

ANALYSIS OF SOUTHERN APPLACHIAN COAL

BY

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Introduction

This is a study of different seams of coal in the Southern Appalachian field. The first work of its kind so far as is known except that carried on by the U. S. Bureau of Mines. The study is different from theirs in that the samples taken by the Government are tipple samples and the samples used in this study are face samples taken from the mines. Assistance was rendered in cutting the samples at the mines by Mr. D. L. Lindamood, Mining Engineer Blue Diamond Coal Co.

General Survey of Field.

Coal has been mined in Tennessee for at least fifty years. Practically all the good seams at the present date are being mined. As these better seams are exhausted it is probable that some of the smaller seams will be opened. It is estimated that about three per cent of all the coal has been mined. Some of the remaining coal, however, is not easily available and at the present time would not be practical to mine. The seams in the Southern Appalachian field vary in depth from 24 inches to 66 inches, the larger seams being easier to mine.

The purpose of these tests are purely experimental. There is nothing new in sampling or analyzing coal, except that face samples are not as common as tipple samples.

The analysis of the ash has not been done but this analysis will be made by Mr. B. L. Thomas.

Chapter 1.

The first step in the analysis of coal is to secure a representative sample. The expensive methods used in case of gold and silver ore are prohibitive in the instance of coal because this would increase the price of coal more than would be justifiable and is not of sufficient commercial importance to warrant the increased expense.

Only the simplest methods are used in sampling coal but at the same time care must be taken to get as near a uniform specimen as possible.

Coal may be sampled in the mines, at the tippie or when unloaded at the power plant. As most of the samples analyzed for this thesis were cut from the mine this method will be the only one described. The method followed in cutting the sample is the same as prescribed by the U. S. Bureau of Mines and is as follows; choose a place inside the mine where the coal is clean and fresh, avoiding coal that has been exposed to the air. Clean off both top and bottom of the seam so as to prevent any impurities getting into the sample that does not belong there. A water proof blanket is then spread on the bottom of the mine and while one man cuts the coal another should hold a paper or

blanket in such manner as to prevent the coal from falling of the blanket spread on the ground. A perpendicular cut about five inches wide and two inches deep should be made the entire length of the seam, discarding such rash and slate as the miner would discard in loading the coal. After finishing the cutting the chips should be crushed to pass the $\frac{1}{2}$ inch screen and then quartered down, placed in an air tight jar and sealed. All operations thus far being inside the mines.

The sample is now ready to be taken to the laboratory where it is crushed to pass the 60-mesh seive and again quartered. It is now placed in an air tight jar to prevent loss in moisture.

The coal samples used in this analysis were cut from Entry, Log Mountain seam Westborne Mine No.1. Seam measured 38 inches, elevation 1850 ft. A 2nd. sample from Entry, Jellico seam, Egan Mine at Egan, Tennessee. Seam measured 54 inches, elevation 1450 ft. A 3rd. sample from 4th. Right Entry, Mingo seam, High Cliff Mine at Pruden, Tennessee. Seam measured 66 inches, elevation 1850 ft. A 4th. sample from No.2 Main Entry, Coal Creek seam, Bear Wallow Mine No. 2, Caryville, Tenn. Seam measured Coal 24 inches, rash (discarded) $2\frac{1}{2}$ inches, coal 6 inches, elevation 1000 ft. A 5th. sample from 1st. Left Entry, Pee Wee

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seam, Sun Coal Co. Mine at Caryville, Tennessee, seam
measured 36 inches, elevation 2600 ft.

The above samples were taken under the following
dates, No. 1. Dec. 20th. 1921, No. 2. Dec. 28th. 1921,
No. 3. Dec. 30th. 1921, No. 4. and 5. May 31st. 1922.

Two tipple samples taken at Westborne, Tennessee,
of 5 inch block and 5 inch steam coal were also used.
These samples were taken by the U. S. Bureau of Mines
on July 18th. 1921, of coal loaded on that date from
Westborne Mine No. 1 and Westborne Mine No. 2. Log Mountain
and Jellico seams.

Chapter 11.

In coal analysis there are two main divisions, proximate and ultimate analysis. The proximate analysis is to determine the percentages of ash, moisture, volatile and fixed carbon. Sulphur is also included but is done separately. The ultimate analysis is a determination of the percentages of the chemical elements in the coal. We deal only with the proximate analysis because we are trying to find the properties which are technically important and of commercial value.

The first determination made was that of the moisture. This being done by taking one gram of coal that has passed the 60-mesh sieve. It is then placed on a watch glass and placed in a furnace heated by a Bunsen burner. It is then heated to 107 C. for one hour and then placed in a dessicator until cool, care being taken not to allow any moisture to get in sample from the air. After cooling the sample and container are weighed. The loss in weight in grams divided by the weight of the wet coal gives the percentage of moisture.

After the moisture has been determined the determination of the ash is taken up. This time a sample which has passed the 100-mesh sieve is used. A porcelain container is weighed and then a small amount of coal placed in the container and both weighed. The coal is then burned over a Bunsen burner

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until it has been reduced to ash. The sample is first burned with a small flame so as to prevent mechanical loss of the powdered coal and after a larger part is burned the flame may be increased to such a point that the tip comes to the bottom of the container. The sample after complete ignition is placed in a desiccator and cooled, after which it is again weighed. The weight of the original divided by the loss of weight gives the percentage of ash.

Then to determine the volatile matter a crucible and lid are weighed and one gram of powdered coal placed in the crucible. This is then heated over a Bunsen burner for seven minutes, the flame being about twenty centimeters in length. The loss in weight gives the percentage of volatile and moisture in the coal. The percentage of moisture is subtracted from this result leaving the volatile.

The fixed carbon is now determined by adding the percentages of ash, volatile and moisture, then subtracting their sum from 100.

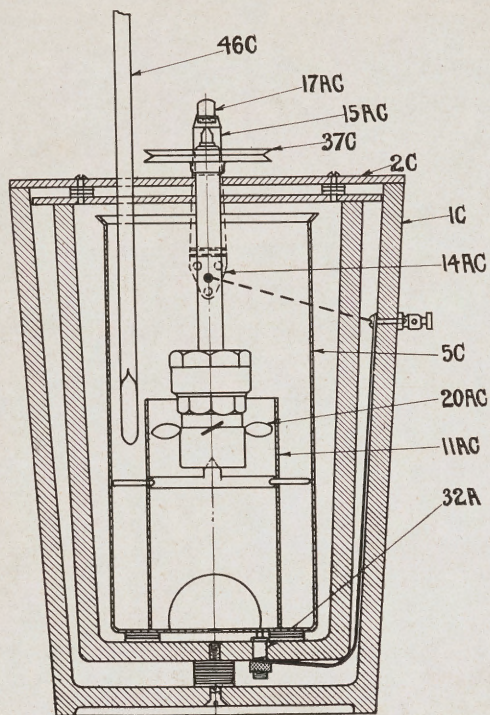


Fig. 1

Fig. 1 Showing general arrangement of Parr Calorimeter described in Chap. 3.

Chapter 111.

When the proximate analysis has been completed the findings of the heating value of the fuel follows. This is done in an especially arranged apparatus known as the Parr Calorimeter. The calorimeter consists of two large jars, one inside the other. A third cylinder of metal is placed inside the smaller jar. (See Fig. 1.) The metal cylinder contains two liters of water. The method of procedure is as follows; the apparatus should be on a firm desk and where one can have as near constant temperature as possible. The charge of coal which is $\frac{1}{2}$ a gram should be air dried and then placed in an oven and dried at a temperature of 220 C. for one hour. It is then ready to mix with the charge. The next step is to see that the fusion cup is in order and perfectly dry before adding any of the charge. Add to the fusion cup, not assembled, one full measure of sodium peroxide care being taken to get the full amount. To this is added one gram of accelerator (Potassium Chlorate). This is used to secure complete combustion by increasing the oxidizing effect of the sodium peroxide. Now place a false top on the fusion cup and mix the ingredients thoroughly. Next remove the false cap and add the $\frac{1}{2}$ gram of coal. Mix again and then tap the fusion cup lightly on the desk to shake all the ingredients from the upper part of the container. Now take the regular cap and attach to the two terminals a fuse wire

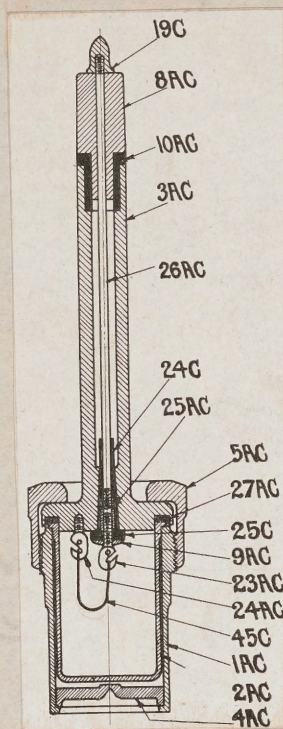


Fig. 2 Showing arrangement of the cartridge.

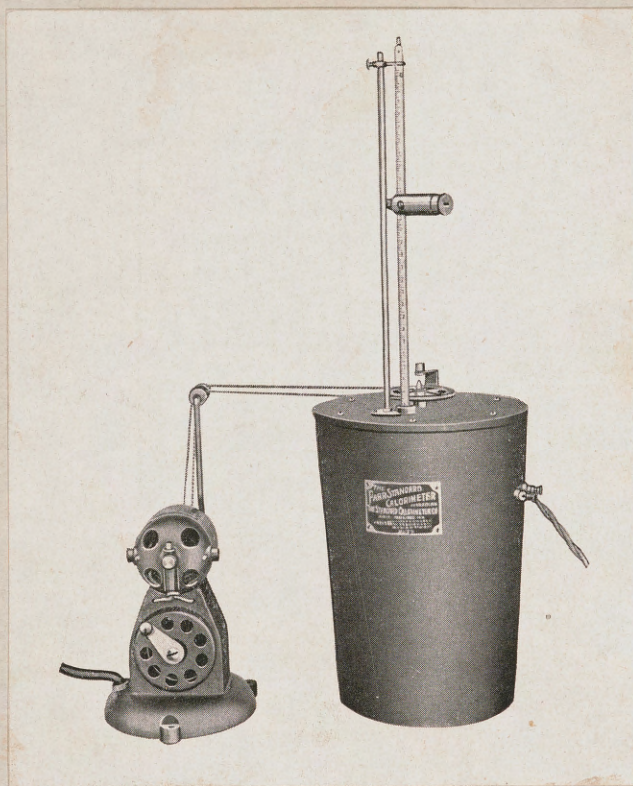


Fig. 3

2
1
up 3

7 centimeters in length, seeing that a good contact is secured at each terminal. The false cap is removed and the regular cap containing stem and ignition wire is screwed on firmly, care being taken not to mar any parts but at the same time making a water proof contact. The cartridge is then placed in the metal cylinder (See Fig.2) and two liters of distilled water is added to the cylinder. The cap is then placed over the large jar and the pulley placed on the stem which protudes above the cover. A hole in the cover is also provided for the thermometer which is placed in the water. A small belt is connected to the pulley from a small shaft which is run by a motor at about 150 r.p.m. Fig. 3 shows the general arrangement of the calorimeter and motor ready for operation. The temperature of the water should be about two degrees lower than the room temperature.

The charge is now ready for ignition. This is done by means of two terminals provided for on the cover of the calorimeter and takes a current of about four amperes. The current being secured by placing in parallel five 16-candle power lamps on a 110 volt line. The charge is ignited after the motor has been started three or four minutes or when the temperature of the water has become constant. After the charge has been properly ignited, which can be told by the flashing of the lights, the temperature is noted carefully every minute for about ten or eleven minutes. The temperature

for the first three or four readings after ignition is only roughly estimated on account of the rapid rise but the readings after this should be very accurate. These readings must be corrected for radiation as follows; for about four minutes after the maximum temperature has been reached the average drop per minute is recorded and this represents the radiation loss. Corrections are made for fuse wire, ash, sulphur, accelerator and hydration as is shown in the data and results sheets. After the test has been completed remove thermometer, pulley and cover, then take out the cartridge. Remove the cap and place the fusion cup on its side in the bottom of a beaker and cover with hot water. After all fuse material has been dissolved take out the cartridge parts and place in position to dry. The residue is preserved in the beaker and used for the sulphur determination.

To determine the sulphur add enough water to the beaker to make about 150 c.c. and heat this for about ten minutes, cool and add pure concentrated hydrochloric acid to the neutral point. Then add about 5 c.c. in excess. The solution is now stirred so as to mix well and enough distilled water added to bring the solution up to the 250 c.c. mark, stirring well again. Now measure out 50 c.c. of the solution for analysis and add 50 c.c. of distilled water, making the final volume 100 c.c. Transfer to an erlenmeyer flask and add about 0.4 gram of Barium Oxalate Powder, close the flask, shake well for about two minutes and allow to stand for about fifteen to twenty minutes. The barium precipitates the sulphur and then the turbidity may be read in a

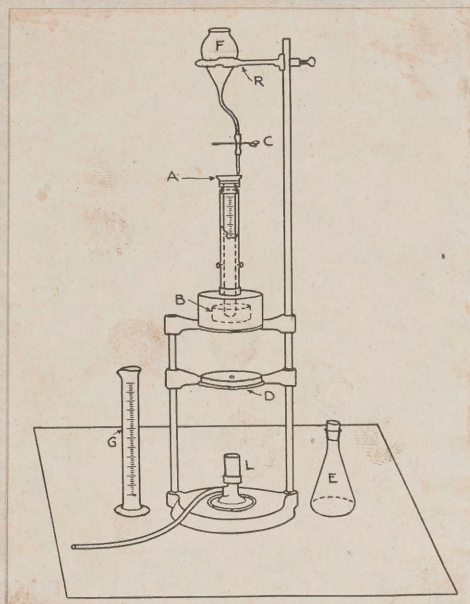


Fig. 4

Sulphur Photometer

- A--- Glass graduate for reading millimeters of sulphur.
- B--- Flat bottomed dish containing water.
- C--- Stop cock.
- D--- Peep hole.
- E--- Erlenmeyer flask.
- F--- Dropping funnel.
- G--- Glass graduate(cubic centimeters).
- L--- Chimney for gas flame.
- R--- Holder for funnel.

sulphur photometer. The method of reading the turbidity is as follows; pour the solution into the dropping flask (See Fig.4.) The gas flame at the bottom of the apparatus should be approximately one inch high. This may be obtained by letting the top of the flame be about $1/8$ of an inch above the chimney L. The solution is dropped slowly into the glass graduate G. which is inside a cast iron tube. The solution is allowed to drop into G. until the flame disappears. Then the graduate is removed and the millimeters of the solution read. The percentage of sulphur is then obtained from the chart issued by the Standard Calorimeter Co. In the case of these particular samples the sulphur percentage being very low, 100 c.c. of the solution was used and no distilled water added. This made it possible to determine the sulphur from the chart.

After the sulphur had been determined the heating value may be found by multiplying the bomb constant times the corrected rise in temperature. The constant is secured by weighing the cartridge and multiplying this weight by the specific heat of the metal. To this is added the weight of the two liters of water. Then since approximately 73 per cent of the heat in the reaction is due to the combustion of the coal the last result is multiplied by 73 and then by 2 (See data sheet) .

The sources of error are numerous. First extreme care should be taken in securing the sample. In the analysis weighing should be exact. Fluctuation in temperature may cause error in determining the heating value. All air currents should be kept from the apparatus. A check was run on the experiments and if both results were not within the limits of error the test was repeated. Some of the errors in the heating value determination are unavoidable and have been previously mentioned, and corrections made for the same.

PROXIMATE ANALYSIS

Eagan Face Sample

Ash.....	2.43%
Moisture.....	1.47%
Volatile.....	31.00%
Carbon.....	<u>.65.10%</u>
	100.00%
Sulphur.....	0.74%

Westbourne Face Sample

Ash.....	2.65%
Moisture.....	1.10%
Volatile.....	32.46%
Carbon.....	<u>.63.79%</u>
	100.00%
Sulphur.....	0.80%

Westbourne 5 inch Block.

Ash.....	2.75%
Moisture.....	1.36%
Volatile.....	33.12%
Carbon.....	<u>62.77%</u>
	100.00%
Sulphur.....	0.67%

Westbourne 5 inch Steam.

Ash.....	6.25%
Moisture.....	1.16%
Volatile.....	30.77%
Carbon.....	<u>61.72%</u>
	100.00%
Sulphur.....	0.90%

Sun Face Sample

Ash	4.10%
Moisture	1.20%
Volatile	28.00%
Carbon	<u>71.70%</u>
	100.00%
Sulphur	0.85%

Bear Wallow Face Sample

Ash.....	6.50%
Moisture	1.32%
Volatile	26.64%
Carbon	<u>65.54%</u>
	100.00%
Sulphur	0.94%

Highcliff Face Sample

Ash.....	2.34%
Moisture.....	1.00%
Volatile.....	32.88%
Carbon.....	<u>63.88%</u>
	100.00%
Sulphur.....	0.71%

HEATING VALUE

Bomb Constant

Weight of Cartridge 1427 grams

$1427 \times .094 = 134.1$ Water Equivalent of Calorimeter

Weight of Water 2000 grams

Water Equivalent..... 134.1 grams
2134.1

$73 \times 2134.1 \times 2 = 3118$ Bomb Constant.

Data & Results

Highcliff Face Sample

Analysis of Coal

Ash.....2.34%
Sulphur 0.74%

Temperature Readings

Readings		Room Temp.... 79.00	
Time	Temp.		
1	76.50		
2	76.50		
3	76.45		
4	76.45-Fired	Initial Temp.....	76.45
5	79.75	Corr.....	<u>0.00</u>
6	80.85		76.45
7	81.05		
8	81.17		
9	81.17-Max.	Final Temp.....	81.17
10	81.16	Corr.....	<u>-0.01</u>
11	81.15		81.16
12	81.13	Radiation loss from 9th	
13	81.12	to 13th min. = .0165 per	
		min. or .05 for four min. <u>0.05</u>	
		Final Temp. corrected	
		for radiation = 81.21	

Correction Factors

Fuse wire.....	005	
Ash(2.34 X .005).....	011	
Sulphur(.74 x .01).....	007	
Accelerator.....	270	
Hydration.....	070	<u>0.363</u>
Corrected Final.....		80.847
Corrected Initial.....		<u>76.45</u>
Corrected Rise.....		4.397

Constant 3118 x 4.397 = 13,700 B.t.u.

Data & Results

Highcliff Face Sample

Analysis of Coal

Ash..... 2.34%
Sulphur..... 0.74%

Temperature Readings

Time	Readings Temp.		Room Temp.... 69.70
1	66.95		
2	66.95		
3	66.95		
4	66.95-Fired	Initial Temp.....	66.95
5	71.00	Corr.....	0.00
6	71.67		<u>66.95</u>
7	71.70		
8	71.70		
9	71.70-Max.	Final Temp.....	71.70
10	71.69	Corr.....	-0.01
11	71.67		<u>71.69</u>
12	71.66	Radiation loss from	
13	71.65	9th to 13th min. = .015	
		per min. or .045	<u>.045</u>
		Final Temp. corrected	
		for radiation	= 71.735

Correction Factors

Fuse wire	005	
Ash(2.34 x .005).....	011	
Sulphur(.74 x .01).....	007	
Accelerator	270	
Hydration	070	<u>0.363</u>
Corrected Final	71.372	
Corrected Initial	66.95	
Corrected Rise	4.422	

Constant 3118 x 4.422 = 13,790 B.t.u.

Data & Results

Eagan Face Sample

Analysis of Coal

Ash 2.43%
Sulphur 0.71%

Temperature Readings

Readings		Room Temp.... 74.15	
Time	Temp.		
1	72.65		
2	72.65		
3	72.65		
4	72.65-Fired	Initial Temp.....	72.65
5	74.80	Corr.....	0.00
6	76.60		<u>72.65</u>
7	77.55		
8	77.60-Max.	Final Temp.....	77.60
9	77.60	Corr.....	-0.01
10	77.59		<u>77.59</u>
11	77.58		
12	77.57		
13	77.56		
14	77.55		
		Radiation loss from 9th to 14th min. = .01 per min. or .05 for five min.	<u>0.05</u>
		Radiation correction	<u>77.64</u>

Correction Factors

Fuse wire.....	.005	
Ash(2.43 x .005).....	.012	
Sulphur(.71 x .01).....	.007	
Accelerator.....	.270	
Hydration.....	.070	<u>0.364</u>
	Corrected Final.....	77.276
	Corrected Initial.....	<u>72.65</u>
	Corrected Rise.....	<u>4.626</u>

Constant 3118 x 4.626 = 14,400 B.t.u.

Data & Results

Eagan Face Sample

Analysis of Coal

Ash..... 2.43%
Sulphur 0.71%

Temperature Readings

Readings		Room Temp.... 77.30	
Time	Temp.		
1	74.10		
2	74.10		
3	74.10		
4	74.10-Fired	Initial Temp.....	74.10
5	77.96	Corr.....	0.00
6	78.90		<u>74.10</u>
7	79.08		
8	79.08		
9	79.08		
10	79.08-Max.	Final Temp.....	79.08
11	79.07	Corr.....	-0.01
12	79.06		<u>79.07</u>
13	79.04		
14	79.03		

Radiation loss from 10th
to 14th min. = .05 or .0165
per min. 0.05

Final Temp. Corrected
for radiation = 79.12

Correction Factors

Fuse wire.....005
Ash(2.43 x .005).....012
Sulphur(.71 x .01).....007
Accelerator.....270
Hydration.....070 0.364

Corrected Final.....78.736
Corrected Initial..... 74.10
Corrected Rise..... 4.636

Constant 3118 x 4.636 = 14,460 B.t.u.

Data & Results

Westbourne Face Sample

Analysis of Coal

Ash 2.65%
Sulphur 0.66%

Temperature Readings

Readings		Room Temp....77.30	
Time	Temp.		
1	75.55		
2	75.60		
3	75.70		
4	75.70-Fired	Initial Temp.....	75.70
5	79.30	Corr.....	0.00
6	80.25		<u>75.70</u>
7	80.55		
8	80.55		
9	80.55-Max.	Final Temp.....	80.55
10	80.54	Corr.....	-0.01
11	80.53		<u>80.54</u>
12	80.52		
13	80.51		

Radiation loss from
9th to 13th min. = .01
per min. or .04 for 4 min.. 0.04

Final Temp. corrected
for radiation = 80.58

Correction Factors

Fuse wire.....	005	
Ash(2.65 x .005).....	012	
Sulphur(.66 x .01).....	006	
Accelerator.....	270	
Hydration.....	070	<u>0.363</u>

Corrected Final.....	80.217
Corrected Initial.....	<u>75.70</u>
Corrected Rise.....	<u>4.517</u>

Constant 3118 x 4.517 = 14,100 B.t.u.

Data & Results

Westbourne Face Sample

Analysis of Coal

Ash.....2.65%
Sulphur.....0.67%

Temperature Readings

Readings

Room Temp.... 79.50

Time	Temp.		
1	77.35		
2	77.35		
3	77.35		
4	77.35	Fired	Initial Temp..... 77.35
5	81.35		Corr..... <u>0.00</u>
6	81.95		77.35
7	82.05		
8	82.22		
9	82.22	Max.	Final Temp..... 82.22
10	82.20		Corr..... <u>-0.01</u>
11	82.19		82.21
12	82.17		
13	82.16		

Radiation loss from 9th
to 13th min. = .015 per
min. or .06 for four min. 0.06

Final Temp. corrected
for radiation = 82.27

Correction Factors

Fuse wire.....	.005	
Ash(2.65 x .005).....	.012	
sulphur(.67 x .01).....	.006	
Accelerator.....	.270	
Hydration.. ..	.070	<u>0.363</u>

Corrected Final.....	81.907
Corrected Initial.....	<u>77.35</u>
Corrected Rise.....	45557

Constant 3118 x 4.557 = 13,170 B.t.u.

Data & Results

Westbourne 5" Block

Analysis of Coal

Ash..... 2.75%
Sulphur..... 0.80%

Temperature Readings

Readings			Room Temp....81.00
Time	Temp.		
1.....	78.15		
2.....	78.15		
3.....	78.15		
4.....	78.15-Fired	Initial Temp.....	78.15
5.....	80.80	Corr.....	<u>70.00</u>
6.....	82.31		78.15
7.....	82.88		
8.....	83.06-Max.	Final Temp.....	83.06
9.....	83.06	Corr.....	<u>-0.01</u>
10.....	83.05		83.05
11.....	83.04		
12.....	83.03	Radiation loss from 9th. to 13th min. = .05 or .0165 per min.	
13.....	83.01		<u>0.05</u>
Final Temp. corrected for radiation =			83.10

Correction Factors

Fuse wire.....	005	
Ash(2.75 x .005).....	013	
Sulphur(.80 x .01).....	008	
Accelerator.....	270	
Hydration.....	070	<u>0.366</u>
Corrected Final.....	82.734	
Corrected Initial.....	<u>78.15</u>	
Corrected Rise.....	4.584	

Constant 3118 x 4.584 = 14,220 B.t.u.

Data & Results

Westbourne 5" Block

Analysis of Coal

Ash..... 2.75%

Sulphur..... 0.80%

Temperature Readings

Readings		Room Temp.... 78.10	
Time	Temp.		
1	76.65		
2	76.66		
3	76.67		
4	76.67-Fired	Initial Temp.....	76.67
5	78.40	Corr.....	<u>0.00</u>
6.....	80.90		76.67
7	81.50		
8	81.55		
9	81.58-Max.	Final Temp.....	81.58
10	81.58	Corr.....	<u>-0.01</u>
11	81.57		81.57
12	81.56		
13	81.55		
		Radiation loss from 10th to 13th min. =	<u>0.03</u>
		Final Temp. corrected for radiation =	81.60

Correction Factors

Fuse wire.....	005	
Ash(2.75 x .005).....	013	
Sulphur(.80 x .01).....	008	
Accelerator.....	270	
Hydration.....	070	<u>0.366</u>
		Corrected Final.....81.234
		Corrected Initial..... <u>76.67</u>
		Corrected Rise..... 4.564

Constant 3118 x 4.564 = 14,200 B.t.u.

Data & Results

Westbourne 5th Steam

Analysis of Coal

Ash..... 6.25%
Sulphur..... 0.90%

Temperature Readings

Readings		Room Temp.... 71.35	
Time	Temp.		
1	72.85		
2	72.90		
3	72.91		
4	72.91-Fired	Initial Temp.....	72.91
5	75.80	Corr.....	<u>0.00</u>
6	76.80		72.91
7	77.20		
8	77.42-Max.	Final Temp.....	77.42
9	77.42	Corr.....	<u>-0.01</u>
10	77.41		77.41
11	77.40		
12	77.39	Radiation loss from 9th	
13	77.38	to 13th min. =	<u>0.04</u>
		Corrected.....	<u>77.45</u>

Correction Factors

Fuse wire.....	005	
Ash(6.25 x .005).....	031	
Sulphur(.90 x .01).....	009	
Accelerator.....	270	
Hydration.....	070	<u>0.385</u>
Corrected Final.....	77.065	
Corrected Initial.....	<u>72.91</u>	
Corrected Rise.....	4.155	

Constant 3118 x 4.155 = 12,950 B.t.u.

Data & Results

Westbourne 5" Steam

Analysis of Coal

Ash..... 6.25%
Sulphur..... 0.90%

Temperature Readings

Readings		Room Temp.... 80.00	
Time	Temp		
1	78.35		
2	78.35		
3	78.35		
4	78.35-Fired	Initial Temp.....	78.35
5	79.50	Corr.....	<u>0.00</u>
6	82.10		78.35
7	82.75		
8	82.88-Max.	Final Temp.....	82.88
9	82.88	Corr.....	<u>-0.01</u>
10	82.87		82.87
11	82.86		
12	82.85	Radiation loss from 9th	
13	82.83	to 13th min. =	<u>0.05</u>
		Corrected for radiation	82.92

Correction Factors

Fuse wire.....	005	
Ash(6.25 x .005).....	031	
Sulphur(.90 x .01).....	009	
Accelerator.....	270	
Hydration.....	070	<u>0.385</u>
Corrected Final.....	82.535	
Corrected Initial.....	<u>78.35</u>	
Corrected Rise.....	4.185	

Constant 3118 x 4.185 = 13,000 B.t.u.

Data & Results

Sun Face Sample

Coal Analysis

Ash 4.10%
Sulphur 0.85%

Temperature Readings

Readings		Room Temp....76.10	
Time	Temp.		
1	78.00		
2	78.00		
3	78.00		
4	78.00-Fired	Initial Temp.....	78.00
5	80.90	Corr.....	<u>0.00</u>
6	82.00		78.00
7	82.90-Max.	Final Temp.....	82.90
8	82.90	Corr.....	<u>0.01</u>
9	82.89		82.89
10	82.88	Corr. for radiation	
11	82.87	from 8th to 13th min.	<u>0.05</u>
12	82.86		82.94
13	82.85		

Correction Factors

Ash(4.10 x .005).....	020
Fuse Wire.....	005
Sulphur(.85 x .01).....	008
Accelerator.....	270
Hydration.....	070
	<u>0.373</u>

Corrected Final.....	82.567
Corrected Initial.....	<u>78.00</u>
Corrected Rise.....	4.567

Constant 3118 x 4.567 = 14,290 B.t.u.

Data & Results

Bear Wallow Face Sample

Analysis of Coal

Ash..... 5.20%
Sulphur..... 0.94%

Temperature Readings

Readings			Room Temp....82.40
Time	Temp.		
1	79.25		
2	79.25		
3	79.25		
4	79.25	-Fired	Initial Temp.....79.25
5	80.50		Corr..... <u>0.00</u>
6	82.20		79.25
7	83.15		
8	83.65		
9	83.74	-Max.	Final Temp.....83.74
10	83.74		Corr..... <u>-0.01</u>
11	83.73		
12	83.72		Corr. for radiation.....83.73
13	83.71		from 9th to 13th min..... <u>0.03</u>
			83.76

Correction Factors

Fuse Wire.....	005	
Ash(5.20 x .005).....	026	
Sulphur(.94 x .01).....	009	
Accelerator.....	270	
Hydration.....	070	<u>0.380</u>
Corrected Final.....	83.380	
Corrected Initial.....	<u>79.25</u>	
Corrected Rise.....	4.14	

Constant 3118 x 4.14 = 12,860 B.t.u.

CONCLUSIONS

The percentage of ash in the Westbourne 5" Block ran higher than in the other Westbourne samples. This is due probably to the fact that the sample came from coal being loaded from both Westbourne Mine No.1 and No.2. In mine No.2 the progress at present is through coal that has a small amount of rash. Drill holes farther ahead show this to be eliminated.

The Highcliff Sample ran low in moisture probably due to the fact that the mine is driven up . This would cause the coal to be more or less air dry.

APPENDIX

Figure 1

46C.....	Thermometer
1C	Outside Jar
14AC.....	Terminal
5C	Metal Can
20AC	Turbine Wings
11AC	Inside Metal Cylinder
32A	Terminal
2C	Cover
37C	Pulley
17AC	Cap Stem

Figure 2

8ACCap Stem
26ACWire Insulation
5ACCap
3ACIgnition Wire
24ACTerminal
23ACTerminal
27ACRubber Gasket
45CFuse Wire
1ACOutside Cartridge
2ACInside Cartridge
4ACFalse Bottom

APPROVAL

The foregoing thesis is hereby approved as a credible study of an engineering subject, carried out and presented in a manner sufficiently satisfactory to warrant its acceptance as a prerequisite to the degree for which it has been submitted. It is to be understood that by this approval the undersigned does not necessarily indorse or approve any statement made, opinions expressed, or conclusions drawn therein, but approves the thesis only for the purpose for which it is submitted.

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