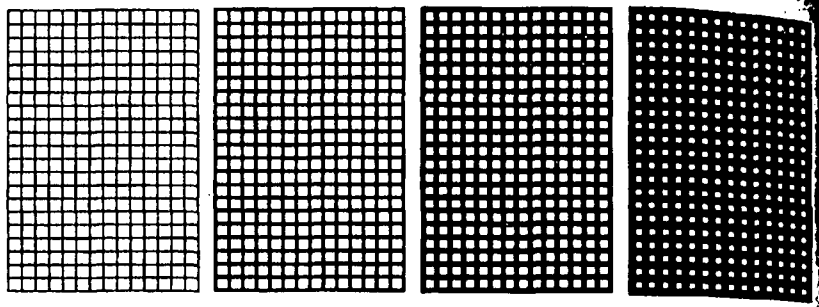
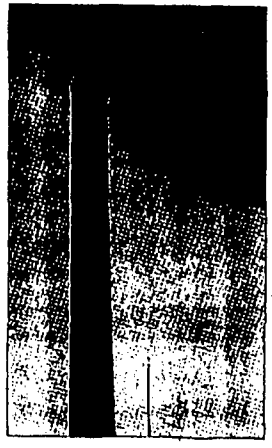
The Ringelmann Chart—widely used, and abused, basis for municipal air-pollution control ordinances



GUILTY OR NOT?



► MUNICIPAL SMOKE INSPECTORS are finding this an increasingly tough question to answer when it comes to proving, to the satisfaction of the courts, their cases against violators of anti-smoke ordinances. A key to the problem seems to be the Ringelmann Chart, a 70-year-old yardstick for smoke measurement published by the United States Bureau of Mines. Below we have two incidents in which courts have dismissed anti-smoke charges for lack of evidence based on the proper use of the Ringelmann Chart.

In a recent Chicago case, the Municipal Court convicted an industrial company of having violated the city's anti-smoke ordinance. This conviction was based on the testimony of a city smoke inspector who stated that, on two occasions, there was an emission of smoke of greater density than permitted under local ordinances based on the Ringelmann Chart.

The Appellate Court of Illinois set this decision aside on the ground that the following facts discredited the inspector's testimony: (1) defendant company had installed an electronic smoke indicator in the stack in question, and an experienced engineer had proved the device to be accurate, (2) the indicator recorded the density of the smoke on graphs on the days in question and these graphs did not show emissions of density greater than permitted by ordinance specifications.

The inspector testified that he determined the smoke to be excessively dense by referring to the Chart, but he did not state how long he'd been an inspector nor his experience in that line. Nor did he state whether he'd followed the standard Chart instructions.

The Appellate Court concluded: "The smoke abatement ordinance is necessary in a community like Chicago, and its enforcement is important. When, however, the defendant in good faith employs the most scientific means recommended by the city for detecting density of smoke to avoid violation of the ordinance, and the graphs do not show any record of No. 3 density for the days in question, it cannot then be said that plaintiff sustained the burden of proving defendant's guilt by the testimony of the one smoke inspector as to the alleged violation."

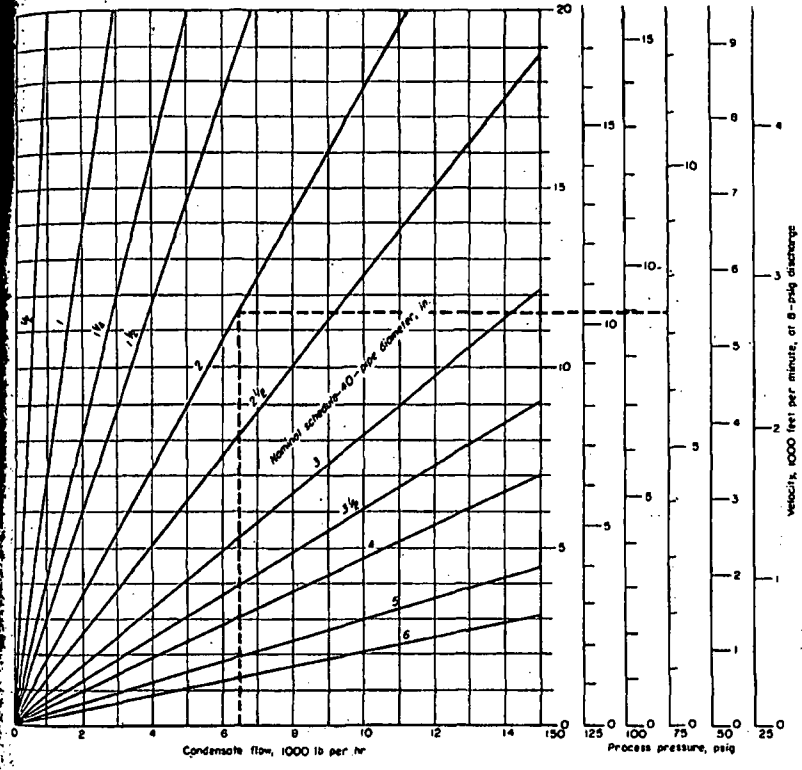
St Louis inspectors, too, are having their troubles in trying to pin down violators of city smoke ordinances. Recent charges brought against a local laundry were dismissed by a police judge. In this case, three inspectors gathered evidence by observing the defendant's stacks from May through July. Despite these efforts, the case was thrown out of court on grounds that the Ringelmann Chart had not been used in gathering evidence.

And so the dilemma continues. In spite of its admitted inadequacies, the Ringelmann Chart is used to define smoke-density limits in many ordinances because it is the only relatively simple measuring method. Quite properly in such cases, the courts refuse convictions unless the Chart is used and used correctly. But because of the inconvenience of viewing the Chart at 50 feet, inspectors often neglect to use it—or don't follow instructions to the letter.

POWER feels there are ways out of this dilemma. Watch future issues for a review of specifications defining the Ringelmann Chart and suggestions for making its principles easier to apply.

Power's DATA SHEET

No. 258



Condensate Velocity Fixes Pipe Size

► TO AVOID too great a pressure drop in trap discharge lines carrying a mixture of condensate and flash steam, the pipe must be large enough to keep velocity low. It is customary to allow maximum velocities of 1000 fpm per inch of inside pipe *diameter for dry steam. To minimize erosion* with flash steam carrying a high proportion of water, the velocity should be lower than this. The above chart may be used for process pressures ranging from 25 to 150 psig, discharging to an exhaust pressure of 8 psig through a Schedule-40 pipe.

Example: A process kettle discharges 6470 lb per hr of condensate at 75 psig through a trap to an 8-psig exhaust line. What will the velocity be? Find the flow of 6470 lb per hr on the lower left scale and follow trace vertically to intersect with the 2-in.-pipe curve. Follow trace to right to read velocity of 7400 fpm on the 75-psig scale. This indicates that pipeline is too small since velocity should be less than 2 × 1000 or 2000 fpm. Three-inch line gives velocity of 3300 fpm. Still too high. So use 3½-in. pipe. If larger pipe size can't be used, a pump or condensate cooler must be installed to maintain discharge-line capacity, or flow will be reduced.

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