

NASHVILLE TESTING EXPERIENCE

by

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Three fundamental types of air pollution control devices have been or are in the process of being tested in Nashville on the emission from two 327 metric tons (360 U.S. tons) per day waterwall incinerators which were started up in mid-1974. Initially, low energy scrubbers were installed because of budget limitations. They were upgraded to the limit of existing fan capability. During this period, other types of wet collectors were being experimentally evaluated in pilot tests. These included a high-pressure spray type scrubber and a high-temperature water flashing nozzle. Eventually, a decision was made to install an electrostatic precipitator on one incinerator, while testing bag filters for possible installation on the second incinerator. The initial testing program did not generate sufficient information to justify a baghouse by the time an order had to be placed under the compliance schedule; therefore, a second precipitator was ordered. However, the baghouse showed sufficient promise in controlling incinerator emissions that tests are continuing under an EPA grant. Precipitator installation is proceeding with the first unit scheduled to be on stream this fall and the second unit in 1977.

What has been learned from experience with the three types of equipment at Nashville?

The experience with scrubbers has been both frustrating and expensive. The original low-energy scrubbers were ineffective in collecting fine particulate. Stack sampling indicated that 90 percent of the particulate escaping the scrubber had an average diameter less than six microns. Modifications to the original scrubbers increased the pressure drop and the collection efficiency but not sufficiently to bring the units into compliance.

Pilot tests of the other two wet collection devices mentioned earlier indicated possible compliance. However, excessive steam usage and stringent recycle water cleanup requirements were factors which caused their rejection in favor of precipitators.

Electrostatic precipitators were selected because of proven performance in collecting fine particulate and because they are less subject to corrosion problems. Metal wastage in the original scrubbers downstream of the wet interface has been a nightmare despite pH control with slack lime in the recirculated water. The three-field, rigid electrode precipitators selected are expected to bring the stack emissions into compliance with the local and federal code of 0.184 g/m^3 (0.08 gr/dscf) at

12 percent CO₂.

The pilot-baghouse program has been conducted in two phases. In the initial baghouse program, five fabrics of glass, stainless steel, and synthetic fibers were exposed in two baghouses, a pulse type and a back-flow type. Meaningful stack sampling was not conducted, although visible emissions appeared to be well controlled. The five fabrics held up for the test period of approximately three months. Burst tests and other analyses of one of the fabrics (an aramid felt) indicated a projected total life expectancy of only five to six months which is not surprising because the fiber is not acid resistant. Hopefully, other fabrics will come closer to a two to three-year life expectancy which appears to be a reasonable goal.

The second phase EPA sponsored program is just getting under way. A 1.416 m³/sec (3,000 cfm) slip stream from the heat recovery incinerator is still being used as the gas source. The temperature of the gas collected just downstream of the economizer and dust collector is approximately 478 K (400 F).

Objectives of the current testing program are: (1) screening of three and possibly four types of high temperature, acid resistant filter media, (2) determine efficiency and optimum air to cloth ratios for the various filter media, (3) make technical-economic comparison of a baghouse using these media versus other particulate control methods such as precipitators and wet scrubbers, and (4) recommend prime filter media candidate for follow-up life expectancy program

The bags to be tested are in various stages of commercial development. They include a microporous "Teflon-type" laminate, a woven glass fiber coated with Teflon, and a coated glass felt. The three high temperature and acid resistant materials to be tested are fabricated in 12.7 cm (5 in.) diameter by 2.4 m (8 ft.) long bags. The 0.101 square meter (1.09 square foot) bags are all projected to sell for less than \$50 each.

Emission tests are expected to get under way shortly, but it may be quite some time before firm conclusions can be drawn from the bag testing program. This is because of the difficulty in projecting life expectancy of the exotic new fabrics and coatings which are required to withstand the high temperature, corrosive gases from an incinerator.

In summary, Nashville is firmly committed to electrostatic precipitators as the best currently available system to control particulate emissions from incinerators. However, efforts will continue here to foster the development of more efficient and more economical emission control systems.