



Project Summary

Fabric Filter System Study: Third Annual Report

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The report gives results of the third year of work (ending October 1, 1980) on the fabric filter study being conducted by Southwestern Public Service Company for the USEPA. Results of the special emissions testing program demonstrated that emissions were less than the applicable 1971 EPA standard of 0.1 lb/10⁶ Btu* in all of the particulate emission tests. Fabric studies to date show that several fabrics have a potential 3-year baglife. The operation and maintenance cost reported for the third year of study is \$434,800, or \$1.21/yr/kW. Data analysis continued through the third year. Information on boiler O₂ levels, air-to-cloth ratio, temperature, system pressure drop, and boiler load is being continuously logged.

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 third year of work on the fabric filter system study being conducted by Southwestern Public Service (SPS) for the USEPA ended October 1, 1980. The overall 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, an electric utility headquartered in Amarillo, Texas, has a generating

capability of 3162 MW and serves customers in Texas, Oklahoma, New Mexico, and a small portion of Kansas. Harrington Station, where the study is being performed, is SPS's first coal-fired plant. Located 8 miles northeast of Amarillo, Harrington began operating in July 1976. Three units are now on line, and construction is underway on SPS's second coal-fired plant, Tolk Station. Tolk Station will also be equipped with fabric filters.

Project activities during the third year of the study included completion of the special testing phase, analysis of fabric testing results, observation of operation and maintenance parameters, and continued data collection. The first and second annual reports describe the objectives and background of these project activities.

The fabric filter system for Harrington Unit 2 is a Wheelabrator-Frye, Inc., structural baghouse with deflate and shake cleaning. It first went on line in June 1978. The baghouse consists of 28 compartments with 204 bags per compartment for a total of 5,712 bags; each bag is 11.5 in. in diameter and 30 ft, 8.75 in. long at 60 lb tension. The baghouse, specified to operate at 1,650,000 acfm of flue gas at 313°F, yielded an air-to-cloth ratio of 3.15 to 1 (gross) or 3.4 to 1 (net).

Summary of Project Activities

1. Special testing of emissions was performed four times during the reporting period. Three of the emissions tests were done by SPS, and the fourth was performed jointly by SPS and GCA. Particulate sizing at the inlets and stack was attempted during the SPS/GCA test.

Particulate emissions from the Unit 2 fabric filter system were less

*Non-metric units are used here for the reader's convenience. Those more familiar with metric units are asked to use the conversion factors at the end of this summary.

than the applicable standard of 0.1 lb/10⁶ Btu in all five of the particulate emissions tests done to date. Results (see Figure 1) show that the average of each of the test series is below both the 0.1 lb/10⁶ Btu standard and the new 0.03 lb/10⁶ Btu standard.

Results of the special testing program also showed that the stack emissions of SO₂ agreed very well with theoretically calculated emission levels based on fuel sulfur content. The consistency between the measured and theoretically derived numbers also indicates that EPA Method 6 is a reliable and accurate measurement technique for SO₂ determination. The emissions measured were in the range of 0.78-1.01 lb SO₂/10⁶ Btu, demonstrating that the existing EPA standard of 1.2 lb SO₂/10⁶ Btu can be met by burning coal with a sulfur content lower than 0.5 percent.

2. In the summer of 1978 the Harrington Unit 2 fabric filter system was rebagged with a variety of fabrics to allow a study of baglife and fabric wear. Results of this program have shown that several of the fabrics

have a potential 3-year baglife. The study also demonstrated that a Teflon-coated 10-oz fabric outlasted a heavier 14-oz acid-resistant fabric. Studying the shaking motion of these fabrics during cleaning revealed that the stiffness of the 10-oz fabric and the extra lubrication offered by the Teflon coating contribute to its longer baglife.

3. Operation and maintenance problems occurred during the third year of the study in four main areas: shaker tube bearings; sagging shaker tube supports; damper drive failure; and fabric failure.

The first two items are a result of inherent design and, once corrected, should not continue to be a source of maintenance effort. The third item, damper drive failures, has been in large part due to machining and lubrication problems. The dampers and drive mechanisms have been damaged at times due to overdriving the mechanism after a limit switch has failed.

The fourth item involved only a few compartments containing a 14-oz silicone/graphite-coated fabric that failed prematurely. This experi-

ence, plus an analysis of the reaction of various fabrics to the shaking motion and interpretation of fabric testing data, indicates that the 14-oz silicone/graphite-coated fabric is not suitable for either Harrington baghouse.

4. The operation and maintenance cost reported for the third year of study is \$434,800, or \$1.21/yr/kW. This figure is somewhat higher than the expected average because it includes redesign and modifications that will not have to be repeated annually.
5. Data analysis continued through the third year of study. Information on boiler O₂ levels, air-to-cloth ratio, temperature, system pressure drop, and boiler load is being continuously logged at Harrington. Analyses have shown that these variables are highly correlated and that modeling attempts will require sophisticated statistical methods.

Conversion Factors

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

Non-Metric	Multiplied by	Yields Metric
Btu	9.48×10^{-4}	J
°F	$5/9(°F-32)$	°C
ft	0.30	m
ft ³	28.32	l
in.	2.54	cm
lb	0.45	kg
oz	28.35	g

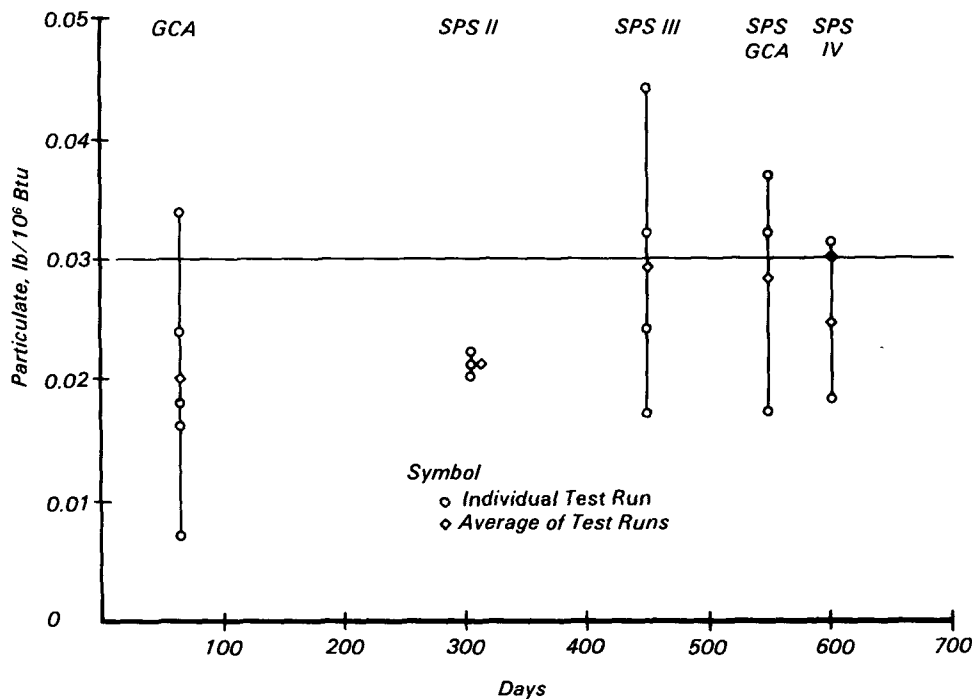


Figure 1. Summary of particulate testing.

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Dale L. Harmon is the EPA Project Officer (see below).

The complete report, entitled "Fabric Filter System Study: Third Annual Report," (Order No. PB 84-141 563; Cost: \$10.00, subject to change) will be available only from:

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