

YALLOURN

YALLOURN ENERGY Ltd.

PIONEERS IN POWER

MINING LICENCE WORK PLAN

PART "B"

ENVIRONMENTAL MONITORING PROGRAM

2 JUNE 1995

APPROVED

BY THE GOVERNOR IN COUNCIL

19 MAR 1996

CLERK OF THE EXECUTIVE COUNCIL

YALLOURN ENERGY LTD. - MINING LICENCE WORK PLAN - PART B
ENVIRONMENTAL MONITORING - YALLOURN MINE

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The Environmental Monitoring Program is divided into two sections:

- . ABOVE GROUND ENVIRONMENT relates to above ground issues land, water, ash, asbestos, hard rubbish and air quality.
- . EARTH MOVEMENT relates to monitoring of batter movement and ground water.

This document is to assist the routine inspection and auditing of the environmental monitoring at Yallourn Energy Ltd. It forms the second part of the Work Plan.

Refer (Fig 12) "Environmental Program and Monitoring."

1.1 LAND REHABILITATION

Planning.

Land rehabilitation is implemented through a works program integrated with the Mine Plan. Rehabilitation of disturbed mine land is planned 3 years in advance and in accord with the long term Rehabilitation Master Plan. The annual works program includes rehabilitation construction of disturbed land and land maintenance.

Monitoring.

Responsible Officer

Monthly: Inspect new works during first 6 months after construction to determine maintenance requirements. EPEYM

6 Monthly: Inspect all rehabilitated lands to determine maintenance requirements. EPEYM

Reporting

Report annual performance against Plan. EPEYM
Report progress of seasonal works program. EPEYM
Update Land Rehabilitation Cost Model to reflect Business liability. EPEYM/FMYM

References:

Land Rehabilitation Practices Manual. ✓
Generation Victoria Rehabilitation Policy. ✓

Legend:

EPEYM - Environmental Planning Engineer Yallourn Mine
FMYM - Finance Manager Yallourn Mine

1.2 MINE DEWATERING

1812-2 par A.

The Mine collects, treats and discharges excess water from the whole Yallourn Energy site. Waste water collects in the Fire Service Pond and is used for fire protection, dust suppression and washdown. Excess water is chemically treated and discharged in accord with the EPA Licence No. LX13/6, which specifies quality, quantity, monitoring and reporting requirements. Approximately 17,000 Ml annually is discharged to the Morwell River. Water treatment is by an automatic dosing station and a dedicated settling pond. Details of this licence are as follows:

Licence Conditions

| | | |
|------------------------|------------------------|----------------------|
| 1. Discharge quantity: | Maximum discharge rate | 104 Ml/day |
| | Annual Mean | 50 Ml/day |
| 2. Quality limits: | <u>Maximum</u> | <u>Annual Median</u> |
| Total Dissolved Solids | 700 mg/l | 450 mg/l |
| Colour | 70 Pt-Co | 50 Pt-Co |
| Suspended Solids | 50 mg/l | 20 mg/l |
| Turbidity | 60 NTU | 25 NTU |
| pH range | 6 to 8.5 | |

Monitoring

Responsible Officer

- . Discharge flow rate is measured and recorded. ✓
- . Sampling and analysis program for discharge water, upstream and downstream to NATA standards.

As required alert performance problems. Mine Fire Service
 Conduct repairs/checks to treatment system. Mine Technical Officer

Written report of exceedances on NATA testing to EPA and maintain hardcopy and electronic database. EPEYM

Daily: Operate pumps and water treatment plant to control and treat excess dirty water. F/S
 Sample and arrange for daily discharge quality tests, and monitor results against Licence requirements. F/S

Weekly: Analysis of TDS, Colour, Suspended Solids, Turbidity and pH. Sample and analyse discharge for routine parameters. NATA Lab
 Monitor and file all NATA analyses. EPEYM

Monthly: Report Licence exceedances and system performance EPEYM

Quarterly: Sample and analyse discharge for background parameters, predominantly for due diligence. NATA Lab
 Analysis for sulphate and nitrate

1.2 MINE DEWATERING CONT:

Reporting

licencee to keep written records of analyses.

exceedance reporting to epa.

annual written report to epa and daem (by exception)

report annual performance against plan.

EPEYM

Legend: EPEYM - Environmental Planning Engineer Yallourn Mine
Mine Fire Service - Mine Personnel Operators
NATA Lab - Laboratory registered by the National Association of
Testing Authorities, Australia.

1.3 POWER STATION ASH

The Yallourn W Power Station ash disposal system, return water system and saline waste water system are located at the Yallourn North Open Cut. The twin pond system operates on a cyclical basis - while one pond is filling the second is being excavated - and the residual ash used as landfill in the Western dump area of the site. The excess saline water is collected via reservoirs (Western, Central and Eastern Basins) before being pumped into the Saline Waste Outfall Pipeline. The pipeline is managed by others.

The ash disposal operation is subject to EPA licence No. LS254/2 issued on 22 February 1995, which permits the deposit of waste at premises "Yallourn North Open Cut".

Monitoring requirements

All sampling and analysis is to be carried out by or under the supervision of NATA registered person in accordance with EPA publication "A guide to the sampling and analysis of water and wastewater."

In at least the months of April & November each year samples of groundwater are to be obtained from each of the specified monitoring bores for analysis for electrical conductivity, Ph and sulphate. Static water levels in each bore are also measured.

During discharge to the Twin Ash Ponds the water level is to be recorded every 24 hours and those records maintained for not less than 12 months.

Reporting requirements

1. Results, observations and measurements are to be accurately recorded in writing, date and time stamped, be under NATA endorsement and signed by the responsible officer.

2. Results are to be made available to an authorised officer upon request and submitted in an annual return to the EPA's Gippsland Office in April of each year.

3. Overflow is to be reported annually with the total volume and duration of each discharge by month of any waste discharged to the Yallourn Fire Service Pond during the previous year. Records are to be kept for at least 2 years after initial entry.

4. Immediate notification is to be made to the EPA Gippsland Office of any overflow, discharge or loss of saline water which:

- . is in excess of 1 m³/hr or 30m³/event, or
- . which may be potentially detrimental to the environment.

This applies for any pipeline or scour valve between the Twin Ash Ponds at Yallourn North Open Cut and the Firmin's Lane pumping station.

5. Annual reporting in April of total volume of ash deposited into the Yallourn North Open Cut ash dump during the year.

1.3 POWER STATION ASH cont:

Licence limits

- 1 Saline water discharge from the Yallourn W Power Station ash pits to the Fire Service Pond shall not exceed 20 hours per month, nor exceed 10 megalitres per month.
- 2 The Twin Ash Ponds shall be operated so that a minimum freeboard of 0.5 metres is maintained at all times.
- 3 The Yallourn Eastern Basin shall be operated so that the level does not exceed 36.0 metres RL.

Operating conditions

- 1 Preventative Maintenance Program - the licenceholder is to prepare and make available to the EPA Gippsland Office a copy of the preventative maintenance program for the ashing system.
- 2 Points of discharge shall be only into the Twin Ash Ponds, Eastern Basin and onto the Western Basin and Central Basin ash dump.
- 3 The types of waste deposited to the above sites is limited to those specified.
- 4 Seepage from Yallourn North Open Cut - the operations shall be conducted so that no seepage occurs which would adversely affect the environment.
- 5 Soil erosion - the licence holder will ensure minimisation of soil erosion and prevent pollution of the Latrobe River and Andersons's Creek. sediment traps are to be installed and maintained on all drainage lines from Yallourn North Open Cut.

Site restoration

Compacted earth to a minimum depth of 0.5m shall be placed over the area specified and the final surface of the ash dump covered and revegetated.

1.4 ASBESTOS DISPOSAL

Asbestos Dump No.3 at Yallourn North Open Cut is operated to EPA Licence LS249/3, and requires annual reporting of the volume dumped split into quantities of hard and soft asbestos. The licence was issued on 19 May 1989 and amended on 14 January 1993 and is currently issued to the SECV but will shortly be transferred to Yallourn Energy Ltd. The responsible officer is the Environmental Manager Yallourn Power Station and the managing contractor appointed is ADI-BAINES HARDING JV.

Required practice

- 1 The wastes must consist only of asbestos, asbestos products and material contaminated with asbestos and all waste must be deposited into the trenches.
- 3 The licence must contain separate trenches for light asbestos and heavy asbestos waste so that the pvc bags enclosing any light asbestos are not subject to damage.
- 4 Any ruptured PVC bag containing light asbestos must be covered with at least 150mm of inert material immediately upon deposition into the trench.
- 5 When each trench is filled it must be compacted and covered with at least 500mm of inert material and that cover material then compacted.
- 6 The final surface of the site must be restored by grading and draining to prevent ponding and revegetated to minimise erosion.

Site management

- 1 The site is to be fenced and access restricted.
- 2 Surface drainage must be diverted away from the premises.
- 3 Any run-off from a vehicle must be directed to and contained within an asbestos disposal trench.
- 4 The licensee must ensure that all personnel responsible for the operation of the site are familiar with the conditions of this licence.

Reporting

By 14 March each year to report to the Gippsland Office of the EPA on the previous years operation, as follows:

- 1 the source of the waste deposited,
- 2 the estimated volume of the waste,
- 3 the number and location of the trenches filled and covered.

1.5 HARD RUBBISH DISPOSAL

Annual reporting of volumes of hard rubbish disposed of into the Yallourn Open Cut Tip (Hard Rubbish Dump), is a new requirement and is in accordance with EPA Licence No. LS62/8. The licence was issued 9 January 1974 and amended 30 June 1994

This licence is currently issued to Generation Victoria but will shortly be transferred to Yallourn Energy Ltd. The responsible officer is the Environmental Manager Yallourn Power Station and the managing contractor appointed is ADI-BAINES HARDING JV.

Conditions of Licence

The waste must:

- 1 be discharged only onto or into the premises delineated;
- 2 consist only of inert solid waste or synthetic mineral fibre;
- 3 only be that which has originated from the Yallourn Works Area;
- 4 not include prescribed waste, putrescible waste or liquid waste.
- 5 if Synthetic mineral fibre must deposited in the manner specified;
- 6 not be burnt at the premises.
- 7 Site restoration is to be by grading, draining and revegetation.

Site Management

- 1 Prompt action must be taken to extinguish fire outbreaks;
- 2 Suitable signs must be prominently displayed to advise permitted wastes and where they may be deposited;
- 3 All surface run-off must be diverted away from land-fill areas which have been or are being used for dumping. All drainage from the landfill area must be managed so as not to adversely affect any waters.
- 4 All users of the premises are to be made aware of this licence and its conditions;
- 5 The site management plan must be submitted to the EPA for approval¹.

Note: ¹ the submission date requirement has been deferred by agreement from that set out in the licence to enable the more substantial requirements of the Yallourn Demolition Project to be incorporated in the Site Plan.

Reporting

By 5 January each year, the licensee must provide to the EPA an estimate of the volume of waste deposited at the premises for the previous calendar year.

1.6 AIR QUALITY

Dust suppression in the mine is linked to the fire mitigation program. Adverse weather projections are monitored by the Fire Service Office and Control Centre. On dry windy high fire risk days the Mine Fire Service wets down coal surfaces to reduce the risk of fire. The wetting down using the fire service system is also the major means of dust suppression. Mobile plant haul routes are also wetted with tanker trucks.

In October/November each year a full fire service test is conducted to determine the effectiveness of the spray cover. Aerial photographs are taken of the test and deficiencies identified and remedied.

2. EARTH MOVEMENT

2.1 General stability practice

Jointing of coal, orientation of batters, width of benches, height of faces, ground water in batters, etc.. are considered when determining safe batter slopes in coal. Operational activities such as diverting runoff away from coal joints, and installation of horizontal bores to relieve water pressure in coal joints are undertaken to maintain batter stability.

Bench and face geometry, and material quality are considered when determining safe batter slopes. Where weak saturated overburden material occurs, prestripping is usually carried out to minimise the face length requiring flatter batters for stability.

Operational procedures are in place that require daily batter inspections ahead of the digging face.

Batters in overburden dump areas are designed considering material quality and drainage criteria. Permanent batters are typically at 1 in 10 which also suits the visual requirements for rehabilitation in dump areas. The design maximises coal recovery, minimises batter stabilisation costs and maintains safety of the operations within prescribed geotechnical limits.

2.2 Geotechnical Monitoring - Western Batters

Three main types of batter monitoring are carried out:

- . Monitoring of groundwater and pore pressure levels in the batters.
- . Monitoring of batter surface movements.
- . Monitoring of sub-surface movements along the base of the coal seam.

Three monthly and annually in a comprehensive manner, all the data compiled for the Western Batters is reviewed to determine how the batters are performing and if any area contains unacceptably high water pressures or is moving at a higher than expected rate. The results of the monitoring program are reported relative to the design movement predicted.

Monitoring of groundwater and pore pressure levels is carried out using a system of 78 bores that have been progressively installed since 1984. Data from the monitoring is assessed either fortnightly or monthly and entered into databases. The data is used to assess the current stability of critical sections of the batters.

~~Horizontal and vertical batter movements are monitored using survey pinlines. The Western Batters pinline system consists of 178 individual pins arranged on 12 pinlines. Critical pinlines are located at the crest of the batters.~~

Annual major pinline survey assessments covering most of the installed pins, are carried out in August. Other smaller pinline surveys are carried out in December and April.

Surface movements across the Yallourn Monocline are monitored by instrumentation anchored across the fault zone.

Subsurface movement along the coal/interseam interface is monitored using bore mounted inclinometers and vertical Resistance Wire Extensometers.

2.2 cont: **SUMMARY OF GEOTECHNICAL MONITORING PROGRAM.**

| | | |
|--------------|---|------------|
| Daily: | Inspect surcharge dump and coal levels by Operations. | PMYM |
| Fortnightly: | Inspect dump placement by Mine Planning, with a brief note to PMYM on status and recommendations. | MPMYM |
| Monthly: | Monitoring of groundwater and pore pressure levels is carried out using a system of 78 bores that have been progressively installed since 1984 and data entered into databases. | Consultant |
| Bi Monthly: | YM Geotechnical meeting to cover all geotechnical issues of mine stability (including East Field) | MPMYM |
| 3 monthly: | Survey of excavation and surcharge dump areas | PMYM |
| 3 Monthly: | Brief review from consultant following the survey. Review of movement of batters and if any unacceptably high water pressures exist. | MPMYM |
| 6 Monthly: | Dec., April. Limited survey of pin lines to check for movement. | Consultant |
| Annual: | A major pinline survey and assessment, covering the 178 installed pins, is carried out in August of each year. | Consultant |
| Annual: | Detailed report from consultant in second quarter of financial year. | MPMYM |
| Annual: | Updated program, providing projections for excavation and surcharge dump construction by end of April. . 12 month program by months . 3 year program by years | MPMYM |

Legend: PMYM Production Manager, Yallourn Mine
 MPMYM Mine Planning Manager, Yallourn Mine

2.3 Deep Aquifer Depressurisation

As the mine deepens deep aquifer depressurisation will become necessary in the East Field to prevent flooding and heave in the base of the Mine. Pressures in the Township Field were sufficiently low and did not require depressurisation works. The current dewatering rate from East field is 410 Ml per annum from one bore, and this is anticipated to increase to 1450 Ml per annum over the next 4-5 years as further bores are installed. This water is collected in the base of the Mine for use in the fire service.

Aquifer depressurisation rates are determined by hydrogeological modelling. The predicted geometry of the mine at one year intervals, together with known information about the location and properties of the coal seams, aquifers, and other strata is used in the model to determine the pumping required to achieve acceptable aquifer pressures.

Within the perimeter of the Mine observation bores in the aquifer have been installed to monitor the aquifer. Piezometric levels are measured routinely and the data recorded in a database.

The Mine has engaged the services of Consultants to advise on the management and control of geotechnical and depressurisation programs. Monthly and quarterly reports on Aquifer Depressurisation are provided by the Consultants.

2.4 Regional subsidence.

Regional subsidence is monitored to determine the impact of mining. Regional groundwater monitoring and Australian Benchmark monitoring is done by consultants, and the analysis is provided to each mine.

In a regional sense the drawdown of aquifer pressures for mine stability extends for some kilometres from the mine area. This has resulted in subsidence of the region which is monitored on a regular basis. The subsidence is relatively uniform, reducing with distance from the mine.

Reference:

"Groundwater Management Plan for Latrobe Valley Mines - January 1994"

2.5 Overburden Aquifer Dewatering

Dewatering of the sands in the overburden of the East Field to improve material handling, avoid face slumping and improve overburden dump stability is carried out. Trials are in progress to finalise the best method to achieve these objectives by either pumping the water from submersible borehole pumps or by excavating gullets in the overburden face to accelerate drainage from the more sandy areas. A trial pump is operating at a flow rate of 127 Ml per annum and this is anticipated to increase to 500 Ml per annum over the next 4-5 years. The water is collected at the base of the mine for use in the fire service.

2.6 East Field flood protection - The Morwell River Diversion

The East Field is currently being developed and is only 20m below the top of coal at present. Within the 3 year planning period, the development will have reached 75m below top of coal at the Southern Batters. Progressively as the mine deepens, horizontal bores, water level observation bores and batter movement monitoring systems will be installed to control the water table and monitor batter stability.

The inflow of water from the coal batters and from the overburden gravels and sands is also monitored to assess the effectiveness of the cut-off barrier beneath the Morwell River Diversion.

A 300m buffer zone exists between the diversion cut-off barrier and the crest of the Southern Batters to limit ground movement and to maintain batter stability.