



Project Summary

Proceedings: First Combined FGD and Dry SO₂ Control Symposium

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The proceedings document presentations at the First Combined FGD and Dry SO₂ Control Symposium, in St. Louis, MO, October 25 - 28, 1988. The objective of the symposium was the exchange of technical and regulatory information on sulfur oxide control technology, including wet and dry scrubbers, emerging processes, and international developments in clean coal/acid rain technologies. Topics covered during the symposium included: retrofit economics, spray dryer technology, furnace sorbent injection topics (demonstration results, byproducts utilization, enhancements), wet FGD operation, municipal solid waste facilities, and post-combustion dry technologies. Also included were concurrent sessions on special topics of interest, including dry FGD, new technologies, and FGD improvement. The proceedings, published in three volumes, include 85 papers and 4 unrepresented papers.

This Project Summary was developed by EPA's Air and Energy Engineering Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented three separate volumes of the same title (see Project Report ordering information back).

Introduction

The first Combined FGD and Dry SO₂ Control Symposium was conducted to exchange technical and regulatory information on sulfur oxide control technology including wet, dry, and semi-dry scrubbers, emerging technologies, and clean

coal/acid rain retrofit technologies. Topics covered included:

- Retrofit Economics
- Spray Dryer Technology
- Furnace Sorbent Injection
- Wet Flue Gas Desulfurization (FGD) Technology
- Municipal Incineration Flue Gas Cleanup
- Post-combustion Dry FGD Technology

In addition, concurrent sessions on specialized FGD topics were held for dry FGD research, new FGD technologies, and FGD process improvement. A total of 85 papers, including 25 foreign, were presented. The proceedings include these as well as four unrepresented papers and a list of attendees.

Session 1

Session 1, International Overview, compared the status of FGD technologies worldwide, and included four European reports. A paper on U.S. FGD research and development status focused on the Clean Coal Program of the Federal and State governments. Details of the recently awarded Clean Coal II projects were presented along with Illinois, Ohio, and Argonne National Laboratory programs. Two papers dealt with progress in European SO₂ and NO_x control with deserved emphasis on recent developments in West Germany. Papers outlining status and future plans for FGD installations in the United Kingdom and the Netherlands were also presented in Session 1. The last paper in Session 1 covered SO₂ and NO_x control technology in Japan and other Far Eastern countries.

Session 2

Session 2 focused on the economic aspects of retrofit SO_2 control technologies. One paper discussed actual retrofit FGD systems and compared economics and performance to that predicted by modelling. A second paper compared six candidate processes for injecting sorbent into post-combustion and combustion zones as applied to a specific site. The third paper summarized the retrofit difficulties of FGD and sorbent injection technology based on case studies at 60 Eastern and Midwestern U.S. power plants firing medium- to high-sulfur coal.

Session 3

Session 3 was devoted to spray dryer technology, with three papers covering commercial-scale experience and two addressing spray drying on a pilot plant basis. A paper by the Tennessee Valley Authority evaluated spray drying on a 10 MWe slipstream facility and concluded that better than 70% SO_2 removal is feasible on high sulfur coal using a spray dryer/ESP combination. Papers were presented by two vendors covering U.S. and foreign spray dryer installations, all showing that guarantees of SO_2 removal and system performance were routinely being achieved worldwide. Another paper also showed that performance of lime-based spray dryers could be enhanced by adding ammonia.

Sessions 4/5

Parallel Sessions 4 and 5 were devoted to furnace sorbent injection and conventional wet FGD, respectively. Session 4A included eight papers on commercial in-furnace SO_2 control, including three U.S. facilities, and units in Finland, Canada, West Germany, Austria, and France. Session 4B included four papers on FGD waste management and four papers on combined SO_2/NO_x control.

Session 5A focused on the consequences of furnace sorbent injection, as papers were presented covering sorbent feed systems, impacts on dust collection, and humidification effects. Other papers detailed diverse topics such as oil-fired boiler injection of sorbent, reactivation and recycle of spent sorbent, and labo-

ratory evaluation of lime and surface-modified lime sorbents. Session 5B covered a range of wet FGD studies. Included were papers on the EPRI high sulfur test center and a TVA program limestone dissolution, droplet size analysis, performance of downstream particulate emissions controls, and two papers outlining troubleshooting of mist elimination/stack opacity problems.

Session 5B continued with eight additional papers on commercial wet FGD systems; four U.S. systems and four foreign FGD systems were included.

Session 6

Session 6 encompassed four discussions of flue gas scrubbing on U.S. municipal waste-fired boilers (MSWs). While much discussion included HCl and SO_2 control, papers included discussion of other types of pollutants being controlled; i.e., volatile organics and heavy metals. It was evident from the papers that scrubbing of MSW flue gas has become a rapid growth area for both vendor and research organizations.

Session 7

Session 7 encompassed 18 papers given in three parallel sessions, with each session designed to focus on specialty areas of FGD research. Session 7A included papers on fundamentals of SO_2 capture on dry sorbent particles under furnace conditions, sorbent recycle studies, and x-ray methods for determining sorbent reactivities. New technologies were the focus of Session 7B. Topics included a circulating fluid-bed absorber for SO_2 , a limestone fixed-bed absorber, a sodium phosphate regenerable SO_2 scrubber, a simultaneous SO_2/NO_x scrubber using sodium compounds, and two papers on sorbents prepared by reacting lime with waste fly ash to produce calcium silicates. FGD improvement was addressed in Session 7C, with papers addressing on-line corrosion monitoring, fluorelastomeric coatings for erosion/corrosion control, FGD cost modelling, performance evaluation of FGD linings, chemical additives for spray-dryer systems, and a video tape on FGD chemistry.

Session 8

Session 8 was devoted mainly to post-combustion dry technologies which are being studied as low-capital cost solutions for acid rain control. Seven of the eight papers dealt with new processes for SO_2 removal, while one paper detailed additive NO_2 reduction with dry sodium injection. The DOE research program for in-duct scrubbing technologies were discussed in one paper. Two papers covered EPRI research areas including injection of sorbent at 540°C and sorbent injection humidification evaluation (HYPAS). Two EPA research areas were detailed: one (E-SO_x) converts an electrostatic precipitator (ESP) stage into a compact spray dryer; and the other (ADVACATE) uses fly ash/lime sorbents to achieve high SO_2 removal in-duct. Two papers were devoted to new foreign technologies: one is a Japanese process using a calcium silicate material in fluid beds; and the other is a circulating fluid bed using lime sorbent developed by Lurgi of West Germany.

Unpresented Papers

The proceedings also include four papers not presented at the symposium. These include papers on a multiple moving bed-limestone dry scrubber, SO_2 capture in a coal-fueled gas turbine, combined SO_2/NO_x removal in spray dryer FGD, and an FGD system cost comparison.

The proceedings include a list of approximately 650 attendees representing government, private industry, academia, and scores of foreign representatives.

In summary, the proceedings outline the current status of FGD commercial activities, research, and FGD-related regulations in all nations currently using, or about to use, FGD technology. Acid rain retrofits and municipal waste applications are given considerable discussion, with emphasis on performance and economics. Practically every FGD topic is addressed in this forum in the context of worldwide demand and regulatory climate prevailing in the late 1980s.

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The complete report consists of three volumes, entitled "Proceedings: First Combined FGD and Dry SO₂ Control Symposium.," (3 volume set: Order No. PB 89-172 142/AS; Cost: \$127.50)

"Volume 1, Sessions 1, 2, 3, and 4," (Order No. PB 89-172 159/AS; Cost: \$49.95)

"Volume 2. Sessions 5 and 6," (Order No. PB 89-172 167/AS; Cost: \$49.95)

"Volume 3. Sessions 7 and 8," (Order No. PB 89-172 175/AS; Cost: \$49.95)

The above reports will be available only from: (Costs subject to change)

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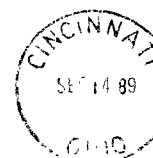
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