YNOC operation with the extinction of coal reserves was offset by the merging and subsequent transfer to YNEOC. Personnel employed at YNEOC were part of the much larger Yallourn Open Cut employee groups with whom they were fully integrated for training and promotional opportunities.

The YNEOC has undergone extensive rehabilitation and erosion control works since the cessation of mining in 1988. Much of the mine site including the external overburden dump has been restored to pre-mining use as grazing land.

### Mine Infrastructure Features

Remaining economically minable coal reserves.

Rehabilitated landscape – leaving resumption of mining as feasible.

Residual water storages for fire fighting and erosion mitigation.

Site of roadside coal storage and outloading bin.

### References

Brown, K et al ‘Yallourn North Extension Open Cut Interim Rehabilitation’, Rehabilitate Victoria, AusIMM, November 1992

Gloe, CS, Geological Report, No.1, SECV, 1956

Gloe, CS, Geology of Brown Coal Deposits, Monograph No.11, AusIMM, 1984

Herman, H, Brown Coals Of Victoria, 1922

Mineral Statistics, Mines Department, 1965


9.5 Morwell Open Cut

Map Reference: 8121-1-2 Morwell Zone 55
Open Cut 4470, 57860
Municipality: City of Latrobe
Land Use/Status: Private

Site History

In 1936, Jan Klitzing, a German consultant to the SECV, recommended opening a new open cut south of Yallourn to provide increased reliability of coal supply to the Yallourn Power Station and Briquetting Plant and to provide for future demand. Reliability from the Yallourn Open Cut had previously suffered due to flood and fire. Klitzing’s recommendation was not adopted at the time, with the SECV allocating funds for additional hydro-power at Kiewa in 1938 and from 1941 for Newport Power Station burning black coal.

In July 1941, an Investigatory Committee on Utilisation of Brown Coal for Essential Services established by the State Government during a prolonged period of hard fuel shortages recommended that briquetting production (all at that time by the SECV at Yallourn) be increased from about 0.4 million tons per year to 1.2 million tons per year to meet existing demand with further increase to 1.7 million tons per year by about 1960. This proposed output did not include provision for replacement of existing coal usage. In August 1941, the SECV Engineer-in-Charge Coal Supply (R. J McKay) submitted a report ‘Yallourn Brown Coal for Essential Services’, taking into account the continuing increasing demand for electricity as well as for hard fuel. He submitted that ‘there are sound reasons for developing another open cut – the work of investigation should be commenced as early as possible’.

The outcome of these recommendations was that the SECV undertook an extensive drilling program of the brown coal resource in Gippsland and submitted several reports on the selection of a new open cut location. On 13 July 1948, the State Government passed legislation approving a SECV recommendation for an Open Cut and Briquetting Works at the Maryvale South site immediately south of the Morwell township. The nomenclature ‘Morwell Briquetting Project’ was adopted. The enabling legislation defined the project as supplying coal for two briquette factory units with a combined output of 1.3 million tons per annum of briquettes, noting that there were sufficient coal reserves available in the approved open cut site for a further output of 1.3 million tons per annum of briquettes. The coal in the Maryvale South site was from an older coal seam to that being mined at Yallourn, was of lower moisture content but higher sulphur and ash content.

In the selection of the Maryvale South location for the briquettng project, the SECV had nominated the Loy Yang area at the south of the Traralgon township site as being more favourable for an electricity generation site, and that the Loy Yang coal resource as well as the coal resource at a Maryvale North location on the north of Morwell township be reserved for future use by the SECV for power generation.

At June 1948, it was noted by the Minister for Electrical Undertakings in introducing the enabling act to Parliament that the SECV had been requested by Government in December 1946 to proceed from that time with procurement of open cut equipment which could be used at Yallourn Open Cut if formal legislation for the Morwell Briquetting Project was delayed.

The development plan proposed by the SECV at 1948 for the 2.6 million tons per annum briquetting output was based on rail mounted ladder dredgers on four operating benches. One dredger was to be on overburden removal with disposal via a rail system to a rail mounted spreader on an external dump. Five dredgers were to be on coal excavation loading to rail tracks with delivery from ditch bunkers on the eastern batters to raw coal bunkers adjacent to the briquette factories. Three of the coal dredgers were planned to be deep digging and two to be high digging ladder dredgers. This plant complex was similar to that in use at Yallourn in the late 1930s and was advocated by senior YOC personnel on the basis of Yallourn experience to the early 1940s.

In 1946, as soon as practical after World War II, a group of senior SECV engineers visited Germany and evaluated trends in German Open Cut practice. Although orders were placed by the SECV in 1947 for three rail mounted bucket chain (ladder) dredgers, consideration was being given to subsequent dredgers for the Yallourn and Morwell Open Cuts to be crawler mounted bucket wheel machines.

Site excavation at the Morwell project commenced by contract on 11 April 1949 on drainage, ramp and road access, water supply, worker accommodation and other infrastructure for
the open cut. By June 1950, work had commenced on the interconnecting SECV 90 cm gauge railway between Morwell and Yallourn Open Cuts, a vital provision for initial transfer of overburden and coal from Morwell and for future reliability of coal supplies (Drawing 9.4/5). In early 1950, orders were placed for a bucket wheel dredger (SECV Number 21) and a rail mounted overburden spreader (SECV Number 3; Photo 9.5/4), a five cubic yard walking dragline and a wide range of electric locos, rail trucks and ancillary rail equipment required for service from 1951 to 1952.\(^466\)

However in August 1951, the Commonwealth Government imposed severe restrictions on funds for development works throughout Australia. Plant procurement for Morwell Project was delayed and site construction work almost completely postponed until September 1954.

(Number 21 dredger travelled off its erection site at Morwell on 16 November 1953 for travel and digging trials. Total excavation time was about one hour of overcasting before the dredger travelled back for modifications and completion of outstanding contractual items.) Number 21 dredger came into service on overburden excavation with trials in September/October 1955 delivering over the Interconnecting Railway to the YOC internal dump and also to Number Three Spreader at the MOC external dump.\(^467\)

Coal excavation commenced in November 1955 over a period of three consecutive day shifts with Number 21 dredger excavating this coal from the overburden face and delivering this over the ICR to Number Three ditch bunker at Yallourn. Regular coal deliveries on this route from Number 21 dredger commenced in December 1955. The rail mounted Number 20 ladder dredger (Photos 9.5/3 A and B) came into service on 16 July 1956, working additionally to Number 21 dredger on overburden removal as well as development of the first coalface. For the 1956/57 year before coal deliveries commenced to the Morwell ditch bunker, approximately 50,000 tons of coal was delivered over the ICR to Yallourn and about 1.5 million cubic yards of overburden excavated by dredgers 20 and 21.\(^468\)

In late 1957, with forecasts of substantially increased coal demand on MOC, the long term development plan for MOC was changed to provide for coal and overburden transport to be by belt conveyor instead of by rail and for excavators to be crawler mounted bucket wheel dredgers. This change was to apply to future plant orders as the open cut developed in depth and to replacement of rail plant when justified. The new plan envisaged transfer of rolling stock to the expanding rail delivery systems in YOC.\(^469\)

In November 1958, coal supplies commenced from MOC to Morwell Power Station.\(^470\)

In August 1959, coal supplies commenced from MOC to the Morwell Briquette Factory which had its first test runs on 9 September 1959 with briquette output for November at 16,583 tons. On 8 December 1959, the first deliveries of briquettes from the MBF to the Gas and Fuel Plant at Morwell commenced.\(^471\) However it was found that briquettes from Morwell Coal were not as good in weathering, and in furnace fouling as those made from the cleaner and lower ash content coal from YOC. Although many subsequent trials of briquetting from MOC coal were carried out subsequently, selected briquetting coal (low silica, low ash, low woody content, and light brown lithotype) from YOC was used continuously at the MBF through to the late 1990s when the ICR was taken out of service. Thereafter road haulage of coal from YOC and later...
Number Three bucket wheel dredger was also a small capacity machine. At MOC it excavated 0.073 million cubic metres of overburden and 13.51 million tonnes of coal between 1959 and 1983. At YOC it excavated 12.82 million tonnes of coal between 1950 and 1959, and 2.07 million tonnes between 1983 and 1984. It was withdrawn from service in 1984 after 34 years service, after which the bucket wheel assembly was preserved as a heritage item on display at the Power Works Visitors Site at Morwell and the remainder of the dredger retained as spare equipment or sold for scrap.

Number 20 bucket chain dredger came into commercial service on 16 July 1956 as a rail mounted overburden excavator loading trains delivering to Number Three spreader on an external dump (Photos 9.5/3 A and B). It excavated 19.77 million cubic metres of overburden and 0.86 million tonnes of coal in its 13 year life from 1957 to 1970. It was taken out of service after its completion of overburden removal in the MOC East Field.

Number 19 bucket chain 'gleisraupen' crawler-mounted dredger came into commercial operation on 10 October 1960 after extensive modifications to convert a German design from rail to conveyor out-loading (Photo 9.5/5). This machine went into service as the excavator at the lowest operating level in the open cut being used for developing the open cut to depth. It had a low output capacity particularly when digging on a deep face. It excavated 40.53 million tonnes of coal to its retirement in 1990. By that time the mine had been opened up to the full depth of the Morwell Number One coal seam. A bucket wheel dredger took over its role of extending the mine on the bottom operating level by excavating on the bottom side of its face conveyor. Number 19 dredger was cannibalised for spares and its remains sold for scrap.

Other excavators of higher capacity than the plant ordered for the initial 'briquetting project' were progressively brought into service. These later machines were all bucket wheel excavators.

Number Nine Dredger (Photo 9.5/8) went into service on coal excavation on 18 May 1964.

Number Ten Dredger went into service on coal excavation in February 1970 and transferred to overburden removal in May 1970 at the commencement of overburden transport by conveyors to the Tripper/Stacker TS2.
Number 11 Dredger (Photo 9.5/9) came into service on 13 July 1970 and was used mainly as a coal winning machine but at times substituting for Number Ten dredger on overburden removal.\(^{481}\)

Number 24 Dredger, a compact bucket wheel excavator, commissioned at YOC in July 1984 was transferred to MOC in an emergency when Number Ten and Number 11 Dredgers had coincident major breakdowns. Number 24 dredger operations at MOC commenced on 25 June 1987. It stayed at MOC excavating 13.67 million tonnes of coal to March 1995 when it was mothballed for sale or emergency recall at either open cut.\(^{482}\) The latter eventuality occurred when dredger Number 24 was recalled to service in MOC, and at 2005 continues to be used in a mobile reserve capacity covering breakdown of other dredgers or for special development excavation.

Number 25 Dredger (Photos 9.5/11 A and B) – a compact bucket wheel excavator of somewhat higher capacity than 24 Dredger – came into service on 13 December 1989.\(^{483}\)

At 2005, Number Nine, Ten, 11 and 25 dredgers remained in service intended for continued operation in the new West Field. These dredgers were all interchangeable being of relatively similar output capacity and excavating reach, albeit that Number Nine Dredger was not favoured for overburden removal and Number 25 Dredger had a somewhat lesser reach.

With the progressive replacement of the rail transport by conveyor systems from about 1960, the open cut was developed in depth and extension predominantly by parallel

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\(^{481}\) A reference to a document or text is not provided.

\(^{482}\) A reference to a document or text is not provided.

\(^{483}\) A reference to a document or text is not provided.
moves of four face conveyors as trunk conveyors extended and pivoted into new ‘fields’. At various periods of the development, there were two top side excavation faces and one bottom side accessed by ramp systems at or near the tail end of each conveyor. At various periods two excavators were allocated to the one face conveyor. Two mobile slew conveyors were available for allocation to provide greater reach and flexibility for a dredger.

A significant feature of the mine development was the need for extensive dewatering of the aquifers below the Morwell Number One and Number Two coal seams, to limit earth movement of the mine batter systems and heave of the floor of the open cut. An extensive monitoring system was employed to measure movement of batters, benches and earth surface while aiming for minimum lowering of aquifer pressures to achieve safety from excessive movements. The aquifer water extracted was utilised in fire protection but predominantly was pumped as ‘clean water’ to the Hazelwood Power Station Cooling Pond to improve water quality therein and reduce the usage of domestic water supply for Power Station cooling water.484

Enhancement of community infrastructure for water supply storages and reticulation, for deviations and upgrading of the regional roads and highways, for housing and local service industries and for education through to tertiary level was significant from 1950 as an outcome of initiation of the Morwell Project and its continuation as a major electricity generating complex based on the Morwell Open Cut.

On 1 January 1994, the SECV was disaggregated. The new public authority responsible to Government for management of coal mines and electricity generation was named Generation Victoria. On 1 February 1995, Hazelwood Power Corporation was established by Government to manage the Morwell Open Cut and Hazelwood Power Station as a public authority. On 9 August 1996, the assets of Hazelwood Power (including Morwell Open Cut) were sold by Government to a private consortium with National Power from England as the majority shareholder.485

The corporate rearrangements did not lead to significant change in the development proposals for Morwell Open Cut except that the new owners undertook repairs at Hazelwood.

Drawing 9.5/2 Morwell Project Proposed Layout at 1950 (from the Mining and Geological Journal, March 1956).
Coal Mining Heritage Study

In August 2000, Hazelwood Power announced details of the Hazelwood West project involving continued development of the Morwell Open Cut by extension of the existing mine at the south, and then westward with site works commencing in 2001 within the existing mining licence area. This was the extension depicted on previous long term plans by the SECV.

In November 2000, International Power now owned 91.84 per cent of the Hazelwood Power Station and Morwell Open Cut complex having purchased 19.9 per cent previously owned by Scottish Power. The Commonwealth Bank retained the remaining 8.16 per cent of the ownership. This ownership structure remained at June 2005.

In April 2001, the first level of the internal dump for overburden disposal was completed after some three years of operation covering about 54 hectares to a depth of up to 28 metres. Relocation of the Tripper Stacker (TS2) and two conveyors to commence a second level dump was then undertaken.

In July 2001, a contract was let for archaeological fieldwork and interpretation of cultural heritage aspects in the proposed Hazelwood West Field. This work involved detailed inspections before and during overburden excavation of old homestead sites. Artefacts were retrieved from Koorie sites, classified and deposited with the Morwell Koorie Co-operative Centre. These archaeological studies were to remain as a continuing feature of the West Field mining operation.

For the 2001 calendar year, 19.77 million tones of coal was excavated and 12,173 Gigawatt Hours of electricity generated.
Drawing 9.5/5 MOC/YOC: 1949 Proposal for introduction of bucket wheel dredgers (from Herman, (1952), Fig.185, p.190A).

Over 11,000 GWh sent out. This was a record annual coal output for MOC. Over four million cubic metres of overburden had been stripped from the West Field by mobile plant and placed in a levee bank on the south side of the West Field and on earth ramps for the site of coal conveyors in the West Field. Sixteen 50 tonne capacity rigid frame trucks and seventeen 40 tonne articulated trucks were used on overburden haulage and placement. Removal and placement of 6.1 million cubic metres of overburden was expected in the 2003 year.

In May 2002, a contract was let for design and construction of four conveyor systems to be used in the Hazelwood West Field, using components from the existing systems in the South East Field where feasible. These four systems were required to be in service progressively from September 2003 to 2006.

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In October 2002, the owners of the Power Station and Mine Complex changed the name of the controlling entity to International Power Hazelwood (IPRH). For 2003, only 2.8 million cubic metres of overburden remained to be excavated in the South East Field.

In May 2003, the Hazelwood West Field Development was given Major Project Facilitation Status by the Commonwealth Government. On the basis that the South East Field coal resource would be fully excavated by 2009, Stage 1 of the proposed development was approved for commencement of coal excavation later in 2003 within the existing coal mining licence boundary. However the proposal submitted by IPRH, including provision for coal supply to 2025, involved a deviation over a length of about seven kilometres of the previous diversion of the Morwell River, deviations of two creeks, relocation of the Strzelecki Highway and Brodribb Road, all to provide for extension of the mine via parallel movements of dredger operating faces through the West Field (Drawing 9.5/13). This proposal involved a logical modification of the mining licence boundary which had originally been arbitrarily defined on land occupation boundaries rather than on a rational mining plan appropriate to the existing dredgers in use by IPRH. The IPRH proposal offered an exchange of coal bearing land of 110 million tonnes within the existing licence area for 92 million tonnes outside the existing licence area.

In July 2003, IPRH submitted an Environmental Effects Statement (EES) for public comment and subsequently was engaged in a process of public and government hearings on provisions for environmental protection, including mitigation of greenhouse gas emissions from Hazelwood Power Station. At April 2005, after extensive discussions and modifications or additional commitments by IPRH, an Independent Panel established by the Government recommended approval of the latest IPRH proposals as ‘the most economical alternative for the supply of base load electricity to Victoria and the National Electricity Market’, and ‘as an appropriate use of the Gippsland brown coal resource’. Government response to the Panel’s recommendations and formulation of commitments by IPRH were still awaited at September 2005. In the meantime from 2004, IPRH had been involved in land purchases to gain ownership of land required for mining and for infrastructure deviations.

Dredger Number 10 completed overburden removal in the South East Field in July 2003. The first coal from the West Field was delivered in February 2004. The second coal system...

in the West Field commenced operation in November 2004. The third system was expected in service by September 2005. The extensive use of mobile plant to open up the West Field eliminated the need for overburden removal by dredger prior to the initial coal excavation and reduced the overburden to coal requirements in the early years of excavation in the West Field. Hence, Dredger Number 25 was allocated the overburden removal and reserve coal excavator task commencing in June 2005. Numbers 9, 10, and 11 Dredgers were allocated to coal excavation in the West Field. Dredger 24 also remained in service for substitution for any of the other dredgers or for special operations.
In January 2004, a major fire in the Morwell Briquette Works owned by HRL and operated as Energy Brix lead to temporary cessation of briquette manufacture. A reduction of about 5 per cent of Morwell Open Cut output resulted. The small Morwell Power Station continued to be operated. Hazelwood and Loy Yang A Power Stations now had to find alternative fuels for start up and combustion stability. In the short term supplies of black coal were accessed from NSW and Queensland while longer term options were considered. At 2005, the Morwell Briquette factory had been restored to part operation by MECRUS on lease from HRL. At that stage, Morwell Power Station ran on MOC coal and MBF used Loy Yang coal.

### Assessment of Heritage Significance

#### Historical Significance

The original concept of the Morwell Briquetting Complex was a major post war initiative to challenge the virtual monopoly exercised by NSW coal exporters to meet the increasing demand for hard fuels in Victoria.

Commencement of the Morwell Open Cut based on the original concept offered the opportunity to adapt the initial heritage significance of the complex to the new operation.

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open cut plant readily to meet changed delivery requirements for a revised concept with priority for power generation.

The availability of Morwell Open Cut to supply coal to the Yallourn Power Station over the Interconnecting Railway over a 15 year period included delivery at an annual rate averaging over 1.3 million tons from 1962 to 1968. This substantial supplementary coal supply to Yallourn helped significantly in base load generation while Yallourn Power Station was the main base load generator in the State.

The supply of coal from the Morwell Open cut has provided fuel for base load power generation rising to over 30 per cent of the State Power Generating requirements by the late 1960s through to the early 1980s, and continuing at about 25 per cent at 2005.

Scientific Significance

Properties of the Morwell Number One seam coal were found to be significantly different from Yallourn Seam Coal. The evident need for a more intense mapping of coal constituents and means of mitigating coal quality problems by furnace plant modifications lead to the establishment by the SECV of the Herman Scientific Laboratory (HRL). This laboratory (privatised on 30 June 1994) reinforced traditional operational scientific analysis in the Power Stations and Briquette Factories and was of significant value in studies associated with proposals and trials for coal conversion opportunities and for new power stations at Yallourn W and at Loy Yang.

Economic Significance

The Morwell Open Cut has been the source of fuel for some 40 years to 2005. Government approval has been given in September 2005 for continuation of this vital economic role through access to coal for a further 25 years or so.

The Morwell Open Cut activity established the extensive brown coal resource of the Latrobe Valley as being economically winnable and suitable, with adequate evaluation of significant coal properties, for conversion to gas, liquid fuels, briquettes, hard char, pulverised dried coal, solar dried coal and a variety of by-products investigated for technical and commercial viability by the Coal Corporation of Victoria (CCV) 1985–1994. Subsequently HRL (Herman Research Laboratories) was a major participant in ongoing research. At 2005, research was being carried out by a number of consortia and agencies, especially in revised coal combustion processes to reduce greenhouse gas effluents in existing and future power stations.

Social Significance

The initiation and progressive expansion of Morwell Open Cut required the rapid acquisition of a skilled workforce both by contractors and the SECV. A high level of retraining of employees was necessary to convert or establish their competence in the operations and maintenance activities of the open cut, power stations, briquette factories and service industries.

The initiation and progressive expansion of Morwell Open Cut changed the Morwell Shire from a small rural community to a highly industrial area with rural pursuits remaining on the outskirts of the former Shire.

The employees at Morwell Open Cut were initially transferees within the SECV from the Yallourn Open Cut, being predominantly first generation Australians with European origins. The MOC gave these employees promotion and status...
improvement. Subsequent waves of employees were largely new migrants engaged in their first employment in Australia.

Although the early workers on the MOC site were predominantly construction workers housed in temporary hostels on the outskirts of the town, a substantial public housing and infrastructure program matched the progressive increase in the workforce numbers such that ethnicity was not a problem in the harmonious growth of the new community. A new township of Churchill was established as a planned residential town in the early 1960s to provide housing stock for the introduction of new employees and for the expected demise of the Yallourn Township with its 4,500 residents.

Mine Infrastructure Features
Display at Power Works, Visitors Centre Morwell.
External overburden dump restoration.
Hazelwood Cooling Pond.
Morwell River Diversion Number Six.
Interconnecting Railway track and bridges.
Buckley’s Reservoir.

References
Discovery, Victorian Department of Primary Industry, February 2003
Herman, H, Brown Coal, SECV, 1952
‘Latrobe Valley Brown Coal Resources’, Proceedings No.194, AusIMM 1960. Papers by: Stewart, EDJ; Glue, CS; Rodgers, HCG; and Alexander, JMA.

9.6 Loy Yang Open Cut
Map Reference: 8221-4-3 Traralgon Zone 55
Open Cut 4618, 57670
Municipality: Shire of Latrobe
Land Use/Status: Private

Site History
It is probable that the existence of brown coal deposits at Loy Yang in the Latrobe Valley was known or at least inferred from other brown coal discoveries in the Gippsland area by 1873. In 1875, lignite (brown coal) was reported officially as having been found at Traralgon. In 1876, the Mining Registrar at Traralgon reported: “There are several parties prospecting for coal, outcrops of which are to be found south of the Gippsland Railway”. Specific reference to exploration for coal at Loy Yang appears to have first occurred in 1889. The extent of identification at 1890 of the coal resource in the Western Latrobe Valley as far east as Traralgon is shown in Drawing 9.6/1.

Drilling to ascertain the geology and extent of the coal at Loy Yang and Traralgon was undertaken by the Mines Department between 1917 and 1922 when Mines Department Loy Yang Bores 1 to 61 were drilled. However, the knowledge gained was not available in time for Loy Yang to be given detailed consideration as an alternative to the proposals coming to fruition by 1915 to develop the Yallourn Coal Field.

No further drilling to investigate the Loy Yang resource occurred until Bore Number 62 was drilled on 8 December 1943. In 1942, the SECV established a Brown Coal Investigation Section to undertake drilling and coal seam evaluation for assessment in selection of a new mining area to provide coal for a briquetting project. An essential feature of this concept was to have a coal transport connection from the new project to the Yallourn Power and Briquetting Complex as an emergency and supplementary fuel source for those economically vital works. In outcome, the Loy Yang coalfield was one of four sites selected for detailed consideration. However, it was the Maryvale South site that was recommended to Government in December 1946. The Maryvale South site was approved by Government in July 1948 as the Morwell Briquetting
Project. A major factor in the preference for the Maryvale South site was its location closer to Yallourn than the Loy Yang site, with its coal transport interconnection being more economical and less intrusive on the local community infrastructure. However an associated recommendation by the mining consultant John Bridge in 1945 was that the Loy Yang site be resumed ‘to provide for its utilisation as a source of fuel for an additional power station’.

The subsequent addition of the Hazelwood Power Station based on fuel from the Morwell Open Cut, together with the extension of Yallourn Power Station and the provision of the Yallourn W power station, both of the latter based on fuel from Yallourn Open Cut, delayed the commencement of an open cut at Loy Yang. Also, the advent of natural gas supplies from Bass Strait in December 1969 lead to the SECV gaining Government approval for a two by 500 megawatt intermediate load power station at Newport. Although subsequently only one 500 megawatt unit was installed at Newport due to environmental concerns, gas turbines with a total 500 megawatt capacity were installed at Jeeralang near Hazelwood.

From the early 1960s, design concepts were being developed within the SECV for a Loy Yang base load power station based on the Loy Yang coal resource. In 1949, an Interim Development Order was placed limiting land price speculation in the Loy Yang area. From 1967 the SECV undertook land purchase in the Loy Yang area (Drawing 9.6/2). The Legislation was passed on 23 November 1976 enabling the SECV to provide for the construction of a 4000 megawatt power generating project with coal supply from a new open cut at Loy Yang.

Until 1977, the site had been subject to visits by drilling crews, surveyors, engineers and geologists. On 19 January 1977, the first contract was let for site works. The Loy Yang Open Cut is situated about seven kilometres south east of the centre of Traralgon township. The potential for an open cut site at Loy Yang was identified earlier than 1922. The specific site selected for coal supply from an open cut adjacent to a 4000 megawatt power station site was in a large shallow basin located between Traralgon Creek on the west and Sheepwash Creek on the east.
The northern boundary was selected to minimise extraction of overburden and the Yallourn Seam coal, each of which became progressively thicker to the north. The southern boundary was along the southern edge of the Morwell Seams at a geological feature named the Loy Yang Dome. Extensions of all boundaries except at the south were feasible. The selected site in an area of about 1,100 hectares contained about 1,000 million tonnes of coal from the Yallourn and three Morwell seams which were separated randomly by interseam clays and sands. The depth of the open cut excavation was proposed to be at the bottom of the Morwell Seam (M2 Seam) approximately 200 metres below ground surface. It was not intended to mine the Traralgon seam which was separated by some 60 to 70 metres from the base of the lowest Morwell Seam. A multi-level external overburden dump immediately south of the open cut was planned to occupy a further 540 hectares, virtually eliminating future economical coal recovery from under this overburden dump.

Following mining concepts which had proven successful at Yallourn and Morwell Open Cuts, it was planned to use bucket wheel excavators loading to conveyors delivering to a ‘just-in-time’ coal bunker storage of about 100,000 tonnes capacity (24 hours usage by the 4,000 megawatt power station). All dredgers were to have access for the delivery of overburden, interseam or poor quality coal to the overburden dump. It was planned to commence an internal dump some 15–20 years after initial coal excavation when sufficient space had been opened at the base of the mine.
It was planned to have four dredgers each of output capacity of 60,000 tonnes of coal per day (hourly rate of 3,750 tonnes), each with its separate face and trunk conveyors to a transfer point for delivery to the coal bunker or to the overburden dump. The dredgers were to each have a telescopic connecting conveyor to a crawler-mounted discharge unit on which was mounted an outloading conveyor. This arrangement allowed for multi level operation on each side of a face conveyor. (In the other open cuts, flexibility for multi-level excavation had been provided by scheduling two mobile slew conveyors for allocation between four or more dredgers, but involving additional manning to the normal dredger crew.) Two overburden trunk conveyor routes were planned to avoid excavation delays when dredgers were encountering interseam digging.

The planning outlined above was implemented without major change in concept.

On 1 October 1982, handover for operations occurred after commissioning of the first dredger D14 (Photos 9.6/2 & 5), the overburden stacker TS4 (Photo 9.6/3) and the first conveyor route to the overburden dump was completed following trial runs from 29 July 1982. Overburden removal by contract totalling 2.570 million cubic metres and 0.133 million cubic metres by Dredger 14 had occurred prior to 1 October 1982.508

Dredger 15 (Photo 9.6/4), basically identical in design to D14, was placed in commercial operation on overburden on 23 March 1984.509 Dredger 16 (Photo 9.6/8), somewhat different in design and by a different supplier from the two previous dredgers, came into commercial service in March 1988 after many problems during construction and commissioning and some 30 months after its contracted in-service date. At this time, the fourth 500 megawatt unit at Loy Yang Power Station was about to come on line completing the 2000 megawatt Loy Yang A power station. The option for the SECV to obtain a fourth dredger to the same design and supplier as D16 existed under the D16 contract but was formally declined by the SECV in early 1987.510

In August 1985, the Government approved the SECV request to place orders for the first two units of Loy Yang B with an in-service date for the first unit to be flexible between November 1991 and November 1994 and for additional flexibility for the second unit.511 However, by the mid 1980s, electricity supply was ‘comfortably’ meeting demand. Ordering for the third and fourth units of Loy Yang B was not proceeded with at that time or to date at 2005.

A review of the design for the fourth dredger was undertaken in this atmosphere of possible reduction of the Loy Yang generation to a 3000 megawatt total. Economic advantage was seen in making provision for two smaller dredgers, only one of which would be procured at this time with the option to be left open for the fifth dredger to be either of the two sizes depending on coal demand forecasts. Procurement proceeded with an order placed in May 1989 for one compact extending bridge bucket wheel excavator (D27; Photo 9.6/8) with specified dimensions for multi-level excavation and a guaranteed hourly output of 1,850 cubic metres of coal. It was decided that the conveyor system to be installed at the same time as


D27 would be of the same capacity as the other conveyor systems. Dredger 27 went into service on 1 June 1992. The fifth excavator has not been proceeded with. A second overburden system with TSS tripper-spreader came into service in January 1991 to provide for simultaneous excavation of overburden, interseam or poor quality coal from two excavators and for increased availability for waste disposal.

In 1984, the SECV Latrobe Valley activities were dissected into three area based groups, one of which was the Loy Yang Production Centre. In 1994, the SECV was disaggregated. Generation Victoria was formed as a State Authority to take over the management of the generation and associated activities of the State including the Loy Yang Open Cut. On 1 February 1995, Generation Victoria was disaggregated into five authorities one of which was Loy Yang Power Pty Ltd. On 12 May 1977, the Loy Yang activities were privatised by the State Government by sale to a private consortium and renamed by them as Loy Yang Power Management Pty Ltd. Loy Yang B 1,000 megawatt Station was completed on 30 September 1996 and sold by Government as a separate private business entity to Mission Energy on that date, with a formal contract with Loy Yang Power for coal supply from LYOC.

In July 1984, the Government requested reservation by the SECV of an allocation of up to five million tonnes per year of coal from LYOC for utilisation by private industry. ‘A quantity of 300 million tonnes of coal was considered to be available from LYOC for this external use in addition to that required for the life-time operation of Loy Yang A & B Power Stations (4,000 megawatt capacity).’

Significant features of the open cut operation included emphasis on coal quality selective excavation, particularly from broken coal seams at the southern faces and higher sulphur in the Northern and Eastern faces. Dewatering of the aquifers and coal batters commenced in 1985 and was increased progressively to control floor heave and batter movement as the open cut extended in area and depth. In July 2001, dewatering of the Upper Traralgon aquifer commenced with initial free flow of 20 lps and subsequent pumping at about 100 lps. At September 2002, over 84,000 mega litres had been extracted from the aquifers at Loy Yang.

For the 2004 calendar year, coal excavation was 30.333 million tonnes with the forward plan for 2005 at 30.565 million tonnes. Annual coal excavation had reached over 10 million tonnes in 1987, over 20 million tonnes in 1994 and had been budgeted at over 30 million tonnes of coal from the 2001 year. In the 2004 year, Coal Supply Reliability had been 99.98 per cent and Contract Compliance for Coal Supply and Quality to Loy Yang B had been 99.85 per cent. These high performance figures had been at this level in previous years indicating the sufficiency of the installed plant and coal storage facilities. An emergency contract for 1.2 million cubic metres of overburden removal had been necessary in January 2001, following a fire on D15 with a 90 day repair program and diversion of D16 to coal excavation. Generally three

dredgers and one stacker were manned on a 24 hour/seven day week basis to meet coal demand and achieve overburden and interseam removal needs while allowing for planned maintenance. Coal demand could generally be met by coal output from only two dredgers except when interseam was being encountered as a large proportion of a face. At 2005, no additions or deletions of plant were intended.

At 30 June 1997, total overall excavation was 275 million cubic metres of which overburden and interseam removal by contract and by dredger and auxiliary mobile plant totalled 73 million cubic metres.520 These quantities equated to an as-excavated waste to coal ratio of 1 to 2.77 (i.e. overburden and interseam proportion of total excavation of 26.53 per cent). For the period from 1990, after the initial opening up stage, to 1997 the waste to coal ratio as excavated over those years had changed to one in 3.66 with this ratio increasing as the open cut developed further to depth.

At 1 December 2004, 446 million tonnes of coal had been excavated and the mine floor was about 60 metres below sea level (i.e. 170 metres below surface level) with further excavation intended below this level.521 The edge of the excavation covered an area 3.2 kilometres east-west by 2.13 kilometres north-south.522 Back filling of the mine with an internal overburden and interseam dump was expected in 2008–2009.523

In April 2004, Loy Yang Power was sold to the Great Energy Alliance Corporation (GEAC) with shareholders comprising the Tokyo Electric Power Company, Australian Gas Light, Commonwealth Bank and two Superannuation Fund.524
In the 2005/6 Victorian State Budget, the coal royalty paid by the Latrobe Valley Coal Producers (including Loy Yang Power) was doubled to provide for funding of various research and development studies and pilot/demonstration plants for combustion and conversion processes based on the Latrobe Valley brown coal resource.

Assessment of Heritage Significance

Historical Significance

The Loy Yang Open Cut has developed to be the largest producer on a daily, annual and lifetime basis of coal, brown or black, in Australia.

The initial three bucketwheel excavators were the highest volumetric productive rate excavators (with the possible exception of some stockpile excavators) in Australia, and incorporated the experience gained in the Yallourn and Morwell Open Cuts. The detailed specification and design for the bucket wheel excavators adapted the latest appropriate German design to the specific conditions and standards applicable to the mining conditions at Loy Yang. The conveyor systems, the overburden disposal systems and the raw coal bunker storage were also to specific detailed specification by the SECV.

The large coal resource in the Loy Yang area allowed the Government, the SECV, and subsequent operators to offer coal supply for trials from the laboratory stage to the production stage of innovative combustion and/or coal conversion processes without the complication of manning and providing plant in a new open cut.


Drawing 9.6/9  Map of Latrobe Valley coal field. Copyright State of Victoria, Department of Primary Industries.
Scientific Significance

The extensive uncommitted coal resource in the Flynn and Gormandale Fields to the east of Loy Yang Open Cut offered scope for a variety of uses other than power generation for coal, with properties similar to that well researched and documented before and during the mining in the Loy Yang field.

The Loy Yang coal had proven suitable in commercial scale plants for conversion to dried pulverised coal (the Lurgi Plant at Loy Yang supplying start up and furnace stabilising fuel for Loy Yang B power station), for briquette manufacture (at the Morwell Briquette Works) and for metallurgical char (with briquettes as fuel and processing feed stock).

In May 2005, the Government announced continued funding, in association with LV Power Generators, to the Co-operative Research Centre for Clean Power from Lignite (CRCCLP).

The provision included establishment adjacent to LYOC of a pilot scale plant using coal at 15 tonnes per hour in a coal drying process with the aim to prove laboratory trials indicating a reduction of water by 70 per cent, reducing greenhouse emissions by 30 per cent in existing power stations and 40 per cent in more modern power plant. Operation of the pilot plant was expected in 2006. This process and others under research offered opportunity for longer term use of Victoria’s major energy resource.

Economic Significance

The economies of scale offered by the larger scale open cut operation at Loy Yang Open Cut compared with the other LV open cuts, as well as the more favourable coal to overburden ratio, demonstrated that generation based on brown coal could be competitive with the cost of base load electricity generation and distribution in Victoria from other fuels. Brown
coal resources of similar economic advantages to that being utilised at Loy Yang are available for power generation and coal conversion processes.

In July 2002, after analysis of tenders, the State Government announced the granting of exploration licences external to existing brown coal mining licence areas in the Latrobe Valley. Loy Yang Power received an exploration licence over 1,670 hectares of the Flynn-Gormandale Coal Field with an economically mining reserve of over 1,000 tonnes. In their tender submission, LY Power proposed examining a concept of developing, between 2010 and 2016, a 1,000 megawatt station of four 250 megawatt units using improved brown coal drying technology offering increased efficiency and reduced greenhouse gas emissions. The submission forecasted continued generation from the existing Loy Yang A until 2048, with a further 25 year extension if the existing open cut was approved for extension of its existing mining licences into the exploration licence area.

Australian Power and Energy Ltd. (APEL) was also granted an exploration licence over an area to the east of Loy Yang Open Cut with the objective to produce low sulphur liquid fuels and to install a 500 megawatt power plant with greenhouse gas emissions sequestered.

Social Significance

In the early years of operation of the Loy Yang Open Cut in the late 1970s, the initial personnel were selected and transferred from Yallourn and Morwell Open Cuts. Many of the selected personnel were first generation Australians well established in the Latrobe Valley community. No specific temporary construction camps or settlements had been necessary in the early construction stage, which had mainly followed on from contract construction in the Yallourn and Morwell/Hazelwood area. In particular, the township of Traralgon, adjacent to the Loy Yang Open Cut, had steady growth as Loy Yang employees tended to take up residence near their work location.
The township of Churchill established in the 1950s as a new planned township by the Housing Commission of Victoria was an outcome of the growing need at that time for housing of the workforce engaged in SECV and service activities. The stability of this township and its educational precinct including Monash University Gippsland, has been enhanced by the continuing workforce and servicing needs of the Loy Yang brown coal utilisation.

The proposed long term operation of the Loy Yang Open Cut beyond 2,050 and/or potential opening of other coal resources tends to offset instability in the workforce resulting from greater use of contract and part time work.

A significant downfall in the number of apprenticeships, largely associated with the transfer of maintenance work to short term contracts, has been an adverse feature of the privatisation of the former SECV activities including Loy Yang Open Cut. This deficiency has been recognised by industry and Government. Combined action to increase apprenticeship numbers is anticipated.

Environmental sensitivity has been a prime feature of the LYOC activities. Community consultation and reporting on compliance with specified objectives have been continuous from the detailed project investigations of the early 1960s.

Mine Infrastructure Features

Traralgon Creek water treatment pondages.
Highland highway deviation.
George Bates Lookout.
Miners Lookout.
Power Works Visitors Centre at Morwell.
High Level Water Storage.

References

Alexander, JM, Planning the Development of Loy Yang Open Cut in Australia, Braunkohle, July 1981


Drilling Records, held at 1994 by Geo-Eng at Morwell.

Progress Report, No.3, Mines Department, August 1875, p. 284

Herman, H, Brown Coals of Victoria, Bulletin No. 45, Mines Department, 1922

Business Plan, Loy Yang Power, 2005

House Journal, Loy Yang Report, Loy Yang Power

Mineral Statistics, Mines Department, 1876, p. 51

Annual Report, Mines Department, 1889. (Remarks on the Development of the Coal and Lignite Resources of Victoria, Murray, RAF)

Annual Report, Mines Department, 1890.

10 East Gippsland—Brown Coal Mines

10.1 Gelliondale Open Cut

Map Reference: 8220-4-3 Sunday Island
Open Cut 4621, 57234

Municipality: Shire of Wellington,
Parish of Alberton West

Land Use/Status: Private Ownership

Site History

The existence of brown coal in the Gelliondale area of Gippsland was known since the late 1800s, although subsequent to brown coal discoveries by RA Murray in 1876 at Won Wron, which later was identified as a different seam. At 1922, it was stated that there is ‘a large area of open cut brown coal of good quality around Hedley and eastwards within about four miles of Port Welshpool which at a comparatively small cost could be made available for fairly large steamers’. It was also stated that ‘From Toora to near Alberton for a direct length of 18 miles in an east north/easterly direction was a continuous, or nearly continuous, brown coal field’. Between 1902 and 1966, the MInes Department and then the SECV drilled 160 bores in the Alberton Depression including the Gelliondale Coalfield.

The Gelliondale coal deposit is located to the west of the Gelliondale Rail Siding on the South Gippsland VR rail line. From Gelliondale, the deposit is located westwards for about eight miles to some two miles to the west of the Hedley Rail Siding and is about 0.5 to 1.5 miles wide. The deposit exists on a coastal plain about 30 to 50 feet above sea level and about four to five miles from the coast. At 1950, it was assessed from analysis of bores that the deposit in the Alberton Parish contained 560 million tons of coal over an area of about 4.75 square miles with an average seam thickness of 140 feet and overburden less than 140 feet. Immediately contiguous in the Welshpool Parish, the coal quantity was assessed at about 488 million tons over an area of 5.8 square miles with a somewhat deeper overburden and a lesser coal thickness.

In 1923, a small open cut was opened near Gelliondale supplying coal to a coal drying and briquetting plant. The specific location of the open cut was about two miles west of the Gelliondale VR Rail Siding, about 30 chains south of the rail line and ten chains south of the South Gippsland Highway. The open cut and briquetting plant worked only intermittently. Greer and Smith (1983) state that ICI sank a trial shaft in 1929 extracting 230 tons of coal. (The site of this shaft was probably that shown on drawing 10.1/1 at Hedley, some 5.6 kilometres west of the flooded open pit.)

At Gelliondale in 1931, the first geophysical work in the Victorian coal areas took place with gravimetric and magnetic surveys. Further such surveys continued in other areas in the 1940s and 1950s with mixed success.

In the early 1940s, the open cut was operated by the Gelliondale Coal and Oil Ltd. A tabulation published in 1952 by H Herman stated that 13,940 tons of coal had been mined from the Gelliondale Open Cut to the end of 1950, with no production in 1950. No reference has been found during this Coal Heritage Study of any further mining at Gelliondale after 1950.

In 1941, the SECV undertook investigations to establish a recommendation for the site of a new open cut to provide increased briquetting manufacture and greater security of coal supply by a transport connection with Yallourn Open Cut. One of the sites which came under final consideration was the Gelliondale deposit. The proposed Gelliondale site (named in some reports as the Alberton West Open Cut) included the existing Gelliondale Open Cut in an area of 1,830 acres, containing over 1000 million tons of ‘economically winnable’ coal under an average of 28 feet of sandy overburden resulting in an excavation ratio of 3.6 feet of coal to one foot of overburden. In outcome, the Maryvale South site was preferred to the Gelliondale site partly on the basis that the objective of coal transport interconnection between Gelliondale and Yallourn was not economical. The adverse high ash content and high moisture content of the Gelliondale coal were other
disadvantages. The proximity of the sea for cooling water associated with power generation and the proximity of the ports and rail line for product transport were notable advantages. In September 1944, State Cabinet requested the SECV for information to be provided to private developers on prospects for encouraging private development of the Gelliondale deposit for briquette manufacture. However war time private investment was not forthcoming.

Subsequently, development of the Gelliondale Coal Field did not come under detailed consideration by the SECV for power generation although the SECV fostered private business interests in utilisation of the resource in coal conversion processes. International Oil Explorations NL (later renamed International Oil Proprietary) commenced a limited exploration program in 1968, with CRA as operator until 1979 and ARCO as operator from 1980 engaged in continuing exploration programs until 1982.

In the Mines Department Annual Report for 1969 it was stated that testing of coal from Gelliondale was occurring with respect to oil production there from. During the ‘oil crisis’ of the 1970s prospects for conversion to liquid fuels received private evaluation. Tests were carried out on liquefaction of...
Gelliondale coal and “a liquids yield of nearly 50 per cent was achieved”.540 International Oil Pty Ltd and ARCO Aust. Ltd. took out exploration licence 1268 in the Gelliondale Area in August 1976 and carried out drilling for aquifer investigations from 1977. A core shed and site offices were completed at Gelliondale in October 1982. A mining feasibility study was undertaken by the ARGO/IOL consortium in 1982.541

At 1980, the coal resources of the Gelliondale Lease area as assessed to that time following ‘extensive investigations by the SECV, DME, and a number of private companies’ had the following features: resources: 1,700 million tonnes indicated and 3,500 million tonnes inferred; economic reserves: 1,700 million tonnes including 1,050 million tonnes readily recoverable; moisture content averaging 65.9 per cent with net wet energy 6.6 MJ/kg.542

At 1982, the Gelliondale Coal Resource, typically 50 metres or more thick, was assessed as split in places to form the Gelliondale A and B Seams extending westwards to Toora and southwards with deeper overburden cover to Snake Island. At 1982, an additional coal resource about four to five kilometres east and south-east of the Gelliondale lease area was delineated by the SECV and DME conjointly as the Alberton Coalfield having economic reserves of 2,000 million tonnes, generally in two seams of combined thickness of some 55 metres with coal quality marginally better than Gelliondale and in a zone of coal five to six kilometres wide over a distance of 18 kilometres between Alberton and Yarram townships.543, 544 By late 1982, the ‘World Oil Crisis’ was in abeyance. Further expenditure on the potential Gelliondale Coal to Oil project was not forthcoming. At 1984, the holder of the mining licence in the Gelliondale Coal deposit was ARCO Australia Ltd.

**Assessment of Heritage Significance**

**Historical Significance**

The Gelliondale mine was the only privately operated brown coal mine in Gippsland from the 1920s. It appeared to have potential to meet commercial opportunities to relieve shortages of briquette supply and locomotive and shipping fuel from the 1920s to the 1960s. It also indicated possibilities for conversion to liquid fuels and by-products from the 1960s. Together with the adjacent recently delineated Alberton brown coal deposit with combined coal availability of some 3,000 million tonnes of recoverable coal, a fuel resource of world significance awaits private development as a part of “the Huge Fortune in Chancery” (from H Herman, 1922) represented by the brown coal resources of Victoria.

**Scientific Significance**

The Gelliondale Coal deposit came under a wide variety of technical investigations by public and private organisations. After 1945, the SECV had indicated that this
Drawing 10.1/3 Depiction of shallow coal areas from Welshpool to Alberton (from Herman, (1962), p.75).
deposit was not as favourable for electricity generation as known available resources in the Latrobe Valley and that the SECV would not oppose its development by private organisations. The technical feasibility of conversion of this coal to liquid fuels had been proven. The properties of the Gelliondale coal deposit were sufficiently similar to the coal seams in the Latrobe Valley which had been more fully tested than this deposit, such that these fuller investigations were relatively applicable to the Gelliondale seams.

**Economic Significance**

It appeared that the Gelliondale coal deposit would not be favoured for electricity generation compared with coal resources in the Latrobe Valley, particularly since the granting in 2004 of exploration licences to private firms over designated areas in the Latrobe Valley. The outcome of financial grants for development proposals in these areas would appear to defer any similar proposals based on the Gelliondale coal deposit.

The recent (1982) definition of the large coal resource at Alberton adjacent to the Gelliondale deposit, which also extends eastward to the township of Toora, offers opportunity of a large scale long term utilisation of these resources in the future either as a combined or sequential development. Preservation of these opportunities for development is of economic significance for Victoria.

**Social Significance**

The location of the Gelliondale (and Alberton) coal deposits is in an almost pristine coastal plain. The main occupation is agricultural/dairying pursuits on small landholdings serviced locally from several small townships spaced east-west along the South Gippsland Highway. Expectations were high in the late 1970s that further development of the Gelliondale coal deposit for conversion to oil was likely by private interests. It was anticipated that a large scale development would occur which would significantly change the local employment mix and service industries, a taste of which was already being experienced from on and offshore servicing of the natural gas developments in Bass Strait.

**Mine Infrastructure Features**

Site of Gelliondale Open Cut.

Site of Gelliondale Briquette Factory.

Shaft site near Hedley rail siding.

Identifiable bore site(s) on South Gippsland Highway near Gelliondale.

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Photo 10.1/2 Gelliondale Scarp, east of Toora (from Thomas and Baragwanath, (1950), Part 2, p.13).

Drawing 10.1/4 Geology of South Gippsland from Foster to Won Wron (from Thomas and Baragwanath, Part 2, Fig. 29).
Drawing 10.1/5 Locality of Gelliondale Open Cut (from Topographical Map 8220-4-3 Sunday Island). Copyright State of Victoria, Department of Sustainability and Environment.
References

Garner LJ, Research in Brown Coal Utilisation, Monograph No. 11, AusIMM, 1984

Gloe, CS, The Geology, Discovery, and Assessment of the Brown Coal Deposits of Victoria, Monograph No. 11, AusIMM, 1984


Herman, H, Brown Coals of Victoria, Bulletin No. 45, Mines Department, 1922

Herman, H, Brown Coal, SECV, 1952

Holdgate, GR ‘Coal Exploration for Lignites: Gippsland Basin 1997’, Australian Coal Geology, Vol. 4 No. 1, pp. 57–70


10.2 Won Wron (Yarram) Open Cut

Map Reference: 8221 2S Carrajung Zone 55
7221 Traralgon Zone 55
Mine site 4760, 57410 Zone 55 approx.
Township 4752, 57415 approx.

Municipality: Shire of Alberton, Parish of Won Wron

Land Use/Status:

Site History

The location Won Wron is on the Hyland Highway about 14 kilometres north of Yarram in Eastern Gippsland. Won Wron was previously a rail station about 234 kilometres from Melbourne on the South Gippsland Railway.

Brown coal was first recorded in the Won Wron area by RAF Murray in 1876, ‘in the Middle Creek, between Mac’s and Greig’s creeks, north from Yarram’.545 The deposits in this area were again referred to in Mines Department reports by Stirling in 1892 and 1899, and by Kitson in 1902. An idealised depiction of the Won Wron deposits was made by Stirling in 1899 (p. 78B) as shown below as Drawing 10.2/3. A brief description of the Won Wron brown coal deposit is given by Stirling (1899).546

Shallow shafts were sunk by 1892, at least one of which passed 30 feet into coal without reaching the bottom of the seam. Sixteen bores were put down between 1922 and 1929 on C.A.77, Won Wron. These were depicted by Thomas and Baragwanath,547 showing coal up to 140 feet thick, commencing at eight feet below surface. A further 20 bores were put down in 1954. Bores on the north side of Middle Creek showed little brown coal. On the south of the creek to the western boundary of C.A.77, the main seam of coal on the average was 150 feet thick under 85 feet of overburden. However the overburden increased outside the western boundary and the coal was split into broken seams towards the southern boundary of Lot 77.548

The Mines Department Annual Report for 1955 (on p.15) reported that two workable seams of coal had been located
An open cut was commenced circa 1957 by the Won Wron Brown Coal Pty Ltd. There was a temporary lapse in activity but overburden removal recommenced in 1958. A record of the quantity of coal extracted from the open cut or the duration of coal excavation has not been found in this study.

Analysis of the main seam showed a calorific value varying from 5,560 to 6,460 BTU’s per lb., marginally better than from Yallourn North, Wensley Bray and Thorpdale. The upper seam of thickness from nine feet to 40 feet had a value from 5,265 to 5,650 BTU’s per lb. Ash content varied from 0.8 per cent to 4 per cent.

The Mines Department Annual Report for 1979 (on p. 46) states that brown coal samples from the Parish of Won Wron were analysed and continuing.

At 1984, the coal deposit at Won Wron was considered to be a small discrete deposit with recoverable coal of the order of two million tonnes. It was geologically associated with a much larger unworked deposit of up to 100 million tonnes at Boodyarn. This latter coalfield was also associated with again-larger unworked but readily mineable deposits at Stradbroke and Alberton, the coal resources of which came under technical appraisal from the 1950s.

No further details have been ascertained with respect to the Won Wron Open Cut in this study. (In some early documentation, this deposit and mine is referred to as the Yarram coal deposit.)

Drawing 10.2/3 Won Wron: Sketch section of brown coal seam (from Stirling, (1899), Plate No. 9).
Assessment of Heritage Significance

Historical Significance
The brown coal deposit north of Yarram as reported by the Mines Department in 1876 was the first coal discovery so far east in Gippsland. The discovery confirmed propositions that the extensive brown coal fields in the Latrobe Valley probably extended at least as far east as Sale and southwards to the coast south and east of Yarram. The existence of the Won Wron deposit as a coal field, found as an outcrop without basalt or limestone cover, led to extensive drilling in South East Gippsland through to the present time to determine the locations and extent of ‘economically winnable coal’.

From the 1920s, the East Gippsland brown coal deposits were progressively confirmed and assessed as being widespread, albeit in much of the area being overlain with thicker overburden and limestone. The Won Wron localised deposit without limestone cover was an indication that similar readily minable deposits would possibly be found by more extensive drilling.

Scientific Significance
No specific scientific outcome arose from the discovery and subsequent geological appraisal of this small discrete brown coal deposit. However resultant further coal discoveries and assessments in South East Gippsland stimulated interest by private industry in coal conversion opportunities from the 1920s.

Economic Significance
The small coal output from the discrete coal deposit at Won Wron was of low economic impact in the region or local community. However the possibility exists that, as at Bacchus Marsh and at Anglesea, more economic deposits other than that found ‘by chance in outcrop’ at Won Wron could be discovered from continuing detailed investigations of the widespread deposits in East Gippsland.

Social Significance
The coal discoveries which followed the Won Wron find and the geological appraisal of the wide extent of the regional brown coal deposits kept in the public view the potential for future large scale development of the resource. The scope for industries based on brown coal as feedstock, such as associated with the gas and oil industries, was appreciated as a future possibility.

Mine Infrastructure Features

Remnants of the open cut activities may still be visible.

References
Gloe, CS, The Geology, Discovery and Assessment of the Brown Coal Deposits of Victoria, Monograph No.11, AusIMM, 1984, p. 89
Knight, JL ‘South Gippsland Brown Coal Field at Won Wron,’ Mining and Geological Journal, Vol. 6 No.2, 1957/58, pp. 38-41
Murray, RAF, Progress Report, No.111, Mines Department, 1875/6, p.148
Stirling, J, Progress Report, No.10, Mines Department, 1899, p. 50
Thomas, DE and Baragwanath, W Geology of the Brown Coals Of Victoria, Part 2, Mines Department, p.14
Endnotes

Endnotes: Chronology and Contextual History

1 Martin, CH et al. History of Coal Mining in Australia, Monograph No 11, AusIMM, 1993, p.5
2 ibid.
5 Halford, M The Coal Industry of South Gippsland, the Land of the Lyrebird, 1920, p.230. Halford writes that this was c1938 by Captain Cole who sent it by boat to Melbourne. This coal, mined on the shore, was not from the same seam(s) as that found by Hovell in 1826.
6 Martin, C et al History of Coal Mining in Australia, AusIMM, 1993, p.8
7 Coglan, J, The State Coal Mine and Wonthaggi, 1979, p.20
8 ibid.
9 Martin, C et al History of Coal Mining in Australia, 1993, p.8
11 Martin, C et al, History of Coal Mining in Australia, 1993, p.8. A year is not stated for this mine in this reference.
12 Halford, M, The Coal Industry of South Gippsland. This reference gives a description of the early Kilcunda mine operations.
15 Martin, CH et al History of Coal Mining in Australia, AusIMM, M.,Melbourne, 1993, pp.2–5
16 ibid. p.3
17 Heritage in the NSW Coalfields, AusIMM, Nov/Dec 2002, p.74
18 ibid. p.5
19 Clark, M, Sources of Australian History, Oxford University Press, London, 1957, p.110
23 ibid. p.55
26 Horton and Morris, The Andersons of Western Port, 1983, p.66
27 ibid. p.55
28 Knight, JL (1940), p.39
30 Information in this paragraph is extracted from Martin, C.H. et al History of Coal Mining in Australia, 1993, pp.2–3
31 Heritage in the NSW Coalfields, AusIMM Bulletin Nov/Dec 2002, p.74
32 Clark, M. Sources of Australian History, Oxford University Press, London, 1957, p.278
33 Knight, JL ‘Geological Survey of Victoria’, (unpublished paper) Mines Department, April 1975
34 ibid.
35 Selwyn, A ‘Report on Cape Paterson Coal Fields’, Geological Survey Office, October 1867, pp.1–2
36 Brough, Smyth R, Goldfields and Mineral Districts – Carboniferous Rocks, Mines Department, p.48
37 ibid. p.48
38 Mineral Statistics, Mines Department, 1865, p.42
39 Murray, RAF, Early Coal Exploration in Gippsland, Land of the Lyrebird,Shire of Korumburra, 1920, p.182
40 ibid. p.183
42 Brough Smyth, R. 1869, p.49
43 Brough Smyth, R. 1869, p.436.
44 Mineral Statistics Report, Mines Department,1865, p.42
Coal Mining Heritage Study

45 Thomas and Baragwanath, Geology of Brown Coals of Victoria, Part 1, 1949–51, pp.1–4
46 Progress Report, No 1, Mines Department, 1873, p. 29
47 Sutherland, A, Victoria and Its Metropolis, Vol 1, Melbourne, 1888, p. 384
48 Victorian Yearbook, 1980 p. 297
49 Sutherland, A (1888), Vol 1, p. 384
50 Victorian Yearbook, 1880, p. 297
52 Sutherland, A, Victoria and its Metropolis, Vol. 1, 1888, p.193
53 ibid. p. 270
54 Murray, RAF, Early Coal Exploration in Gippsland, 1920, p.184
55 Mineral Statistics, Mines Department, 1872, p. 52
56 Mineral Statistics, Mines Department, 1874, p. 53
58 Bowden, K, Early Days of Korumburra, 1967, p.14
59 Borings in search of coal and lignite, Mines Department, 1890, pp.101–102 and Annual Report, Mines Department, 1890, p. 9
60 Mineral Statistics, Mines Department, 1873, p.52
61 Murray, RAF, Geology and Mineral Resources of South Western Gippsland, Mines Department, 1875, pp.158, 159
62 Legg S., Heart of the Valley: a History of the Morwell Community, 1992, p. 77
63 Annual Report, Mines Department, 1889, p. 22
64 Legg S. (1992), p. 82
65 Adams, J So Tall the Trees, 1978, p. 94
66 ibid. p.101
67 ibid. p. 94
68 Wells, J, Gippsland – People, a Place, and their Past, Landmark Press, 1986, p.158. (J Adams, p. 94, places the date as early 1879 and the shaft as 26 metres deep. The workings were visited by a government and municipal party in June 1879, stimulating interest in coal ventures in the Narracan Valley. The company mined a few tons only but collapsed financially in the early 1880s.)
69 Adams, J (1978), p. 96
70 ibid. p. 94
71 ibid. p. 96
72 ibid. pp.95–96
73 ibid. p. 97
74 Adams, J (1978), p. 97
75 Morwell Advertiser, 1 September 1888, p. 3
76 Mineral Statistics for Victoria, Mines Department, 1873, p. 52
78 ibid. pp.40,41
79 ‘Brown Coal in the Latrobe Valley’, Mining & Geological Journal, March 1947, p. 4
80 Stirling, J, Report on the Brown Coals and Lignites of Victoria, Mines Department, 1899, p. 78
81 Wright, J, Notes on the Geological Features of South Gippsland, Mines Department, 1894, p.34
82 Stirling, J, Report on the Brown Coals and Lignites of Victoria, Mines Department, 1899, p.75
83 ibid.
84 ibid.
85 Adams, J (1978), p.105
86 Stirling, J (1899), pp. 73, 77
87 Morwell and Mirboo Gazette, 1890
88 Adams, J (1978), p.105
89 ibid. p.104
90 Stirling, J, Report on the Brown Coals and Lignites of Victoria, Mines Department, 1899, p.74
91 Adams, J (1978), p.104
92 Thomas and Baragwanath (1950), Part 3, p.12
93 Mineral Statistics, Mines Department, 1878, p.49
94 Priestley, S, Altona – A Long View, City of Altona, 1988, p. 86
96 Thomas and Baragwanath (1950), Part 3, p.12 and Gloe, C (1984) state that shaft sinking and actual mining of brown coal also occurred at Newport at 1890.
98 Geological Survey Progress Report, No.1, Mines Department, 1873, p.29
100 Wells, J. (1986), p.163
102 ibid.
103 ibid. p.100
104 ibid.
105 ibid.
108 White, J, History of the Shire of Korumburra, Shire of Korumburra, 1987, p.271. Extensive use of this reference has been made with quotation of page number. The author J White has made specific references to his source documents thus facilitating further research.
109 Bowden, K, The Early Days of Korumburra, 1967, p. 59
110 White, J (1978), pp.133,134
111 ibid. p.126
112 ibid. p.122
113 ibid.
114 ibid. p.122
115 ibid. p.128
116 Bowden, K (1967), p.67
117 White, J (1987), p.271

276 Coal Mining Heritage Study
118 ibid. p.128 Bowden, K (1967), pp. 67, 78
119 Bowden, K (1967), p. 85
121 White, J (1987), p.130
123 Halford, M The Coal Industry of South Gippsland, c1910, pp. 234–237
124 White, J (1987), p.130
125 Halford, M (c1910), p. 236
126 Gleeson, K ‘The Rise and Fall of Outtrim’, The Korumburra Times, 16 September 1965, p. 71
127 White, J (1987), p.132
128 Bowden, K (1967), p. 79
129 White, J (1987), p.132
131 ibid. pp.17–20
132 Coglan, J The State Coal Mine and Wonthaggi, 1979, p. 78
133 White, J (1987), p.132
134 ibid. p.236
136 ibid. p.17
137 ibid. pp. 34, 81, 99, 100
138 ibid. p.33
139 Fahey, C Wonthaggi State Coal Mine, Department of Conservation, Forests and Lands, 1987, p. 21
140 ibid. pp. 23, 24
141 ibid. p.24
142 Herman, H Brown Coals of Victoria, Mines Department, 1922, p.6
143 Mineral Statistics, Mines Department, 1878, p. 49
144 Thomas and Baragwanath (1949), Part 1, p. 4
145 ibid. Herman, H (1922), p.7
146 See Fig 14
147 Gloe, C ‘The Geology Discovery and Assessment of the Brown Coal Deposits of Victoria’, Victoria’s Brown Coal, AusIMM, 1984, p.95
148 Thomas and Baragwanath (1949), Part 1, p. 4
149 Thomas and Baragwanath (1950), Part 3, p.12
150 ibid.
151 Stirling, J (1999), p. 82
152 Priestley, S (1988), pp.112, 113
155 Priestley, S (1988), p.113
156 ibid. pp.134, 135
157 Mining and Geological Journal, March 1947, p. 7, Table 11
158 Herman, H, Brown Coal, SECV, 1952, p.49
160 Thomas and Baragwanath (1950), Part 3, p.18
161 Herman, H (1952), p. 5
162 Kenny, JPL (1947), p.10
163 Thomas and Baragwanath (1950), Part 3, p.18
164 Millard, R, The Deans Marsh Story, Geelong, 1985, p.57
165 Thomas and Baragwanath (1950), Part 3, p.18. Drucker (1984), p.48, states that the mine at Benwerrin was an open cut operation. I have not yet found confirmation of this. Others including Herman, H (1952) refer to tunnelling operations, which is more likely.
166 Herman, H (1922), p.7
168 Herman, H (1922), pp. 7, 8
169 Mining and Geological Journal, March 1947, pp.6–8
170 Herman, H (1952), p. 8
171 Herman, H (1952), pp.157–159
172 ‘Power for Victorian Industries’, The Industrial Australian and Mining Standard, 17 March 1921, pp.20–25
174 ibid. p.134
175 White, J (1987), p.128
176 ibid. p.133
177 ibid. pp.134, 135
178 Harper, P (1987), p. 79. Details stated in Harper are quoted from G Broome, Manager of the State Mine.
181 ibid.
183 ibid.
185 ibid.
191 ibid. p.17
193 Brown, G 'Coal Resources in Victoria', Mining & Geological Journal, September 1948, p.11
194 Thomas and Baragwanath (1950), part 3, p.14
196 ibid.
197 Herman, H (1952), p. 49
199 ibid. p.17
200 Kenny, JPL 'Benwerrin Brown Coal Mine', Mining & Geological Journal, March 1947, p.10
201 ibid.
202 ibid.
203 Mining & Geological Journal, March 1947 to September 1948
204 Herman, H (1952), p. 49 and Table 11
205 Thomas and Baragwanath (1950), Part 3, p.17 and Vol. 3, p. 23
206 Thomas and Baragwanath (1950), Part.3, pp.18 and 22 to 24
207 Millard, R (1985), p.58
208 ibid.
209 Herman, H (1952), pp. 85, 86
210 Thomas and Baragwanath (1950), Part 3, p.18. Date of mining commencement is stated as 1921.
211 Herman, H (1952), pp. 49, 85
212 Thomas and Baragwanath (1950), Part 3, pp.18, 19
213 Thomas and Baragwanath (1950), Part 3, p.19 use this nomenclature but the spelling Wensleybrae is also used by others. The name Winchelsea South Coal Mine was also used colloquially.
214 Swift, D 'The Wensley Bray Brown Coal Mine', Mining & Geological Journal, March 1948, p.10
215 Thomas and Baragwanath (1950), Part 3, pp.18, 19. Herman, H (1952), p. 85. Note that Herman’s descriptive location of the mine is incorrect, the mine being about five miles north west of Deans Marsh not south east thereof.
217 Gregory, E et al. (1984), p.140, 141. A photo of the mine when under Roche Brothers operation is shown on page 141.
218 ibid. p.134
219 Gloe, C (1984), p.81
220 ibid. p.134
222 Gloe, C (1984), p.81
223 Thomas and Baragwanath (1949), Part 1, p.5
224 Gloe, C (1984), p.98
225 Herman, H. (1952), p.81. Note that the depth and thickness of the coal, and the levels at which the mine was worked as stated by Herman do not reconcile with the figures as stated by Thomas and Baragwanath (1949), part 1, p.5 or as stated by Gloe (1984), p.81.
226 Gloe, C (1984), p.98
227 Annual Report, Mines Department, 1947
228 Thomas and Baragwanath (1950), Part 3, p.10. This output figure appears to be low. Another source states 120,000 tons by 1947.
229 Herman, H (1952), p.49
230 Annual Report, Mines Department, 1954
231 Thomas and Baragwanath (1950), Part 3, p.10
232 Herman, H (1950), p.49
233 Thomas and Baragwanath (1950), Part 3, p.10 and Herman, H (1950), p.49
234 Thomas and Baragwanath (1950), Part 3, p.10 and Herman, H(1952), p.49
235 Mining & Geological Journal, March 1951, March 1952 and September 1952
236 Thomas and Baragwanath (1951), Part 4, p.8, 9
237 Thomas and Baragwanath (1951), Part 4, pp.8–10
238 Annual Report, Mines Department, 1948
239 Annual Report, Mines Department, 1947 and 1948
240 Thomas and Baragwanath (1951), Part 4, pp.8–10
241 Assessed from Annual Reports, Mines Department 1947 to 1965
244 Vines, JA, A History of Morwell Open Cut, Generation Victoria, 1996, p.140 and Table 8.3/1
246 Vines, JA (1994), p.35. See Photo 1.31/5
247 Rusden, GF (1968), pp.82–84, 98
249 Vines, JA (1989), p.67, Table 5.1/2
250 Brown, K et al Yallourn North Extension Open Cut Interim Rehabilitation, Rehabilitate Victoria, AusIMM, 1992, pp. 71–76
252 Vines, JA (1994), pp.17, 21
252 Rodgers, HC ‘Excavation Equipment for Brown Coal’, Proceedings, AusIMM, 1960, No. 164, Fig. 1 Cross Section showing proposed disposition of dredgers in Yallourn South Field circa1962/63. Number 13 dredger was subsequently installed in 1977 and number four dredger was retired.


254 Vines, JA (1994), p.143, Table 6.15/4 and p. 241 Table 9/1 and p.242 Table 9/2

255 Live Wire, Yallourn Energy, January 2003, p. 2

256 Vines, JA (1996), pp. 18–38

257 Vines, JA (1996), pp. 264, 265


259 ‘This River is a Mover’, Discovery, Dept of Primary Industries, February 2003, pp.10, 11

260 Vines, JA (1996), p.109, See Table 7.5/3


262 ibid. p.221

263 ibid. pp.310–316

264 ibid. p.293 and Table 9.1/1; see also Table 7.1.1/1

265 ibid. pp.180, 295–297

266 ibid. p.379

267 ibid. p.210 See Table 7.1.1/1


270 Speirs, C ‘Loy Yang Mine marks 20 years’, Discovery, Department of Natural Resources & Environment, December 2002, p. 20.


272 Herman, H (1952), p. 49


274 ibid. (1984), p.90

275 Stirling, J, Progress Report, Mines Department, No.10, 1899, p. 76

276 Thomas, DE and Baragwanath, W, Geology of the Brown Coals of Victoria, Part 2, 1950, p.14

277 Gloe, CS, The geology, discovery and assessment of the brown coal deposits of Victoria, AusIMM Monograph Series, No 11, 1984, p.89

278 Knight, JL ‘South Gippsland Brown Coal Field at Won Wron’, Mining & Geological Journal, Vol. 6, No. 2, c1969, pp. 38–41


280 ‘Eight Billion Dollars in brown coal proposals’, Discovery, Department of Natural Resources & Environment, August 2002, pp. 5–7

281 Jumbunna, International Power Hazelwood, Jan/Feb 2004, p.15

Endnotes: Mine Sites Identification


(This publication was initially published in four consecutive parts in the Mining and Geological Journal from Sept. 1949 to March 1951 and subsequently reprinted in four parts by the Department of Mines Victoria. The Mines Department pagination will be used in this Coal Heritage Study in further references to this four part document.)

2 ibid.

3 ibid.

4 Garner, EL & Barton, C, The Importance of Lignite in South Asia, AusIMM Spectrum Series No. 8, 1987, p.1


(This publication has numerous references to early source documentation. Some writers incorrectly attribute the coal discovery at Cape Paterson to the exploration of Hume and Hovell in 1824 which did not reach Western Port.)

6 ibid. p.55

7 ibid. p.54

8 ibid. pp.66–72

9 ibid. pp.72–73

10 Knight, JL ‘The Story of Black Coal in Victoria’, Mining and Geological Journal Vol. 4 No. 4, September 1951, p.39

11 Royal Commission on Coal, 18 December 1891, p.19

12 Knight, JL (1951), p.40

13 Knight, JL (1951), p.39

14 Selwyn, A, Cape Patterson Coal Fields, Mines Department, 1867, p. 2


16 Knight, JL (1951), p.40


18 Knight, JL (1951), p. 40

85 White, J (1987), p.128
86 White, J (1987), p.133 referring to The Advocate, 17 September 1925
87 White, J (1987), p.133 referring to The Korumburra Times, 30 January 1937
88 Annual Report, Mines Department, 1949
90 ibid.
91 Murray, RAF, ‘Recollections and Experiences’, Annual Report, Mines Department, 1891, p.300
93 White, J (1987), p.271
94 See VR Jumbunna and Outtrim Railway Map 1895, No.138
95 White, J (1987), p.130
97 White, J (1987), p.129
99 Mining and Geological Journal, Mines Department, March 1947, p.51
100 Harper, P (1987), p.79
102 Murray, RAF, ‘Recollections and Experiences’, Annual Report, Mines Department, 1891, p.301
103 Wells, John Gippsland: A People, a Place, and their Past, Landmark Press, 1986, p.162
104 Gleeson, K, ‘The Rise and Fall of Outtrim’, The Korumburra Times, 16 September 1965, p.71
105 White, J (1987), p.131
106 ibid.
109 Mining and Geological Journal, Vol. 6 No. 2, Mines Department, 1957
112 Brown, G (1948), p.7
114 Fahey, C, Wonthaggi State Coal Mine, Wonthaggi Coal Mine Committee, 1987, p.15
115 The Melbourne Age, 28 October 1909
117 ibid.
118 ibid. p.34
119 ibid. p.81
120 ibid. pp.99, 100
121 Fahey, C (1987), pp.55, 56
123 Fahey, C (1987), p.56
124 Knight, JL (1970), p.68
125 ibid.
127 Sleeman, J, Black Coal In Gippsland, 1976, p.4
129 Knight, JL (1970)
130 Adams, John, So Tall the Trees, p.93. The majority of information collated in this sub-Section has been taken from interlocking information in this John Adams writing, pp.93–99, and from John Wells’ Gippsland: A People, a Place, and their Past, 1986, pp.158–161
131 Wells, John, Gippsland: A People, a Place, and their Past, 1986, p.158
132 Mineral Statistics, Mines Department, 1876, p.51
133 Wells, John (1986), p.158
134 ibid. pp.95–96
136 Wells, John, Gippsland: A People, a Place and their Past, pp.158–161
138 Adams, John, p.97
139 Hillbrick, G, ‘Memories of Coalville’, Coach News
141 Wells, John, Gippsland: A People, a Place and their Past, 1986, p.158
143 The Gippsland Times, 24 November 1874
145 ibid.
146 Murray, RAF Geological Survey Progress Report, No. 7, 1883, p.74
149 The Morwell Advertiser, 3 March 1983
or statistics. not officially recorded in Mines Department production records. The 200 tons mined previously from the second prospecting shaft had been mined spasmodically for product trials and was not officially recorded in Mines Department production records or statistics. The 200 tons mined previously from the second prospecting shaft had been mined spasmodically for product trials and was not officially recorded in Mines Department production records or statistics.

150 ibid. Legg (1992), pp. 78–79
151 'Borings in search of Coal and Lignite or Brown Coal', Annual Report, Mines Department, 1890, p.102
152 Annual Report, Mines Department, 1889, pp. 21–22
153 Knight, J.L. 'The Story of Black Coal in Victoria', Mining and Geological Journal, Vol. 4 No. 4, September 1951, p. 41
154 Annual Report, Mines Department, 1890, p. 9
155 Progress Report, Mines Department, No. 10, 1899, pp. 4, 5
156 Murray, RAF, Geological Survey Progress Report, No. 3, Mines Department, 1876, p.159
157 ibid.
158 The Morwell Advocate, 6 October 1888, p. 3
159 Stirling, J, Reports on the Victorian Coal Fields, Report on the Yarragon District, 1892, p.16
160 ibid.
161 Annual Report, Mines Department, 1889, p. 92
162 Annual Report, Mines Department, 1890, p.101
163 Mining and Geological Journal, Vol. 6 No.2, 1957
164 Annual Reports, Mines Department, 1957, 1958, 1959
165 Murray, RAF, Annual Report, Mines Department,1890, p. 9
166 Dickers Mining Record, June 1864, p.100. A visit to the Lignite Deposits at Lal Lal, near Ballarat. This article provides a contemporary account of theignite discovery and early development of the lignite mining at Lal Lal.
168 Dickers Mining Record, June 1864, p.100
169 ibid.
170 ibid.
171 Minerals Statistics, Mines Department, 1864, p.88
172 Dickers Mining Record, June 1864, p.100
174 ibid.
175 Minerals Statistics, Mines Department, 1864, p.38
176 The 200 tons mined previously from the second prospecting shaft had been mined spasmodically for product trials and was not officially recorded in Mines Department production records or statistics.
177 Minerals Statistics, Mines Department, 1865, p.48
178 Brough Smyth, R, Goldfields and Mineral Districts, Mines Department, 1869, p.436
179 ibid. p.437
181 Minerals Statistics, Mines Department, 1870, p. 48
182 Minerals Statistics, Mines Department, 1878, p.49
183 Thomas, DE and Baragwanath, W Geology of the Brown Coals of Victoria, Part 3, Mines Department, 1950, p.15
185 Herrman, H, Brown Coals of Victoria, Bulletin No. 45, Geological Survey of Victoria, 1922, p. 7
187 Kenny, JPL Victorian Central Brown Coal Mine, Lal Lal, Mines Department, 1921. Drawing signed by JPL Kenny on 12 November 1921, now on microfi che DRMG CM 2002/5/1 and 2002/B/1. This same layout of the underground workings and adjacent bores and shafts is also shown by Jenkins, HC (1920), Brown Coal Mine, Parish of Lal Lal, Microfi che DRMG CM 2466/D/8.
188 Griffi ths, Peter M (1988), p.100
189 ibid.
190 Thomas, DE and Baragwanath, W Geology of the Brown Coals of Victoria, Part 3, Mines Department, 1951, p.17. Pages 14 to 17 of Part 3 of this publication provide a geological analysis of the Lal Lal brown coal deposit.
191 Mining and Geological Journal, March 1952 and September 1952
192 Brough Smyth, R, Goldfields and Mineral Districts 1869, Mines Department, 1869, pp. 436–438
193 Minerals Statistics, Mines Department, 1865, p.43
195 Progress Report of Geological Survey, No.111, Mines Department, 1876, p.284
196 Mineral Statistics, Mines Department, 1874, p.54
197 Progress Report, No. 1, Mines Department, 1873, p.29
198 Progress Report, No. 3, Mines Department, 1876, pp.172,173
199 Minerals Statistics, Mines Department, 1875, p.51
200 ibid.
201 Mineral Statistics, Mines Department, 1873, p.53
202 Gloe, CS, Geology of Brown Coal Deposits, Monograph No.11, AusIMM, 1984, p.97
203 Progress Report, No.2, Mines Department, 1874, p.8
204 ibid.
205 Progress Report, No.3, Mines Department, 1876, pp.149,172
206 From the Dawning: A History of Yarragon and District, Back to Yarragon Committee, March 1978, p.120
207 Stirling, J Report on the Brown Coals and Lignites of Victoria,’ Progress Report, No. 10, Mines Department, 1899, p.74
208 ibid.
209 Thomas, DE and Baragwanath, W Geology of the Brown Coals of Victoria, Part 1, Mines Department, 1949, p.11
210 From the Dawning (1978), p.120
211 ibid. p.121
212 Stirling, J (1890), p.74
213 From the Dawning (1978), p.121
214 Adams, John, So Tall the Trees, 1978, p.105
215 Stirling, J (1892), p.15
216 Fraser, N ‘Exploration Licence 1800 Trafalgar’, Final Report to the Mines Department, 1983, p.8
217 Stirling, J Report on the Yarragon District, Mines Department, 1892, pp.15–16
218 From the Dawning (1978), p.103
219 ibid.
220 Stirling, J ‘Report on the Brown Coals and Lignites Of Victoria’, Progress Report, No. 10, Mines Department, 1899, p.75
221 Adams, John, So Tall the Trees, 1978, p.97
222 ibid.
223 Thomas, DE and Baragwanath, W Geology of the Brown coals of Victoria, Part 4, Mines Department, 1951, pp.8–10
224 Stirling, J (1899), p.75
225 Fraser, N ‘Exploration Licence 1800 Trafalgar’, Final Report to the Mines Department, 1983, p. 8
226 Stirling, J Report on the Yarragon District, Mines Department, 1892, pp.15–16
227 ibid.
228 Stirling, J ‘Report on the Brown Coals and Lignites Of Victoria’, Progress Report, No. 10, Mines Department, 1899, p. 74
229 Gloe, CS Geology of Brown Coal Deposits, Monograph No.11, Mines Department, 1984, p.97
230 Annual Report, Mines Department, 1897
231 Annual Report, Mines Department, 1948
232 Thomas, DE and Baragwanath, W Geology of the Brown coals of Victoria, Part 4, Mines Department, 1899, pp.103
234 Stirling, J (1899), p. 77
236 Stirling, J (1899), p. 76
237 ibid. Plate 7
238 Stirling, J (1899), Plate No. 5
239 Thomas, DE and Baragwanath, W (1951) pp. 8–10
240 Annual Report, Mines Department, 1889, p.93
241 Borings in search of Coal and Lignite or Brown Coal, Mines Department, 1890, p.103
243 Stirling, J (1899), p.77
244 Stirling, J (1899), Plate 6
245 Thomas, DE and Baragwanath, W, Geology of the Brown coals of Victoria, Part 4, Mines Department, 1899, pp.80, 83
246 Thomas, DE and Baragwanath, W (1989a), p.4
247 ibid. pp. 6–8
248 Annual Report, Mines Department, 1947
249 Annual Report, Mines Department, 1948
250 Thomas, DE and Baragwanath, W Geology of the Brown coals of Victoria, Part 4, Mines Department, 1899, pp.103
251 Stirling, J (1899), p.75
253 From the Dawning (1978), p.103
254 ibid.
255 Stirling, J ‘Report on the Brown Coals and Lignites Of Victoria’, Progress Report, No. 10, Mines Department, 1899, p.75
256 ibid.
257 Thomas, DE and Baragwanath, W Geology of the Brown coals of Victoria, Part 4, Mines Department, 1899, pp.80, 83
258 ibid. p.24
259 ibid. p.18.
260 ibid. pp. 6–8
261 ibid. p.18.
262 ibid. p.24
263 ibid. p.18.
264 ibid. pp. 6–8
265 ibid. p.18.
266 ibid. pp. 6–8
267 ibid. p.18.
268 ibid. pp. 6–8
269 ibid. p.18.
270 ibid. pp. 6–8
271 ibid. p.18.
272 ibid. pp. 6–8
273 ibid. p.18.
274 ibid. pp. 6–8
275 ibid. p.18.
276 ibid. pp. 6–8
277 ibid. p.18.
278 ibid. pp. 6–8
279 ibid. p.18.
280 ibid. pp. 6–8
281 ibid. p.18.
282 ibid. pp. 6–8
283 ibid. p.18.
281 Thomas, DE and Baragwanath, W (1949–1951), Part 3, pp.18–22
283 Thomas, DE and Baragwanath, W (1949–1951), Part 3, pp.18–22
285 ibid.
286 ibid.
287 Herman, H (1952), p.49
291 Mining and Geological Journal, March 1951
293 Cecil, KL and Carr, RV. Aireys Inlet, A History, Anglesea and District Historical Society, 1987, p.74
294 Knight, JL. Preliminary Report on Structure of the Anglesea Coalfield, Mines Department, July 1960
295 ibid.
296 Gloe, CS (1984), p.81
298 ibid.
299 ibid. pp.45–46
300 Foran, B. Australia’s Alumina since 1963, Alcoa World Alumina Australia, 2004, p.1
301 Rolland, C. The Ongoing Rehabilitation of the Anglesea Brown Coal Mine, Rebuild Victoria, AusIMM, No. 11, November 1992, p.134
303 Rolland, C (1992), p.134
305 ibid. pp.133–137
306 Foran, B (2004), p.3
308 ibid. p.1
309 Foran, B (2004), p.3
310 Gloe, CS. Geology of Brown Coal Deposits, Monograph No.11, AusIMM, 1984, p.81
311 Annual Report, Mines Department, 1889, p.22
312 Priestley, S. Altona: A Long View, City of Altona, 1998, p.95
313 Knight, JL. Brown Coal in the Melbourne Area, Mines Department, (unpublished), March 1960, p.1
314 Priestley, S (1988), p.95
315 Knight, JL (1960), p.1
316 Priestly, S (1988), p.100
319 Australian Mining Standard, 15 August 1912, p.157
321 ibid. p.168
322 Thomas, DE and Baragwanath, W. Geology of the Brown Coals Of Victoria, Part 1, 1949, p.5
323 Herman, H Brown Coal, SECV, 1952, p.49
324 Priestly, S. Altona: A Long View, City of Altona, 1988, p.86
325 Herman, H. Brown Coals of Victoria, Bulletin No. 45, Mines Department, 1922, pp.11, 12
326 Thomas, DE and Baragwanath, W. Geology of the Brown Coals Of Victoria, Part 3, 1950, p.13
328 Herman, H (1923), p.12
329 Thomas, DE and Baragwanath, W (1951), Part 4, p.12
330 Thomas, DE and Baragwanath, W (1950), p.9
331 ‘The Parwan Coal Field’, The Bacchus Marsh Express, 15 July 1933
334 ibid.
335 The Bacchus Marsh Express, 15 July 1933
336 Kenny, JPL (1947), p.14
337 Thomas, DE and Baragwanath, W (1950), p.9
338 Kenny, JPL (1947), p.15
339 Mining and Geological Journal, September 1947, p.37
340 Thomas, DE and Baragwanath, W (1950)
342 Thomas, DE and Baragwanath, W (1950), Part 3, p.10
343 Brown, G. ‘Coal Resources of Victoria’, Mining and Geological Journal, September 1948, p.9
344 Thomas, DE and Baragwanath, W (1950), Part 3, p.10
345 Moffat, G. ‘The Maddingley Brown Coal Open Cut, Bacchus Marsh,’ Mining and Geological Journal, March 1954, p.4
347 ibid. p.9
348 Annual Report, Mines Department, 1947
349 Annual Report, Mines Department, 1947
350 Annual Report, Mines Department, 1951, p.25
351 Moffat, G (1952), p.4
Thomas, DE and Baragwanath, W (1950), Part 3, p.9
Brown, G ‘Coal Resources of Victoria’, Mining and Geological Journal, September 1948
Mining and Geological Journal, March 1950
The Bacchus Marsh Express, 21 March 1953
Mining and Geological Journal, March 1955
Annual Report, Mines Department, 1969
Annual Reports, Mines Department, 1973, 1975 and 1979
The Melton/Bacchus Marsh Independent, 3 August 1999
Brown, G ‘Coal Resources of Victoria’, Mining and Geological Journal, September 1948, p.10
Mining and Geological Journal, September 1947
Brown, G (1948)
Annual Report, Mines Department, 1947
Mining and Geological Journal, September 1948
Mining and Geological Journal, March 1950, pp.27–30
Mining and Geological Journal, September 1951
Annual Reports, Mines Department, 1969–1979
Brown, G, ‘Coal Resources of Victoria’, Mining and Geological Journal, September 1948, p.10
Annual Report, Mines Department, 1947
Mining and Geological Journal, March 1947
Brown, G (1948)
Mining and Geological Journal, March 1948, September 1948, March 1949 and March 1950
Thomas, DE and Baragwanath, W, Geology of the Brown Coals Of Victoria, Part 3 Mining and Geological Journal, September 1950, p.10
Mining and Geological Journal, March 1951, pp.30–35
Annual Report, Mines Department, 1951, p.25
Mining and Geological Journal, September 1952, pp.35–36
Mining and Geological Journal, September 1947
Brown, G ‘Coal Resources of Victoria’, Mining and Geological Journal, September 1948, p.10
Mining and Geological Journal, September 1949

—Mine Sites Identification—

Rusden, GF (1968), p. 85

ibid. pp. 82, 98

ibid. Appendix 5, p. 13

Power for Victorian Industries, *The Industrial Australian and Mining Standard*, 17 March 1921, pp. 10–12. This report of 80 pages provides a contemporary technical collation of the decision making and implementation related to the establishment of the SECV and the Yallourn Open Cut.

Clark, L. ‘Letter to The Hon. Arthur Robinson, Minister for Public Works’, 6 December 1918 including Appendices 1 to 111

*Power for Victorian Industries*, *The Industrial Australian and Mining Standard*, 17 March 1921, pp. 10–13


ibid. p. 20


ibid. pp. 8–28

ibid. Appendix 1, pp. 237–239. This Appendix details a list of all rolling stock employed at YOC and YNOC through to 2005 by which time no rail transport was in service.

ibid. pp. 41–44

ibid. Appendix 1, pp. 237–239

ibid. Tables 9.1 to 9.4, pp. 241–244

ibid. Table 9.1, p. 241


ibid. p. 40


Vines, JA (1994), Table 9.2, p. 242

ibid. Drawing 6.15/4, p. 143


Vines, JA (1994), Photo 7.13, p. 181

ibid. Post Script, p. 249


*Environmental Effects Statement Summary, Yallourn Energy*, 2004

Metha, R, ‘Morwell River Diversion’, *Discovery*, Department of Primary Industries, June 2005, p. 27


Gloe, CS, *Geology of Brown Coal Deposits*, Monograph No. 11, AusIMM, 1984, p. 85


ibid.

Gloe, CS, *Geology of Brown Coal Deposits, Monograph No.11*, AusIMM, 1984, Table 1, p. 91


Rusden, GF (1968), p. 99

Rusden, GF (1968), pp. 101–102

Rusden, GF (1968), p. 98

ibid. Appendix 10

Vines, JA (1989), p. 64


ibid. p. 87


Brown, K et al (1992), p. 71


Brown, K et al (1992), pp. 71–76

*Mineral Statistics, Mines Department*, 1865, p. 48

Herman, H, *Brown Coals of Victoria*, Bulletin No. 45, Mines Department, 1922, p. 5


ibid. p. 27 and pp. 24–25

ibid. pp. 37, 38

ibid. pp. 29–32. Drawing 9.6.1 shows the plant layout as proposed at 1946.

Revised program at July 1950

Vines, JA (1996), pp. 95–100

ibid. p. 103

ibid. p. 105

ibid. pp. 110–111

ibid. pp. 112, 140, 153

ibid. pp. 153–155

ibid. pp. 141–144

ibid. p. 56
475 ibid. p.109  
476 ibid. p.345  
478 ibid. p.319  
479 ibid. pp.155–163  
480 ibid. pp.183–185  
481 ibid. pp.186–190, 225  
482 ibid. pp.303–306, 345  
483 ibid. pp.298–302, 318  
485 Jumbunna, International Power Hazelwood, June 2002  
486 ibid. August 2000  
487 ibid. November 2000  
488 ibid. April 2001  
489 ibid. July 2001  
490 ibid. May 2002  
492 ibid., July 2003. Also, Discovery, Victorian Department of Primary Industries, February 2003, pp.10, 11  
493 ibid., July 2003. Also, Discovery, Victorian Department of Primary Industries, February 2003, pp.10, 11  
494 ibid. April 2005 and December 2004  
496 Progress Report, No.3, Mines Department, August 1875, p.284  
497 Mineral Statistics, Mines Department, 1876, p.51  
498 Annual Report, Mines Department, 1889, p.22 (Remarks on the Development of the Coal and Lignite Resources of Victoria, Murray, RAF)  
499 From Minerals Department, Annual Report, 1890. The drawing of the Coal Field in the County of Buln Buln in the copy of the 1890 Annual Report held by me is rather illegible. Drawing 9.6/1 of this Coal Heritage Study was redrawn from the 1890 report superimposed on a more recent topographical and infrastructure map and included as Drawing 1.8/1 in Vines, JA A History of the Loy Yang Mine, 2000.  
501 Drilling Records held at 1994 by Geo-Eng at Morwell  
502 Vines, JA (2000), p.48. See also Drawing 3.3.17/1 on p.75 depicting land acquisition areas.  
503 Vines, JA (2000), p.77  
505 Herman, H, Bulletin No.45, Geological Survey of Victoria, Mines Department, 1922, p.18  
507 Alexander, JM Planning the Development of Loy Yang Open Cut In Australia, Braunkohle, July 1981  
511 Vines, JA (2000), pp. 354, 357  
514 Report, Loy Yang Power, 4 July 2001  
515 ibid. 25 September 2002  
516 Business Plan, Loy Yang Power, 2005, p.5  
518 Report, Loy Yang Power, 30 January 2001  
519 ibid.  
521 Discovery, Department of Primary Industries, December 2002 and September 2003  
522 Report, Loy Yang Power, 1 December 2004  
523 Report, Loy Yang Power, 6 April 2005  
524 Business Plan, Loy Yang Power, 2005  
525 Report, Loy Yang Power, 18 May 2005  
526 Discovery, Department of Primary Industries, August 2002, p.5  
527 Discovery, Department of Primary Industries, December 2004, p.16  
528 Gloe, CS, The Geology, Discovery, and Assessment of the Brown Coal Deposits of Victoria, Monograph No. 11, AusIMM, 1984, p.90  
530 Herman, H, Brown Coals of Victoria, Bulletin No.45, Mines Department,1922, pp.10–12  
531 Greer, IR ‘Geological Report to Arco Aust Ltd. Sept.1982 to August 1983’, Appendix H by Greer, IR and Smith, GL.  
532 Thomas, DE and Baragwanath, W ‘Geology of the Brown Coals Of Victoria’, Mining and Geological Journal, Mines Department, Vol. 4 No.1, 1950, Fig. 31  
533 Thomas and Baragwanath (1949), Vol. 3 No. 6, p. 31  
534 Thomas and Baragwanath (1949), Vol. 3 No. 6, p. 31  
535 Greer, IR and Smith G. E. Geology of the Geillondale Coalfield, Appendix H of ‘Report to Arco Aust Ltd.’, September 1982 to August 1983  
536 Gloe, CS (1984), p.100  
538 Herman, H, Brown Coal, SECV, 1952, p.49  
539 Vines, JA, (1996), Table 2.2.2/1, p.22, (Table extracted from report by J Bridge, 1944)  
540 Annual Report, Mines Department, 1969  
541 Garner, LJ Research in Brown Coal Utilisation, Monograph No.11, AUSIMM, 1984, p.184  
542 Greer, IR ‘Geological Report to Arco Aust Ltd.’, September 1982 to August 1983, p.10  
543 Gloe, CS (1984), pp.90–91
543 Gloe, CS (1984), pp. 89–91
544 Holdgate, GR, Coal Exploration for Lignites: Gippsland Basin, 1997
545 Murray, RAF, Progress Report, No.111, Mines Department, 1875–1876, p. 148
546 Stirling, J, Progress Report, No.10, Mines Department, 1899, p. 80
547 Thomas, DE and Baragwanath, W (1949–1951), Part 2, p. 14
549 ibid.
550 ibid.
551 ibid.
552 Gloe, CS, The Geology, Discovery and Assessment of the Brown Coal Deposits of Victoria, Monograph No.11, 1984, p. 89