Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

TAKEN FROM:

PROCEEDINGS OF THE AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS

Title: "ELECTRIC ~~ARC~~ FURNACE STEEL"

by: C.A. Faist

filter during that time. This is an outstanding record for dust-collecting equipment in this severe service.

This type of dust-collecting unit can be used for air temperatures up to 250°F. The control of the air temperature can be accomplished in several ways. Atmospheric air can be added to the air stream or water vapor can be added to the dust-laden stream, to reduce the temperature. Water vapor can be added to the air stream as long as the dew point remains well below 250°F without danger of condensation in the dust filter. An air to air heat exchanger can also be used. These are design considerations that must be considered for each individual application.

From the operating results obtained in the Los Angeles area in attempting to meet the requirements of the Los Angeles air pollution control district, it appears that the tube-type dust collector using Orlon bags and designed with proper shaking and control devices is the best solution of the problem, considering both initial cost and operating cost of the dust-collection equipment.

Acknowledgment

The author wishes to express appreciation to the Horrell Company, Mechanical Engineers, whose efforts made this paper possible.

DISCUSSION

V. E. Zang, Chairman: Thank you, Mr. Erickson. There are a few written discussions. The first is by Mr. C. A. Faist, Research Metallurgist, Burnside Steel Foundry Co., Chicago, Illinois. Mr. Faist.

Burnside Steel Foundry Practice

C. A. Faist—Mr. Erickson has shown very well the extent to which various manufacturers have gone to furnish equipment to control dust and fume exhausted to the outside air by industrial installations. He has brought out the advantages as well as the shortcomings of such control equipment.

It should be readily apparent to those responsible for industrial management and policy that the problem of controlling fume and dust emissions is real and not fancied. To establish this, one has only to look to the ever increasing number of municipalities that have adopted fume-control ordinances. Backing up the ordinances is the pressure of various community groups which are actively working for more and more stringent laws and law enforcement.

The Burnside Steel Foundry Co. has recognized the challenge to industry to do something concrete in this direction. For three years, it has been actively investigating, experimenting, and testing methods and procedures to eradicate this troublesome problem.

The source of the greatest amount of concentrated fume is of course the melting furnaces. Originally, the melting units at Burnside exhausted fume to a wet dust-collector unit. As pointed out by Mr. Erickson, our experiences with this type of collector followed closely the operational efficiency that he reported. Tests showed that the unit removed the "rocks" but had little effect on "fines" removal once the particle size passed below the 5 to 10-micron range. Maintenance was very high, owing to corrosion by the necessarily acidic condition of the sludge collected. Cost of operation was high, because of the quantity of metered city water required.

Some modifications in equipment and process were made; for instance, corrosion-resisting liners, use of wetting agents, use of gels. However, no method that increased the ultimate overall efficiency could be found.

Next a pilot-plant installation having a different working principle was tried. This used an atomizing venturi, which enabled a mist of water spray to contact the fume. The theory was to bring into intimate contact fume particles and water particles of the same size classification and under the same relative velocity. This method proved unsatisfactory also.

After some discussion, management decided to install a baghouse. This equipment was chosen instead of electrical or static precipitation because of the initial cost, since no guarantee of operational efficiency could be made by the manufacturers.

A three-compartment baghouse, having 654 bags, was installed. The unit is completely automatic, each compartment being shaken down once during each hour. At shake-down time, the compartment undergoing the operation is by-passed. During this time it remains dormant for one minute, immediately followed by a 3-minute shaking cycle. This compartment is then returned to the system. During shaking of one compartment, the remaining two compartments are in full operation. As originally set up, the baghouse was collecting fume and dust at the rate of 3 tons per six-day week. This corresponded roughly to an average dust loading in the exhaust air of 0.66 grains per cubic foot. This in turn could be said to represent 22.6 lb of dust per ton of melt. It was felt that this could be improved. The fan revolutions per minute were therefore increased from 772 to 980 and relative air rates were increased from 12,000 to 16,000 cfm. At the same time, the main duct damper was removed and the main duct outlet from the furnace hood enlarged from 24 in. to 30 in. These changes had the overall effect of increasing the dust and fume collection to 5 tons of dust per six-day week. The average dust loading from the exhaust air was thereby raised to 0.88 grains per cubic foot. This in turn could be expressed as 37.8 lb of dust per ton of melt. Lastly, the cotton bags originally installed were replaced by orlon since the cotton bags rotted after short periods of use. Like the cotton bags, the orlon bags were dusted with lime prior to initial installation, to close pores and neutralize acidity of fume.

As of the present, the collector system has not met with municipal approval. It is believed that this does not result from ineffectiveness of the baghouse but rather from the failure of the [illegible] over the furnaces. The present hood allows fume to by-pass the [illegible] duct and leave through [illegible] ventilator openings into the open air outside. It is this source of fume that [illegible] the disapproval of the city inspectors. The present city ordinance states that smoke or fume cannot be emitted [illegible] Kingelman chart rating of No. [illegible] total of 6 minutes (either [illegible] intermittently) during each [illegible]

I would like to ask Mr. [illegible] several questions:

1. What are the requirements [illegible] acceptability [illegible] Control District.

2. What [illegible] the bags?

3. [illegible] arily acceptable [illegible] illiary [illegible] purpose of temperature [illegible] nized [illegible] the amount passed [illegible] may materially [illegible] main intake possibly [illegible] more powerful fan [illegible] of partial vacuum.

[illegible] given results that are a [illegible] ribution toward dust and fume [illegible] The unit is efficient and the [illegible] is negligible. To date [illegible] one man-hour per week [illegible] been required for maintenance [illegible] collector.

V. E. Zang, Chairman—[illegible] you, Mr. [illegible] and discussion from another section of [illegible] country. The next discussion will be given [illegible] us by Mr. E. Knaggs, Plant Superintendent.