

More TECHNICAL BRIEFS

most talked-about air pollution conditions, and also one of the most thoroughly investigated.

The answer to these seemingly contradictory facts lies in a new type of pollution: the emission of apparently harmless gases which, under the influence of the abundant sunlight, gradually change into physiologically active constituents that cause discomfort and eye irritation to man, and serious damage to sensitive leafy crops. The salient determinants are meteorological and topographical—the combination of sunshine, the Pacific inversion, and the mountain chains hemming the Los Angeles Basin on three sides. Yet, there is no reason to believe that this type of air pollution cannot or does not exist in other parts of the country. It may be that the unfavorable conditions merely occur much more frequently in Los Angeles. *APCA Paper. No number.*

The Role of the Area Survey in Dust Control. By R B Engdahl, Battelle Memorial Institute.

An attempt has been made to point out that on the dust phase of air pollution the many extraneous variables intersecting at any point limit greatly the value of data taken at one point only. Simultaneous measurements at many points over an area are required to give a picture that will show the influence of the main variables of interest. The principal practical tool available for such an area survey is the simple dirt-fall station. Some modifications show promise.

Equivalent means for getting the picture on suspended dust are not available. And the rapid weight-wise dilution of ultrafine, highly visible clouds of fine dust by the larger dust particles normally raised in an inhabited area make chemical identification of the visible components of the cloud extremely difficult. An unusual example of the difficulty of identifying the origin of finely deposited dust is the problem of distinguishing between flyash and meteoric dust.

The need is great for research to improve existing means for all kinds of dust measurement and to develop entirely new and more rapid means for such measurements. *APCA Paper. No number.*

Internal Flow Problems in Mechanical Centrifugal Dust Collectors. By E H R Peag and D W Gibbs, Aerotec Corp.

It has long been recognized by those familiar with multiple-tube centrifugal collectors that factors other than the

design of the individual tubes are of paramount importance to proper operation, and, in the past, some installations have obtained efficiencies very much lower than would be obtained from independent tubes. This has been true of most designs of this general type and probably would be true of all if complete information could be assembled.

Barring any more obvious sources of trouble, the factor usually responsible for poor performance is so-called "recirculation." This refers to a secondary gas flow between tubes through the dust discharge section, and is caused by unbalance in the main flow through the tubes. The term recirculation, while not exactly descriptive of the conditions existing, has become established through usage and lack of a better term.

This flow through the dust discharge section leaves some tubes in the same direction as the dust discharge and enters others in the opposite direction. Flow in the same direction as the dust discharge is of little concern. However, flow opposite to the dust discharge upsets the normal action in the tube and inhibits or prevents the discharge of dust as well as re-entraining dust already collected by other tubes. Consequently, serious dust losses occur if the secondary flow is sufficiently large. A more commonly recognized similar condition exists if the hopper is under negative pressure and leakage into the hopper occurs.

Lengthy experiments developed a highly effective outlet shield for individual tubes. Just how these shields produce relatively high degrees of balance is based partly on conjecture. However,

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Air Pollution Control Assn., annual meeting, Hotel Baltimore, Baltimore, Md. May 24-29, 1953. Identified by initials APCA and obtainable in proceedings printed and distributed by R C Griebling, exec secy, 4400 Fifth Ave, Pittsburgh 13, Pa.

American Petroleum Institute, mid-year meeting, Hotel Commodore, New York, N. Y. May 11-13, 1953. Identified by initials API and obtainable through API, 50 W 50th St, New York, N. Y.

it is apparent that in effect they form directional vane which discharge the gas in the desired direction. This tends to streamline the flow and minimize turbulence. Also, they have an aspirational effect on the flow from front to rear. The data shows that they have reduced the differential from front to rear in the gas outlet compartment practically to zero, at the same time they have promoted balance in the dust discharge compartment.

Probably because of the reduction in outlet losses they have caused only minor change in the overall pressure drop. Another effect of the shields which is not thoroughly covered in any data yet available, is that they tend to improve top to bottom gas distribution by more properly directing the outlet flow. *APCA Paper. No number.*

Gas Distribution in Electrostatic Precipitators. By S W Randolph, Koppers Co, Inc.

Uniform distribution of the gas through the treatment zone of the precipitator is essential for good operation and removal of entrained dust. This is true not merely because of the obvious possible observation that when the foul gas passes through only part of the treatment zone, that part is overloaded and the rest is relatively idle. It is also true because of the exponential character of the performance efficiency formula that describes the phenomenon of electrostatic dust collection.

Under a given set of circumstances there is a specific velocity or rate of gas flow required to produce a desired cleaning efficiency. A host of other design factors are, of course, involved but the velocity at which the gas is passed through the precipitator is a central and important one. Thus, if design curves show that a desired cleaning result on a given gas is obtainable at a treatment zone velocity of 5 ft per sec, the area of the cross section of the precipitator is defined. If, for instance, the volume of gas to be treated is 1,500 cubic feet per second, the cross-sectional area of the precipitator treatment zone must be 300 square feet, thus creating a 5 foot per second velocity.

Poor cleaning performance in a battery of four electrostatic precipitators cleaning blast furnace gas was attributed to poor distribution of the gas into the precipitator treatment zones. The precipitators were arranged in parallel along a manifold. The manifold was fed by a single main. Field operating conditions prevented adequate direct measurement of flow characteristics.

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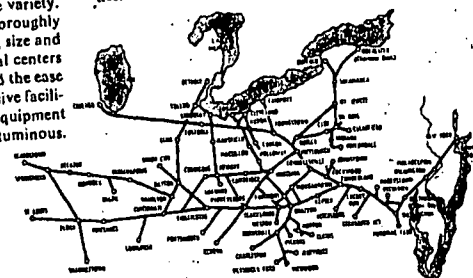
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