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DEPARTMENT OF MINES.
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MOUNT VICTORIA URANIUM DEPOSIT.

COMPARISON OF METHODS OF OPERATING.

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**DEPARTMENT OF MINES.
SOUTH AUSTRALIA.**

DM 1117/55

MN/I 20/25

**MOUNT VICTORIA URANIUM DEPOSIT.
COMPARISON OF METHODS OF OPERATING.**

INTRODUCTION

Possible methods of operating at the Mount Victoria uranium deposit are:

1. All operations by the Government.
2. All operations by private enterprise.
3. Mining by private enterprise and treatment by the Government.

In the following discussion it has been assumed that the value of ore delivered to the treatment plant at Mount Victoria would be 36/- per pound of contained $U_3 O_8$ for 5 lb.-ore. This is in accordance with the scale laid down by the Commonwealth Government.

If any of the operations are carried out by private enterprise the operating company would be expected to pay lease rents and royalty on the mineral won and to recoup the Government for the expenditure incurred in prospecting and exploration.

The cost of lease rents per pound of $U_3 O_8$ would be small and has been disregarded in any estimates.

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Royalty would be $2\frac{1}{2}$ per cent of the value at the mine of the minerals won. This would amount to 11d. per pound of U_3O_8 contained in the ore.

The expenditure incurred by the Government is approximately £100,000. If 125,000 tons of 5lb.-ore is mined the repayment of this sum would cost approximately $\frac{3}{3}$ per pound of U_3O_8 contained in the ore, or approximately nine per cent of the value at the mine of the mineral won.

In the following discussion, in order that the figures quoted are comparable, these costs have been added to the estimated costs for operation by the Government.

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ALL OPERATIONS BY THE GOVERNMENT.

In this scheme, all mining, treatment, and transport of concentrates to Port Pirie would be carried out by the Government.

Capital requirements would be £810,000

Working costs would be:

| Direct cost of mining and treatment | £1-13-11 | per lb. of $U_3 O_8$ contained in ore. | | | |
|--|----------|--|---|---|---|
| Royalty | 16- 7 | " | " | " | " |
| Depreciation | 11 | " | " | " | " |
| Prospecting and exploration | 3- 3 | " | " | " | " |
| | <hr/> | | | | |
| | £2-14- 8 | " | " | " | " |
| | <hr/> | | | | |
| Assuming 85 per cent recovery equivalent to | £3- 4- 4 | per lb. of $U_3 O_8$ contained in the concentrate. | | | |
| Transport of concentrate to Port Pirie | | | | | |
| Direct cost | 5- 6 | " | " | " | " |
| Depreciation | 1-11 | " | " | " | " |
| | <hr/> | | | | |
| Cost, excluding interest, of concentrate delivered to Port Pirie | £3-11- 9 | " | " | " | " |
| Interest at 5 per cent on capital requirements | 7- 8 | " | " | " | " |
| | <hr/> | | | | |
| Total cost, including interest | £3-19- 5 | " | " | " | " |

The cost, excluding royalty and refund of exploratory expenditure, would be £3 - 14 - 6 per lb. of $U_3 O_8$.

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The advantages of this scheme would be:-

1. The Government would retain control at all stages of the exploitation of an important national and strategic asset.
2. It would be possible to maintain close liaison between the mine and the treatment plant and between the treatment plant and the chemical treatment plant at Port Pirie.
3. The cost of concentrates delivered to Port Pirie would be lower than for any other scheme. Any profits would be retained by the Government.

The disadvantages would be:-

1. Policy for the employment of labour must conform to that for other Government Departments, and it would not necessarily be suitable for this project.
2. Inducements could not readily be offered to attract the best labour.
3. Obtaining decisions regarding both policy and expenditure is slower than in private enterprise. This could affect the time required to go into production, as well as efficiency and costs.

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ALL OPERATIONS BY PRIVATE ENTERPRISE

Three schemes are considered:-

- (1) Total capital requirements provided by the Company.
- (2) Portion of the capital requirements obtained by bank overdraft guaranteed by the Government.
- (3) Treatment plant erected by the Government, working capital obtained by bank overdraft, and remaining capital provided by the Company.

- (1) Capital provided by the Company.

It is considered that a return of ten per cent per annum would be the minimum necessary to attract private investors, and that investors might possibly require a return of 15 per cent per annum. Working costs would be the same as under Government operation.

Total capital requirements. £810,000.

| | | | | | |
|---|---------|-------------------------------|---|---|---|
| Cost, excluding interest, of concentrates delivered Port Pirie | £3-11-9 | per lb. of contained U_3O_8 | | | |
| Interest at 10 per cent per annum | 15-3 | " | " | " | " |
| Total cost | £4- 7-0 | " | " | " | " |
| <hr/> | | | | | |
| Total cost if 15 per cent per annum is returned to shareholders | £4-14-8 | " | " | " | " |

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(2) Bank Overdraft Guaranteed by Government.

It is suggested that the Government might guarantee a bank overdraft to cover portion of the capital requirements as was done for Nairne Pyrites Limited. An overdraft of £460,000 would cover the cost of erecting the treatment plant and provide sufficient working capital.

| | | | | | |
|---|-----------------|-------------------------------|---|---|---|
| Capital | £350,000 | | | | |
| Overdraft | <u>£460,000</u> | | | | |
| Total | <u>£810,000</u> | | | | |
| Cost, excluding interest, of concentrates delivered Port Pirie | £3-11-9 | per lb. of contained | | | |
| | | U ₃ O ₈ | | | |
| Interest at 5 per cent on overdraft | 4-4 | " | " | " | " |
| Interest at 10 per cent on capital | <u>6-7</u> | " | " | " | " |
| Total cost | <u>£4- 2-8</u> | " | " | " | " |
| Total cost, if 15 per cent per annum is paid on capital | £4- 6-0 | per lb. of contained | | | |
| | | U ₃ O ₈ | | | |

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(3) Treatment Plant Erected by Government.

This case differs from the previous one in that the treatment plant would be erected and paid for by the Government. The Company would pay interest to the Government and refund the expenditure incurred by the Government. Interest paid to the Government would be at the same rate as paid on a bank overdraft, which is taken to be 5 per cent per annum.

| | |
|-----------------------------------|----------|
| Capital provided by Company | £350,000 |
| Capital expenditure by Government | £202,000 |
| Bank overdraft | £258,000 |
| | <hr/> |
| Total | £810,000 |
| | <hr/> |

Working costs would be the same as in the previous case, that is:-

if 10 per cent is paid

on capital

£4-2-8 per lb. of contained
U₃ O₈

if 15 per cent is paid

on capital

£4-6-0 per lb. of contained
U₃ O₈

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The advantages of all operations being carried out by private enterprise are:-

1. Production would be commenced in a shorter time.
2. Conditions of employment would be more flexible and better labour attracted, resulting in greater efficiency and lower costs.
3. A big incentive would be given to private interests to search for other uranium deposits in the State.

The disadvantages would be:-

1. Treatment of the ore and of the concentrates would be controlled by different interests and liaison might be difficult.
2. The Government would receive no profit, except lease rents and royalties, from the operations.
3. The cost of concentrates delivered to Port Pirie would be higher.

The advantage of the Government guaranteeing a bank overdraft would be to reduce the cost of the concentrates delivered to Port Pirie. There is no obvious disadvantage to this.

It should be a big advantage to a private Company for the Government to erect the treatment plant on their behalf. The Département of Mines has carried out the research work on the ore and knows the method of treatment most suitable for the ore. It has the knowledge, experience, and facilities necessary to carry out the design and construction of the plant. A Company would have to have this done by an outside firm.

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COMBINED OPERATIONS.

In this scheme the mining would be done by private enterprise and the treatment and transport by

- (1) the Government, or
- (2) the Company on behalf of the Government.

In both cases the Company would be paid for the ore delivered to the treatment plant according to its uranium content.

It is assumed that the base rate would be £1-16-0 per pound of contained uranium for 5 lb.-ore.

(1) Mining by Company - Treatment by Government.

As both mining and treatment are on a relatively small scale, it would be necessary for one of the operators to supply necessary services, such as power, water, and accommodation, to the other. It is suggested that this would be done by the Company. The Company would then require sufficient capital to cover all capital expenditure other than that for treatment and transport of concentrates.

The Government would pay the Company for all services provided at a rate that would cover the actual cost plus 5 per cent per annum on the proportion of the capital necessary to provide these services to the Government.

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Mining and Services.

Capital requirements of Company.

| | |
|------------------|----------|
| Mining | £105,000 |
| Power station | 65,000 |
| Water supply | 30,000 |
| Workshops | 10,000 |
| Office and store | 13,000 |
| Town site | 75,000 |
| Transport | 3,000 |
| | <hr/> |
| | £301,000 |
| Working capital | 140,000 |
| | <hr/> |
| Total | £441,000 |

Working Costs.

| | | |
|-----------------------------|----------|---|
| Mining, direct cost | £3- 0- 0 | per ton of ore |
| Community services | 13- 6 | " " " " |
| Depreciation on £199,000 | 1-15-10 | " " " " |
| | <hr/> | |
| | £5-17- 4 | " " " " |
| For 5-lb. ore equivalent to | £1- 3- 6 | per lb. of |
| Royalty | 11 | contained U ₃ O ₈ |
| Prospecting and exploration | 3- 3 | " " " " |
| | <hr/> | |
| Total cost | £1- 7- 8 | " " " " |
| Value of ore | £1-16- 0 | " " " " |
| | <hr/> | |
| Profit | 8- 4 | " " " " |

Output 25,000 tons per annum containing 125,000 lbs. of U₃ O₈.

| | |
|---|---------|
| Annual profit | £52,062 |
| Interest paid by Government for services 5 per cent on £125,000 | <hr/> |
| | 6,250 |
| Total annual profit | £58,312 |

This annual profit is equivalent to a return of
13.2 per cent per annum on a capital of £441,000.

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Treatment and Transport.

Capital requirements of Government

| | | |
|-----------------|---------------|-----------------|
| Treatment plant | £202,000 | |
| Transport | <u>42,000</u> | £244,000 |
| Working capital | | <u>125,000</u> |
| | | <u>£369,000</u> |

Working costs, including depreciation and interest at 5 percent.

| | | |
|---|-----------------|----------------|
| Cost of ore paid to Company | £ 9- 0-0 | per ton of ore |
| Treatment, direct charges | 3-13-5 | " " " " |
| * Administration and community services | 14-6 | " " " " |
| * Depreciation and interest | <u>3- 3-8</u> | " " " " |
| Total | <u>£16-11-7</u> | " " " " |
| Equivalent to | £77-18-6 | per ton of |
| Transport, direct charge | 5-10-3 | concentrate |
| * Depreciation and interest | <u>2-13-7</u> | " " " |
| Total cost of concentrate delivered at Port Pirie | £86- 2-4 | " " " |

Grade of concentrates - 20 lbs. of $U_3 O_8$ per ton.

Cost per lb. of $U_3 O_8$ in concentrates

delivered at Port Pirie £ 4- 6-1

* Includes amounts paid to Company for services.

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(2) Mining by Company.

Treatment on behalf of Government.

The whole of the operations would be under the one control but treatment of the ore and transport of the concentrates would be done by the Company on behalf of the Government. The Government would pay the Company the cost of treatment and transport, including the applicable portion of overhead expenses, plus a managerial fee. It is suggested that a suitable fee would be £5,000 per annum.

Capital requirements would be similar to the previous case, that is:-

| | |
|------------|----------|
| Company | £441,000 |
| Government | £369,000 |

The working costs would be varied by the addition to them of the managerial fee. A fee of £5,000 per annum would amount to approximately 1/- per pound of $U_3 O_8$ contained in the concentrates.

The cost of the concentrates delivered to Port Pirie would thus be £4 - 7 - 1 per pound of contained $U_3 O_8$.

The advantages of combined operations are:-

1. Control of contracts would be simpler if the selling point is between the mine and the treatment plant at Mount Victoria rather than between the Mount Victoria treatment plant and the Port Pirie Chemical treatment plant.

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2. Any improvement in ore treatment found as a result of research work by the Department of Mines would be to the benefit of the Government rather than to private enterprise.
3. The Government could treat parcels of ore from any other deposits that might be found in the immediate vicinity.

The disadvantages are:-

1. Separate administrations would not be economic.
2. Conditions of employment for employees of both operators would have to be the same, and might be difficult to arrange.
3. Allocation of power, water, and services during breakdowns or shortages would be difficult.
4. Transport between the mine and the railhead would have to be shared by both operators.
5. The mine and treatment plant would have to work closely together at all times and this might be difficult with divided control.
6. The cost of concentrates delivered to Port Pirie would be higher than if all operations were controlled by the Government.

Most of these disadvantages would not apply if the Company were to operate the treatment plant on behalf of the Government.

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SUMMARY OF COSTS.

Cost per lb. of $U_3 O_8$ in
concentrate at Port Pirie.

All operations by Government,
including 4/11 for royalty and
exploration £3 - 19 - 5

All operation by private enterprise
all capital provided by Company
Return to investors 10 per
cent per annum £4 - 7 - 0

Return to investors 15 per
cent per annum £4 - 14 - 8

Overdraft guaranteed by Government
Return to investors 10 per
cent per annum £4 - 2 - 8

Return to investors 15 per
cent per annum £4 - 6 - 0

Combined operations.

Mining by Company (return to inves-
tors 13.2 per cent) and treatment
by Government £4 - 6 - 1

Mining by Company (return to inves-
tors 13.2 per cent) and treatment
by Company for Government £4 - 7 - 1

8.7.55

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