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DEPARTMENT OF MINES.

South Australia.

-RESEARCH AND DEVELOPMENT BRANCH-

METALLURGICAL SECTION.

REPORT R. D. 40

# PRODUCTION OF HYDRATED LIME AND QUICK LIME FROM MOUNT GAMBIER LIMESTONE

by

P.K. Hosking

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# PRODUCTION OF HYDRATED LIME AND QUICKLIME. FROM MOUNT GAMBIER LIMESTONE.

## -ESTIMATED PLANT CAPITAL AND OPERATING COSTS-


### Abstract

Capital and operating costs are estimated for a rotary kiln plant to produce agstone, quicklime, and hydrated lime from Mount Gambier limestone. The output from the plant has been considerably increased above that used in the original estimates.


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## 1. SUMMARY.

Previous estimates have been modified to permit a much greater production of lime from the rotary kiln installation and to provide for the production of quicklime.

A comparison of previously estimated output and costs, and those used in this report, is given below.

| | Original Estimate | Increased Plant |
|---|---|---|
| Stone quarried per week | 688 tons | 1510 tons |
| Agstone production per week | 191 " | 432 " |
| Quicklime " " " | -- " | 280 " |
| Hydrate (bagged) " " " | 335 " | 335 " |
| Hydrate (bulk) " " " | -- | 70 " |
| Capital cost. | £136,200 | £247,000 |
| Operating Capital | £60,000 | £90,000 |
| Operating cost, including depreciation & interest. | | |
| Agstone per ton. | 15/2d. | 9/1d. |
| Quicklime per ton | -- | 106/10d. |
| Hydrate (bagged) per ton | 163/6d. | 147/5d. |
| " (bulk) " " | -- | 109/11d. |
| Manpower | 20 | 24 |
| KWH/week | 11,000 | 19,500 |

## 2. INTRODUCTION.

An earlier report (1) gives estimates for the capital and operating costs of a plant to produce hydrated lime and agstone from Mount Gambier limestone. The weekly output of this plant was to be 335 tons of bagged hydrate and 191 tons of agstone.

These estimates have now been revised to permit an increase of some 220 percent in capacity. The weekly output now becomes:

| | |
|---|---|
| Hydrate bagged | 335tons |
| " bulk | 70 " |
| Quicklime " | 280 " |
| Agstone " | 432 " |

This report deals only with a plant operating at full capacity whereas the original report covers costs at two thirds and full capacity.

3. ADDITIONAL EQUIPMENT COST.

The following costs will be incurred for additional or enlarged equipment over and above those shown in Report R.D.21.

| | |
|---|---|
| Crushed stone bins extra | £6,000 |
| 2 conveyors 24' x 18" | 1,500 |
| 3 feeder conveyors 14' x 24" | 1,600 |
| Enlarged kiln 30% on £50,000 | 15,000 |
| 50 ton trucking bin. | 700 |
| Enlarged hydrator extra. | 2,000 |
| Miscellaneous. | 3,000 |
| 84' x 16" conveyor (omitted from R.D. 21) | 3,400 |
| | £33,200 |

4. TOTAL NEW CAPITAL COST.

| | |
|---|---|
| Previous equipment cost. (see RD21(1)) | £101,400 |
| Additional " " | 33,200 |
| | £134,600 |
| Installation. | 33,600 |
| Stores on-cost 3% | 4,000 |
| Technical services | 12,600 |
| | £184,800 |
| 10% contingencies | 18,500 |
| | £203,300 |
| Buildings. | 29,200 |
| Electrical. | 9,900 |
| Oil Storage. | 3,800 |
| Water Supply. | 800 |
| | £247,000 |

## 5. OPERATING COSTS.

### 5.1 Fuel.

Estimated 7.5 million B.T.U.'s/ton remains unaltered.

Cost of fuel oil/ton of hydrate. = 47/8d.

" " " " ton of quicklime. = 59/6d.

### 5.2 Power.

To the 126 H.P. (continuous) installed before add:

| | |
|---|---|
| 20 H.P. | for kiln |
| 12½ | air compressor. |
| 1 | preheater. |
| 7½ | cooler fan. |
| 1 | cooler extractor. |
| 15 | induced draught fan. |
| 5 | lime hydrator. |
| 1 | air separator. |
| 63 H.P. | |

say now 190 H.P. (continuous).

Cost of power at 3d. unit is:

| | | |
|---|---|---|
| Agstone | = | 1/2 per ton |
| Hydrate | = | 6/6d " " |
| Quicklime | = | 6/1d " " |

### 5.3 Manpower.

(includes reddef).

| | | | Total |
|---|---|---|---|
| Crushing. | 2 men | 1 shift | 2 men |
| Calcining | 1 | 3 | 4 " |
| Hydrating. | 1 | 3 | 4 " |
| Classifying and bagging. | 4 | 1 | 4 " |
| Maintenance. | 3 | 1 | 3 " |
| Clerical | 2 | 1 | 2 " |
| Miscellaneous. | 3 | 1 | 3 " |
| Supervision. | 2 | 1 | 2 " |
| | | | 24 men |

### 5.4 Wages.

| | |
|---|---|
| Agstone | 2/7d ton |
| Quicklime | 11/- " |
| Hydrate. | 18/6 " |

5.5 Stores.

| | Agstone. | Quicklime. | Hydrate. |
|---|---|---|---|
| Crushing. | 4d. | 8d. | 8d. |
| Calcining. | - | 9/- | 9/- |
| Hydration. | - | - | 6d. |
| Fans etc. | 6d. | 3d. | 3d. |
| Miscellaneous. | 3d. | 1/6 | 1/6 |
| Water. | - | - | 3d. |
| | 1/1d. | 11/5d. | 12/2d. |

5.6 Bags.

Bagged Hydrate = 37/6d. ton for bags.

5.7 Depreciation.

Agstone = 2/6d. per ton
Quicklime = 11/2d. " "
Hydrate = 14/11d. " "

5.8 Interest.

Total capital = £246,000
+ 90,000
£336,000

Interest charges each week at 5% S.I. = £350.

This amounts to:

| | |
|---|---|
| Agstone | 1/9d. per ton. |
| Quicklime | 7/8d. " " |
| Hydrate | 10/2d. " " |

5.9 Total Operating Cost. (per ton of product.)

| | Agstone. | Quicklime | Hydrate. | |
|---|---|---|---|---|
| Interest | 1/9 | 7/8 | 10/2 | |
| Depreciation | 2/6 | 11/2 | 14/11 | |
| Stores | 1/1 | 11/5 | 12/2 | |
| Bags | - | - | - | 37/6 |
| Wages | 2/7 | 11/- | 18/6 | |
| Power | 1/2 | 6/1 | 6/6 | |
| Fuel | - | 59/6 | 47/8 | |
| | 9/1 | 106/10 | 109/11 bulk | |
| | | + | 37/6 | |
| | | | 147/5 bagged | |

## 6. CONCLUSIONS.

The proposed larger plant will require a further £60,000 for capital and £30,000 for operating capital but the cost per ton of finished product will be substantially reduced.

The labour force will need to be increased by four men only.

REFERENCES:

(1) Hosking, P.K. - Estimated Capital and Operating Cost of plant for the production of hydrated lime from Mount Gambier Limestone. S.A. Department of Mines, Research & Development Branch, Report R.D. 21