

TR7-178-183

R. 416

DETERMINATION OF COAL LOSS IN TABLE DISCARD

Summary

Sampling of the table reject at the washery at Stanhope colliery on 25th July, 1962, indicates that approximately one ton of good quality coal per day is being lost into the table discard.

Investigation

The Stanhope Colliery washes all minus $1\frac{1}{2}$ inch coal by tabling. From observation, Mr. J. Stanley, owner of the Colliery, considered that the plant was discarding some good quality coal. He accordingly requested the Department to investigate the nature and extent of this loss of coal.

Preliminary

The washery was visited on 11th July, 1962, by Messrs. Liddy and Dawe, primarily to design a sampler to allow the table discard to be sampled quantitatively.

Inspection of the table operation showed that some good quality coal appeared to be discarded into the reject. A number of pieces of discards which had the appearance of good quality coal were hand picked from the end of the table as they were about to discharge with the waste. These pieces were all plus $\frac{3}{8}$ inch size, and were segregated according to specific gravity, as follows:—

Specific Gravity of Material	Number of Pieces	Ash Content Percent
Less than 1.4	36	10.4
1.4 to 1.5	22	19.2
1.5 to 1.6	11	31.0
1.6 to 1.7	8	41.2
1.7 to 1.8	5	50.5
More than 1.8	10	69.6

The above established that some good quality coal was being discarded. A sampler was accordingly made to allow the table reject to be quantitatively sampled over the lower four feet of the table, segregated into six inch intervals.

The upper portion of the table discard was not sampled, as this product obviously contained a negligible proportion of useful coal.

The washery was revisited on 25th July, 1962, and the table discard sampled as detailed below. Unfortunately the sampling was interrupted several times due to lack of table feed.

Research

Time	
10.40 a.m.	10 second sample taken
10.50 a.m.	10 second sample taken
11.00 a.m.	10 second sample taken
Out of feed 11.05 to 12.40	p.m.
12.45 p.m.	10 second sample taken
12.55 p.m.	10 second sample taken
Out of feed 1.00 to 1.13	p.m.
1.18 p.m.	10 second sample taken
1.26 p.m.	10 second sample taken
1.35 p.m.	10 second sample taken
1.45 p.m.	10 second sample taken
1.55 p.m.	10 second sample taken
Out of feed 1.57 to 2.05	p.m.
2.10 p.m.	10 second sample taken
2.20 p.m.	10 second sample taken
2.30 p.m.	10 second sample taken

Out of coal at 2.35 p.m., and there was still no feed at 2.55 p.m., sampling was discontinued.

Thus 13 samples, each of 10 seconds duration, were taken.

The various samples were dewatered, air dried and screened plus and minus 22 mesh. The plus 22 mesh material was segregated according to specific gravity.

Locations of the various samples were:—

- Sample R.416A: From 3" to 9" on bottom of discharge end.
- Sample R.416B: From 9" to 1' 3" on bottom of discharge end.
- Sample R.416C: From 1' 3" to 1' 9" on bottom of discharge end.
- Sample R.416D: From 1' 9" to 2' 3" on bottom of discharge end.
- Sample R.416E: From 2' 3" to 2' 9" on bottom of discharge end.
- Sample R.416F: From 2' 9" to 3' 3" on bottom of discharge end.
- Sample R.416G: From 3' 3" to 3' 9" on bottom of discharge end.
- Sample R.416H: From 3' 9" to 4' 3" on bottom of discharge end.

Note: There was no discharge from the bottom 3 inches of the table.

In the tabulations below, all quantities are shown on the basis of pounds per hour of table operation.

Size	S.G. of Fraction	Production Pounds/Hour	Weight Percent	Ash Content Percent
Sample R.416A				
Plus 22 mesh	Less than 1.4	44	18.4	9.6
	1.4-1.5	29	12.1	19.7
	1.5-1.6	21	8.8	29.8
	1.6-1.7	18	7.5	41.2
	1.7-1.8	8	3.3	49.2
	More than 1.8	106	44.4	76.8
Minus 22 mesh ..	—	13	5.5	50.3
Composite	—	239	100.0	—

Sample R.416B				
Plus 22 mesh	Less than 1.4	29	15.6	10.6
	1.4-1.5	15	8.1	20.2
	1.5-1.6	22	11.8	31.8
	1.6-1.7	14	7.5	42.8
	1.7-1.8	5	2.7	46.9
	More than 1.8	86	46.2	76.6
Minus 22 mesh ..	—	15	8.1	56.3
Composite	—	186	100.0	—

Sample R.416C				
Plus 22 mesh	Less than 1.4	33	12.6	11.4
	1.4-1.5	14	5.3	20.4
	1.5-1.6	16	6.1	30.2
	1.6-1.7	21	8.0	40.5
	1.7-1.8	9	3.4	48.1
	More than 1.8	152	58.1	76.7
Minus 22 mesh ..	—	17	6.5	60.0
Composite	—	262	100.0	—

Sample R.416D				
Plus 22 mesh	Less than 1.4	59	9.1	10.0
	1.4-1.5	24	3.7	19.8
	1.5-1.6	24	3.7	28.3
	1.6-1.7	32	4.9	41.5
	1.7-1.8	13	2.0	49.6
	More than 1.8	471	72.2	77.8
Minus 22 mesh ..	—	29	4.4	63.1
Composite	—	652	100.0	—

Sample R.416E				
Plus 22 mesh	Less than 1.4	57	8.6	10.2
	1.4-1.5	21	3.2	21.4
	1.5-1.6	17	2.6	29.4
	1.6-1.7	24	3.6	39.8
	1.7-1.8	26	4.0	51.2
	More than 1.8	466	70.6	79.4
Minus 22 mesh ..	—	49	7.4	65.8
Composite	—	660	100.0	—

Size	S.G. of Fraction	Production Pounds/Hour	Weight Percent	Ash Content Percent
Sample R.416F				
Plus 22 mesh	Less than 1.4	41	7.1	11.0
	1.4-1.5	16	2.8	20.0
	1.5-1.6	11	1.9	28.5
	1.6-1.7	34	5.8	41.7
	1.7-1.8	32	5.5	48.3
Minus 22 mesh ..	More than 1.8	379	65.4	79.7
Composite	—	67	11.5	64.0
Composite	—	580	100.0	—

Sample R.416G				
Plus 22 mesh	Less than 1.4	22	5.2	11.6
	1.4-1.5	9	2.1	22.1
	1.5-1.6	7	1.7	29.4
	1.6-1.7	14	3.3	39.7
	1.7-1.8	10	2.4	49.4
Minus 22 mesh ..	More than 1.8	299	71.0	80.1
Composite	—	60	14.3	61.7
Composite	—	421	100.0	—

Sample R.416H				
Plus 22 mesh	Less than 1.4	8	2.1	11.6
	1.4-1.5	12	3.1	23.7
	1.5-1.6	6	1.5	31.9
	1.6-1.7	12	3.1	40.2
	1.7-1.8	12	3.1	52.0
Minus 22 mesh ..	More than 1.8	291	74.8	82.4
Composite	—	48	12.3	62.3
Composite	—	389	100.0	—

All eight samples contain some good quality coal with ash contents of about 10 to 11 percent. However, sample R.416H contains much smaller proportions of good coal than the other fractions, and can be neglected as a potential source of reclaiming coal.

The tabulations below show the quantities of coal of similar S.G.'s from samples R.416A to R.416G inclusive:—

Sample	Production Pounds/Hour	Ash Content Percent
Specific Gravity: Less than 1.4		
R.416A	44	9.6
R.416B	29	10.6
R.416C	33	11.4
R.416D	59	10.0
R.416E	57	10.2
R.416F	41	11.0
R.416G	22	11.6
Total	285	10.5

Specific Gravity: 1.4-1.5

R.416A	29	19.7
R.416B	15	20.2
R.416C	14	20.4
R.416D	24	19.8
R.416E	21	21.4
R.416F	16	20.0
R.416G	9	22.1
Total	128	20.3

Specific Gravity: 1.5-1.6

R.416A	21	29.8
R.416B	22	31.8
R.416C	16	30.2
R.416D	24	28.3
R.416E	17	29.4
R.416F	11	28.5
R.416G	7	29.4
Total	118	29.7

Thus the quantities of coal with various specific gravities from samples R.416A to R.416G are—

Specific Gravity	Production Pounds/Hour	Ash Content Percent
Less than 1.4	285	10.5
1.4-1.5	128	20.3
Less than 1.5	413	13.5
1.5-1.6	118	29.7
Less than 1.6	531	17.1

Depending on what ash content can be tolerated in the saleable coal, the loss of useful coal was 413 pounds per hour of coal with an ash content of 13.5 percent, or 531 pounds of coal with an ash content of 17.1. This last figure is a little high, and for calculations below, the hourly coal loss has been assumed to be 413 pounds of coal with an ash content of 13.5 percent.

Inspection of table operation showed that good quality coal in the $\frac{3}{4}$ inch size range had difficulty in discharging over the bottom baffle of the table for about the last three feet of table length. However, sizing of the various coal fractions with a specific gravity less than 1.4 showed that the coal lost is mostly in the minus $\frac{1}{4}$ inch size range, although the larger pieces of coal discharging along the bottom baffle are the most obvious on table inspection.

The coals with a specific gravity less than 1.4 were sized into three fractions, viz., plus $\frac{3}{8}$ inch, minus $\frac{3}{8}$ inch—plus $\frac{1}{4}$ inch, and minus $\frac{1}{4}$ inch sizes. The tabulation below shows the quantities of each of these sizes from samples R.416A to R.416G inclusive.

Production: Pounds/Hour

Size Fraction	R.416A	R.416B	R.416C	R.416D	R.416E	R.416F	R.416G	Total
+ $\frac{3}{8}$ inch	17	6	13	9	13	5	4	67
— $\frac{3}{8}$ inch + $\frac{1}{4}$ inch	10	10	9	23	8	6	1	67
— $\frac{1}{4}$ inch	17	13	11	27	36	30	17	151
Total	44	29	33	59	57	41	22	285

No attempt was made to assess the possibility of recovery of coal from the minus 22 mesh fractions, as these fractions represented such a small proportion of the various samples.

Discussion

The above results show that 413 pounds of useful coal are lost per hour of table operation. Assuming an operation of say 6 hours per day, then approximately one ton of coal is lost per day.

With the existing plant there is no means of attempting to recover this coal. The simplest method of recovering this coal would appear to be to return portion of the discard to the table feed. This returned discard would contain about 13.7 percent by weight of useful coal. However, returning this discard to the table feed might result in some of the fine high ash fractions of the discard entering the washed coal.

No responsibility is accepted for the results shown in this report except in so far as they apply to the plant operation on the 25th July, 1962.

All calculations above are based on the assumption that table performance as sampled represents average conditions. All weights quoted refer to air dried samples. All ash determinations quoted are on a moisture free basis.

Screen used were British Standard Screens.