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Project Summary

Fabric Filter System Study: Fourth Annual Report

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The fourth year of study on the fabric filter system at Harrington Station ended October 1, 1981. Project work during the fourth year concentrated on fabric studies. Maintenance and operation observations continued, and the resolution of these types of problems became more efficient because of increased experience of maintenance personnel with baghouse-related problems.

This Project Summary was developed by EPA's Industrial Environmental Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

The fourth year of work on the fabric filter system study being conducted by Southwesten Public Service Company (SPS) for the U.S. Environmental Protection Agency (EPA) ended October 1, 1981. The objective of this project is to make a comprehensive study of a fabric filter system used for particulate collection on an electrical generating unit that utilizes low-sulfur Western coal.

SPS is an electric utility headquartered in Amarillo, Texas. The company has a generating capacity of 3,773,000 kW and serves customers in Texas, Oklahoma, New Mexico, and a small area of Kansas. Harrington Station, where the study is being performed, is SPS's first coal-fired plant. A second coal-fired plant is now on line in Lamb County, Texas.

Project work during the fourth year of study concentrated on fabric studies. Maintenance and operation observations continued, and the resolution of these types of problems became more efficient because of increased experience of maintenance personnel with baghouse-related problems.

Fabric wear patterns were studied closely during the fourth year. Certain test fabrics were installed for an in-depth analysis. Inspections were made on a regular basis, and records of fabric failures were maintained. For in-depth analysis, bag samples were periodically sent to an outside consulting firm for specialized tests. This fabric experience will be of value to other utilities selecting cloth for ash types similar to Harrington Station's.

Summary of Project Activities

1. Studies indicate that, within limits, the same cleaning can be obtained by varying shaker speed and amplitude in opposite directions according to

$$a = f^2A$$

where a is the fabric acceleration, f is the shaking frequency, and A is the amplitude of shake. From observations of the shaking motion and laboratory analysis of failed fabric, it is apparent that the amplitude of shake is the more detrimental to baglife. These results indicate that shaking amplitudes smaller than 1.5 in. would increase fabric life.

The level of deflation has been found to be surprisingly important. At the extremes, too much deflation collapses the bags and causes poor cleaning and fabric damage; with too little deflation, the fabric does not clean sufficiently, resulting in

high pressure drop. Proper control would be easier to maintain by controlling deflation gas flow rather than pressure drop.

2. Fabric choice plays a central role in determining both pressure drop and baglife. Fabrics which clean better have to be cleaned less frequently and therefore last longer. More protective coatings and more adequate constructions are capable of sustaining the effects of cleaning longer. The data collected at Harrington Station have not been sufficient to determine the optimum fabric for a specific application; however, the 10-oz/yd² fabrics of the 150 1/2 warp, 150 2/2T fill construction have demonstrated their superiority over the most common 14-oz/yd² constructions, regardless of coating.

   Over the lifetime of the fabric, no appreciable difference has been discerned between acid-resistant coated fabrics and Teflon-coated fabrics on either the 10- or 14-oz/yd² fabrics in terms of pressure drop performance. Fabric life at Harrington, however, has been appreciably better with Teflon-coated 10 oz materials.

   Experience with synthetic fabrics has been limited to two styles of 5.5-oz/yd² Nomex materials. One of the fabrics, a 3x2 twill Allspun fabric, has shown remarkably higher flow and lower pressure drop compared with the glass fabrics. The other fabric, a 3x1 twill combination material, has performed at the same level of pressure drop and flow as the glass fabrics.

   Future work in optimizing cleaning and fabric life will concentrate on reducing shake time and the evaluation of certain commonly available fabric constructions.

3. The procedures adopted at Harrington have proven to be successful with no problems having been credited to improper start-up or shutdown procedures since the unit came on line in 1978. For application to other units the procedures used at Harrington may require modification due to higher sulfur contents in certain coals, lower operating temperatures, and lack of alkalinity in the fly ash. To overcome some of the problems associated with higher sulfur operation longer warm-up periods may need to be employed during start-up and a longer flue gas purge during the shutdown.

4. Good maintenance and inspection procedures are necessary to maintain an awareness of the current state of operation, to detect developing problems, and to perceive the opportunities for improving operation. Good recordkeeping has proved beneficial in resolving recurring problems and in judging baghouse performance from an historical perspective.

Conversion Factors

To convert the units in this summary to metric equivalents, please use the following:

Non-Metric	Multiplied by	Yields Metric
in.	2.54	cm
oz	28.35	g
oz/yd²	33.89	g/m²

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***Dale L. Harmon** is the EPA Project Officer (see below).*
The complete report, entitled "Fabric Filter System Study: Fourth Annual Report," (Order No. PB 84-229 749; Cost: $10.00, subject to change) will be available only from:
- *National Technical Information Service*
  5285 Port Royal Road
  Springfield, VA 22161
  Telephone: 703-487-4650

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