Rept. No. 37/133.

DEPARTMENT OF MINES.

SOUTH AUSTRALIA.

METALLURGICAL REPORT

NO. MT. 69.

BENEFICIATION OF LEIGH CREEK COAL.

A. D. SMITH

SENIOR METALLURGIST.

27th May, 1954.

D. M. 74/53.

BENEFICIATION OF LEIGH CREEK COAL.

SUMMARY.

Asample of coal was substituted to determine whether any separation of bright and dull coal or coal and ash could be effected.

Methods of beneficiation investigated were gravity concentration with a Humphrey Spiral, and flotation.

No appreciable concentration of bright or dull coal or separation coal from ash was achieved.

SAMPLE.

The sample consisted of run-of-mine coal in lumps greater than two inch diameter. It was crushed to pass 60 mesh B.S.S. and a smaple submitted for analysis and petrological examination.

Analysis.

Moisture at 105°C.	10.54 per cent
Volatile matter	33.85 " "
Fixed Carbon	41.79 " "
Ash	13.82 " "
	100.00 per cent

Petrological Examination.

Bright coal	52 per cent
Dull Coal	48 per cent

Screen Analysis of Crushed Coal.

B.S.S. mesh	Per cent Weight.
+ 60	2.1
- 60 + 80	42.1
- 80 + 100	30.0
-100 + 150	22.7
-150 + 200	2.0
-200	1.1
	100 .0

S.G. of coal = 1.25

HUMPHREY SPIRAL TESTS.

Three tests were conducted on minus 60 mesh material. In each, the flow of feed to the spiral and the volume of wash water used was kept constant and concentrates were drawn from ports 3, 6, 9 and 12. Feed dilution was varied.

In the first two tests a slight concentration of ash was obtained. Distribution of bright and dull coal was determined only in the third test. A slight concentration of dull coal is evident.

Results are shown in Table No. 1.

Feed rate to spiral - 10 gallons per minute.

wash water - 3 gallons per minute.

Per cent solids in feed 5,10,15 for tests 1,2,3 respectively.

TABLE NO. 1.

Humphrey Spiral Tests.

Test	Product	Weight %	Assays per cent				Ash % Dist.
			Moisture	Volatile Matter	Fixed Carbon	Ash	
1	Port 3	3.5	8.14	32.18	37.54	22.14	4.9
	" 6	3.5	6.98	29.06	30.06	33.90	7.5
	" 9	3.5	8.12	31.24	39.10	21.54	4.8
	" 12	3.5	8.40	33.54	39.64	18.42	4.1
	Slime tail.	63.5	10.00	34.37	41.55	14.08	57.1
	Coarse tail.	22.5	9.59	33.92	41.51	14.98	21.6
2	Port 3	4.0	7.44	28.10	33.58	30.88	6.5
	" 6	3.2	6.00	23.22	28.06	42.72	7.4
	" 9	3.2	5.84	26.48	26.28	41.40	7.5
	" 12	3.2	8.42	28.56	34.40	28.62	4.9
	Slime Tail.	75.2	9.82	32.59	42.20	15.39	62.1
	Coarse Tail.	11.2	9.75	30.56	40.10	19.59	11.6

Test	Product	Weight %	Bright coal Per cent	Dull Coal Per Cent	% Distribution Bright Coal.
3	Port 3	8.1	42.6	57.4	
	" 6	5.6	49.8	50.2	
	" 9	3.3	46.5	53.2	
	" 12	5.5	49.7	50.3	
	Tailing	77.5	67.0	33.0	

Anumber of tests using closely sized screen fractions gave results similar to the above.

FLOTATION TESTS.

Initial tests were confined to attempts to float with frothers only, in neutral pulp and pulp slightly acidified with sulphuric acid.

Frothers used were B22, B23, B25, pine oil, Dowfroth 250, frother 60 and frother 63. Pulp was conditioned for five minutes with from 0.5. to 5.0 lb. frother per ton prior to flotation.

In all cases a very lightly loaded froth was obtained and no products were assayed.

The above frothers were then used separately with kerosene, fuel oil, gas oil, creosote, aerosol 18, potassium ethyl xanthate and sulphonated castor oil.

In a few cases a reasonable amount floated and the concentrates and tailings were assayed. Both products had practically the same composition.

Heating the coal in an oven at temperatures ranging from 212°F to 350°F prior to flotation with various frothers and collectors made no appreciable difference to results.

Grinding with varying amounts of carbon tetrachloride followed by conditioning with frothers and collectors gave no separation.

A. D. SMITH
SENIOR METALLURGIST.

ADS:CMP
28/5/54.