime costs would also have been incurred for a replacement employee during the on-job training.) By contrast, the same training at the Yallourn and Morwell open cuts for similar sized dredgers is on average 96 hours per employee.

- Skills extension payments to employees who had either not acquired skills or utilised the acquired skills, and the reluctance of employees at the top level of their salary range to undertake further training without payments beyond those envisaged. Automatic progression has also added to pressures on the work relationships between skilled and semi-skilled employees by reducing wage relativities. For example:
  - Automatic progression for base grade employees provides CFMEU members access to higher earnings not available to other similarly skilled employees of the SECV; and
  - Advancement of half of all dredger drivers to a higher classification without demonstration of higher skills. This placed these CFMEU members on the same remuneration and classification as supervisory staff who are members of the ASU and resulted in industrial disputes between the CFMEU and ASU over the responsibilities applicable to the different employees.
- A high proportion of training provided to open cut employees has related to basic tasks which many employees would have already possessed including tool handling, lifting procedures and light truck driving instructions. Despite substantial costs incurred on training and related extension payments, it is considered that training in these basic skills has had minimal impact on the productivity of open cuts.
- In many areas of SECV operations, the use of skills extension payments as a bargaining tool for the acceptance of staff reductions contributed to significant productivity improvements with savings from lower staffing levels exceeding the cost of skills extension payments made to the remaining employees. This incentive was inappropriate within open cuts as substantial staff reductions could not be achieved due to the inflexibility of fixed manning arrangements.

7.78 Overall, open cuts have incurred additional costs in the order of $5 million through increases in salaries and wages resulting from skills extension payments. Despite this substantial annual cost, the benefits of additional skills training have been minimal due to inefficient skills training and the failure to achieve the work place reform necessary to enable effective application of acquired skills. In future, it is important that:

- **training provided to open cut employees be geared to those tasks of sufficient complexity to warrant substantial related expenditure and which provide the greatest benefits to open cuts in terms of productivity and efficiency gains; and**
- **skills training payments should only be made to those employees demonstrating effective application of the acquired skills.**

- *RESPONSE provided by the Chief General Manager, SECV*

  Training referred to in the Report is to ensure operators are adequately skilled to operate the complex dredgers which dig all of the coal and overburden at the mines. A system is in place to manage training and this system highlights poor training performance and brings it to the attention of management. This form of performance appraisal has demonstrated its worth in terms of improved performance. In the past 12 months, there has been a 15 per cent reduction in the average time taken by trainees, with further improvements targeted.

Development of a productive culture

7.79 As part of the processes initiated by the AIRC to improve productivity and efficiency, the development of a more productive culture is considered essential for work-place reform to be successful. The SECV recognised the importance of developing a productive culture in its *Challenge* document which stated that:

> *"In pursuing greater employee flexibility at all levels in the organisation we intend the process to also include attitudinal and behavioural change. There is an urgent need to develop a productive consciousness and culture, emphasising the great importance of skill formation, redesign of work and the responsibilities of employees".*

7.80 At the time of the preparation of the *Challenge* document, the SECV identified the need to address problems associated with attitudes in its work force which had contributed to:

- low productivity;
- low utilisation of employee time;
- high levels of absenteeism including sick leave; and
- increasing WorkCare levies resulting from rising claim levels.

7.81 Initiatives specifically aimed at improving the work culture have included:

- corporate-wide schemes such as skills training, revised remuneration policies and flatter organisation structures; and
- initiatives specific to open cuts, such as a greater involvement of employees in the setting and monitoring of production targets.

7.82 Despite these initiatives, the current work place culture within open cuts is generally not conducive to promoting significant improvements in efficiency and productivity. In audit opinion, the ability to change the culture and attitudes of the open cut work force was restricted by the:

- Failure of corporate management to establish a single award with all major unions;
- Lack of involvement of local management, unions and employees in developing new awards and arrangements to ensure that all major local work place factors are addressed;
- The absence of direct competition, the benefits of which are evidenced by the experiences of the Morwell Overburden Group; and
- Veto power used by union representatives over agreements previously negotiated with management. Specifically, in late 1992 following several months of negotiations and the agreement of all other relevant unions the CFMEU members withdrew from participation in an agreement aimed at increasing the flexibility in performing maintenance while providing compensation for the loss of shift work. This agreement was subsequently finalised following a ministerial directive to settle the dispute between the CFMEU and management.

7.83 Despite the significant improvements that have occurred within the Morwell Overburden Group, the continued existence and reluctance to change inefficient practices is indicative of the fact that substantial improvement is still required in the attitudes and culture of the open cut work force.

Result of the structural efficiency program

7.84 Under the structural efficiency program, the SECV aimed to more effectively manage operations, improve its ability to attract, retain and motivate a skilled work force, and develop a productive culture. Under this program, the SECV recognised that it would be necessary to reclassify a large number of employees to higher remuneration levels and provide skills extension payments to other employees. As such employees were to share in the savings achieved from increased productivity under structural efficiency. It was estimated by the SECV that the costs of the structural efficiency program would account for approximately 50 per cent of the total gross savings achieved by the reduction of staff numbers under the program.

7.85 The *Challenge* document estimated that by 30 June 1993 cumulative gross savings in wages and related expenditure of $554 million (in June 1992 dollars), would be achieved from staff reductions of which $278 million would be used to meet the higher remuneration and training costs of the remaining employees. **While overall staff reduction targets and savings levels were established for the SECV, targets for individual business units including open cuts were not established.**

7.86 As part of its structural efficiency program, detailed in paragraphs 7.53 to 7.57 of this Report, the SECV aimed at an across-the-board reduction in total employee numbers of 19 per cent over a 4 year period commencing in July 1989. This target was subsequently increased by a further 10 per cent after the 19 per cent target was achieved in the first year. At 1 July 1989, the start of the structural efficiency program, total SECV employee numbers were 21 551 with 2 199 employed in open cuts. By 30 June 1992 SECV employees totalled 14 864. The SECV had achieved a reduction of 31 per cent in total staff, exceeding the revised targets of 29 per cent.

7.87 A report submitted to the SECV Board by its Human Resources Directorate in January 1993 identified an estimated cumulative net saving of $263 million compared with the initial savings target of $205 million in the SECV's payroll costs as a result of staff exits to 31 December 1992. The higher savings identified resulted from the greater level of employee reductions. Despite the higher overall savings, the average actual cumulative saving associated with each employee exit to 31 December 1992 of $31 310 has been approximately 36 per cent lower than the $48 810 estimated in the *Challenge* document for each employee.

7.88 The major reasons for the lower than anticipated savings associated with each employee exit have been:

- the exclusion of voluntary departure packages costs from the *Challenge* document; and
- higher than anticipated wage increases particularly within the Production Group including open cuts.

7.89 While the overall targets of staff reductions within the SECV have been met, only minimal staff reductions were achieved in open cuts over the same period. After allowing the transfer of responsibility for certain categories of staff to other SECV divisions, staff numbers in open cuts had only been reduced by 20 per cent in open cuts which was far lower than the overall reduction of 31 per cent achieved throughout the SECV and the 26 per cent reduction achieved throughout the Production Group.

7.90 The lower staff reductions in open cuts have in the main been due to:

- the failure of the SECV under the structural efficiency program to establish staff reduction targets for each section of its operations;
- the continuation of pre-existing fixed manning agreements even though it was recognised that the level of employees provided for under these agreements resulted in substantial over-staffing (refer to paragraphs 7.24 to 7.33 of this Report); and
- a lower level of outsourcing of open cut activities, with the contracting of the removal of Morwell overburden the only major external contract.

- *RESPONSE provided by the Chief General Manager, SECV*

  The structural efficiency changes made in the mines in the period 1989 to 1992 fell short of original expectations but were significant in reducing costs and helping create the environment for the major changes that have been achieved in the mines during 1992-93. In the period June 1989 to June 1992 the numbers of personnel in the 3 mines were reduced by 20 per cent and at the Yallourn open cut reductions exceeded 40 per cent. There has been a further 15 per cent reduction in 1992-93 to date, and an overall 40 per cent reduction from June 1992 to June 1995 is projected.

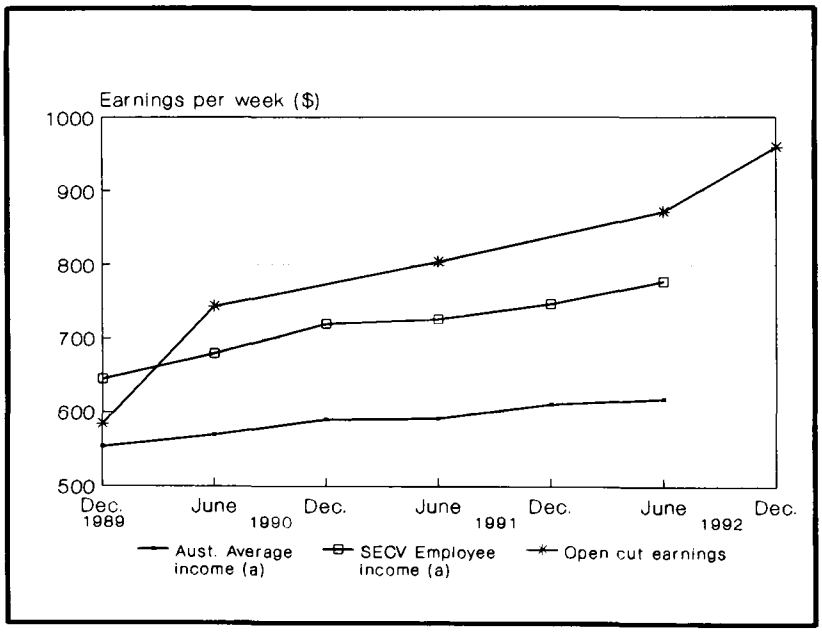
  Over the same period, with increased output particular from the Loy Yang mine, productivity is scheduled to increase by some 80 per cent.

Changes in remuneration levels

7.91 After eliminating the costs of employees transferred to other SECV units in 1989, total annual payroll and associated costs in open cuts have increased between 1988-89 and 1991-92 from $64 million to $73 million (in June 1992 dollars), an increase of 14 per cent despite a net reduction in employee numbers of 158 since 1 July 1989. Over the same period, the average base remuneration to open cut employees, excluding overtime, has increased by 36 per cent from $448 per week in 1989 to $612 per week in 1991-92.

7.92 As illustrated in Chart 7G, the 36 per cent average pay increase to open cut employees is substantially higher than the average increase in the base remuneration of SECV employees as a whole, (27 per cent), and the average increases paid to Australian salary and wage earners over the same period (13 per cent).

CHART 7G
COMPARISON OF MOVEMENTS IN AVERAGE WEEKLY REMUNERATION



(a) **Figures not available for Australian average income and SECV employee income, December 1992.**

7.93 These substantial additional remuneration costs have been incurred by open cuts before achieving the reforms envisaged by the structural efficiency program. Major reforms to work practices and improved productivity have not been achieved to offset the additional costs associated with the increases in remuneration. The substantial increases in remuneration are a result of:

- The practice of providing reward in the form of additional remuneration prior to the demonstrated willingness and ability of employees to implement the required reforms under the *Challenge* document has significantly increased employment costs without achieving desired improvements to operations;
- The CFMEU successfully negotiated a 7 band pay structure, endorsed by the AIRC, with 3 skill steps within each band and a single career stream which differed from the SECV's preferred approach applicable to all other SECV employees. The SECV has advised that this revised career structure has provided employees under this award with higher earnings than those available to other employees;
- The total cost of allowances such as the *open cut allowance paid to open cut employees actually increased by $1.4 million from $4.9 million in 1988-89 to $6.3 million in 1991-92, with the majority of the increase attributable to employees at Loy Yang open cut. Loy Yang open cut management was unable to provide audit with reasons for the increase in allowances;*
- The payment of a $51 a week open cut allowance or a $26 a week workshop allowance, to the administrative and management staff of open cuts at a total cost of $400 000 each year. The entitlement of these staff to such allowances could not be justified by the SECV;
- Remuneration paid to unskilled staff has increased to the same level as skilled workers. For example, qualified tradesmen such as fitters and electricians are paid at the same rate as semi-skilled trades such as riggers, truck drivers and dredger operators; and
- By 1992, the reclassification of the majority of open cut staff to the top of their employee classification.

7.94 Substantial costs have been incurred in open cuts as a result of the implementation of the structural efficiency program without management successfully implementing effective work place reforms. In future, action should be taken to achieve greater productivity and fully implement reforms before agreeing to further increases in wage costs.

- *RESPONSE provided by the Chief General Manager, SECV*

  The SECV's approach to enterprise bargaining supports this concept.

INDUSTRIAL RELATIONS

Industrial relations framework

7.95 **The majority of SECV employees, including those in the Latrobe Valley, are covered under Federal industrial awards endorsed by the AIRC.** These awards cover both remuneration and certain general employment conditions. More specific workplace and employment conditions associated with the operations of open cuts are contained in localised agreements between open cut management and individual groups of employees. Localised agreements currently in operation within each of the open cuts include coverage of fixed manning agreements and demarcation arrangements for specific tasks performed.

7.96 In October 1991, the AIRC introduced the concept of enterprise bargaining. Under the principles of enterprise bargaining, employers and employees are encouraged to formulate new agreements within individual organisations or workplaces to replace the former centralised industrial award system which covered all employees within a particular trade or union. This process is aimed at the operation of industrial arrangements specific to employers and employees within particular organisations or workplaces, and the removal of work practices not relevant to a particular workplace and which hinder productivity. An enterprise agreement was recently entered into between the SECV and the Morwell Overburden Group employees. It is expected that further agreements will be developed and implemented in the open cuts during 1993.

7.97 In terms of the SECV, the introduction of enterprise bargaining should enable the consolidation of conditions currently enshrined in industrial awards and localised agreements. Enterprise bargaining should also provide the facility for the SECV and its employees to negotiate and agree on workplace reforms.

7.98 As the majority of SECV employees are covered under Federal employment awards, the State Government's new industrial relations policy and legislation is expected by the SECV to have only limited direct impact on its employment arrangements.

Management of industrial relations - open cuts

7.99 Effective industrial relation processes are important to ensure the efficient operation of the SECV workforce, to guarantee the supply of electricity throughout Victoria and to minimise any costs associated with industrial disputes. The impact of SECV industrial disputes on the Victorian economy is clearly illustrated by estimates that a one day stoppage by electricity employees and the disruption of electricity generation would result in the loss of $140 million in wages to Victorian employees as well as a further $327 million in lost production by Victorian companies.

7.100 The importance of effective industrial relations is likely to increase as a result of:

- the need for negotiation of enterprise agreements;
- the need for workplace reform; and
- the implementation of the State Government's policy of major restructure of the SECV.

7.101 As well as aiming to minimise industrial disputation, major responsibilities in the effective management of industrial relations include the provision of evidence to industrial hearings, monitoring the progress and outcomes of the dispute resolution process and evaluating the impact of disputes on the organisation. To assist in effectively undertaking these functions it is important that a full and detailed record of disputes and their resolution is maintained and analysed. However, in the past, the recording of disputes within the Production Group has been limited as only Loy Yang open cut maintained a detailed record of the cause, lost production and cost of industrial disputes.

7.102 In recent years, a number of industrial disputes have had a major impact on the operations of open cuts. Table 7H details the cost of industrial disputes on the operations of Loy Yang open cut.

TABLE 7H
LOY YANG OPEN CUT - COST OF MAJOR INDUSTRIAL DISPUTES *(a)*

Impact of dispute		*6 months of 1989-90 (b)*	*8 months of 1990-91 (b)*	*12 months 1991-92*
Lost wages	($)	937 000	106 900	682 000
Cost of lost overburden production	($)	3 411 500	5 055 600	11 230 000
Productive hours lost		36 900	3 700	17 700
Lost coal production	(tonnes)	716 400	395 000	366 800
Lost overburden production	(m^3)	682 300	1 011 600	2 246 100

(a) Figures as supplied by Loy Yang open cut management.
(b) Full year costs were not maintained for 1989-90 and 1990-91.

7.103 As a result of the failure to maintain adequate records, the full cost of disputes on open cut operations cannot be ascertained. To overcome this deficiency the Production Group has recently introduced a requirement for all business units including open cuts to report disputes to its industrial relations unit on a monthly basis. In addition, a disputes registration system is in the process of implementation to allow more timely recording of disputes and allow monitoring of the progress of disputes by central Production Group industrial relations managers. It is hoped that this system will contribute to reducing the number and length of disputes by identifying issues when they first arise, providing a basis for initiating resolutions and preventing disputes from escalating to other business units.

7.104 Industrial disputes within the production group occur due to a wide range of factors. Discussions with Production Group managers and union representatives revealed that contributing factors are considered to be the:

- confrontational approach between management and union representatives; and
- large number of unions, with 15 unions represented in the Production Group and open cuts.

7.105 To improve relationships, Production Group management has initiated a more consultative approach with union representatives aimed at jointly identifying potential workplace reforms and negotiating agreement on these reforms that will assist in achieving the SECV's aims for improved productivity and cost efficiency. Major negotiations are currently underway with the aim of progressively introducing reforms throughout 1993.

ORGANISATION STRUCTURE AND RESPONSIBILITIES

Reporting relationships - open cuts

7.106 The establishment of an appropriate management structure within any organisation assists the effective and efficient management and utilisation of available resources in order to maximise productivity.

7.107 The SECV has been organised into 3 key operational areas known as strategic business units, namely production, customer services and power grid, and a number of corporate-based service divisions including finance and administration, and human resources. Under the management structure of the SECV, each of the general managers of the strategic business units is directly responsible to the Chief General Manager of the SECV and largely act independently to achieve the production and operating targets of the business unit within the framework of the corporate business plan.

7.108 The General Manager of the Production Group has overall responsibility for the operations and management of the 3 open cuts, a number of service groups including maintenance and production technology, and the power stations in the Latrobe Valley and at Newport. Each of these areas is also established as an independent business unit under the Production Group with transactions and dealings between the groups simulating commercially independent operations. The managers of business units within the Production Group, including the manager of each of the 3 open cuts, are fully responsible for the achievement of financial, production and other operational targets.

Benefits and disadvantages of the business unit structure

7.109 Major advantages arising from the devolution of responsibility can include:

- greater accountability by each business unit for operating and financial performance;
- ability to compare the performance of like business units which allows the identification of areas for improvement in productivity and efficiency;
- a greater emphasis on the individual profitability of business units; and
- ability to instil a competitive spirit in employees at the business unit level which promotes improved performance through increased commitment.

7.110 Despite the above advantages, the audit disclosed that certain practices have developed which have to some extent offset the benefits anticipated from the establishment structure of business units, namely:

- there has been separate development and implementation of different production and information management systems by each of the open cuts (refer to Part 8 of this Report);
- independent investigation and evaluation of world best practice benchmarks and current performance by each of the open cuts has resulted in duplication of expenditure on consultants; and
- the sharing of technical and other services between each open cut has not occurred and therefore savings from lower staffing and operating costs may have been forgone.

7.111 In audit opinion, the operation of open cuts and other Production Group divisions as independent and competitive business units should continue and be further developed as it facilitates accountability and provides an impetus for improved levels of productivity. However, to minimise the costs of open cut operations, potential areas for the sharing of resources and information, such as the development of new systems, should be clearly identified and action taken to ensure that these activities are not duplicated by each open cut.

- *RESPONSE provided by the Chief General Manager, SECV*

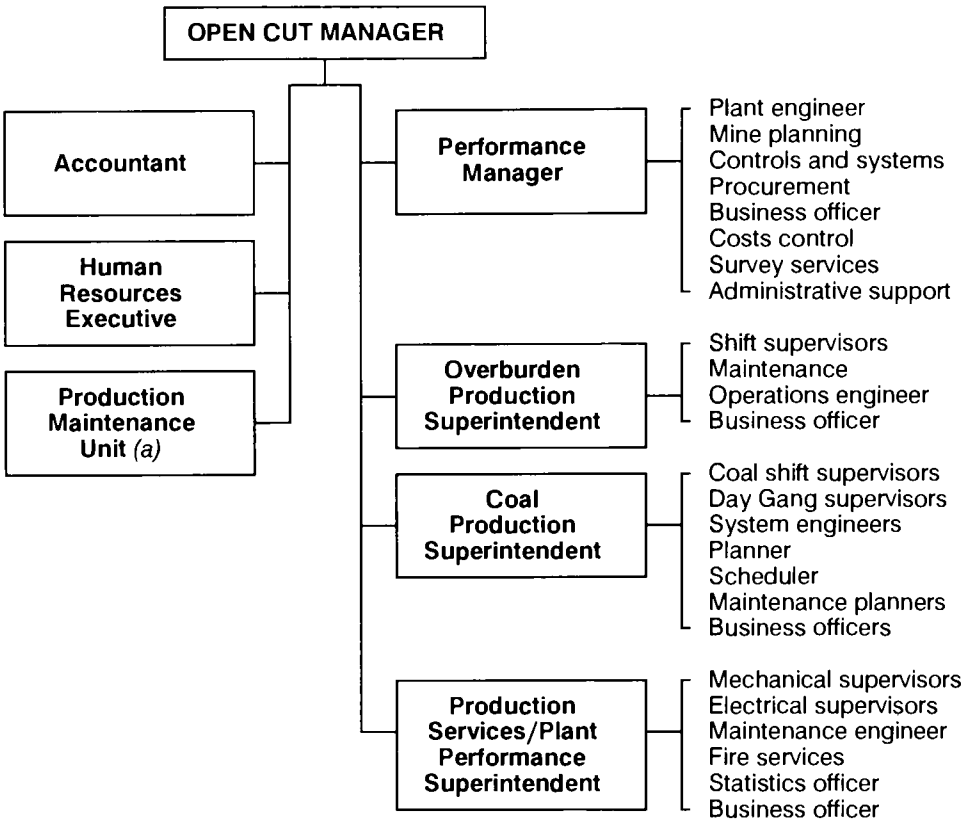
  The Production Group has instituted a mine managers technical committee to ensure that initiatives are shared across all operations for greater efficiency.

Management structure - open cuts

7.112 Organisation structures within each of the 3 open cuts are comparable, with 6 line managers accountable to the respective open cut manager for the direction and control of various functions.

7.113 Chart 7I illustrates a typical organisation structure within open cuts, together with the responsibilities of each line manager. The responsibilities of the line manager of each open cut varies mainly due to the different allocation of responsibilities for service functions including maintenance.

CHART 7I.
ORGANISATION STRUCTURE WITHIN OPEN CUTS



(a) Although the Production Maintenance Unit is shown as responsible to the open cut, this unit operates autonomously (refer paragraph 6.56 of this Report).

7.114 The organisation structure within open cuts should have clear lines of responsibility for all functions including overburden and coal production, human resource management and accounting functions. However, clear lines of accountability and management responsibility do not exist in respect of:

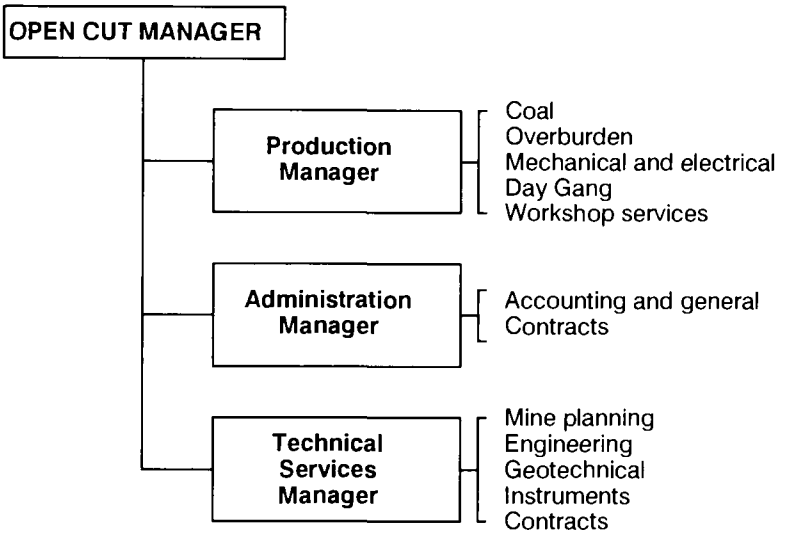
- The open cut performance managers and production services superintendents. These managers and superintendents are currently responsible for a range of diverse and unrelated duties which may include engineering, procurement, maintenance, mine planning and operational supervisory roles. However, in many cases they do not have direct management control over the employees and plant performing such activities; and
- The shared accountability for maintenance between open cut management and the Production Maintenance Unit (refer paragraph 6.63 of this Report).

7.115 Audit is of the opinion that, improvements to the organisation structure currently in operation in the open cuts would facilitate more effective accountability and improved management of open cut operations by:

- Ensuring clear accountability for tasks performed by all open cut groups to the open cut manager;
- Reducing the number of managers reporting to the open cut manager to streamline reporting and accountability; and
- Ensuring an appropriate split between operations and support functions for all operational aspects of each open cut. This would allow overburden and coal excavation, maintenance and mine performance, to be under the responsibility of one production manager and all support services for production, including engineering, geotechnical and mine planning, under the technical services manager.

7.116 Chart 7J provides details of a suggested organisation structure for open cuts as provided by Minenco Pty Ltd which reviewed the existing structure on behalf of audit. The implementation of such a structure would not be expected to increase the number of levels of management.

CHART 7J
SUGGESTED ORGANISATION STRUCTURE FOR OPEN CUT OPERATIONS.



7.117 Given the possible advantages of the suggested organisation structure, consideration should be given to its implementation within open cuts and where appropriate throughout the other units of the Production Group.

- *RESPONSE provided by the Chief General Manager, SECV*

  The proposed organisation structure appears to introduce a further level of management whereas the SECV initiatives have been directed towards flatter structures and clearly focused accountabilities of smaller groups. The proposed organisation structure is not considered by the SECV to be practical.

PART 8

Management Information Systems and Performance Measurement

OVERVIEW

8.1 Management requires timely and reliable information together with performance indicators to assist in the effective planning, monitoring and evaluation of operations.

8.2 A wide range of information systems are maintained within open cuts. These include:

- corporate financial and administration systems supported by information systems maintained by open cuts; and
- technical and production systems which record excavation rates, plant utilisation, coal storage levels and other production related functions.

8.3 In addition, there are a number of performance targets and measures for open cut activities. These performance indicators are reported at different levels of detail depending on whether the information is for open cut, production or corporate management.

8.4 Audit considers that there is potential for improvements to information systems and performance measurement which would not only facilitate better management control and accountability, but provide management with information in a more efficient manner. In particular, the audit found:

- **a failure to always share development initiatives and information between open cuts resulting in the SECV incurring unnecessary costs;**
- **inaccuracies and inconsistencies in management information; and**
- **a need to establish performance targets and measures more specific to the monitoring and control of open cut operations.**

8.5 Comments on the effectiveness of these systems and measures and the efficiency with which they are maintained are provided in the following paragraphs.

BACKGROUND

8.6 Information systems and performance measures within open cuts are used as a basis for monitoring operations and providing accountability on open cut performance to senior management. Management information and performance measurement includes:

- daily reports provided by operational and maintenance employees to line management;
- monthly performance reports by each section within open cuts to the open cut manager;
- monthly performance reports for each open cut to the Production Group manager; and

- the consolidation of this information with that from other related business units into the monthly Production Group business report.

8.7 These reports are used to monitor and evaluate each open cut in terms of financial, production, maintenance and environmental performance. Information to compile these reports is based on material obtained from various sources such as the manual records of excavation and plant performance prepared by the supervisor on each shift, the computerised recording of production within each open cut, and the SECV corporate financial and personnel systems.

DEVELOPMENT AND PROCESSING OF MANAGEMENT INFORMATION

8.8 A wide range and large volume of information is compiled and used in open cuts to record and monitor performance and assist in planning future operations. This information is processed by a number of systems ranging from manual records to computerised systems which provide on-line information. Given the diversity and volume of information, it is important that information be processed and reported in a form that is effective for use by management, while administrative costs associated with information processing are kept to a minimum. The following paragraphs outline areas where there is potential for reduced costs.

Development of management information

8.9 In many cases the development of management systems has been undertaken independently by each open cut despite similar production and information processes. For example, computerised on-line production systems used by open cuts to record the operation of plant and the level of excavation have been separately developed and introduced in both Loy Yang and Morwell open cuts in recent years. To date, Yallourn open cut does not have a similar on-line system, but instead relies on daily production reports.

8.10 Given the similarities in operations and information requirements, greater emphasis should be placed in future on the joint development of new systems.

Processing of management information

8.11 Within each open cut, line management prepares a wide range of reports and performance indicators on production, personnel and other areas of operations. The compilation of this data may require:

- The preparation of manual shift reports and other information by each supervisor;
- The input of the manual reports to production or personnel information systems;
- The reprocessing of information using spreadsheet software to enable the preparation of graphs and tables. At this level, separate spreadsheet and report formats are developed by different line managers within each open cut and between open cuts; and

- The summarising and reformatting of this information for the compilation of monthly performance reports and performance indicators.

8.12 These procedures result in substantial reprocessing of information and associated administrative times and costs. Given the existence of major computerised corporate and open cut information systems:

- **reporting needs should be properly evaluated prior to the development of future systems;**
- **the feasibility of generating the majority of performance reports from these systems without the need for reprocessing should be investigated; and**
- **greater emphasis should be placed on the development of standard documentation formats for daily and weekly reporting both within and between open cuts to further reduce the administrative costs associated with information processing.**

THE RELIABILITY AND ACCURACY OF MANAGEMENT INFORMATION

8.13 Accurate and reliable information is essential if it is to be of value to management in the planning, monitoring and evaluation of operations against established performance measures.

8.14 Despite this requirement, the audit disclosed the following instances where management information was either inaccurate or inconsistent:

- Data which had been inconsistently prepared by the 3 open cuts and other business units within the Production Group was consolidated. For example, the cost of industrial disputes is consolidated for the entire Production Group in its monthly performance report despite inconsistencies in the recording and costing of losses in each open cut and other units of the Production Group;
- Data reported in the various management reports of the Production Group and its business units was inaccurate. In particular, discrepancies were noted in June 1992 employee levels in information provided by:
  - the human resources sections of each open cut;
  - the monthly performance report of open cuts; and
  - the Production Group and the SECV's published annual reports.

- Payroll costs for the open cuts were inconsistently prepared between the SECV corporate payroll and personnel system and records maintained by each open cut creating difficulties in establishing the actual costs of individual components of total payroll. In particular:
  - on-costs could not be distinguished from direct labour costs in the records of open cuts which prevented reconciliation with direct labour costs provided for open cuts by the SECV's corporate Human Resource section;
  - quarterly payroll costs were identified for the SECV as a whole but could not be obtained for individual business units; and
  - payroll data was not held by open cuts for periods prior to 1 July 1989, and therefore did not allow analysis of trends and comparisons between years.

8.15 Given the deficiencies in management systems, it is important that open cuts and the SECV take action to ensure that all management systems and performance measures contain accurate and consistent information relevant to the needs of management.

PERFORMANCE MEASURES

8.16 The Production Group aimed to develop standard financial information and performance measures to enable the monitoring of operations and facilitate comparisons between similar business units. A selection of these performance measures is provided in Table 8A. Despite this aim, a number of significant deficiencies were identified in the standard performance measures used in open cuts and the Production Group. These deficiencies included:

- The omission in most cases, of comparative figures for previous years to enable evaluation of variations and to identify trends in performance. Audit considers that comparative indicators such as the unit cost of coal, the unit excavation cost, overtime and sick leave and employee productivity should be incorporated in performance reports;
- Targets did not always reflect a sufficiently high but achievable standard of performance for which open cuts and other business units should be aiming. For example, 1992-93 targets for the reliable supply of coal to power stations have been established at less than 100 per cent and, for Yallourn and Loy Yang open cuts, at rates lower than those achieved in 1991-92 - refer Table 8B. As a result unsatisfactory performance may not be identified; and
- Performance measures on plant performance and utilisation are normally based on monthly moving averages which are important to identify trends in performance over time. However, monthly moving averages do not readily identify large variations in monthly performance which should be investigated and explained by open cut management.

TABLE 8A
PERFORMANCE MEASURES WITHIN OPEN CUTS

Performance measure	*Bases*
MONTHLY BUSINESS UNIT PERFORMANCE REPORTS	
Production and profit analysis (comparison of actual with target)	
Cost, volume and profit analysis	Comparison of actual revenue and costs with budget based on $ per kilotonnes of coal mined.
Performance accountabilities (comparison of actual with target)	
Coal supply reliability	Extent to which power station demand for coal is achieved.
Overburden excavated	Million cubic metres of overburden excavated.
Breakdown rate	Percentage of time lost due to plant breakdown.
Employee availability	Percentage of actual time available to total time.
Performance indicators (comparison of actual with target)	
PERSONNEL	
Productivity	Total material mined per open cut employee.
ENVIRONMENTAL	
Water licence compliance	Number of infringement notices received.
Land rehabilitation	Percentage of planned rehabilitation completed.
MONTHLY PLANT PERFORMANCE REPORT (BASED ON MONTHLY MOVING AVERAGES)	
Dredger operations	Actual utilisation of plant and reasons for non-utilisation.
Dredger capacity	Actual output of dredgers in comparison with potential output.

TABLE 8B
COAL RELIABILITY
(per cent)

Open cut	*Actual 1991-92*	*Target 1992-93*
Yallourn	99.9	99.5
Morwell	97.5	98.5
Loy Yang	100.0	98.3

8.17 Action should be taken by both open cut and Production Group management to improve the level and quality of performance measurement so that appropriate and consistent accountability is provided by each open cut to facilitate monitoring of the efficiency and effectiveness of open cuts.

- *RESPONSE provided by the Chief General Manager, SECV*

  The SECV has established performance targets and measures specifically for monitoring and control of open cut operations.The SECV recognises that management needs the right information provided accurately and efficiently. Substantial improvements have been made over recent years both in data collection and reporting. An objective comparison to the systems in equivalent organisations would have given a useful benchmark by which to determine the success of our current improvements.

  Differences in information systems in each open cut have partly been necessary due to the different data logging and control equipment installed in the different era's of open cut development and should be recognised. Each mine was built and equipped with data logging equipment in different eras (i.e. Morwell open cut the oldest, Yallourn open cut next and Loy Yang open cut) and the installation of new equipment has had to take into account the existence of different existing systems for control and data storage.

  It should also be noted that the Mine managers technical committee meets monthly fostering the sharing of initiatives which includes the development of QA manuals, research projects and fire protection initiatives.

  The audit comments on the development and processing of management information is aimed very broadly. It is worth noting that:

  - *Action is in hand to create performance audit reports without reprocessing.*
  - *Line managers reports are all using the same standard format used for monthly performance reporting at the Production Group level for each mine. Non-standard reporting is used only where unique operational requirements require a different report.*

PART 9

Environmental Management

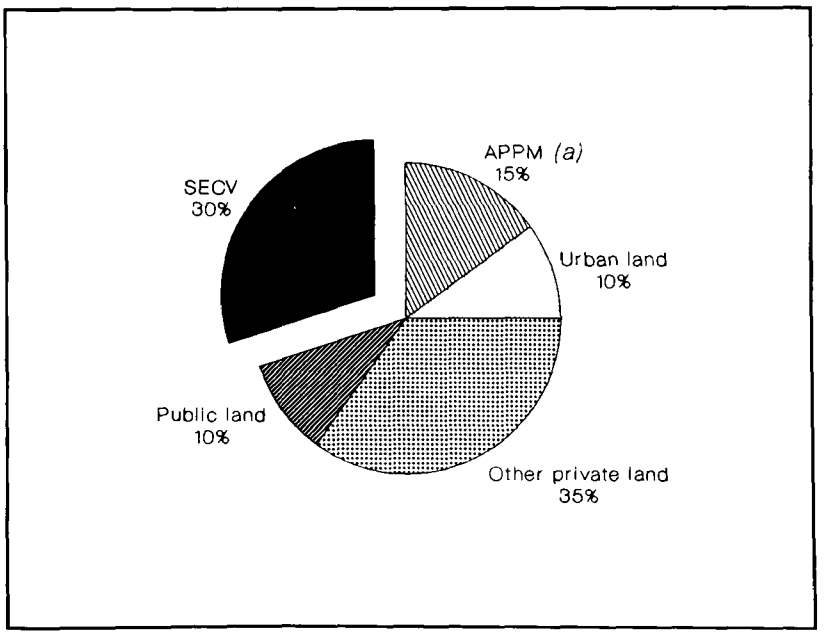
ENVIRONMENTAL MANAGEMENT

Overall conclusion

9.1 In recent years there has been a growing awareness in the community of the importance of the environment in which we live. This has led to much public debate over the implementation of sound environmental policies to achieve a balance between economic and ecological goals. The result of these changing attitudes has been a significant awareness and responsiveness of governments and resource managers to the adverse environmental effects that resource development activities can produce.

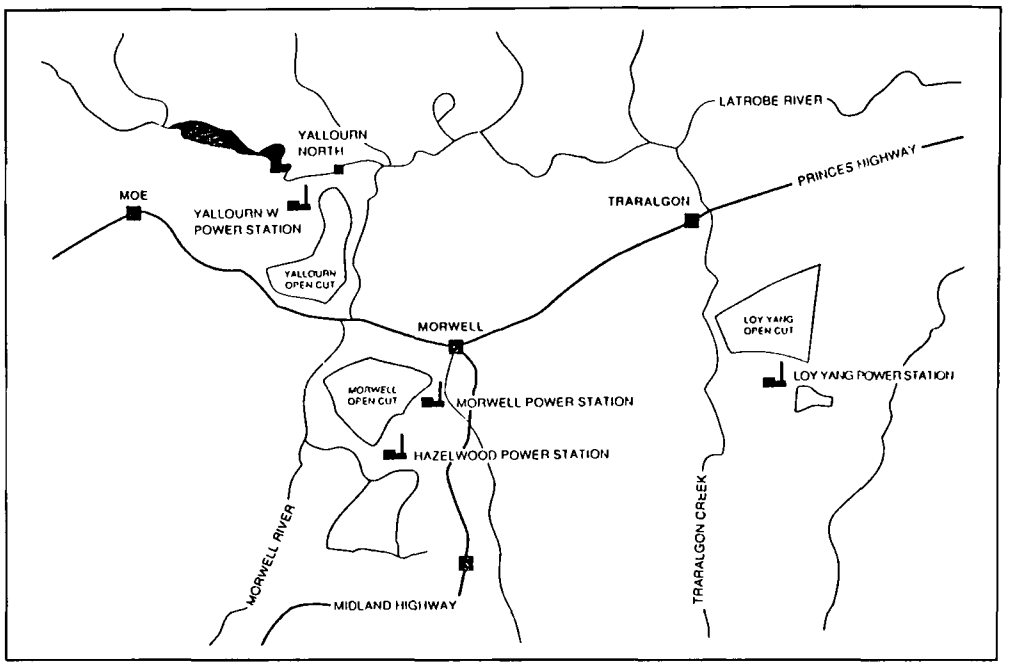
9.2 The SECV's operations cover approximately 20 000 hectares, or 30 per cent of land in the Latrobe Valley, with 5 800 hectares including open cuts under the control of the Production Group, of which 2 200 hectares are currently mined. Chart 9A indicates the extent of the SECV land holdings in the Latrobe Valley and Chart 9B shows the proximity to the major townships. The SECV is also the major user of water in the Latrobe Valley. In this context, it can be seen that the SECV has a major environmental responsibility in terms of land rehabilitation and water management in the Latrobe Valley.

CHART 9A
LAND OWNERSHIP IN THE LATROBE VALLEY



(a) APPM - Australian Pulp and Paper Mill.

CHART 9B
MAP OF SECV OPEN CUTS



9.3 In 1991 the SECV developed its corporate environmental objective which is *"... to be a community leader in protecting the environment by responsibly managing environmental effects of SECV's activities and striving to enhance the quality of the SECV works environment"*.

9.4 The SECV advised that it had in recent years successfully undertaken a number of land rehabilitation works in the Latrobe Valley. These included Westbrook Gully, Saviges Track and the Loy Yang Open Cut Viewing Mound and Western Perimeter. Areas currently in the process of rehabilitation include the Morwell Western dump and levee bank, Yallourn North Extension open cut, Yallourn East Field overburden dump and the Morwell Eastern overburden dump. To undertake this work the SECV has consulted widely with government agencies and the community.

9.5 **Although the SECV has undertaken land rehabilitation related to open cuts, the audit concluded that overall the SECV had not demonstrated that there was a structured and co-ordinated approach to achieving its environmental objective in the areas of land rehabilitation of open cuts and water quality management. Specifically, the SECV had not:**

- **determined the total level of funding required to effectively rehabilitate open cuts, nor considered the impact of environmental funding requirements on the future restructuring of the SECV** (refer to paragraphs 9.14 to 9.24 of this Report);
- **decided on the end-use of the open cuts in order to provide direction for rehabilitation works, nor completed master plans to assist effective implementation** (refer to paragraphs 9.31 to 9.36 of this Report);
- **established comprehensive indicators to measure performance in the area of the land rehabilitation and water quality management** (refer to paragraphs 9.37 to 9.41 of this Report);
- **evaluated whether land rehabilitation works undertaken had been effective** (refer to paragraphs 9.42 to 9.50 of this Report);
- **backfilled open cuts despite evaluations by the SECV determining that this was the most economic alternative** (refer to paragraphs 9.51 to 9.61 of this Report); **and**
- **always achieved EPA standards with respect to the quality of its water discharges to local waterways** (refer to paragraphs 9.62 to 9.66 of this Report).

■ *RESPONSE provided by the Chief General Manager, SECV*

The SECV responsed to growing community awareness in the mid-1980s by adopting a corporate rehabilitation policy for open cuts and overburden disposal (April 1986) and by the establishment of rehabilitation consultative group (June 1986) to assist in the implementation of policy objectives and strategies.

Extensive rehabilitation has been carried out since then, particularly of external overburden dumps, totalling more than 550 ha. The Yallourn North Extension has been almost completely rehabilitated. Rehabilitation plans for the operating open cuts are currently being developed and will be progressively implemented during the next 20 to 40 year remaining life of these mines. Funding for these projects has been included in operational budgets.

The SECV has a full commitment to achieving environmental objectives. The SECV has, since adopting the 1986 rehabilitation policy, demonstrated a significant commitment to rehabilitation of land affected by open cut operations. More than 50 per cent of disturbed land has been rehabilitated to-date.

Indicators are used to measure land rehabilitation and water quality management.

Backfilling of open cuts is not possible until the mining operations have reached the bottom of the coal seam. Yallourn open cut has been backfilling overburden for more than 50 years. Morewell open cut is planning to commence backfilling on the completion of the external dump. Loy Yang Mine is only at half depth and backfilling will not be possible for at least another 10 years.

The SECV places considerable attention on meeting EPA standards for water discharges and implements corrective action when appropriate.

BACKGROUND

Policy and legislation

9.6 The environmental concerns arising from mining operations and power generation in the Latrobe Valley encompass land, water, air, noise and dangerous goods. The audit specifically concentrated on those high priority environmental concerns directly related to open cut mining, namely land management and rehabilitation, and water management.

9.7 The effectiveness and efficiency of the management of environmental responsibilities arising from open cut production can be measured against legislative requirements, government policy and actual practice in private industry. The following paragraphs outline some of these significant legislative requirements and policies.

9.8 In Victoria, there are 2 principal bodies of legislation which govern environmental management. The *Environmental Protection Act* 1970 covers environment protection by prohibiting water, air and land pollution. In relation to land rehabilitation, the *Mines (Amendment) Act* 1983 requires mining companies to provide a rehabilitation bond to guarantee obligations for rehabilitation and stabilisation of land disturbed by mining. That legislation was reinforced by the introduction of the *Mineral Resources Development Act* 1990, which requires licensees of mines to rehabilitate land according to an approved plan, and complete this rehabilitation, as far as practical before cessation of its licence.

9.9 The *State Electricity Commission of Victoria Act* 1958 (*SECV Act* 1958), exempts the SECV from the *Mineral Resources Development Act* 1990. Similarly, the *Environmental Effects Act* 1978, which requires a stringent consultative process leading to an Environment Effects Statement before allowing mining to commence, was enacted after the establishment of the existing open cuts and, therefore, the SECV was not required to comply with it. However, the *SECV Act* 1958 does require compliance with State environmental protection policies and proper consideration of environmental factors, relevant to the planning, design, construction and operational phases of every project.

9.10 The previous State Government released *The Victoria - Brown Coal, Government Energy Policy Statement* in July 1984. The policy covered issues such as the rate and impact of brown coal development on social and environmental conditions, the protection of ecologically sensitive areas, overburden disposal and the Morwell River diversion which was required to enable the ongoing supply of coal to power stations.

9.11 Subsequent to this, the government released a *Statement of Planning Policy No. 9 - The Latrobe Region Brown Coal Deposits in the Context of Overall Resources* which provided the basis for co-ordinated planning and development of the major resources of the Latrobe Valley. It required that:

- comprehensive planning and management for the rehabilitation of all coal development and mining sites be undertaken in a manner which would achieve a high level of environmental quality;
- brown coal excavations, overburden dumps and other associated development be progressively rehabilitated to enable the highest practicable future use; and
- buffers be used to provide separation between coal development and residential or other sensitive areas to alleviate any adverse effects arising from coal operations.

9.12 In 1986 the SECV put forward its *Rehabilitation Policy for Open Cuts and Overburden Disposal*. The policy's rehabilitation objective was *"... to ensure that land disturbed by coal winning activities is stabilised and landscaped to blend into or complement existing natural features, allowing for further beneficial use at the earliest practical time"*. The SECV policy required the development and implementation of rehabilitation plans for disturbed areas in accordance with:

- government policy and statutory requirements;
- community expectations;
- sound environmental management principles; and
- sound and cost-effective engineering practices.

9.13 In the context of setting standards, it is important to note the stance adopted by the Australian Mining Industry Council (AMIC). The AMIC, representing companies and individuals involved in mineral exploration and the mining and processing of minerals, exists to promote and advance the profitability of the mining and metals industry consistent with the national interest. The rehabilitation objective endorsed by AMIC is *"... to meet both environmental and commercial objectives which reflect the long-term interests of both the local and the wider Australian communities"*.

ENVIRONMENTAL FUNDING

Funding requirements

9.14 The SECV has not assessed the level of total funding required to rehabilitate land disturbed by open cut mining as it is still to develop master plans (refer paragraphs 9.31 to 9.33 of this Report). However, the SECV has assessed the cost to fully rehabilitate the 300 hectare site of the Morwell Eastern overburden dump at approximately $7.5 million or $25 000 per hectare. Although rehabilitation costs at open cuts vary considerably depending on the site conditions, this figure accords with an estimate by the Latrobe Regional Commission that total funding costs for land rehabilitation at the open cuts alone would be in the vicinity of $125 million, notwithstanding that some rehabilitation has already been undertaken over the past 30 years.

9.15 This estimate is comparable with NSW rehabilitation costs where security deposits of up to $32 000 per hectare are required to cover the full estimated cost of rehabilitation, with funds released progressively by the Department of Minerals and Energy as rehabilitation is successfully completed. If the NSW model was to be adopted by the SECV, total funding of $160 million would be necessary for the 5 000 hectares of open cut area requiring rehabilitation over the next 30 years.

9.16 These estimated costs should be seen as the minimum funding requirement to restore the land to grazing status. In addition, the SECV will also continue to incur costs in relation to the control and improvement of water quality and management.

9.17 Although mine operations are undertaken with a view to minimising future land rehabilitation costs, the audit disclosed that the SECV had failed to:

- identify the ongoing level of financial commitment required to meet its environmental objectives; and
- plan for environmental expenditure requirements.

9.18 The failure to identify the total financial commitment is reflected in the level of funding allocated to the environment each year. In relation to annual expenditure on open cut operations, the SECV incurred expenditure of some $408 million in 1991-92, excluding capital works expenditure of approximately $36 million. Of this total expenditure, $3.4 million or less than 1 per cent related to the environmental management at the open cuts. This position has not improved in 1992-93 where in an environmental budget of approximately $4 million, a total of $1.9 million has been allocated to environmental activities in the Latrobe Valley.

9.19 Although it is acknowledged that some environmental works are undertaken as part of mining operations environmental expenditure is not essential to the ongoing operations of the open cuts. Environmental works are therefore competing against funding for non-discretionary operational works, and it may be possible that the annual level of funding may not be sufficient to meet minimum requirements.

9.20 Audit concluded that:

- **there should be further consideration of both the impact of environmental costs and future funding availability to meet these costs; and**
- **the current level of annual environmental expenditure at the SECV does not compare favourably with either the Latrobe Regional Commission or NSW estimates.**

Potential impact on the future restructuring of the SECV

9.21 In recent times there has been a world-wide trend to include the costs of remedying adverse environmental effects in the production cost of all goods and services. The inclusion of environmental costs in decision-making is sound economic management which is supported by both the Federal and State Governments.

9.22 As current electricity demand is lower than was anticipated in the 1980's and there is both increasing competition from other power sources and environmental pressures to use generation alternatives such as solar and wind power which result in lower environmental costs, the rate of development of open cuts in the Latrobe Valley may decline. Further, the proposed restructure of the electricity industry and possible changes in ownership of the power stations, open cuts and other facilities will necessitate that the total costs associated with future rehabilitation be included in the cost of production.

9.23 The need to determine future rehabilitation strategies and costs can be illustrated by the emerging issue in relation to the agreement to sell the briquette factory site in Morwell to the Coal Corporation of Victoria (CCV) in October 1992. The sale of the briquette factory site cannot be finalised until the issue of which party, the SECV or the CCV, is responsible for the rehabilitation of the briquette factory site and related parts of the Yallourn open cut site is resolved.

9.24 The current Government in its Energy Policy of October 1992 provided for the corporatisation or where appropriate, privatisation of individual power stations and other business segments to encourage competition. Such corporatisation and privatisation will necessarily include assured access to coal which could have implications for the SECV, given the cost of rehabilitation still to be undertaken.

- *RESPONSE provided by the Chief General Manager, SECV*

  For each mine, provisions have been made in annual budgets and in the 5 year plans, to rehabilitate areas disturbed by mining. Whole of life mine planning includes estimates for rehabilitation works still required to be done at the end of the project. The 5 000 ha of open cut area requiring rehabilitation quoted by Audit has no basis. Less than 2 000 ha will need rehabilitation.

  The cost of rehabilitation is not separated from normal operations expenditure, but is included within business unit financial plans. The SECV sees little significant financial commitment necessary beyond that allowed for in future budgets and projections. The SECV accepts that there is a substantial rehabilitation works required for the Latrobe Valley mines and has made the necessary annual provisions.

The issue of rehabilitation of the Briquette and Power plant has never affected the consideration of transfer of the facility.

This conclusion by Audit is largely based on a failure to separate out expenditure on rehabilitation from total SECV operations costs. The SECV has provided evidence that the rehabilitation works have been carried out, and that their standard has been commented on favourably at a recent national seminar on mining rehabilitation. The Audit conclusions are considered to be unsubstantiated.

LONG-TERM PLANNING AND LAND REHABILITATION

Introduction

9.25 The key to sound environmental management is to identify potential concerns and implement appropriate strategies which minimise adverse impacts at the earliest possible stage. To successfully achieve a balance between economic necessities and ecological goals many factors must be considered in the implementation of sound environmental policies. In the case of the rehabilitation of mines, including open cuts, the first objective should be to achieve a stable and self-sustaining land surface which minimises erosion and other environmental damage. The second and longer-term objective should be to achieve an end-use for the site which is beneficial, non-polluting and compatible with its surroundings. In order to achieve these objectives, a long-term plan needs to be developed and supported by ongoing monitoring procedures.

9.26 The Victorian *Mineral Resources Development Act* 1990 requires holders of mining licenses to rehabilitate land in accordance with a pre-approved plan. The requirements stipulated in Victoria relating to rehabilitation planning are similar to practices adopted interstate and overseas, which are illustrated by the following examples:

- In Western Australia mining companies prepare plans for State authorities at least 5 years in advance, and work closely with that State's Forests Department;
- Rehabilitation of coal mining areas in NSW is controlled by legislation under the Coal Mines and Coal Mines Regulations Acts which provides for rehabilitation to be progressively undertaken throughout the term of the lease;
- In the Hunter Valley of NSW the mining experience indicates that rehabilitation planning is integrated with mine planning at the earliest stages to ensure that mining constraints can be accommodated in the rehabilitation plans and vice-versa. Audit was advised that such early rehabilitation planning may show little impact during early mining stages, but can avoid costly rehandling and reshaping as the mine reaches the end of its life; and
- In Germany, current practice requires rehabilitation to be as carefully planned and monitored as the mining operation.

9.27 In 1987, the Rehabilitation Consultative Group (RCG) comprising representatives from various government agencies and the community was established by the SECV. The first task of the RCG was to oversee the implementation of the 1986 SECV *Rehabilitation Policy for Open Cuts and Overburden Disposal Areas*. The implementation strategy was to focus on all coal mining affected areas, i.e. the external overburden disposal area, the open cuts, and coal-winning areas in general. Open cuts were given priority in acknowledgement of the need to develop master plans for Morwell and Yallourn open cuts, where development preceded environmental effects legislation. The policy also recommended the development of rehabilitation master plans for each open cut and that these plans should be available progressively for public comment by 1988-89. As the operational life of SECV open cuts varies significantly, in some cases extending for up to 50 years, it proposed to develop master plans which would allow decisions on end land use to be made nearer to the end of the mine's life. The SECV proposed that detailed master plans would be supported by annual action plans for each open cut.

9.28 The following paragraphs outline the extent of planning and land rehabilitation undertaken to date by the SECV.

Rehabilitation

9.29 Rehabilitation mainly relating to external overburden dumps and concentrating on agricultural land uses and some wetlands areas has been undertaken. The works represent a series of specific rehabilitation projects including:

- the Westbrook Gully/Saviges Track overburden disposal area with some 75 hectares regrassed with trees planted;
- roadside plantings along the Morwell By-pass, the Traralgon South Road and the Midland Highway near Jeeralang Power Station;
- the restoration of Yallourn Eastfield and Yallourn North Extension; and
- the shaping and landscaping of the Morwell overburden disposal areas.

9.30 Audit was also advised by the SECV that at the Morwell open cut, there is a policy to rehabilitate all recently disturbed land as soon as possible but that some rehabilitation of the older areas had either been unsuccessful or for a period of time not rehabilitated at all. However, it was not possible for audit to establish whether the rehabilitation works undertaken to date were adequate.

Master plans

9.31 The SECV is proposing to prepare rehabilitation master plans for each of the production centres with the first of these plans covering Yallourn currently being finalised. This plan will guide the future activities of the SECV in the rehabilitation of the open cut, power station and surrounding lands, including wetland areas associated with the Morwell River. Part of the master planning process will involve a decision on the future use of the open cut. While audit was advised that a feasibility study on whether the open cut could be filled with water has recently been undertaken there is still no final decision on the likely end-use of the Yallourn open cut.

9.32 In the interim, the SECV developed 5 year plans which audit found to be deficient in that there was:

- An inconsistent level of detail. For example, there was no financial analysis in either the Yallourn and Loy Yang open cut plans, and there was an absence of performance measures in the Loy Yang plan;
- No review mechanism in any of the plans; and
- No consideration given to the responsibility and maintenance of the site after mining.

9.33 To date there are no final master plans to guide the rehabilitation and landscaping work of any of the open cuts and no commitment to a final end-use. While this approach may keep options open for future coal winning, there is a risk that future large-scale rehabilitation may become physically impractical and financially more costly. The lack of master plans may also have resulted in the inability of SECV to properly assess and account for future environmental resource requirements.

Alternative land use

9.34 The SECV advised that future electricity generation strategies are based on moderate electricity demand scenarios for the next 15 years. Audit considers that the lower than previously expected demand will free up large tracts of land reserved for coal-winning which could currently be temporarily used for alternative purposes such as forestry.

Conclusion

9.35 In audit opinion, the SECV's approach to mine rehabilitation and landscaping has been fragmented and insufficient priority has been assigned to:

- **the development and co-ordination of master plans;**
- **the preparation of detailed final concept plans for the rehabilitation of each open cut, and the review of these in accordance with the lower coal and power demand scenario; and**
- **the establishment of a progressive program of environmental works to match the rate of coal extraction including consideration of alternative land use.**

9.36 The lack of comprehensive and detailed plans in line with current mining practice could result in a large expanse of land which has either not been or is poorly rehabilitated and which may require significant expenditure in future years.

- *RESPONSE provided by the Chief General Manager, SECV*

  The SECV believe that the rehabilitation works completed over the last 5 years have been major, significant and completed to the highest standard. At a recent Australia wide rehabilitation conference run by the Australian Institute of Mining and Metallurgy the rehabilitation practices were praised by attending experts. Furthermore the Morwell River diversion has won engineering awards for excellence. Local community groups are involved and are very satisfied with the rehabilitation works achieved.

  The Yallourn Open Cut rehabilitation plan is currently being prepared for discussion with the Consultative Group during April (according to an agreed timetable) and the Morwell and Loy Yang plans are programmed for later discussion. Final rehabilitation for Loy Yang Mine is not expected to be required until around 2030 and the final size of the mine will be affected by coal requirements at that time as the coal resource does not cease at the currently planned boundary of the mine. Rehabilitation practice includes leaving contoured,stable overburden and dump batters which will fit easily into the final agreed form of the rehabilitated surface.

  Significant public comment has been sought while preparing the Master Plans, which when complete will give a range of options for the final end use. The Yallourn plan is 95 per cent complete and the Morwell plan 80 per cent complete.

  The 5 Year Mine Plans include financial estimates, performance measures for environmental issues, (although improvements are possible) funding for rehabilitation works within each groups operational budgets, review mechanisms and allocate responsibility for environmental matters.

  The SECV has been extensively examining alternative uses of all of its land. Currently more than 1300 hectares has been forested and a further 300 hectares is planned to be forested in the next few financial years.

  It is correct that when the final rehabilitation plans are completed there will be some readjustments necessary. Due to the timeframe that rehabilitation will be necessary it is unlikely that the cost will affect the price of coal. Finally, the SECV considers that rehabilitation development has been significant since 1986 and is not fragmented nor has it been given insufficient priority. The action in the field, and in planning, bear out the SECV commitment to rehabilitation.

PERFORMANCE INDICATORS

9.37 The extent of rehabilitation of coal development areas and visual effect of such rehabilitation have not been reported in the *SECV's Annual Report* since 1988-89.

9.38 The SECV should have well-developed, meaningful and challenging performance indicators. At the minimum, the performance indicators would be expected to encompass:

- the extent and quality of land rehabilitation;
- long-term success of rehabilitation work performed; and
- a water licence compliance set at a zero infringement level.

9.39 Monthly performance indicators reported in the SECV's internal business reports relate to land rehabilitation and water licence compliance. The audit of these indicators disclosed that:

- the land rehabilitation indicators are not comparable between open cuts in that the Morwell open cut expressed land rehabilitation as a percentage of target completion while the Loy Yang measure is expressed in hectares completed;
- the performance indicators for water quality at Yallourn and Loy Yang open cuts are aimed at an infringement level of 2 and 19 infringements a year respectively, rather than at a zero infringement level; and
- there was no proper analysis of the performance at each open cut in relation to the above targets.

9.40 Due to the deficiencies in the current monitoring procedures in relation to land rehabilitation and water quality it was not possible for audit to fully evaluate the extent that SECV had achieved its environmental objectives.

9.41 In audit opinion, the performance indicators included in the annual environment report and internal monthly business reports were not sufficiently comprehensive to measure and monitor environmental performance in the area of land rehabilitation and water quality.

- *RESPONSE provided by the Chief General Manager, SECV*

  Performance indicators are included in the 5 year mine plans and the Commission has adopted a Rehabilitation and Landscape Monitoring System which is being piloted at Morwell Open Cut.

POST-IMPLEMENTATION REVIEWS

9.42 Post-implementation reviews (PIRs) are an essential part of project management including environmental rehabilitation projects. A timely PIR coupled with ongoing environmental audits will enable an assessment of the achievement or otherwise of a project's objectives and can provide valuable guidance and feedback on work undertaken. The failure to undertake PIRs has 2 major consequences:

- without such an assessment required remedial action may not be identified; and
- new policies and programs may not give regard to the success or failure of the implementation of existing policies and programs.

9.43 Discussion with a private company which undertakes open cut mining activities indicated that PIRs and ongoing environmental audits were beneficial in determining the success or otherwise of processes undertaken and provide valuable feedback for future environmental projects.

9.44 The SECV advised audit that rehabilitation works were undertaken in accordance within the broad framework outlined in its 1986 *Rehabilitation Policy for Open Cuts and Overburden Disposal Areas* which also required a PIR to be performed in 1991. However, there has not been a comprehensive review of the implementation of any of the specific programs to establish the success or otherwise of the programs undertaken. To date, there has only been an informal review of the SECV's 1986 policy which resulted in the development of *the SECV Practices Manual for Open Cuts and Overburden Dumps*. The guidelines were adopted in June 1992 but had not been implemented in any detail.

9.45 The need to undertake PIRs and environmental audits in relation to the rehabilitation of land also encompasses land and waterways affected by mining operations but external to the actual open cut site. This was the case with respect to the Morwell River diversion at the Morwell open cut and the second river diversion at Yallourn open cut, which were required to increase availability of coal for electricity production. There has been no formal PIR or environmental audit despite the SECV view that the diversion at Morwell could cause:

- changes in the flooding characteristics of streams, impediments to the movement of fish, and changes to the landscape;
- loss of agricultural land, disturbance to gravel deposits and restriction on the stock water supply to a dairy property; and
- the displacement of some private and public land use.

9.46 The SECV completed environmental audits relating to the:

- Hazelwood power station facility and Morwell open cut coal mine (performed in 1990 by external consultants); and
- Yallourn production centre - open cut and power station (performed in 1991 by the SECV's corporate Environmental Management Unit).

9.47 Among the findings, the external review at the Morwell open cut disclosed that personnel had no environmental inspection checklist to document the visual check of the results of rehabilitation works which occur at regular intervals. This lack of documentation of the environmental inspection would make it difficult to evaluate the results of such checks.

9.48 Although, it is sound management practice that recommendations from all environmental audit reports be reviewed and where appropriate, actioned in a timely manner, in the above instances, there had been no formal assessment of the recommendations.

9.49 Audit has concluded that in relation to environmental projects:

- **a formal policy to assess achievements and benefits of the SECV's environmental policy or specific programs completed and in progress does not exist;**
- **there was no ongoing evaluation of the long-term effects on the environment that may result from past actions; and**
- **the effectiveness of environmental policy adopted by the SECV has not been reviewed.**

9.50 Consequently, it cannot be established whether works undertaken to date by the SECV in the Latrobe Valley have been implemented in the most appropriate economic and environmental manner.

- *RESPONSE provided by the Chief General Manager, SECV*

  The Rehabilitation and Landscape Monitoring system developed by the SECV is to be applied to Post Implementation Reviews. The policy review is a formal review currently being undertaken by the Rehabilitation Consultative Committee. The "Guidelines for Rehabilitation of Open Cuts and Overburden Dumps" is an SECV initiative, and outcome of the original policy objective. Many of the rehabilitation works are relatively recent and although formal PIRs are yet to be undertaken, the Commission's assessment and local feedback indicate that the work is satisfactory. Further, the Morwell River diversion at Morwell was constructed in the mid 1970s and has operated successfully since that date.

DISPOSAL OF OVERBURDEN

Background

9.51 To extract coal from an open cut, the overlying vegetation and soil, known as overburden, must first be removed. Characteristically in the Latrobe Valley, there are 15 to 30 metres of overburden over an area measuring 70 kilometres by up to 25 kilometres wide with large reserves of brown coal contained in coal seams ranging in depth from 30 to 140 metres. This gives a coal-to-overburden ratio of approximately 4 to 1 which compares favourably in operational terms to the average ratio in other interstate and overseas mines of 1 to 12.

9.52 Large bucketwheel dredgers are employed to excavate and transfer overburden onto an overburden conveyor system. The overburden material is then removed from the conveyor system by a travelling stacker which deposits the overburden material by either:

- depositing it external to the mine on what is called an overburden dump; or
- backfilling a section of the open cut which is no longer utilised for mining purposes.

9.53 The creation of an external overburden dump involves setting aside large tracts of productive land to accommodate overburden material. The land remains inoperative for long periods while the overburden is deposited and formed into hills of up to 50 metres in height. Once the overburden dump is no longer needed, the original land use may need modification given the alteration to both the natural landform and the absence of soil for re-vegetation.

Travelling stacker depositing overburden.

9.54 In contrast, the long-term benefits of backfilling include:

- minimisation of the total area requiring rehabilitation and therefore lower cost;
- less fire risk as a result of reduced exposed coal mass; and
- less sterilisation of otherwise productive land.

9.55 Victorian, interstate and overseas mining experience also indicate a preference to backfilling open cut mines rather than the creation of external overburden dumps.

9.56 In July 1984, the previous Government released *The Victorian Brown Coal, Government Energy Policy Statement*. The policy provided that: *"... to minimise potential sterilisation of coal and land use conflicts, it is the Government's policy that wherever practicable, internal dumping of overburden will be required. This policy recognises that some external dumping may be necessary until suitable worked out areas become available for internal dumping, although the sterilisation of some lower seam coal is not ruled out".*

9.57 The SECV recognises that even though there is not enough overburden to completely fill an open cut, it is more environmentally friendly to backfill a mined area with overburden than to create several external overburden dumps. Despite this recognition, to date only Yallourn open cut has introduced backfill operations as the preferred method of overburden disposal. At Yallourn, the majority of the overburden has been placed in the worked out areas of the open cut as mining proceeds. The oldest site at the northern end of the Yallourn open cut near the Latrobe River was then planted with pines. Similarly, the Midfield Disposal Area at Yallourn is also complete and has been regrassed to stabilise its surface. A summary of the overburden disposal operations at the other 2 mines is detailed below.

Loy Yang open cut

9.58 Loy Yang is still considered by SECV to be too small to backfill. A 1982 internal review stated that due to the requirements for the stability of the dumped overburden, and the need to allow space for large equipment to manoeuvre, backfilling could not commence until the coal removal operations were well advanced. Overburden has therefore been transported by conveyor systems to a location external to the open cut. It is planned, to commence backfill operations with overburden that is mined, after the completion of the life of the existing external overburden dump in 2007. However, the existing external overburden dump at Loy Yang created from the current mining operation will become a permanent feature of the landscape which requires rehabilitation involving ongoing expenditure over the life of the overburden dump.

Morwell open cut

9.59 Backfill operations are not currently planned for the Morwell open cut. The SECV has stated that the main reason given for not backfilling at Morwell is the existence of a second coal seam which lays beneath the surface of the existing coal mining operation. In the late 1970s and early 1980s, given the higher electricity demand scenarios estimated for Hazelwood power station, the SECV then considered that there may have been a need to excavate this coal and therefore it would have been inefficient to cover over the second coal seam with overburden. By the mid-1980s revised projections indicated that the need to mine the second seam was remote. Nevertheless, the decision was made to extend the existing overburden dump, despite an internal review completed in 1986 which:

- determined that the quantity of coal in the second seam represented about 40 million tonnes or only one year's supply of SECV's total coal requirements at 1986 usage rates;
- stated that backfill establishment costs would be in the order of $20 million compared with off-site disposal at an overburden dump at a cost between $25 and $55 million;
- estimated that operating costs to backfill would be lower than the overburden alternative; and
- concluded that the backfilling option into Morwell open cut was the most cost-effective as well as yielding the least social and environmental effects of the alternatives examined.

9.60 The 1989 Electricity Development Strategy Implementation review also confirmed that backfilling would be economic. The review noted that the commencement of overburden disposal by backfilling of overburden would be programmed to commence in late 1991. Audit observed that despite all the recommendations to backfill and the need for about a 5 year lead time, there are still no plans, no public consultation or agency approval processes in place to commence backfill operations. Audit was advised by the SECV that backfilling has not been a planning priority at Morwell open cut but was not able to provide audit with a justification for this decision. Currently, the overburden dump extends over 300 hectares, equivalent to nearly twice the size of the Melbourne central business district and represents approximately 6 per cent of the total area requiring rehabilitation by the SECV.

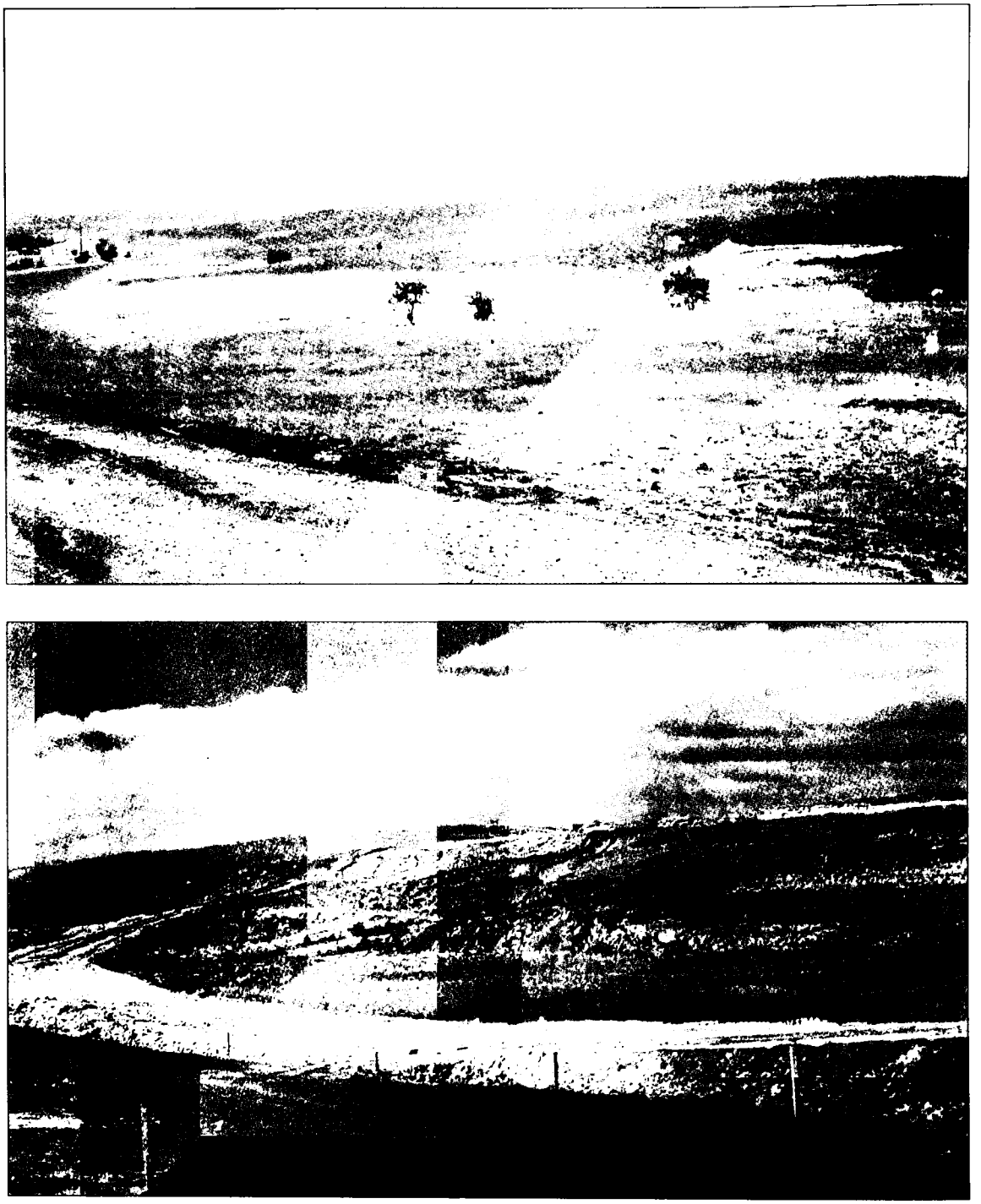
9.61 By not backfilling at the Morwell open cut the SECV has not followed the most economic alternative recommended by a number of internal reviews. In fact, the SECV has selected the option which results in:

- **an overall higher establishment and short-term operating cost;**
- **the need in the future to rehabilitate both the overburden dump and the open cut pit; and**
- **a failure to comply with government policy.**

- *RESPONSE provided by the Chief General Manager, SECV*

  Timing of the backfilling of open cuts is a matter both of economics and practicability. With very thick coal seams it takes many years for the operation of the mine to achieve the base of the coal seam. Yallourn open cut commenced in 1926 and the external dump is located on the north-eastern side. Internal dumping commenced in the 1940s. External dumping at Morwell open cut commenced in the early 1960s and will continue until the late 1990s. Internal dumping has been possible in the last 4 or so years but the expense of the move cannot be justified until the current dumping has been completed. At Loy Yang Mine the base of the seam will not be exposed until approximately 2005. Internal dumping onto the exposed coal surface before the base is reached would significantly reduce the available coal resource and raise coal costs.

  The eastern overburden dump at Morwell is being developed as planned and will not extend, in plan, to cover any further area. The development of the second coal seam was based on a large Morwell-Driffield mine following the removal of the first coal seam. Under this development some 500 Mt of second coal seam would be available to meet the demand of a future power station. The SECV believes that internal dumping at Morwell should occur and had planned to commence that activity. However, a reduction in the future power demand and the SECV's "no new debt" policy necessitated a review of the timing of such works. It is expected that internal dumping will commence in about 1998-99 on completion of the eastern dump. It is still to be determined if the stacker (TS2) will be transferred into the mine or mobile plant will be used to transport the overburden. The planning time is still sufficient for this assessment to be completed over the next 2 years.



Morwell Eastern overburden dump.

WATER MANAGEMENT

Background

9.62 The development of an open cut to extract coal first requires the removal of vegetation and soil. Water run-off and erosion are the most common problems on a mining site resulting from this removal operation. Steep slopes, failure to re-vegetate and inadequate drainage further add to the problem. Control is best achieved by lowering the grade of slopes, minimising any unvegetated area, and installing adequate drainage. Other water management concerns relate to the quantity and quality of water discharged in the mining process.

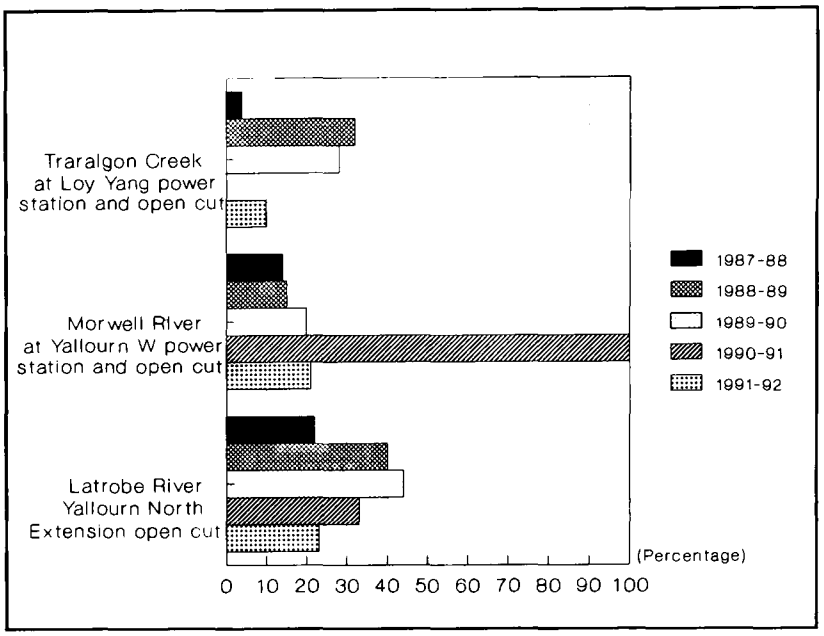
9.63 In the case of the Latrobe Valley, additional water management practices relate to the removal of water from aquifers at the Morwell and Loy Yang open cuts. Aquifers are water-bearing layers of sand and rock beneath the coal seams which would flood the open cuts if the water was not pumped out to reduce underground pressure to a safe level.

Monitoring of discharges

9.64 The discharge of water to local waterways, from mining sites and power stations requires an Environmental Protection Authority (EPA) discharge licence and works approval. The licence stipulates the standards of quality that water discharges must meet. Breaches from these standards require immediate remedial action and can result in fines by the EPA. Audit was advised by the EPA that the levels set for SECV were comparable with those standards set for other industries. The EPA regional manager also advised that in the past there had been an apparent lack of understanding of EPA requirements on the part of SECV mine management. A 1990 review of water quality at the Morwell open cut revealed a number of instances where the standards set were exceeded. **There was no formal follow-up assessment by the SECV of these breaches.**

9.65 The EPA advised audit that over the past 12 months as shown in Chart 9C a significant improvement in wastewater quality has been achieved. Nevertheless, the quality of water discharges at the open cut in 1991-92 were still outside the licence limits for between 10 to 20 per cent of the time which meant that polluted water was discharged into surrounding waterways at relatively frequent levels. In one instance, poor wastewater handling practice at the coal transfer area at Hazelwood Power Station resulted in the EPA granting approval for emergency discharge into the waterways of coal-laden wastewaters. **Despite assurances from the SECV that remedial works would be in place by January 1992 to prevent such discharges in the future, the EPA in July 1992, issued a Pollution Abatement Notice which required the SECV to control the discharges within a specified period or be fined.** The SECV is now complying with EPA requirements for water chemistry and suspended solids at the transfer area.

CHART 9C
EPA LICENCE INFRINGEMENTS *(a)*



(a) Frequency of non-compliance is expressed as a percentage of the total annual samples at each discharge point.
(b) Discharge points relate to water discharged from both open cut and power station operations.

9.66 The SECV should continue to improve the quality of water discharged into waterways and establish performance targets aimed at maximising the quality and minimising the quantity of its wastewater discharges.

- *RESPONSE provided by the Chief General Manager, SECV*

  Although some water discharges have not meet EPA requirements on some limited parameters, at some sites, the water is not 'polluted' so as to create health risks. The Commission's understanding is that the EPA consider the Commission's work on improving water quality has been commendable even with the knowledge that further works are required. It should be noted that the Commission is now using solar powered dosing stations, where previously it was not possible to undertake controlled water quality improvements.

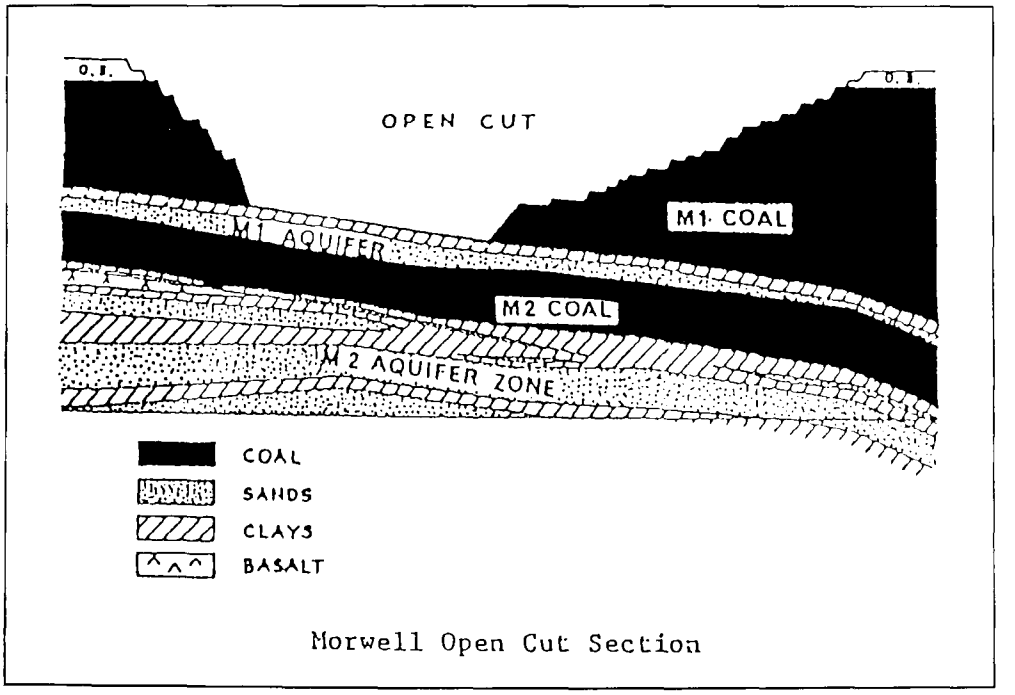
  Each breach of any licence is followed up within the SECV and reported to the EPA.

  The Morwell River discharge from the Yallourn mine was affected by sulphate due to ash discharges from the Yallourn W power station. The licence has now been changed by the EPA. Also water discharges from the mined out Yallourn North Extension have exceeded licence limits almost entirely due to the acidity of spring water flowing through the catchment. There has been extensive discussion with the EPA over the need to treat this natural water prior to discharge from the site.

Artesian dewatering and land subsidence

9.67 Large-scale dewatering of underlying aquifers, that is the removal of underground water similar to that of an artesian bore, is carried out to maintain the stability of the open cut floor. Dewatering operations occur in the Latrobe Valley at both the Morwell and Loy Yang open cuts. As shown in Chart 9D at the Morwell open cut, there are 2 extensive aquifers that contain groundwater. There were originally no plans to pump groundwater from beneath the open cut at Morwell, but in the 1970s the base of the open cut rose 6 to 7 metres. In order to avoid excessive floor movement which could have resulted in flooding, and large movements in the coal-face the pressure of the artesian water needed to be maintained at a safe level by dewatering. Such activities can result in both vertical and horizontal land movements.

CHART 9D
MORWELL OPEN CUT AQUIFER



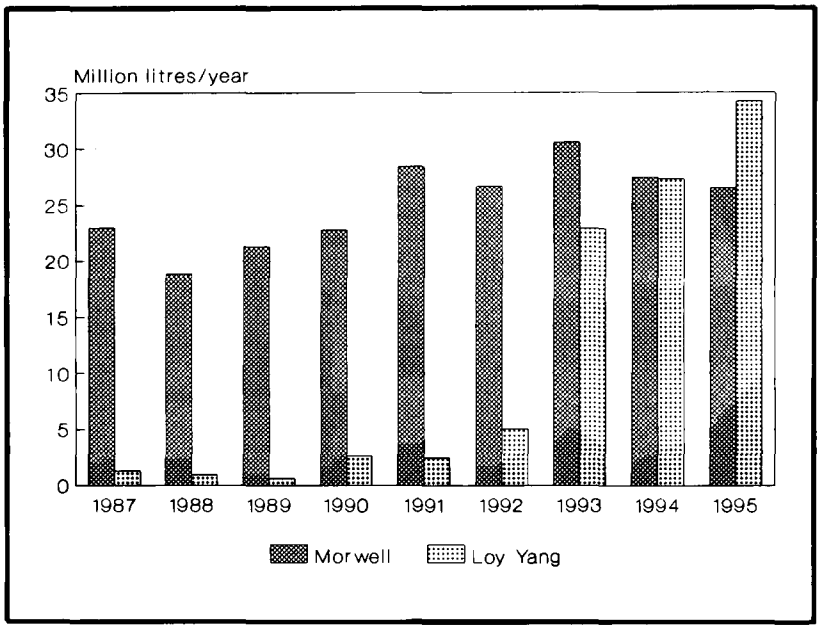
Key:
OB Overburden.
M1 First coal section.
M2 Second coal section.
Aquifer zone Water-bearing permeable zone.

Source: SECV.

9.68 Audit was advised by the SECV that dewatering operations can be expected to continue at a high level in the foreseeable future. Chart 9E depicts the level of dewatering activities in the Latrobe Valley and indicates that dewatering at:

- Morwell will again peak in 1993 and gradually decline over the next 4 years; and
- Loy Yang dewatering has been minimal to date but is expected to dramatically increase from 1993 as the Loy Yang power station becomes fully operational.

CHART 9E
ARTESIAN DEWATERING *(a)*



(a) Figures for 1987 to 1991 are actual. Data provided for 1992 to 1995 are predicted.

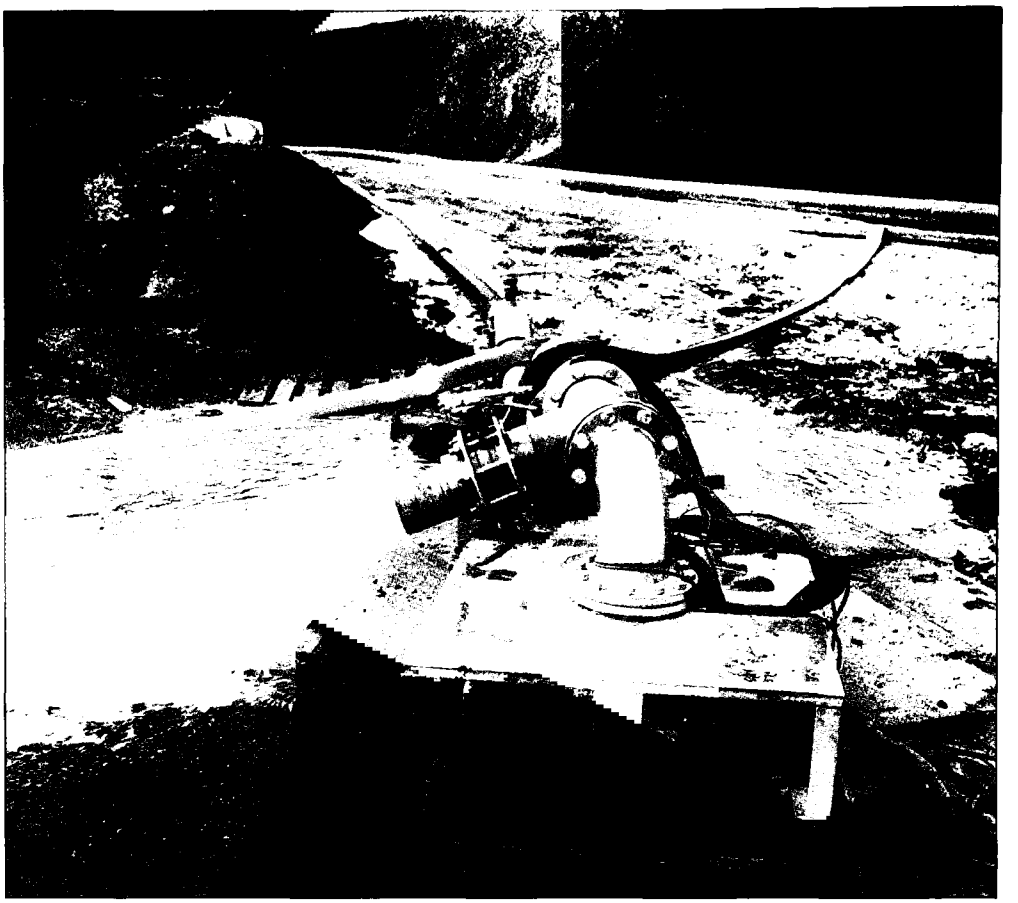
9.69 To date, as a result of dewatering activities and mining operations, there has been horizontal movement at the edge of Morwell open cut equal to 2 metres, and at the edge of Morwell township equal to 0.1 metres. There has also been vertical movement, that is land subsidence, at Morwell of up to 2 metres over a period of time.

9.70 Other possible consequences of dewatering are illustrated by the following example. The settlement pond used to remove excess silt and particles from Loy Yang stormwater and wastewater before it is released into Traralgon Creek experienced leakage problems for several years and was initially controllable. Seepage increased during 1989 and the flow became too high by 1991. An immediate need to prevent damage and to control the discharge into the Traralgon Creek resulted in a decision that the most effective and efficient solution would be to line almost a third of the pond with 56 000 square metres of a geo-membrane, at a cost of $2 million. While undertaking this process a major crack was found in the floor of the settlement pond. Audit was advised by the SECV that the dewatering activities and the resulting depletion of the aquifer, although not the major factor, was a contributing factor to the leakage experienced at the settlement pond.

9.71 The SECV has taken a number of positive steps in relation to the management, control and monitoring of the impacts of dewatering on land formation movements including investigating claims by Morwell residents relating to alleged structural house damage. In addition, the SECV, engaged a contractor to perform geological modelling to monitor the amount of pumping and the settlement that occurs as a result of the artesian dewatering operations. There was no evidence of a formal follow-up procedure nor reporting to an independent body on the results of this monitoring.

9.72 Esso/BHP and SECV have expressed possible interest in studies of the geological relationships between the off-shore impact resulting from oil drilling and those occurring on-shore from groundwater extraction by the SECV. To date no studies of the combined impact of oil drilling operations in Bass Strait and the dewatering operations in the Latrobe Valley have been commissioned and therefore the combined long-term effects of dewatering could not be provided.

9.73 Audit concluded that the effects of water extraction from the aquifers should be independently evaluated and monitored to ensure that the impact of large-scale dewatering on the surrounding land and infrastructure is effectively addressed.



Groundwater extraction at Loy Yang.

Level of groundwater extraction

9.74 The EPA advised that the groundwater extracted at the Latrobe Valley to stabilise the mine floor is relatively pure and therefore should be considered to be a resource. The quantity of water obtained through dewatering operations by the SECV as compared to other water sources and uses in the Latrobe Valley is detailed in Table 9F.

TABLE 9F
WATER USAGE 1991-92
(million litres)

Water Source	*Quantity*
SECV *(a)* -	
Extracted -	
Aquifers	26 000
Morwell River	99 000
Gippsland Water Authority	26 600
APPM -	
Gippsland Water Authority	24 600
Townships of Traralgon and Morwell -	
Gippsland Water Authority	7 500

(a) Used in open cut and power station operation.

9.75 This table indicates that the SECV is both the principal user of water in the Latrobe Valley, and water obtained by the SECV's dewatering activities is a significant resource in terms of power generation. The Gippsland Water Authority advised audit that it is concerned that the subsequent use of artesian groundwater had not received the same consideration as to its use as had been given to other traditional sources. For example, until recently the SECV turned the clean artesian groundwater into polluted water by using it for fire services and dust suppression. Audit understands that the water now generally by-passes the fire services and is more effectively put to use in the power stations at Hazelwood and Loy Yang.

9.76 The SECV and Rural Water Corporation are currently examining the possible licensing and monitoring of groundwater extraction but in the past, there has been no independent body monitoring the SECV's dewatering activities. As water is an immensely valuable resource, proper accountability should be developed between the SECV and an independent body to ensure the best use of this resource.

- *RESPONSE provided by the Chief General Manager, SECV*

  Dewatering of artesian aquifers is an essential part of open cut mining in the Latrobe Valley. The effects of water extraction have been fully evaluated on an on-going basis over the past 30 years both by the SECV and by international consultants.

  Geological and groundwater modelling are, and have in the past, been undertaken to predict dewatering requirements and expected earth movements. No structural damage has been caused by earth movements related to mining at Morwell, although some services were effected in the early 1970's. An independent body, including representation from the CSIRO, was established in about 1970 to review any claims for damage. The results of the significant monitoring of earth movements is forwarded to local and Government bodies for information. The long term effects of aquifer depressurisation have been fully documented and reviewed by international consultants.

  The Commission's monitoring, which has extended beyond Longford, indicates that mine dewatering activities have little effect beyond Rosedale.

The Commission has through technical assessments, minimised the extraction and maximised the use of artesian water for use at power stations. At Morwell the artesian water goes to the Hazelwood Pondage. At Loy Yang an aquifer water collection system is in operation with water going to the power station cooling water system. Any minor water entering the dirty water system is recycled in the fire service system and is not wasted.

The Rural Water Corporation has been informed of the aquifer depressurisation activities and that the SECV is committed to make the best use of the resource. It is critical that mining operations are not unduly limited by dewatering restrictions, as the energy requirements of the State are met.

The SECV contends that the State has sufficient monitoring mechanisms without the establishment of a further independent body to review.

Appendix A

Glossary of terms

GLOSSARY OF TERMS

AIRC	Australian Industrial Relations Commission.
AMEWU	Australian Metal Employees Workers Union. Members of AMEWU are predominantly employed by the Production Maintenance Unit that provides maintenance services to the open cuts and power stations.
Aquifer	An underground water-bearing layer of permeable rock, sand or gravel which is capable of supplying water to bores. Aquifers flow beneath Morwell and Loy Yang open cuts. As a result of mining activities and the removal of vast quantities of overburden and coal from above the aquifers, pressure within the aquifers is released. Unless preventative measures are undertaken, this release of pressure causes the mine floor to rise and become uneven with tension cracks developing and allows an uncontrolled flow of water into the mine which destabilises the worked-out coalfaces. To minimise the destabilising effects on surrounding land, the Morwell and Loy Yang open cuts pump water from their respective aquifers.
Artesian ground water	The water pumped from the aquifers.
ASU	Australian Services Union (Energy). Represents the majority of clerical, supervisory and management employees deployed in the open cuts.
Availability factor	Measures the time that electricity generators or plant within open cuts are available for production.
Award restructuring	The process of revising industrial awards to achieve more flexible and efficient working arrangements. Award restructuring within the SECV was undertaken as part of the Structural Efficiency Program.
Bank cubic metre	Measure used in comparing performance between different mining operations by converting volumes excavated to standard units by allowing for the density of material excavated.
Base load	The minimum load produced by an electricity network over a given period to meet a constant demand. In Victoria, this load is provided by the brown coal power stations in the Latrobe Valley.
Bucketwheel excavator	Plant used in open cut operations to excavate overburden and coal.
Capacity factor	Measures the actual electricity production compared with the total electricity production possible if plant was fully utilised.

CFMEU	Construction, Forestry, and Mining Employees Union (CFMEU), formally called the Federated Engine Drivers and Firemans Association(FEDFA). In open cuts, members of the CFMEU are mainly involved in the excavation of coal and overburden.
Coal reliability	Measures the extent to which open cuts have met the demand for coal by power stations.
Co-generation	Privately owned generating plant used firstly to meet the owner's requirements and then also able to supply any excess generation to the SECV's power grid.
Demarcation	The division of work to assign tasks exclusively to designated employees usually on the basis of trades, skills or union membership.
Dewatering	The process involving the removal of water from the open cut and/or its aquifers. (Refer aquifers.)
Dredger	Excavation machine usually comprising a bucketwheel, set of crawlers, and a loading and discharge boom.
Dredger/conveyor system	Each mining system comprises a dredger and a series of conveyors to transport excavated material to power stations or overburden dumps.
Enterprise bargaining	Current industrial relations system aimed at the development of agreements on an industry basis rather than a union or trade basis in order to achieve specific and flexible employment conditions.
ETU	Electrical Trades Union. Within the SECV, the ETU represents employees mainly employed by the Production Maintenance Unit.
FEDFA	Refer CFMEU.
FIMEE	Federation of Industrial, Manufacturing and Engineering Employees. FIMEE represents employees mainly employed by the Production Maintenance Unit.
Fire Services	A unit attached to each of the open cuts responsible for the prevention, detection and suppression of fires within the open cuts.
Fixed manning agreements	Agreements between employees and management which prescribe the minimum employee numbers required before operations will commence.
GWh	Giga Watt Hour: 10^9 watt hours.
Hydro	Electricity generated by a turbine spun by water from a reservoir. In Victoria, hydro is primarily used for peak electricity demand operations for short periods.
Land subsidence	The gradual sinking of land formation to a lower level.
Megatonnes	1 000 tonnes. Used as the measurement of coal mined and utilised over a given time period.
MEWU	Metal Employees Workers Union. (Refer AMEWU.)

MWh	Mega Watt hour: 10^6 watt hours.
National Grid	Proposed interconnection of State electricity transmissions with the aim of deregulating the industry, increasing competition and more efficiently supplying electricity to participants in the Grid.
Output capacity	The volume that dredgers can excavate per hour of operation.
Overburden	Material overlaying coal which is required to be removed before coal mining can commence.
Overburden/coal ratio	The ratio of overburden to coal. Typically, Latrobe Valley open cuts have a ratio of 1 part overburden to each 4 parts of coal.
Production Group	Strategic business unit within the SECV with overall responsibility for the operations of open cuts, power stations, production maintenance and other technical services.
Production Maintenance Unit	The business unit which is responsible for providing the majority of maintenance services to all other Production Group business units.
Reserve plant margin	The level of excess generating capacity over maximum demand requirements.
Roche Thiess Linfox (RTL)	Consortium of private sector companies with contractual arrangements for the management of Morwell overburden removal.
Skills extension	The identification and provision of training in skills necessary to improve the performance level of employees in open cuts.
Structural efficiency	The process initiated by the AIRC to improve the competitiveness and efficiency of workplaces. This required a review of awards, commitment to skills development and flexibility in the organisation of work.
Thermal power station	Power stations within the SECV which are reliant on brown coal for the generation of electricity. Currently, these stations produce over 85 per cent of Victoria's electricity requirements.
Travelling stacker	A machine which can remove material from the conveyor and deposit it in the overburden dump.
Utilisation rate	The proportion of time plant is operating compared with total available time.