CONTROL OF SULFUR OXIDE EMISSIONS FROM ELECTRIC-POWER-GENERATING PLANTS

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More than two-thirds of the 33,400,000 tons of sulfur oxides emitted to the atmosphere of the United States in 1969 came from fuel combustion in stationary sources. More than half of this total, 17,700,000 tons, was emitted from steam-electric power-generating plants - 15,824,000 tons from coal and 1,919,000 tons from fuel oil.

Because fuel combustion is the principal source of sulfur oxide emissions, attention has been focused in recent years on reduction of sulfur in fuels and on equipment and processes that will control emissions from this source, with emphasis on developing emission control technology for power plants.

In the December 23, 1971, issue of the Federal Register the Environmental Protection Agency published "Standards of Performance for New Stationary Sources." Fossil-fuel-fired steam generators are included as a category in this standard. The standards for sulfur dioxide for large new power plants are 0.80 and 1.2 pounds of SO_2 emitted per million Btu of heat input for liquid and solid fossil fuel, respectively. Roughly applied, the standard means that about 75 percent of the sulfur must be removed from either the fuel or the combustion gases in a power plant burning 3 percent sulfur fuel.

Two utility companies developed and constructed sulfur control systems on full-scale boilers several years before the Federal emission standards were adopted, and numerous others are following their lead. As shown in Table 1, some 20 power plants either have a full-scale sulfur dioxide

removal system or have contracted to put one on stream within the next several years. The total of these contracts is estimated to be $200 million, $140 million of which has been or will be spent for retrofit equipment on existing power plants.

Although most of the contracts are for sulfur dioxide removal systems that employ limestone or lime, other types of systems are also being installed. In addition to the calcium-based scrubbing systems, three other SO_2 abatement systems are being installed on four different power plants. Two of the processes employ scrubbing, one with a sodium-based system and the other with a magnesium oxide reactant. The third system employs catalytic oxidation.

Among the firms that have contracts for full-scale flue-gas desulfurization systems are: Babcock and Wilcox, Chemico, Combustion Engineering, Combustion Equipment Association, Monsanto, Peabody Engineering, Research Cottrell, and Zurn. Most of the control systems being installed are designed for 70 to 90 percent sulfur dioxide removal, and most of them accomplish high-efficiency particulate removal as well.

Table 1. SULFUR DIOXIDE REMOVAL SYSTEMS AT STEAM-ELECTRIC PLANTS IN UNITED STATES

Utility company/plant	Unit size, megawatts	Scheduled startup	Fuel
Limestone scrubbing			
1. Union Electric Co. (St. Louis)/ Meramec No. 2	140	September 1968	3.0% S coal
2. Union Electric Co. (St. Louis)/ Meramec No. 1	125	Spring 1973	3.0% S coal
3. Kansas Power & Light/ Lawrence Station No. 4	125	December 1968	3.5% S coal
4. Kansas Power & Light/ Lawrence Station No. 5	430	November 1971	3.5% S coal
5. Kansas City Power & Light/ Hawthorne Station No. 3	130	Mid-1972	3.5% S coal
6. Kansas City Power & Light/ Hawthorne Station No. 4	140	Mid-1972	3.5% S coal
7. Kansas City Power & Light/ La Cygne Station	820	Late 1972	5.2% S coal
8. Detroit Edison Co./St. Clair Station No. 3	180	November 1972	2.5-4.5% S coal
9. Detroit Edison Co./River Rouge Station No. 1	270	December 1972	3-4% S coal
10. Commonwealth Edison (Chicago area)/ Will County Station No. 1	175	February 1972	3.5% S coal
11. Northern States Power Co. (Minnesota) Surban County Stations No. 1 and 2	680 680	May 1976 (first unit)	0.8% S coal
12. Arizona Public Service Co./ Cholla Station	115	January 1973	0.4-1% S coal
13. Tennessee Valley Authority/ Widow's Creek Station No. 8	550	April 1975	3.7% S coal
14. Duquesne Light Co. (Pittsburgh)/ Philips Station	100	February 1973	2.3% S coal
15. Louisville Gas & Electric Co./ Paddy's Run Station No. 6	70	Mid-Late 1972	3.0% S coal
16. City of Key West/Stock Island[a]	37	June 1972	2.75% S fuel oil
Sodium-based scrubbing			
17. Nevada Power Co./Reid Gardner Station	250	Mid-1973	1.0% S coal
Magnesium oxide scrubbing			
18. Boston Edison/Mystic Station No. 6[a]	150	March 1972	2.5% S fuel oil
19. Potomac Electric & Power (Maryland)/ Dickerson No. 3	195	Early 1974	3.0% S coal
Catalytic oxidation			
20. Illinois Power/Wood River[a]	100	June 1972	3.5% S coal

[a]Partial funding by the Environmental Protection Agency.