

water or air. The *Bureau of Mines Report of Investigations* No. 3272<sup>a</sup> shows that the loss of seasonal efficiency is not so great as has been believed and usually is not over 6 per cent because the greater part of the heat is transmitted through the combustion chamber surfaces. The *Bureau of Standards Report* BMS 54<sup>b</sup> points out that, although the decrease in efficiency of an oil fired boiler due to soot deposits is relatively small the attendant increase in stack temperature may be considerable.

The soot accumulation clogs the flues, reduces the draft, and may prevent proper combustion.

### CONDENSATION AND CORROSION

Sulphur dioxide or trioxide formed by the combustion of fuels is the corroding element in flue gases and becomes active whenever moisture is available for the formation of sulphurous or sulphuric acid. It is therefore necessary to maintain a flue gas temperature above 175 F in all parts of appliances, and consequently it is not practicable to recover the latent heat in flue gases. Since some unpreventable condensation occurs during the warming-up period, it is important to design appliances so that all surfaces reach quickly a temperature above the dew-point of the flue gases or have corrosion resistant properties enabling them to withstand the corrosive effect.

### DUSTLESS TREATMENT OF COAL

The practice of treating the more friable coals to allay the dust they create is increasing. The coal is sprayed with various petroleum products, a solution of calcium chloride or a mixture of calcium and magnesium chlorides.

The coal is usually treated at the mine, but sometimes by the local distributor just before delivery. The salt solutions are sprayed under high pressure, using from 2 to 4 gal or from 5 to 10 lb of the salt per ton of coal, depending on its friability and size. Oil for the dustless treatment of coal is also applied under high pressure, in concentrations of 1 to 8 qt per ton of coal, depending upon the characteristics of the coal and oil.

Dustless treatments which are of such a corrosive nature that they may damage coal handling or burning equipment should not be used.

### REFERENCES

- Fuels and Their Combustion, Haslam and Russell (McGraw-Hill Co., 1926).
- Principles of Combustion in the Steam Boiler Furnace, Arthur D. Pratt (Babcock and Wilcox Co.).
- Smoke-Producing Tendencies in Coals of Various Ranks, by H. J. Rose and F. P. Lasseter (A.S.H.V.E. TRANSACTIONS, Vol. 45, 1939, p. 329).
- Fundamentals of Combustion in Small Stokers, C. A. Barnes (*Bituminous Coal Research, Inc., Technical Report* No. IV).
- Combustion Efficiencies as Related to Performance of Domestic Heating Plants, A. P. Kratz, S. Konzo, and D. W. Thomson (*Illinois Engineering Experiment Station Circular* No. 44).
- Hand-Firing of Bituminous Coal in the Home, A. P. Kratz, J. R. Fellows, and J. C. Miles (*Illinois Engineering Experiment Station Circular* No. 46).
- Classification and Selection of Illinois Coals, G. H. Cady (*Illinois State Geological Survey Bulletin* No. 62).

<sup>a</sup>Effect of Soot on Heat Transmission in Boilers (*U. S. Bureau of Mines Report of Investigation* No. 3272).

<sup>b</sup>Effect of Soot on the Rating of an Oil-Fired Heating Boiler (*National Bureau of Standards Report* BMS 54).

### Battelle Memorial Institute:

- Technical Report* XI, The Treatment of Coal with Oil and Other Petroleum Products, J. M. Pilcher and R. A. Sherman.
- Bulletin* No. 4, Dustless Treatment of Coals with Materials Other than Oil, R. A. Sherman and G. W. Land.
- Bulletin* No. 6, Questions and Answers on the Use of Fuel Oil for Dustless Treatment.
- Technical Report* VII—Application of Overfire Air Jets, R. B. Engdahl.

### Bureau of Mines Publications:

- Bulletin* No. 97, Sampling and Analyzing Flue Gases, by Henry Kreisinger and F. K. Ovitiz.
- Report of Investigations* (R. I. 2980), Coke as a Domestic Heating Fuel, by P. Nicholls and B. A. Landry.
- Technical Paper* No. 303, Value of Coke, Anthracite, and Bituminous Coal for Generating Steam in a Low-pressure Cast-Iron Boiler, by John Blizard, James Neil, and F. C. Houghten.
- Bulletin* 378, Effect of Preheat, and Distribution of Ash in Fuel Beds, by P. Nicholls.
- Bulletin* 360, Removal of Soot from Furnaces and Flues by the Use of Salts and Compounds, by P. Nicholls.
- Handbook, Questions and Answers for the Home Fireman (Revised), by J. F. Barkley.

### Anthracite Industries Laboratories Publications:

- Report 2015, Comparison of Sizes, Egg, Stove and Chestnut Anthracite.
- Report 2018, Domestic Survey.
- Report 2062, Utilization of Anthracite for Domestic Heating.
- Report 2204, The Crater Method of Firing.
- Report 2403, Anthracite Industries Manual.

### Oil and Gas Publications:

- Oil Fuels and Burners, James A. Moyer (McGraw-Hill Co., 1937).
- Handbook of Oil Burning, by Harry F. Tapp (*American Oil Burner Association*).
- Industrial Gas Series, Combustion (*American Gas Association*).
- Comfort Heating (*American Gas Association*).