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# EVALUATION OF

# THE WOODBURY COAL PROJECT

## (TASMANIAN TRIASSIC COAL PROSPECT)

INCLUDING A REVIEW OF THE GEOLOGICAL AND RESERVE INFORMATION SUPPLIED BY VICTOR PETROLEUM. (REVISED REPORT THE WOODBURY COAL DEPOSIT EXPLORATION LICENCE 31/80, JUNE, 1982.)

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MELBOURNE

JULY, 1982.

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## 1. SUMMARY

The Woodbury coal prospect as defined by Victor's measured and indicated reserves for a 10:1 cut-off limit would support a 1.000 m.t.p.a. R.O.M. coal product mine for a twenty (20) year operating life. The R.O.M. coal production could be scheduled to average approximately 40% ash based on the very limited quality data supplied.

An annual overburden ($m^3$) to R.O.M. coal (tonnes) stripping ratio of 8:1 will be required over at least the first ten (10) years of the operation to meet the annual coal production. The maximum mining depth planned is 50m.

The F.O.R. production cost of the R.O.M. coal product at the minesite (including all Government charges and overheads) will be approximately $18/tonne.

If a washed coal product of 20% ash is produced at an estimated yield of 50% the production cost will rise to $37/ tonne.

The capital investment required to develop the 1.0 m.t.p.a. operation would be $M45 with an additional $M62 being required for equipment replacement over the twenty (20) year project life. The labour force employed will reach a maximum of 250 personnel by Year 5.

It is estimated that production would commence one year after project authorisation with the initial year's production being 0.700 m.t.p.a. R.O.M., reaching 1.000 m.t.p.a. in the second year of operation.

No provision has been made for infrastructure outside the mine development, e.g. rail line or highway improvements, additional housing, power, water supply, etc..

2. GENERAL:

After reviewing Victor plans and sections, we have generally used their proposed mining areas, since these appear satisfactory and time does not allow a detailed check of their reserve calculations.[1].

Using the proposed coal blocks, a mining schedule has been developed to produce 1.0 m.t.p.a. R.O.M. coal with a consistent ash level of approximately 40% and a constant overburden volume of 8.0 x $10^6$ b.c.m. per annum. Using both measured and indicated reserves for the 10:1 cut-off overburden limit (from Victor) gives an annual overburden ($m^3$) : R.O.M. coal (tonne) ratio of 8:1. We have assumed the following:-

(1) Coal seam S.Gs.:-

| | | |
|---|---|---|
| B | - | 1.6 |
| C | - | 1.5 |
| D | - | 1.7 |

(2) Average seam thickness for each coal block from Victor plans, cross sections and tabulations. These are listed in the coal block quantities - Table 2.

(3) Varying mined coal recoveries, depending upon total and individual ply thickness and the number of splits. These are listed in the coal block quantities - Table 2.

From using the Victor reserve figures for measured and indicated coal for the cut-off limit of 10:1, there will be sufficient coal reserve to support a 1.0 m.t.p.a. R.O.M. coal operation for 20 years.

## 3. MINE PLAN:

To achieve the required 1.0 m.t.p.a. R.O.M. coal production requires an annual overburden removal of $8.0 \times 10^6$ b.c.m..

This is detailed in the Annual Production Summary - see Table 1.

Using the available quality data and the quantities for each of the separate coal blocks, a mine development and production schedule has been prepared to meet the production requirements. These are detailed in Tables 2 and 3.

The overall plan is to commence development in the first year with labour recruitment and equipment commissioning continuing at a practical level such that at the end of Year 1 the operation will have reached the required annual rate of 1.0 m.t.p.a.. In this year one coal block will have been developed to make two seams available.

By Year 2, additional manpower will have been employed and equipment added for annual overburden capacity to reach $8.0 \times 10^6$ b.c.m.. In Year 3, another coal block will be opened thus increasing the coal available. This pattern will continue for the remainder of the 20 Year project life, with additional coal blocks being developed before completion of the coal extraction from the operating block.

It is proposed to use scrapers as much as possible for overburden removal (depending on overburden type and weather conditions) because of the high productivity under correct conditions and their flexibility for mine development and rehabilitation. It is planned that scrapers will operate for half the year only (in practice this would best be achieved using contractors). It is envisaged that scrapers would operate to a depth of 10/15m, while the maximum pit depth will reach 50m.

The bulk of the overburden removal will be by hydraulic excavator and truck crews working on a 3 shift 5 day per week basis. Coal will be handled by front end loader and truck crews on a 2 shift basis 5 days per week. The majority of overburden will be drilled and blasted prior to loading. Small capacity rotary drills will be used to drill 180 mm diameter holes on a close pattern to suit the seam thickness and dips. The same drill will be used for coal drilling using smaller 150 mm diameter bits. Thin coal seam (<2m) interseam and partings will be ripped and dozed. Parting (<0.5m) will be included with coal.

Coal handling will be a simple system of sizing and storage of the R.O.M. coal product.

Rehabilitation of the mined-out area will be carried out to return the land to its current agricultural condition although the final voids for each area will become water storages. Sufficient mining equipment has been provided and operated to regrade the spoil areas to contours similar to those existing.

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TABLE 1

## WOODBURY - ANNUAL MINE QUANTITY SUMMARY

| YEAR | COAL DRILLED $t \times 10^6$ | COAL MINED $t \times 10^6$ | COAL PRODUCT $t \times 10^6$ | OBDN. DRILLED $bcm \times 10^6$ | OBDN. SCRAPED $bcm \times 10^6$ | OBDN. EX./TK. $bcm \times 10^6$ | ANNUAL OBDN. $bcm \times 10^6$ |
|---|---|---|---|---|---|---|---|
| 1 | 0.600 | 0.800 | 0.700 | 5.500 | 0.300 | 6.400 | 6.700 |
| 2 Onwards | 0.825 | 1.100 | 1.000 | 6.500 | 0.500 | 7.600 | 8.100 |

TABLE 2

WOODBURY - COAL BLOCKS - IN-SITU & R.O.M. CUT QUANTITIES

| BLOCK | CUT | COAL SEAM PLY | SEAM S.G. | BLOCK AREA $m^3 \times 10^6$ | COAL THICKNESS m | IN-SITU COAL QTY $t \times 10^6$ | PIT RECOV. % | R.O.M. $t \times 10^6$ | *OBDN. AREA $m^3 \times 10^6$ | AV. DEPTH $m^3$ | OBDN.VOL $bcm \times 10^6$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BLOCK B | | | | | | | | | | | |
| (Victor) | B1 | C/2 | 1.7 | 0.160 | 2.0 | 0.544 | 90 | 0.490 | 0.160 | 23 | 3.680 |
| ( $3^m$ ) | B2 | C/3 | 1.7 | 0.160 | 2.0 | 0.544 | 85 | 0.462 | 0.160 | 23 | 3.680 |
| ( $4^m$ ) | B3 | C/3 | 1.7 | 0.150 | 1.6 | 0.408 | 85 | 0.348 | 0.150 | 24 | 3.600 |
| ( $5^i$ ) | B4 | C/3 | 1.7 | 0.150 | 1.6 | 0.408 | 85 | 0.348 | 0.150 | 24 | 3.600 |
| ( $6^i$ ) | B5 | C/3 | 1.7 | 0.180 | 1.6 | 0.490 | 85 | 0.416 | 0.188 | 25 | 4.688 |
| | B6 | C/3 | | | | | | | 0.150 | 25 | 3.750 |
| BLOCK C | | | | | | | | | | | |
| (Victor) | C1 | D/1 | 1.65 | 0.070 | 2.9 | 0.335 | 95 | 0.318 | 0.072 | 27 | 0.194 |
| ( $5^m$ ) | C2 | D/1 | 1.65 | 0.070 | 2.9 | 0.335 | 95 | 0.318 | Uncovered by C3 | | |
| ( $6^m$ ) | C3 | C/3 | 1.7 | 0.210 | 2.0 | 0.714 | 85 | 0.607 | **0.230 | 30 | 6.700 |
| ( $7^m$ ) | C4 | D/1 | 1.65 | 0.070 | 2.9 | 0.335 | 95 | 0.318 | 0.070 | 30 | 2.100 |
| ( $7^i$ ) | C5 | D/1 | 1.65 | 0.160 | 2.9 | 0.765 | 95 | 0.727 | 0.140 | 39 | 5.400 |
| | C6 | D/1 | 1.65 | 0.200 | 2.4 | 0.396 | 95 | 0.376 | 0.212 | 22 | 4.664 |
| | C7 | D/1 | 1.65 | 0.250 | 2.4 | 0.495 | 95 | 0.470 | 0.250 | 18 | 4.500 |
| | C8 | D/1 | 1.65 | 0.070 | 2.4 | 0.277 | 95 | 0.263 | 0.135 | 18 | 2.430 |
| BLOCK D | | | | | | | | | | | |
| (Victor) | D1 | C/2 | 1.7 | 0.110 | 1.3 | 0.243 | 90 | 0.219 | 0.120 | 14 | 1.676 |
| ( $8^m$ ) | D2 | B/3 | 1.6 | 0.055 | 2.5 | 0.220 | 85 | 0.087 | 0.057 | 37 | 2.109 |
| ( $8^i$ ) | D3 | B/3 | 1.6 | 0.110 | 2.5 | 0.440 | 85 | 0.374 | 0.110 | 24 | 2.640 |
| ( $9^m$ ) | D4 | B/4 | 1.6 | 0.150 | 2.8 | 0.672 | 80 | 0.538 | 0.159 | 27 | 4.293 |
| ( $9^i$ ) | D5 | B/4 | 1.6 | 0.146 | 2.8 | 0.650 | 80 | 0.520 | 0.153 | 28 | 4.300 |
| ( $10^m$ ) | D6 | B/4 | 1.6 | 0.124 | 2.8 | 0.556 | 80 | 0.444 | 0.130 | 35 | 4.550 |
| ( $10^i$ ) | D7 | B/1 | 1.6 | 0.120 | 3.7 | 0.710 | 95 | 0.675 | 0.126 | 34 | 4.284 |
| ( $11^i$ ) | D8 | B/1 | 1.6 | 0.120 | 3.7 | 0.710 | 95 | 0.675 | 0.124 | 35 | 4.340 |
| ( $13^i$ ) | D9 | B/1 | | 0.104 | 3.7 | 0.618 | 95 | 0.587 | 0.108 | 35 | 3.780 |

* In calculating area distance include allowance for battens at average depth $/_2$.

** Less seam C.

TABLE 3

## WOODBURY - DETAILED ANNUAL PRODUCTION SCHEDULE

| | OVERBURDEN REMOVAL | | | | COAL PRODUCTION | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR | CUT | % REMOVED | CUT VOL. bcm x $10^6$ | ANNUAL OBDN. bcm x $10^6$ | CUT | % REMOVED | R.O.M. COAL t x $10^6$ | ANNUAL R.O.M. t x $10^6$ | COAL STOCK | ANNUAL PRODN. |
| 1 | C3 | 100 | 6.700 | | C2 | 100 | 0.318 | | | |
| | | | | | C3 | 75 | 0.455 | | | |
| | | | | | | | | 0.773 | | |
| | | | | 6.700 | | | | | 0.073 | 0.700 |
| 2 | C1 | 100 | 1.900 | | C3 | 25 | 0.152 | | | |
| | C4 | 100 | 2.100 | | C1 | 100 | 0.318 | | | |
| | C5 | 100 | 4.100 | | C4 | 100 | 0.318 | | | |
| | | | | | C5 | 30 | 0.218 | | | |
| | | | | 8.100 | | | | 1.006 | 0.079 | 1.000 |
| 3 | C5 | 25 | 1.300 | | C5 | 70 | 0.508 | | | |
| | C6 | 75 | 3.500 | | C6 | 40 | 0.301 | | | |
| | D1 | 100 | 1.680 | | D1 | 100 | 0.219 | | | |
| | D2 | 75 | 1.580 | | | | | | | |
| | | | | 8.060 | | | | 1.028 | 0.107 | 1.000 |
| 4 | C6 | 25 | 1.164 | | C6 | 60 | 0.451 | | | |
| | C7 | 100 | 4.500 | | C7 | 30 | 0.282 | | | |
| | D2 | 25 | 0.529 | | D2 | 100 | 0.187 | | | |
| | D3 | 70 | 1.848 | | | | | | | |
| | | | | 8.041 | | | | 0.920 | 0.027 | 1.000 |
| 5 | D3 | 30 | 0.792 | | C7 | 70 | 0.564 | | | |
| | D4 | 100 | 2.970 | | D3 | 100 | 0.374 | | | |
| | D5 | 100 | 4.293 | | C8 | 10 | 0.053 | | | |
| | | | | 8.055 | | | | 0.991 | 0.018 | 1.000 |
| 6 | D5 | 100 | 4.300 | | C8 | 90 | 0.479 | | | |
| | B1 | 100 | 3.680 | | D4 | 100 | 0.538 | | | |
| | | | | 7.980 | | | | 1.017 | 0.035 | 1.000 |
| 7 | D6 | 100 | 4.550 | | D5 | 100 | 0.520 | | | |
| | B2 | 100 | 3.680 | | B1 | 100 | 0.490 | | | |
| | | | | 8.230 | | | | 1.010 | 0.045 | 1.000 |
| 8 | D7 | 100 | 4.284 | | D6 | 100 | 0.444 | | | |
| | B3 | 100 | 3.600 | | B2 | 100 | 0.462 | | | |
| | | | | 7.884 | | | | 0.908 | | 1.000 |
| 9 | D8 | 100 | 4.340 | | D7 | 100 | 0.675 | | | |
| | B4 | 100 | 3.600 | | B3 | 100 | 0.348 | | | |
| | | | | 7.940 | | | | 1.023 | | 1.000 |
| 10 | D9 | 100 | 3.780 | | D8 | 100 | 0.675 | | | |
| | B5 | 100 | 4.682 | | B4 | 100 | 0.348 | | | |
| | | | | 8.462 | | | | 1.023 | | 1.000 |

## 4 . OVERBURDEN REMOVAL

It is planned that overlying (weathered) overburden up to a depth of approximately 10 m will be stripped by twin powered tandem scrapers. They will provide flexibility for stripping in different locations and suit development work in the upper overburden. They will also be used for coal surface preparation, and interseam stone band removal. However, because of the weather conditions it has been assumed that they will operate for half the year only on a 2 shift basis.

The bulk of the waste will be loaded by hydraulic excavator (DEMAG 241 size) and hauled by 120t rear dump trucks on a 3 shift, 5 day per week basis. This will allow flexibility since four waste removal locations are possible and the truck size matches the excavator loading rate for the assumed cycle times.

Parting material will be handled by the front end loaders which have excess capacity over that required for coal loading. These will be able to load the 120t trucks.

### 4.1 EXCAVATORS

Production Rates

Assumptions - 1) Availability = 85%
2) Machine Size = $14m^3$ (bank)
3) Hourly Production Rate = 720 b.c.m.

Annual overburden removal capacity required is $7.6 \times 10^6$ b.c.m..

Effective annual operating hours/operating machine

= 210 x 5.5 x 3 shifts
= 3,465 hours.

∴ Annual capacity/operating machine = $2.5 \times 10^6$ b.c.m.
∴ Annual capacity/operating machine/shift = $0.830 \times 10^6$ b.c.m.
∴ Require a fleet of 4 excavators at 80%, i.e. 10 excavator operating shifts per day each with a fleet of trucks.

4.2 SCRAPERS

Production Rates

Assumptions - 1) Availability of twin powered 24$m^3$ scrapers at 50%.

2) If circuits are designed so that cycle time is less than 4 min. and material is suitably prepared, hourly production per operating hour will be 220 b.c.m..

3) Scrapers will be able to operate for half the year only because of unsuitable weather conditions.

An annual 0.5 x $10^6$ b.c.m. scraper overburden removal capacity is required:-

Effective annual operating hours/operating machine

$$= \frac{210}{2} \times 5.5 \text{ hrs/shift} \times 2 \text{ shifts}$$

$$= 1{,}155 \text{ hours}$$

∴ Annual capacity/operating machine = 254,100 b.c.m.

∴ Require 2 operating scrapers.

∴ Fleet size = 4 scrapers.

The scraper fleet will require the following support fleet:

- 1 x 988 B size wheel closer
- 2 x 510 KW size ripper/pusher tractors
- 1 x 16 G size grader
- 1 x scraper water cart

4.3 TRUCKS

Production Rates

Assumptions - 1) Waste bank density = 2.4 tonnes/$m^3$ at 25% swell - loose density = 1.92 tonne/$m^3$

2) Availability - 75%.

3) Truck size - 120t = 50 b.c.m.

TRUCKS - Production Rates - Contd.

4) Average cycle time - 12 mins.

5) Hours per year = 210 x 5.5 x 3 = 3,465 hours.

∴ Number of cycles/year /operating truck = 17,325 cycles.
∴ Annual truck operating capacity = $0.866 \times 10^6$ b.c.m.
For an annual overburden handling capacity of 7.6 b.c.m.
∴ Number of operating trucks required = 10
∴ Require a truck fleet of 13.

## 4.4 EXCAVATOR/TRUCK

### Operating Details

To achieve the required 10 excavator shifts per day (from a possible 12 i.e. 83%) the following truck combinations were considered:-

1 x excavator with 3 x trucks
1 x excavator with 4 x trucks
1 x excavator with 2 x trucks

(a) The capacity of 1 x excavator with 3 x trucks is:-

Each truck for a 12 min. cycle will make 5 trips/hour.
∴ for the 3 truck combination, excavator will have to load 15 trucks/hour, i.e. 15 x 50 = 750 b.c.m./hour.
Since its capacity is 720 b.c.m./hour, the excavator will be slightly overtrucked and trucks will queue briefly before loading.
i.e. for the excavator capacity of 720 b.c.m./hour, only 14.4 trucks will be loaded.
∴ each truck will make 4.8 trips/hour.
∴ truck capacity will be 240 b.c.m./hour.

(b) Since the capacity of 1 excavator is slightly exceeded by a 3 truck combination, a 4 truck combination is of no use.

(c) The capacity of 1 excavator with 2 trucks is:-

EXCAVATOR/TRUCK - Operating Details - Contd.

Each truck for a 12 min. cycle will make 5 trips/hour.

∴ for the 2 truck combination the loader will load 10 trucks/hour, i.e. 10 x 50 = 500 b.c.m./hour.

∴ since its capacity is 720 b.c.m./hour, it will be under trucked and the excavator will be waiting for trucks.

The following shift combinations were selected:-

D.S. - 2 excavators x 3 trucks; 2 excavators x 2 trucks.

A.S. - 3 x 3

N.S. - 3 x 3

The daily operating capacity of these combinations would be -

(2 x 720 + 2 x 500 + 6 x 720) x 5.5 hours

= 37,180 b.c.m./day

= $7.8 \times 10^6$ b.c.m./annum

## 4.5 DRILLING AND BLASTING

### Overburden

It has been assumed that 15% of overburden to be removed will not require drilling and blasting. It will be ripped, dozed and dug by the excavator unblasted.

#### Drilling Production Rates

Assumptions:

- Drill Type : G.D.25C size rotary (capacity 6"/7"dia. hole)
- Hole Size : 187 mm
- Pattern : 5 m x 4 m
- Availability : 75%
- Penetration Rate : 30 m/hour

Annual overburden drilling capacity required is $6.5 \times 10^6$ b.c.m.

Drilling Production Rates - Contd.

Effective annual operating hours per operating drill = 210 x 5.5 x 3
= 3,465 hours.

For the assumed pattern, volume per metre drilled = $20m^3$.

∴ Drilling rate = $600m^3$/hour.

∴ Annual capacity per drill operated
= $2.1 \times 10^6$ b.c.m.

∴ Require to operate 3 drills per shift.

At 75% availability this requires a drill fleet of 4.

## Blasting

Assumptions:

- Powder Factor : $0.30 kg/m^3$ - total explosive.
- ANFO : 80% of total explosive.
- Slurry : 20% of total explosive (anticipated net blasting).

For the annual overburden quantity of $6.5 \times 10^6$ b.c.m. total explosive required = 1,950 t.

| | | | | | |
|---|---|---|---|---|---|
| ∴ ANFO | = | 1,560 t | @ $500/t | = | 780,000 |
| ∴ Slurry | = | 390 t | @ $800/t | = | 312,000 |
| | | | | | $1,092,000 |

High explosives at 10% of ANFO and Slurry = 110,000

∴ Total Annual Overburden Blasting Cost = $M1.202

## 5. COAL PRODUCTION

Coal will be loaded by front end wheel loaders of $6m^3$ capacity into 50t rear dump trucks. This will provide flexibility allowing coal to be loaded from alternate seams and also from the different coal blocks to maintain an average ash level.

Coal will be loaded on a 2 shift, 5 day per week basis, requiring 2 shift operation of the coal handling system at an average rate of 500 t.p.h. (with a peak rate of 650 t.p.h.).

It is assumed the coal dump station will be located centrally for most of the separate coal blocks such that the total haulage distance would average 6 kms. The upper coal surface preparation and interseam parting removal will require careful dozing and intensive supervision to maximise coal mine recovery and should be undertaken on a day shift basis. Dozers should be assisted by scrapers. Coal seams greater than 2m will be drilled and blasted; thin seams will be ripped and dozed for loading. Interseam stone bands less than 0.5m will be loaded out with the coal.

The coal will be drilled using the same type of drill rig as that used for the overburden, i.e. a rotary drill using on average a 130m diameter bit, depending on coal seam thickness.

The winning of coal from the various blocks has been scheduled to allow annual blends which should produce a R.O.M. coal blend averaging 40% ash. A minimum of two alternative coal seams from at least two different locations should be available at any time to enable blending. These are detailed in Table 3.

## 5.1 DRILLING AND BLASTING

Coal thicknesses greater than 2 metres will be drilled and blasted. It has been assumed that this is 75% of all in-situ coal.

∴ Annual coal quantity to be blasted = 75% of $1.1 \times 10^6$t
= 0.825 m.t.p.a.

### 5.1.1 Drilling Production Rate

**Assumptions** - Drill Type = same as for overburden.
Hole Size = 130 mm.
Pattern = 3m x 3m
Penetration Rate = 50m/hour
Availability = 80%

Volume/metre drilled = $9m^3$
∴ Drilling rate = $450m^3$/hour = 720t/hour
∴ Annual drill requirements = 1,145 hours
i.e. 1 shift/day.

### 5.1.2 Blasting

**Assumptions** - All coal to be blasted with slurry.
Powder Factor = 0.15 kg/tonne

∴ for coal blasting tonnage of 0.825 m.t.p.a.
= 125 t

∴ Slurry cost @ $800/kg. = $100,000

High explosive @ 7% = $7,000

∴ Total Coal Blasting Cost = $M0.110

## 5.2 COAL LOADING

Production Rates

Loading will be by front end wheel loaders to provide flexibility.

| | | | | |
|---|---|---|---|---|
| Assumptions | - | 1) | Availability | = 60% |
| | | 2) | Loader size | = 6m$^3$ (988B size) |
| | | 3) | Hourly production rate | = 500 t.p.h. |

Annual coal loading requirement is $1.1 \times 10^6$t.

Effective annual operating hours/operating machine/shift

= 210 x 5.5 = 1,155 hours

∴ Annual capacity/operating machine on 2 shift basis

= 1.7 m.t.p.a.

∴ Number of F.E.Ls. required at 65% availability is 2, of which 2 coal loading shifts would be worked.

## 5.3 COAL HAULAGE

| | | | | |
|---|---|---|---|---|
| Assumptions | - | 1) | Availability | = 75% |
| | | 2) | Truck size | = 50t |
| | | 3) | Cycle time | = 20 mins. |

Effective trucks hours/year on 2 shift basis = 2,310 hours

∴ Number of truck cycles/year/operating truck = 6,930

∴ Annual operating truck capacity = 0.350 m.t.p.a.

For annual coal haulage capacity for 1.1 m.t.p.a.

∴ Number of operating trucks required = 3

∴ Coal haulage fleet required = 4 trucks

## 5.4 F.E.L./TRUCK OPERATING DETAILS

System capacity is 3 trucks x 3 trips hour @ 50t/trip

= 450 t.p.h.

compare with loader rate of 500 t.p.h.

i.e. F.E.L. will be slightly under trucked for longer leads.

F.E.L./Truck Operating Details - Contd.

For total haulage distance of < 5 km when cycle time falls to 15 mins., 3 trucks will each make 4 trips at 50t/trip = 600 t.p.h.

i.e. the F.E.L. will be overtrucked and trucks will have to wait thus extending their cycle time.

5.5 COAL HANDLING

Provision has been made for the following coal handling system which will operate 2 shifts per day, 5 days per week:-

1. Dump station - for rear tipping 50t trucks, double side dumping - hopper sized for 3 truck loads, peak loading rate of 650 t.p.h.

2. Breaker for sizing and rejecting some stone (650 t.p.h.).

3. Conveyors - from dump station to breaker, breaker to conical product stockpile by elevating belt, alternatively, direct to 500t rail loading bin. From stockpile to bin by gullet conveyor, feeding from stockpile being assisted by dozer.

4. Coal handling plant would be operated by one man per each of 2 shifts with cleanup by general labour on day shift.

5. Train loading will require one controller assisted by dozer operator and it is expected that this will occur periodically over a 5 day week - they will not be continuous functions.

# 6. LABOUR

## 6.1 Effective Working Times

Based upon good industrial conditions, working a 35 hour week on a 7 hour shift basis with minor weekend maintenance work.

| | | | |
|---|---|---|---|
| Average employee | - | 260 | possible working days per year. |
| Less: | Annual Leave | 23 | (average for workforce) |
| | Statutory Holidays | 9 | |
| | Compassionate and Sick Leave | 8 | |
| | Strikes | 5 | |
| | Compensation | 5 | |
| | | 50 | days |

Actual working days per employee = 210

| | | | | |
|---|---|---|---|---|
| Total hours per shift | | - | 7 | hours |
| Less: | Start and finish time | - | 40 | mins. |
| | Smoko | - | 15 | " |
| | Crib | - | 35 | " |
| | | | 90 | mins. |

∴ Effective working hours per employee per shift = 5.5 hours

## 6.2 Labour Cost

Based upon an award rate of $363 per week (i.e. includes January, 1982, increases - Base $300 + 35, $28 travelling time) and a bonus of $50 per week.

| | | |
|---|---|---|
| Ordinary Time | | $15,200 |
| Bonus | | 2,100 |
| Shift Allowance | | 1,400 |
| Overtime | | 2,000 |
| Annual Leave and Holidays | | 2,500 |
| Sick Leave | | 500 |
| Allowances | | 1,000 |
| ∴ Gross wage per average employee | = | $24,700 |
| Compensation | | 1,300 |
| Miners Pension | | 1,500 |
| Payroll Tax | | 1,500 |
| ∴ Total cost per average employee | = | $29,000 |

# LABOUR FORCE

| CLASSIFICATION | YEAR 1 FINAL | YEAR 1 AVERAGE | YEAR 2/ YEAR 3 | YEAR 4 | YEAR 5 ONWARDS |
|---|---|---|---|---|---|
| **MINE SUPERVISION** | | | | | |
| Manager | 1 | 1 | 1 | 1 | 1 |
| Shift Supervisors | 3 | 2 | 3 | 3 | 3 |
| D. & B. Supervisors | 1 | 1 | 1 | 1 | 1 |
| Technical Assistants | 2 | 1 | 2 | 2 | 2 |
| Clerks | 1 | 1 | 1 | 1 | 1 |
| Geologists | 2 | 2 | 2 | 2 | 2 |
| Surveyors | 2 | 2 | 2 | 2 | 2 |
| | 12 | 10 | 12 | 12 | 12 |
| **MINE OPERATIONS** | | | | | |
| Drillers O.B. | 7 | 5 | 9 | 9 | 9 |
| Drillers Coal | 1 | 1 | 1 | 1 | 1 |
| Blast Crew | 2 | 2 | 2 | 2 | 2 |
| Shot Firers | 1 | 1 | 1 | 1 | 1 |
| Dozer/Ripping | 3 | 2 | 3 | 3 | 3 |
| Scraper Operators | 4 | 4 | 4 | 4 | 4 |
| Dozer/Push/Rip | 4 | 3 | 4 | 4 | 4 |
| Excavator Operators | 16 | 12 | 20 | 20 | 20 |
| Overburden Truck Drivers | 24 | 18 | 28 | 28 | 28 |
| F.E.L. Operators | 2 | 1 | 2 | 2 | 2 |
| Coal Truck Drivers | 6 | 4 | 6 | 6 | 6 |
| Spoil Dozer | 3 | 2 | 4 | 4 | 4 |
| Coal Preparation Dozer | 2 | 1 | 3 | 3 | 3 |
| Grader Operator | 3 | 2 | 4 | 4 | 4 |
| Water Truck Driver | 3 | 2 | 3 | 3 | 3 |
| G.P. Tracked Dozer | 2 | 1 | 3 | 3 | 3 |
| G.P. Wheel Dozer | 3 | 2 | 5 | 5 | 5 |
| Rehabilitation Crew | 2 | 1 | 3 | 3 | 3 |
| General Labour | 2 | 1 | 3 | 3 | 3 |
| | 90 | 65 | 108 | 108 | 108 |
| Absentee Allowance @ 10% | | – | 10 | 10 | 10 |
| | | | 118 | 118 | 118 |

## LABOUR FORCE

| CLASSIFICATION | YEAR 1 FINAL | YEAR 1 AVERAGE | YEAR 2/ YEAR 3 | YEAR 4 | YEAR 5 ONWARDS |
|---|---|---|---|---|---|
| **MAINTENANCE SUPERVISION** | | | | | |
| Chief Engineer | 1 | 1 | 1 | 1 | 1 |
| Supervisors | 3 | 3 | 3 | 4 | 4 |
| Schedulers | 1 | 1 | 1 | 1 | 1 |
| Clerks | 1 | 1 | 1 | 1 | 1 |
| Technical Assistants | 1 | 1 | 2 | 2 | 2 |
| | 7 | 7 | 8 | 9 | 9 |
| **MAINTENANCE** | | | | | |
| Fitters | 20 | 15 | 25 | 30 | 35 |
| Electricians/Air Cond. | 4 | 3 | 5 | 5 | 5 |
| Boilermakers | 6 | 4 | 6 | 10 | 10 |
| Labour | 6 | 4 | 6 | 8 | 10 |
| Apprentices | - | - | 3 | 4 | 5 |
| Lube Attendants | 6 | 4 | 6 | 6 | 6 |
| Fuel/Lube Truck | 4 | 3 | 4 | 4 | 4 |
| Hiab Truck | 3 | 2 | 4 | 4 | 4 |
| Crane | 2 | - | 2 | 2 | 2 |
| Fork Lift Truck | 2 | 1 | 2 | 2 | 2 |
| Tyre Fitters/Lab. | 2 | - | 2 | 2 | 2 |
| Cleaners | 2 | 2 | 2 | 2 | 2 |
| | 58 | 38 | 67 | 79 | 87 |
| **ADMINISTRATION** | | | | | |
| Personnel | 2 | 2 | 2 | 2 | 2 |
| Accountant | 1 | 1 | 1 | 1 | 1 |
| Cost Clerks | 3 | 2 | 4 | 4 | 4 |
| Timekeeper/Paymaster | 2 | 2 | 2 | 2 | 2 |
| Typist/Clerks | 2 | 1 | 2 | 2 | 2 |
| Stores | 4 | 3 | 6 | 6 | 6 |
| | 14 | 11 | 17 | 17 | 17 |

## LABOUR SUMMARY - YEARLY NUMBERS AND LABOUR COST

| DEPARTMENT | YEAR 1 NO.OF PERSONNEL | YEAR 2 NO.OF PERSONNEL | YEAR 3 NO.OF PERSONNEL | YEAR 4 NO.OF PERSONNEL | YEAR 5 ONWARDS NO.OF PERSONNEL |
|---|---|---|---|---|---|
| Mine Supervision | 10 | 12 | 12 | 12 | 12 |
| Mine Production | 65 | 118 | 118 | 118 | 118 |
| Maintenance Supervision | 7 | 8 | 8 | 9 | 9 |
| Maintenance | 38 | 67 | 67 | 79 | 87 |
| Administration | 11 | 17 | 17 | 17 | 17 |
| TOTAL ANNUAL PERSONNEL | 131 | 222 | 222 | 235 | 243 |
| TOTAL ANNUAL LABOUR COST $M | 3.799 | 6.438 | 6.438 | 6.815 | 7.047 |

TOTAL ANNUAL COST PER MAN EMPLOYED (AVERAGE) = $29,000 (JUNE 1982 $)

TABLE 4.

# WOODBURY - MINING EQUIPMENT SCHEDULE

( ) = Replacement

| MINE EQUIPMENT | UNIT TYPE | YEAR 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | MAX. NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Drills - Overburden and Coal | CO - 25C | 4 | 1 | | | | | (4) | (1) | | | | | | (4) | (1) | | | | | | 5 |
| Scrapers - Overburden and Rehab. | Cat.657B | 4 | 1 | | | | | (4) | (1) | | | | | | (4) | (1) | | | | | | 5 |
| Excavators - Overburden | DEMAG 241 | 3 | 1 | | | | | (3) | (1) | | | | | | (3) | (1) | | | | | | 4 |
| Front End Loaders - Coal | Cat.988B | 2 | | | | (1) | (1) | | | | (1) | (1) | | | | (1) | (1) | | | | | 2 |
| Overburden Trucks - Rear Dump | 120t | 10 | 3 | | | | | | | | (10) | (3) | | | | | | | | | | 13 |
| Coal Trucks - Rear Dump | K.W.50t | 3 | 1 | | 1 | | | | | | (3) | (1) | | (1) | | | | | | | | 5 |
| Dozers - Tracked | D10 | 2 | 1 | 1 | 1 | (2) | (2) | | | | (2) | (2) | | | | (2) | (2) | | | | | 4 |
| Dozers - Tracked | D9-L | 3 | 1 | | | (3) | (1) | | | | (3) | (1) | | | | (3) | (1) | | | | | 4 |
| Dozers - Tyred | 824B | 1 | 1 | | | | | (1) | (1) | | | | | | | (1) | (1) | | | | | 2 |
| Farm Tractor | | | 1 | | | (1) | | | | | (1) | | | | | (1) | | | | | | 1 |
| Grader | 16G | 1 | 1 | | | | | | | | (1) | (1) | | | | | | | | | | 2 |
| Water Cart | 3,000 lt. | 1 | 1 | | | | | | | | (1) | (1) | | | | | | | | | | 2 |
| Low Loader | 100t | 1 | | | | | | | | | (1) | | | | | | | | | | | 1 |
| Crane | P & H - 50t | 1 | | | | | | | | | (1) | | | | | | | | | | | 1 |
| Crane Trucks | | 2 | 1 | | | 1 | (2) | (1) | | | (1) | (2) | (1) | | | (1) | (2) | (1) | | | | 4 |
| G.P. Trucks | | 2 | 2 | | | | (2) | (2) | | | (2) | (2) | | | | (2) | (2) | | | | | 4 |
| Light Vehicles | | 10 | 4 | 4 | (10) | 2 (4) | (4) | (10) | (6) | (4) | (10) | (6) | (4) | (10) | (6) | (4) | (10) | (6) | (4) | (10) | | 20 |
| Fuel/Lube Trucks | | 2 | | 1 | | | (2) | | (1) | | | (2) | | (1) | | | (2) | | | | | 3 |
| Pump/Lights | | 50% | 50% | | | | | | | | (50%) | (50%) | | | | | | | | | | |
| Back Hoe | | 1 | | | | | | | | | (1) | | | | | | | | | | | 1 |
| Explosive Truck | | 1 | | | | (1) | | | | | (1) | | | | | (1) | | | | | | 1 |

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TABLE 5.

# WOODBURY - CAPITAL COST SCHEDULE (JUNE, 1982 $)

( ) = Replacement

| | UNIT TYPE | COST PER UNIT $M | TOTAL INITIAL | YEAR -1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | TOTAL REPLACEMENT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MINE EQUIPMENT | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drills - Overburden & Coal | CD-25C | 0.400 | 2.000 | | 1.600 | 0.400 | | | | | (1.600) | (0.400) | | | | | | (1.600) | (0.400) | | | | | | ( 4.000) |
| Scrapers - Overburden & Rehab. | Cat.657B | 0.750 | 3.750 | | 3.000 | 0.750 | | | | | (3.000) | (0.750) | | | | | | (3.000) | (0.750) | | | | | | ( 7.500) |
| Excavators - Overburden | DEMAG 241 | 2.000 | 8.000 | | 6.000 | 2.000 | | | | | (6.000) | (2.000) | | | | | | (6.000) | (2.000) | | | | | | (16.000) |
| Front End Loaders - Coal | Cat.988B | 0.400 | 0.800 | | 0.800 | | | | (0.400) | (0.400) | | | | (0.400) | (0.400) | | | | (0.400) | (0.400) | | | | | ( 2.400) |
| Overburden Trucks - Rear Dump | 120t | 0.760 | 9.880 | | 7.600 | 2.280 | | | | | | | | (7.600) | (2.280) | | | | | | | | | | ( 9.880) |
| Coal Trucks - Rear Dump | K.W.50t | 0.350 | 1.750 | | 1.050 | 0.350 | | 0.350 | | | | | | (1.050) | (0.350) | | (0.350) | | | | | | | | ( 1.750) |
| Dozers - Tracked | D10 | 0.700 | 2.800 | | 1.400 | 0.700 | 0.700 | | (1.400) | (1.400) | | | | (1.400) | (1.400) | | | | (1.400) | (1.400) | | | | | ( 8.400) |
| Dozers - Tracked | D9-L | 0.450 | 1.800 | | 1.350 | 0.450 | | | (1.350) | (0.450) | | | | (1.350) | (0.450) | | | | (1.350) | (0.450) | | | | | ( 5.400) |
| Dozer - Tyred | 824B | 0.350 | 0.700 | | 0.350 | 0.350 | | | | | (0.350) | (0.350) | | | | | | | (0.350) | (0.350) | | | | | ( 1.400) |
| Farm Tractor | | 0.050 | 0.050 | | | 0.050 | | | (0.050) | | | | | (0.050) | | | | | (0.050) | | | | | | ( 0.150) |
| Grader | 16G | 0.350 | 0.700 | | 0.350 | 0.350 | | | | | | | | (0.350) | (0.350) | | | | | | | | | | ( 0.700) |
| Water Cart | 3,000 lt. | 0.500 | 1.000 | | 0.500 | 0.500 | | | | | | | | (0.500) | (0.500) | | | | | | | | | | ( 1.000) |
| Low Loader | 100t | 0.200 | 0.200 | | 0.200 | | | | | | | | | (0.200) | | | | | | | | | | | ( 0.200) |
| Crane | P&H 50t | 0.200 | 0.200 | | 0.200 | | | | | | | | | (0.200) | | | | | | | | | | | ( 0.200) |
| Crane Trucks | | 0.030 | 0.120 | | 0.060 | 0.030 | | | 0.030 | (0.060) | (0.030) | | | (0.030) | (0.060) | (0.030) | | | (0.030) | (0.060) | (0.030) | | | | ( 0.330) |
| G.P.Trucks | | 0.020 | 0.080 | | 0.040 | 0.040 | | | | (0.040) | (0.040) | | | (0.040) | (0.040) | | | | (0.040) | (0.040) | | | | | ( 0.240) |
| Light Vehicles | | 0.015 | 0.300 | | 0.150 | 0.060 | 0.060 | (0.150) | 0.030 | (0.060) | (0.150) | (0.090) | (0.060) | (0.150) | (0.090) | (0.060) | (0.150) | (0.090) | (0.060) | (0.150) | (0.090) | (0.060) | (0.150) | | ( 1.620) |
| Fuel/Lube Trucks | | 0.050 | 0.150 | | 0.100 | | 0.050 | | (0.060) | (0.100) | | (0.050) | | | (0.100) | | (0.050) | | | (0.100) | | | | | ( 0.400) |
| Pump/Lights | | 0.200 | 0.200 | | 0.100 | 0.100 | | | | | | | | (0.100) | (0.100) | | | | | | | | | | ( 0.200) |
| Back Hoe | | 0.200 | 0.200 | | 0.200 | | | | | | | | | (0.200) | | | | | | | | | | | ( 0.200) |
| Explosives Truck | | 0.030 | 0.030 | | 0.030 | | | | (0.030) | | | | | (0.030) | | | | | (0.030) | | | | | | ( 0.090) |
| SUB-TOTAL .... .... | | | 34.710 | | 25.080 | 8.410 | 0.810 | 0.350 | 0.060 | | | | | | | | | | | | | | | | |
| DEVELOPMENT | | | | | | | | | | | | | | | | | | | | | | | | | |
| Site Works -incl.Roads,Drains,etc. | | | 0.500 | 0.300 | 0.200 | | | | | | | | | | | | | | | | | | | | |
| Office & Buildings | | | 0.500 | 0.300 | 0.200 | | | | | | | | | | | | | | | | | | | | |
| Workshop & Store | | | 2.600 | 1.000 | 1.600 | | | | | | | | | | | | | | | | | | | | |
| Dump Station | | | 1.500 | 0.500 | 1.000 | | | | | | | | | | | | | | | | | | | | |
| Coal Handling & Storage | | | 1.500 | 0.500 | 1.000 | | | | | | | | | | | | | | | | | | | | |
| Services, Power & Water | | | 0.300 | | 0.300 | | | | | | | | | | | | | | | | | | | | |
| Exploration | | | 3.000 | 2.000 | 1.000 | | | | | | | | | | | | | | | | | | | | |
| SUB-TOTAL .... .... | | | 9.900 | 4.600 | 5.300 | | | | | | | | | | | | | | | | | | | | |
| TOTAL INITIAL CAPITAL | | | 44.610 | 4.600 | 30.380 | 8.410 | 0.810 | 0.350 | 0.060 | | | | | | | | | | | | | | | | |
| TOTAL REPLACEMENT CAPITAL | | | | | | | | (0.150) | (3.290) | (2.510) | (11.170) | (3.640) | (0.060) | (13.650) | (6.120) | (0.090) | (0.550) | (10.690) | (6.860) | (2.950) | (0.120) | (0.060) | (0.150) | | (62.060) |
| TOTAL CAPITAL | | | 44.610 | 4.600 | 30.380 | 8.410 | 0.810 | 0.500 | 1.350 | 2.510 | 11.170 | 3.640 | 0.060 | 13.650 | 6.120 | 0.090 | 0.550 | 10.690 | 6.860 | 2.950 | 0.120 | 0.060 | 0.150 | | 106.670 |

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## 7.3 MINING EQUIPMENT - ANNUAL OPERATING HOURS

General : 5 day week : 7 hour shift.

3 shifts - overburden removal and drilling
2 shifts - coal winning
1 shift - coal drilling

| | | | | | |
|---|---|---|---|---|---|
| Effective operating hours per shift | | | | = | 5.5 hours |
| | | | | = | 1,155 hours/year |
| 2 shifts | = | 11 | hours/shift | = | 2,310 hours/year |
| 3 shifts | = | 16.5 | hours/shift | = | 3,465 hours/year |

**Drills (Coal and Overburden)**

**Year 1**

8 drill shifts/day
= 9,240 hours/year
say, 8,000 for part Year 1.

**Year 2 Onwards**

10 drill shifts/day
= 11,550 hours/year

**Excavators**

**Year 1**

8 loading shifts/day
= 9,240 hours/year
say, 8,000 for part Year 1.

**Year 2 Onwards**

10 loading shifts/day
= 11,550 hours/year

**Scrapers**

**Year 1 Onwards**

2 scrapers x 2 shifts x 110 days = 2,500 hours/year.

**Front End Loaders**

**Year 1**

2 loading shifts/day
= 2,310 hours/year
say, 2,000 for part Year 1.

**Year 2 Onwards**

2 loading shifts/day
+ miscellaneous
= 3,000 hours/year.

Overburden Trucks

Year 1

24 truck shifts/day
= 27,720 hours/year
say, 24,000 hours for part Year 1.

Year 2 Onwards

28 truck shifts/day
= 32,350 hours/year

Coal Trucks

Year 1

6 truck shifts/day
= 6,930 hours/year
say,5,500 hours for part Year 1.

Year 2 Onwards

6 truck shifts/day
= 7,000 hours/year

Dozers - Tracked - 520 kw

Year 1

4 shifts/day
= 4,620 hours/year
say,4,000 hours for part Year 1.

Year 2

6 shifts/day
= 7,000 hours/year

Year 3 Onwards

8 shifts/day
= 9,240 hours/year.

Dozers - Tracked - 350 kw

Year 1

6 shifts/day
= 7,000 hours/year

Year 2 Onwards

8 shifts/day
= 9,240 hours/year

Dozer (Rubber Tyred), Grader, Water Cart

Year 1

3 shifts/day
= 3,500 hours

Year 2 Onwards

4 shifts/day
= 4,620 hours/year

Low Loader, Crane, Back Hoe, Farm Tractor

1,000 hours/year.

Small Trucks

2,000 hours/year.

TABLE 6

## PRODUCTION EQUIPMENT - ANNUAL OPERATING HOURS AND OPERATING COST SUMMARY (JUNE,1982 $)

| | OPERATION COST $/HR. | YEAR 1 | | YEAR 2 | | YEAR 3 & 4 | | YEAR 5 ONWARDS | |
|---|---|---|---|---|---|---|---|---|---|
| | | OP.HRS. | OP.COST $M | OP.HRS. | OP.COST $M | OP.HRS. | OP.COST $M | OP.HRS. | OP.COST $M |
| Drills - Overburden & Coal | 40 | 8,000 | 0.320 | 11,500 | 0.460 | | 0.460 | | 0.460 |
| Scrapers | 50 | 2,500 | 0.125 | 25,000 | 0.125 | | 0.125 | | 0.125 |
| Excavators - Overburden | 80 | 8,000 | 0.640 | 11,500 | 1.920 | | 1.920 | | 0.920 |
| Front End Loaders - Coal | 50 | 2,000 | 0.100 | 3,000 | 0.150 | | 0.150 | | 0.150 |
| Overburden Trucks - Rear Dump | 65 | 24,000 | 1.560 | 32,350 | 2.103 | | 2.103 | | 2.103 |
| Coal Trucks - Rear Dump | 40 | 5,500 | 0.220 | 7,000 | 0.280 | | 0.280 | | 0.280 |
| Dozers - Tracked - 520 kw | 60 | 4,000 | 0.240 | 7,000 | 0.420 | | 0.420 | | 0.420 |
| Dozers - Tracked - 350 kw | 45 | 7,000 | 0.315 | 9,240 | 0.416 | | 0.416 | | 0.416 |
| Dozer - Tyred | 35 | 3,500 | 0.123 | 4,620 | 0.162 | | 0.162 | | 0.162 |
| Farm Tractor | 10 | 500 | 0.005 | 1,000 | 0.010 | | 0.010 | | 0.010 |
| Grader | 35 | 3,500 | 0.123 | 4,620 | 0.162 | | 0.162 | | 0.162 |
| Water Cart | 40 | 3,500 | 0.140 | 4,620 | 0.185 | | 0.185 | | 0.185 |
| Low Loader | 15 | 800 | 0.012 | 1,000 | 0.015 | | 0.015 | | 0.015 |
| Crane | 15 | 800 | 0.012 | 1,000 | 0.015 | | 0.015 | | 0.015 |
| Crane and G.P. Trucks | 14 | 7,000 | 0.098 | 20,000 | 0.280 | 22,000 | 0.308 | 24,000 | 0.336 |
| Back Hoe | 15 | 1,000 | 0.015 | 1,000 | 0.015 | | 0.015 | | 0.015 |
| Pumps/Lights | | | 0.060 | | 0.100 | | 0.100 | | 0.100 |
| Light Vehicles | | | | | | | | | |
| - Annual Number | | 10 | 0.050 | 14 | 0.070 | 18 | 0.090 | 20 | 0.100 |
| - Annual Cost/Vehicle | $5,000 | | | | | | | | |
| Coal Handling etc. | 60¢/t | | 0.420 | | 0.600 | | 0.600 | | 0.600 |
| TOTAL ANNUAL EQUIPMENT PRODUCTION COST | | | 4.578 | | 6.488 | | 6.536 | | 6.574 |

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# 8. PRODUCTION COSTS

## 8.1 General

The following Tables 7 and 8 show the annual production costs for the project's 20 Year life for two cases:-

Case 'A' - 1.000 m.t.p.a. R.O.M. coal product (40% ash)

Case 'B' - 0.500 m.t.p.a. washed coal product (20% ash at 50% yield)

All money values are in June, 1982, dollar values, no escalation or inflation factors have been applied.

No capital expenditure costs or depreciation benefits are shown in these tables. Only direct operating cost expenditure is shown.

## 8.2 Operating Costs

The individual operating costs shown in Table 7 (Case 'A') are drawn from:

| | |
|---|---|
| Labour Cost Summary | See Page 20. |
| Total Annual Explosives Costs | See Pages 12 and 14. |
| Equipment Operating Cost Summary | See Page 25 |

For Case 'B', the washed coal product alternative (see Table 8) all the above are combined as Total R.O.M. Production Cost.

## 8.3 General Service Charges

An additional $M1.0 has been allowed for annual additional operating costs. It will cover water, electricity, marketing, administration, exploration and testwork, contractor charges.

8.4 Government Charges and Overheads

The following charges have been assumed to apply to each product tonne:-

| | $/t |
|---|---|
| Excise Duty | 0.15 |
| State Royalty | 1.70 |
| Mine Reserve and Coal Owner Association Levy | 0.10 |
| Lease Charge | 0.01 |
| Shire Rates and Land Tax | 0.04 |
| Insurance | 0.30 |
| | $2.30/t |

8.5 Coal Washing

Assuming ten additional personnel would be employed to operate and maintain a washery, the additional annual cost would be $M0.290.

Assuming operating and maintenance materials will cost $1.50 per tonne of feed, the annual materials cost will be = $M1.500.

i.e. Annual Cost of Coal Washing Operation = $M1.790

= $3.50 per product tonne.

8.6 Revenue

For Case 'A' a sales price of $35/tonne has been assumed, resulting in an annual income of $M35.0.

If this price is optimistic, for a reduced price of, say, $30/tonne the annual revenue will fall to $M30.0.

However, Case 'B' shows that for a sales price of $42/tonne for the lower ash product (20% ash), the annual revenue falls to $M21.00 for the reduced annual product tonnage.(The 1.000 m.t.p.a. R.O.M. coal yields only 0.500 m.t.p.a. of washed coal product at 50% yield.)

8.6 <u>Revenue</u> - Contd.

Therefore, if $30/tonne can be obtained for a R.O.M. product at 40% ash, a price of $65 per tonne would be necessary to gain the same margin for a washed coal product at 20% ash.

The $35 per tonne price was estimated by comparing with F.O.R. prices for N.S.W. energy coals, adjusting for energy content and deleting $5 as a penalty for the high ash level.

TABLE 7

## WOODBURY - ANNUAL PRODUCTION COSTS (JUNE, 1982 $)

### CASE 'A' : UNWASHED COAL - 1.0 M.T.P.A. R.O.M. WITH 40% ASH

| | | YEAR 1 | 2 | 3 | 4 | 5 | 6 ONWARDS |
|---|---|---|---|---|---|---|---|
| Annual R.O.M. | | 0.773 | 1.006 | 1.028 | 0.920 | 0.991 | 1.017 |
| Annual Product Tonnage | | 0.700 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Total Labour Cost | $M | 3.799 | 6.438 | 6.438 | 6.815 | 7.047 | 7.047 |
| Total Explosives Cost | $M | 1.120 | 1.312 | 1.312 | 1.312 | 1.312 | 1.312 |
| Equipment Operating Cost | $M | 4.578 | 6.488 | 6.536 | 6.536 | 6.574 | 6.574 |
| General Service Charges<br>e.g. Water, Electricity, Exploration, Marketing Contractors, Travel. | $M | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Government Charges and Overheads<br>(Levy and Excise $M 1.85<br>Rates, Land Tax 0.05<br>Mine Rescue 0.10<br>Insurance etc. 0.30<br>$M 2.30 ) | $M | 1.610 | 2.300 | 2.300 | 2.300 | 2.300 | 2.300 |
| Total F.O.R. Cost at Minesite | $M | 12.107 | 17.538 | 17.586 | 17.963 | 18.233 | 18.233 |
| F.O.R. Cost/Tonne R.O.M. | $/t | 17.30 | 17.54 | 17.59 | 18.00 | 18.23 | 18.23 |
| Working Capital | $M | 3.000 | 3.000 | - | - | - | - |
| Revenue at $35/tonne<br>(on R.O.M.basis at 40% ash at 25 Mj/kg ADB) | $M | 24.500 | 35.000 | 35.000 | 35.000 | 35.000 | 35.000 |

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TABLE 8

WOODBURY - ANNUAL PRODUCTION COSTS (JUNE,1982 $)

CASE 'B' : WASHED COAL AT 20% ASH FOR 50% YIELD

| | | YEAR 1 | 2 | 3 | 4 | 5 | 6 ONWARDS |
|---|---|---|---|---|---|---|---|
| Annual R.O.M. Tonnage | t x $10^6$ | 0.773 | 1.006 | 1.028 | 0.920 | 0.991 | 1.017 |
| Annual Product Tonnage (at 50% yield) | t x $10^6$ | 0.350 | 0.500 | 0.500 | 0.500 | 0.500 | 0.500 |
| Total R.O.M. Production Cost (excluding washing) | $M | 10.497 | 15.238 | 15.286 | 15.664 | 15.933 | 15.933 |
| Washing Cost (including labour) at $3.50/t product | $M | 1.225 | 1.750 | 1.750 | 1.750 | 1.750 | 1.750 |
| Government Charges and Overheads at $2.30/t | $M | 0.805 | 1.150 | 1.150 | 1.150 | 1.150 | 1.150 |
| Total F.O.R. Cost at Minesite | $M | 12.527 | 18.138 | 18.186 | 18.464 | 18.833 | 18.833 |
| F.O.R. Cost/product tonne (washed) | $/t | 35.8 | 36.3 | 36.4 | 36.9 | 37.7 | 37.7 |
| Working Capital | $M | 3,000 | 5,000 | - | - | - | - |
| Revenue at $42/t (for 20% ash product at 25 Mj/kg ADB) | $M | 15.750 | 21.000 | 21.000 | 21.000 | 21.000 | 21.000 |

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## 9. CAPITAL COST

The capital expenditure requirements are as listed in Table 5 (see Page 22).

This table shows the initial capital expenditure, totalling $M44.610, necessary to develop the project to its 1.000 m.t.p.a. R.O.M. capacity. It includes the purchase of all mining equipment and the building of the infrastructure necessary to support the operation e.g. office, workshop, buildings, coal handling plant, supply of services, etc.. It does not include land purchase, external infrastructure items such as rail line extension, highway upgrading, power and water supply to the minesite or improvements to township facilities.

The replacement cost of the mining equipment, totalling $M62.06, is also shown in Table 5. These capital purchases are disbursed over the 20 Year project life.

All money values are in June, 1982, dollar values, no escalation or inflation factors have been applied.

No provision is shown for depreciation benefits.

10. FINANCIAL ANALYSIS

For the Case 'A', producing 1.100 m.t.p.a. of R.O.M. coal (40% ash), the economic evaluation indicates that the discounted cash flow rate of return is 38% inflated (or 20% in real terms).

This is based upon the capital expenditure detailed in Table 5 and the Operating Costs and Revenue shown in Table 7.

However, the project is very sensitive to sales price, a $5 (14%) reduction in price/tonne would reduce the d.c.f. rate of return to 17% inflated. A 25% inflated d.c.f. rate of return would require a selling price of $32 per tonne.

A summary of the results of the economic analysis, together with the capital cost, operating cost, production and revenue assumptions is attached as Appendix 1.